iSMACONTROLLI

iSMA-B-AAC20

User Manual

M-Bus

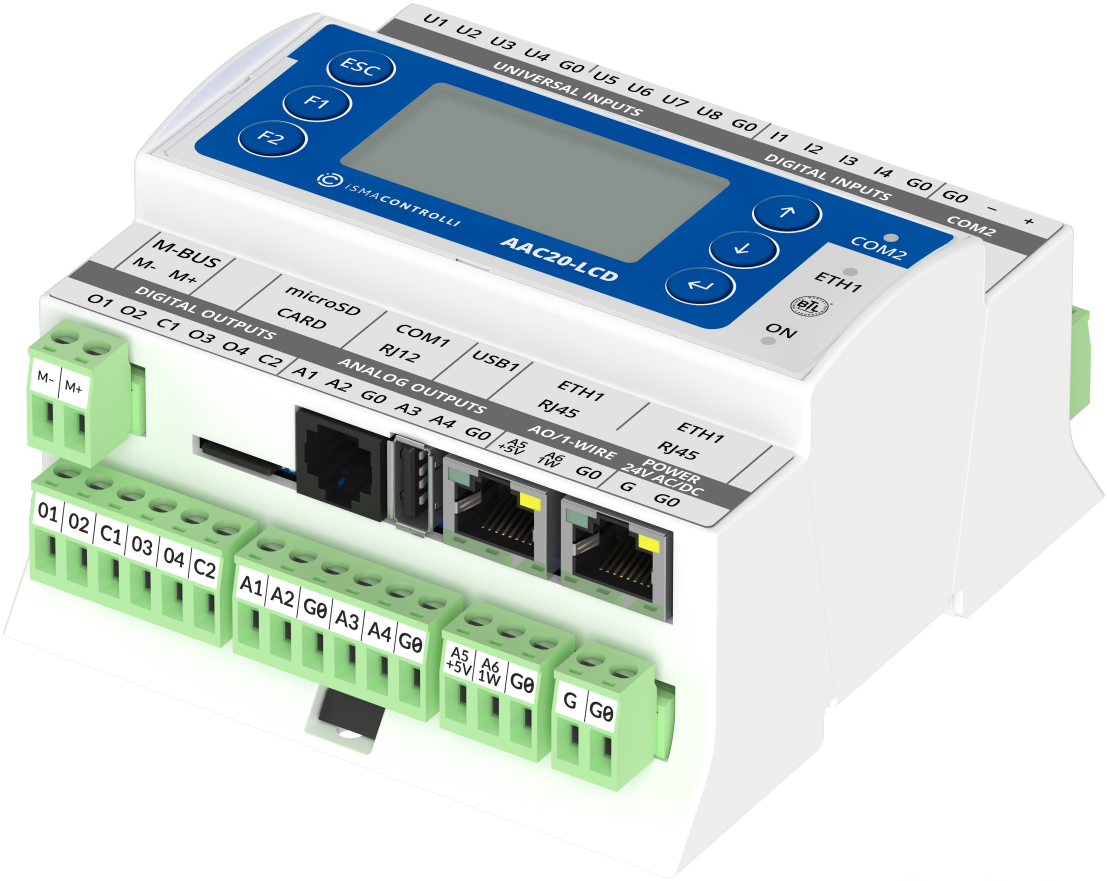

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Table of Contents

1 Introduction

This manual contains information about an M-Bus protocol in the iSMA-B-AAC20 controllers. M-Bus devices can be connected directly only to the iSMA-B-AAC20-M hardware version with the M-Bus interface (max. 20 devices) and with firmware version 5.1 and above. The M-Bus devices can also be connected to all iSMA-B-AAC20 controllers with firmware 5.1 and above using M-Bus-IP gateway.

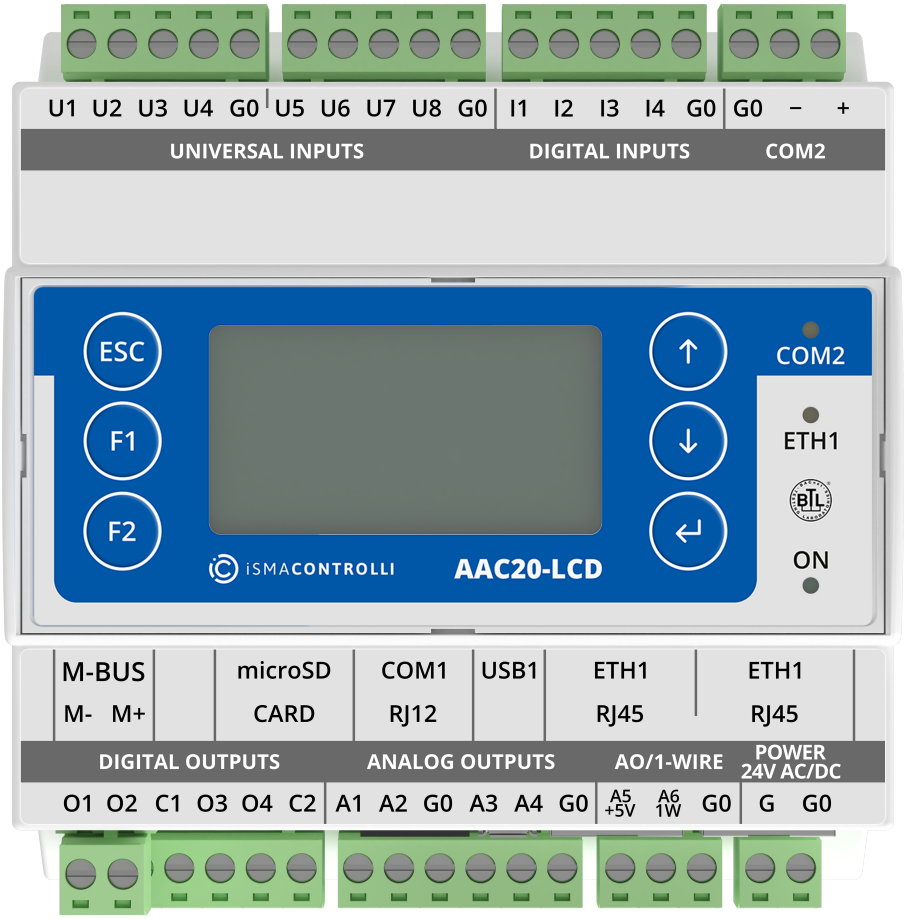

Figure 1. AAC20-LCD controller

1.1 Revision History

Rev.	Date	Description
1.4	19 Jun 2024	Replaced environment of programming from iSMA Tool to iC Tool
1.3	28 Feb 2022	Rebranded
1.2	27 Jan 2020	Replaced environment of programming from Workplace to iSMA Tool
1.1	20 Apr 2017	Added action "Reset Stat" in the network components
1.0	22 Nov 2016	First edition

Table 1. Revision history

2 About M-Bus

The M-Bus (Meter Bus) was developed to fill the need for a system for the networking and remote reading of utility meters, for example, to measure the consumption of gas or water in the house. This bus fulfills the special requirements of remotely powered or battery-driven systems, including consumer utility meters. When interrogated, the meters deliver the data they have collected to a common master, for example, a DDC controller or a hand-held computer, connected at periodic intervals to read all utility meters of a building.

2.1 M-Bus Topology and Cable

The M-Bus is a hierarchical system, with communication controlled by a master (for example the iSMA-B-AAC20-M). The M-Bus consists of the master, a number of slaves (end-equipment meters), and a two-wire connecting cable. The slaves are connected in parallel to the transmission medium - the connecting cable.

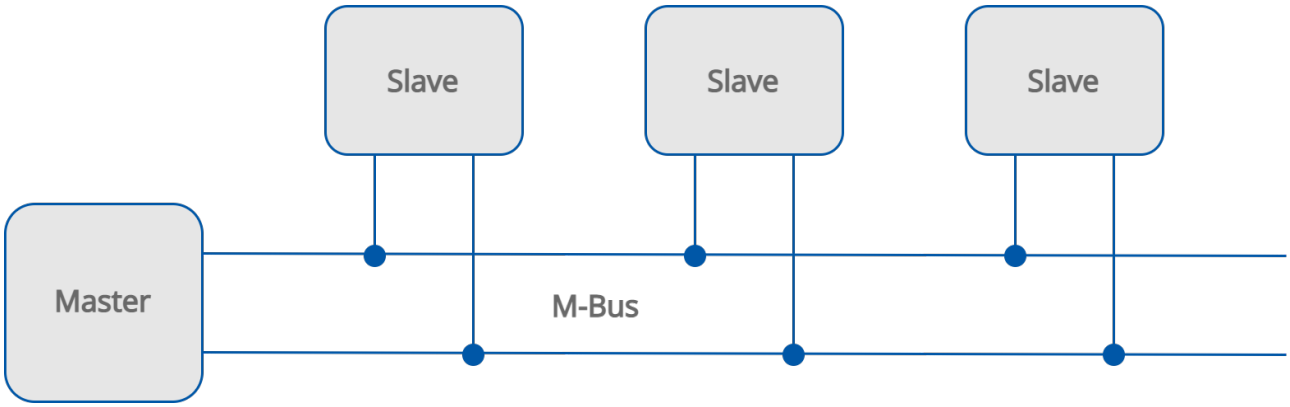

Figure 2. The M-Bus network

A two-wire cable (jYStY N*2*0.8 mm) is used as the transmission medium for the M-Bus. The maximum distance between the slave and the repeater is 350 m; this length corresponds to a cable resistance of up to 29 Ω. This distance applies for the standard configuration having a baud rate between 300 and 9600 baud rate, and a maximum of 250 slaves. The maximum distance can be increased by limiting the baud rate and using fewer slaves, but the bus voltage in the Space state must at no point in a segment fall below 12 V, because of the remote powering of the slaves. In the standard configuration, the total cable length should not exceed 1000 m, in order to meet the requirement of a maximum cable capacitance of 180 nF.

2.2 M-Bus Addressing

The M-Bus devices are using two types of addressing:

- primary: this address is assigned by the user in a commissioning process (all new M-Bus devices have this address, set by the factory to 0); this type of address has a limited range from 0 to 250;
- secondary: this address has a wider range than primary and by default contains a device serial number. All out of box devices connected to the bus have unique secondary addresses.

3 Installation of iSMA M-Bus Kit

To install the M-Bus kit, import the kit to the iSMA Tool software (possibly as part of the package of the various kits in a zip file). To do this, go to Import -> Import Framework Files.

After a successful import of the files, upload them to your device using the Kit Manager.

WARNING! Before programming the M-Bus network, please check if the latest kit version is used. The latest kits are available at iSMA CONTROLLI support web site: ismacontrolli.com.

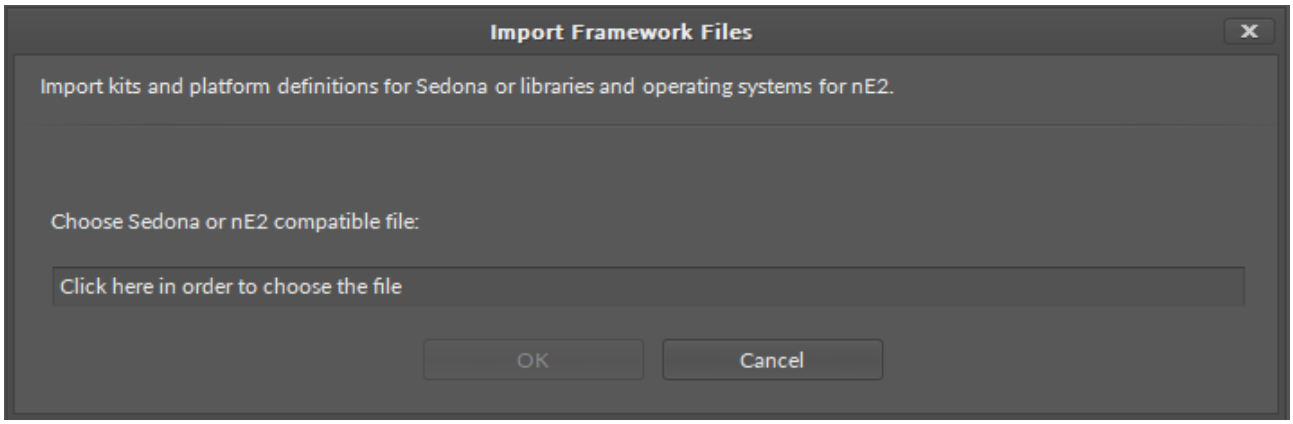

Figure 3. Importing dialog window

3.1 M-Bus Kit

To serve the M-Bus protocol (connected either to the Local interface or by the IP gateway) the iSMA-B-AAC20 controller uses the iSMA_MBus kit.

The M-Bus kit contains two types of device components based on communication interface:

- Local Device: for devices connected directly to the iSMA-B-AAC20-M (this connection requires a special hardware version equipment with the M-Bus interface). This type of communication is using two components:
  - MbusLocalNetwork: the main component responsible for handling local interface,
  - MbusLocalDevice: the component responsible for handling devices connected to the local interface;
- IP Device: for devices connected by the M-Bus-IP gateway (for all types of hardware versions):
  - MbusIPNetwork: the main component responsible for the connection to the M-Bus-IP gateway,
  - MbsuIPDevice: the component responsible for handling devices connected to the M-Bus-IP gateway.

The iSMA_Mbus kit does not have devices points components available for the user's use. The devices' points are added automatically during the points discovery process.

This kit contains the MbusFolder component to segregate the devices and points.

4 MbusLocalNetwork

The MbusLocalNetwork component is responsible for servicing the M-Bus devices connected directly to the iSMA-B-AAC20-M M-Bus interface. The maximum number of devices connected to the iSMA-B-AAC20-M is 20, and it is a hardware limitation (a built-in M-Bus power supply).

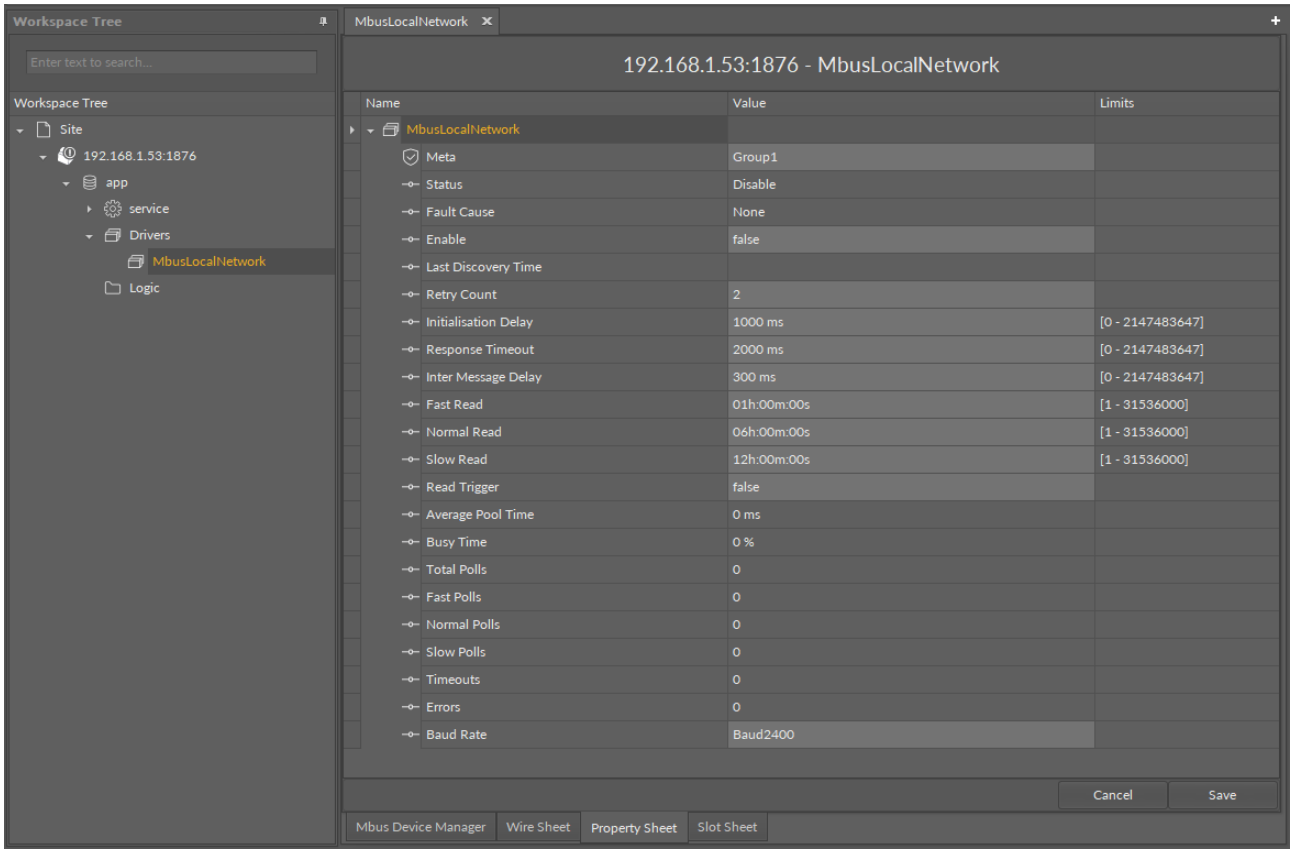

Figure 4. MbusLocalNetwork component

The MbusLocalNetwork component has the following slots:

- **Status:** component's current status;
- **Fault Cause:** fault cause description;
- **Enabled:** enables/disables the M-Bus Local Network;
- **Last Discovery Time:** last success discovery action time;
- **Retry Count:** number of error messages (CRC error, lost messages) before device down;
- **Initialization Delay:** delay time after initialization message;
- **Response Timeout:** device response time from the device request;
- **Inter Message Delay:** time between messages sent to the device,;
- **Fast Rate:** time between device read in the fast mode poll frequency;
- **Normal Rate:** time between device read in the normal mode poll frequency;
- **Slow Rate:** time between device read in the slow mode poll frequency;
- **Read Trigger:** remote force device data read trigger;
- **Average Poll Time:** average time for sending/receiving one message;
- **Busy Time:** percentage of the M-Bus network usage;
- **Total Polls:** total number of messages;
- **Fast Polls:** number of messages sent in the fast mode;
- **Normal Polls:** number of messages sent in the normal mode;
- **Slow Polls:** number of messages sent in the slow mode;

- **Timeouts:** number of lost messages, the difference between sent and received messages;
- **Errors:** number of error messages (for example, with wrong CRC);
- **Baud Rate:** default network M-Bus local port baud rate;
    - Available options: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.

Parameters like: **Retry Count, Initialization Delay, Response Timeout, Inter Message Delay,** and **Baud Rate** are used in device discover action. If it is required, these parameters can have different settings in the devices than the network (the devices connected to the bus can have different communications parameters).

The MbusLocalNetwork component has the following actions:

- **Search Primary Address**: discovers devices connected to the M-Bus local interface by the primary address. The user can also enter the searching range in action pop-up window by doing a simple calculation**: Range Number = Start Address * 256 + End Address**, for example, to search range from 10 to 20 the user must enter 2580 (10*256 + 20=2580);

> **WARNING!** All new devices have the default Primary Address set to 0, it is recommended to search by the secondary address for new devices.

- **Search Secondary Address**: discovers devices connected to the M-Bus local interface by the secondary address. This address contains the device's serial number assigned by factory. This action is recommended for the first bus commissioning;
- **Read Network:** forces devices data read;
- **Reset Stats:** resets network statistics and starts calculating from 0.

4.1 MbusLocalDevice

The MbusLocalDevice is a component for servicing the M-Bus devices connected to the iSMA-B-AAC20-M M-Bus interface (this connection requires a special hardware version equipment with the M-Bus interface).

There are two ways to add the M-Bus local device to the application:

- **Manual**: by drag and drop from a Sedona kit to the network component. In this case, the user must know the M-Bus device address (primary or secondary);
- **Automatic**: by using a discover action in the network component. For the first commissioning, it is recommended to search by the secondary address and then assign the primary address. All new devices have factory default primary address set to 0.

> **WARNING!** ALL discovered devices are placed in the DiscoveredDevices folder. In this folder, devices are read-only, for normal use they must be moved from this folder and placed directly to another MbusFolder under the MbusLocalNetwork component.

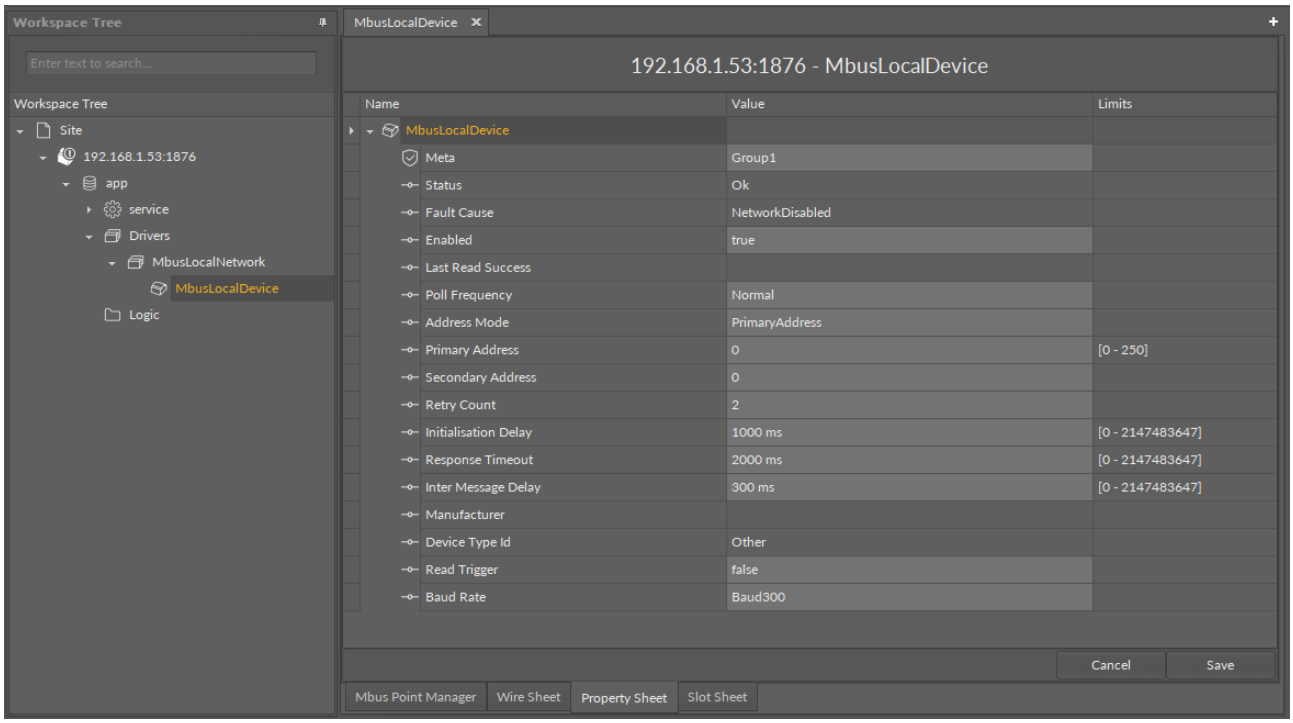

Figure 5. MbusLocalDevice component

The MbusLocalDevice component has the following slots:

- **Status:** component's current status;
- **Fault Cause:** fault cause description;
- **Enabled:** enables/disables the M-Bus local device;
- **Last Read Success:** last proper success device read time;
- **Poll Frequency:** device read frequency (times defined in the network component),;
- **Address Mode:** define device communication type address (primary or secondary);
- **Primary Address:** device primary address;
- **Secondary:** device secondary address;
- **Retry Count:** number of error messages (CRC error, lost messages) before the device down;
- **Initialization Delay:** delay time after initialization message;
- **Response Timeout:** device response time from the device request;
- **Inter Message Delay:** time between messages sent to the device;
- **Manufacturer:** manufacturer description read from device (read-only);
- **Device Type Id:** the M-Bus device type ID read from device (read-only);
- **Read Trigger:** remote force device data read trigger;
- **Baud rate:** device read baud rate;
    - available options: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.

The MbusLocalDevice component has the following actions:

- **Read:** forces the device data read;
- **Set Primary Address:** sets the primary address to the device (range from 0 to 250); this action automatically sets the Address Mode to the primary address;
- **Discover Points:** decodes the device message and creates points according to the device specification.

4.1.1 M-Bus Local Device Points

The iSMA_Mbus kit does not have device points components available in the Sedona palette for the user's use. The devices points are added automatically during the points discovery process. In the discovery process, the response message is decoded, and based on this information the iSMA-B-AAC20 creates corresponding points components. The iSMA_Mbus kit uses two types of components:

- Numeric: for numeric values;
- String: for values other than numeric like description, time, etc.

Note: The M-Bus device always responses with a full message, so the number of components has no influence on the network traffic. To maintain the order the user can delete unused components.

5 MbusIpNetwork

The MbusIpNetwork component is responsible for servicing the M-Bus devices connected to the iSMA-B-AAC20 controller by the IP network and IP-M-Bus gateway. The maximum number of devices connected to the bus is limited by a gateway specification.

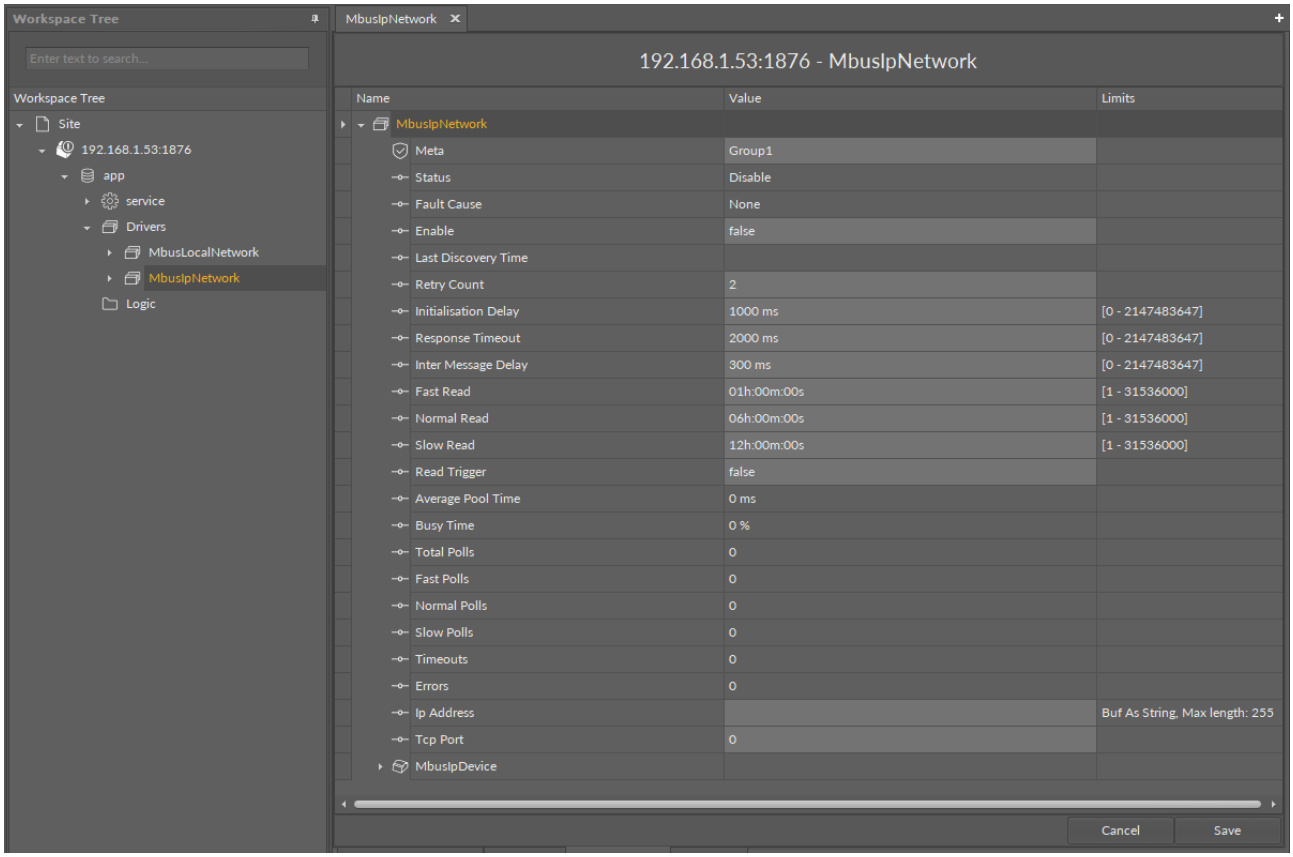

Figure 6. MbusIpNetwork component

The MbusIpNetwork component has the following slots:

- **Status:** component's current status;
- **Fault Cause:** fault cause description;
- **Enabled:** enables/disables the M-Bus IP network;
- **Last Discovery Time:** last success discovery action time;
- **Retry Count:** number of error messages (CRC error, lost messages) before device down;
- **Initialization Delay:** delay time after initialization message;
- **Response Timeout:** device response time from the device request;
- **Inter Message Delay:** time between messages sent to the device;
- **Fast Rate:** time between device reads in the fast mode poll frequency;
- **Normal Rate:** time between device reads in the normal mode poll frequency;
- **Slow Rate:** time between device reads in the slow mode poll frequency;
- **Read Trigger:** remote force device data read trigger;
- **Average Poll Time:** average time for sending/receiving one message;
- **Busy Time:** percentage of M-bus network usage;
- **Total Polls:** total number of messages;
- **Fast Polls:** number of messages sent in the fast mode;
- **Normal Polls:** number of messages sent in the normal mode;
- **Slow Polls:** number of messages sent in the slow mode;

- **Timeouts:** number of lost messages, the difference between sent and received messages;
- **Errors:** number of error messages (for example, with wrong CRC);
- **IP Address:** gateway IP address;
- **TCP Port:** gateway TCP IP port number.

Parameters like: **Retry Count, Initialization Delay, Response Timeout,** and **Inter Message Delay** are used in the device discovery action. If it is required these parameters can have different settings in devices than the network (devices connected to the bus can have different communications parameters).

The MbusIpNetwork component has the following actions:

- **Search Primary Address:** discovers devices connected to the M-Bus IP interface by the primary address. The user can also enter the searching range in action pop-up window by doing a simple calculation**: Range Number = Start Address * 256 + End Address**, for example, to search a range from 10 to 20 the user must enter 2580 (10*256 + 20=2580).

WARNING! All new devices have the default primary address set to 0, it is recommended to search by the secondary address for new devices.

- **Search Secondary Address:** discovers devices connected to the M-Bus IP interface by the secondary address. This address contains part of the device serial number and is assigned in the factory. This action is recommended for the first bus commissioning.
- **Read Network:** forces devices data read,
- **Reset Stats:** resets network statistics and starts calculating from 0.

5.1 MbusIpDevice

The M-BusIpDevice is a component for servicing the M-Bus devices connected to the M-Bus IP gateway. All types of the iSMA-B-AAC20 devices can use this type of communication.

There are two ways to add the M-Bus IP device to the application:

- **Manual**: by drag and drop from the Sedona palette to the network component. In this case, user must know the M-Bus device address (primary or secondary).
- **Automatic**: by using the discovery action in the network component. For the first commissioning, it is recommended to search by the secondary address and then assign the primary address. All new devices have factory default primary address set to 0.

WARNING! ALL discovered devices are placed in the DiscoveredDevices folder. In this folder, devices are read-only, for normal use they must be moved from this folder and placed directly to another MbusFolder under the MbusIpNetwork component.

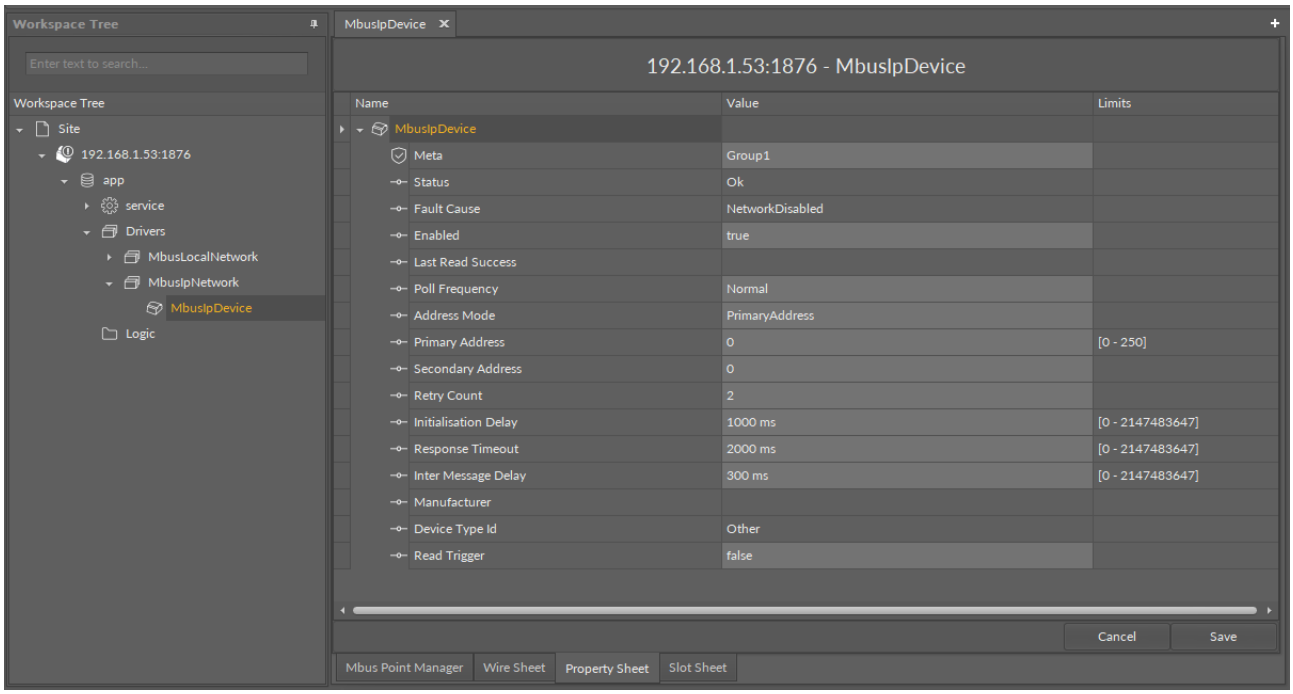

Figure 7. MbusIpDevice component

The MbusIpDevice component has the following slots:

- **Status:** component's current status;
- **Fault Cause:** fault cause description;
- **Enabled:** enables/disables the M-Bus IP device;
- **Last Read Success:** last proper success device read time;
- **Poll Frequency:** device read frequency (times defined in the network component);
- **Address Mode:** defines the device communication type address (Primary or Secondary);
- **Primary Address:** device primary address;
- **Secondary:** device secondary address;
- **Retry Count:** number of error messages (CRC error, lost messages) before device down;
- **Initialization Delay:** delay time after initialization message;
- **Response Timeout:** device response time from the device request;
- **Inter Message Delay:** time between messages sent to the device,;
- **Manufacturer:** manufacturer description read from device (read-only);
- **Device Type Id:** M-Bus device type ID read from device (read-only);
- **Read Trigger**: remote force device data read trigger.

The MbusIpDevice component has the following actions:

- **Read:** forces the device data read;
- **Set Primary Address**: sets the primary address to the device (range from 0 to 250); this action automatically sets the Address Mode to the primary address;
- **Discover Points:** decodes the device message and creates points according to the device specification.

5.1.1 M-Bus IP Device Points

The iSMA_Mbus kit does not have the device points components available in the Sedona Palette for the user's use. The device points are added automatically during the points

discovery process. In the discovery process response message is decoded, and based on this information the iSMA-B-AAC20 creates corresponding points components. The iSMA_Mbus kit uses two types of components:

- Numeric: for numeric values,
- String: for values other than numeric like description, time, etc.

Note: The M-Bus device always responses by a full message, so the number of components has no influence on the network traffic. To maintain the order the user can delete unused components.