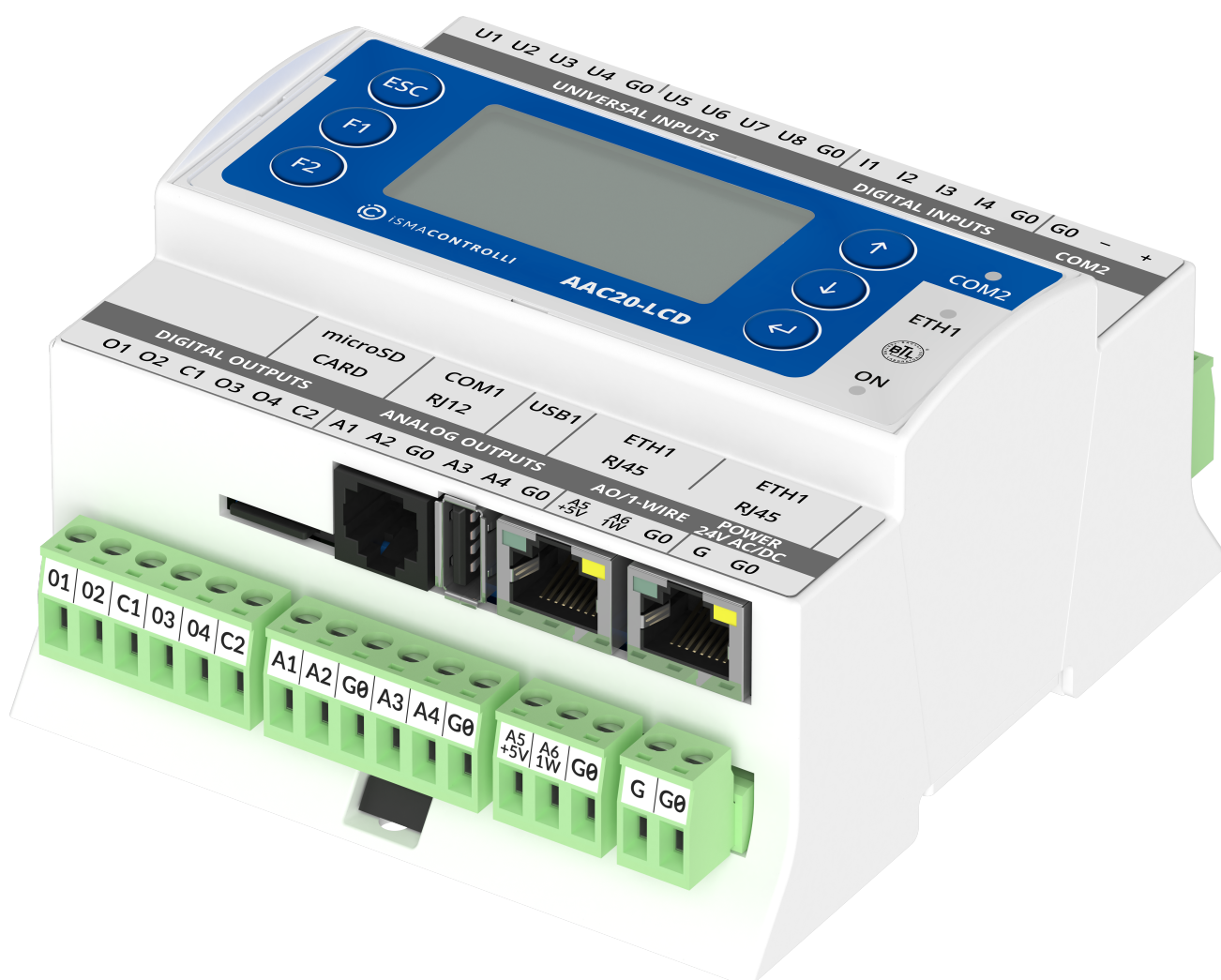


# iSMA-B-AAC20

User Manual

## Platform



Powered by  
**sedona**  
FRAMEWORK™

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# 1 Introduction

This manual contains information about commissioning the iSMA-B-AAC20 controller.

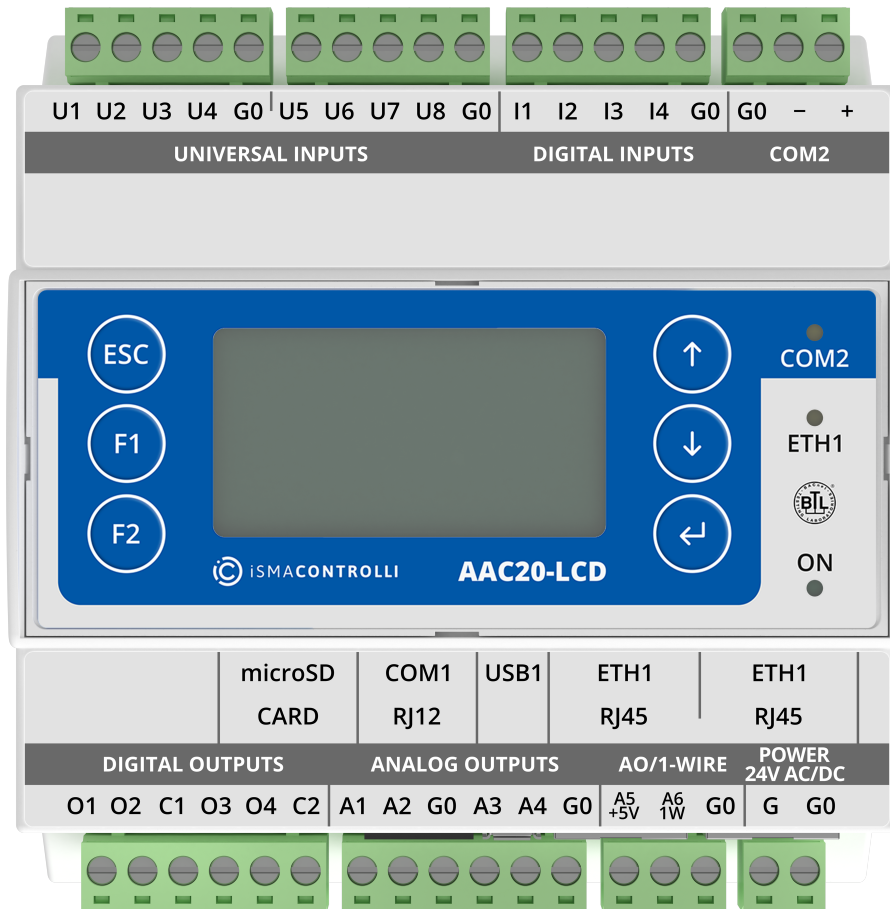


Figure 1. AAC20 controller

## 1.1 Revision History

Rev.	Date	Description
1.1	28 Aug 2015	First edition
1.2	20 Apr 2017	Added DHCP option
1.3	5 Feb 2018	Added DNS option
1.4	27 Jan 2020	Added chapter about NVMultiStateWritable Changed description of License Manager Replaced environment of programming from Workplace to iSMA Tool Added description of Autologin slot in AAC20 Platform Service
1.5	23 Jul 2020	Company data update



Rev.	Date	Description
1.6	28 Feb 2022	Rebranded Corrected information about the PWM mode in analog outputs

*Table 1. Revision history*

## 2 AAC20 Updater

AAC20 Updater is a software designed to administer an operating system of the iSMA-B-AAC20 controller. The software is free and can be obtained from iSMA distribution partner or downloaded from the iSMA CONTROLLI website: [www.ismacontrolli.com](http://www.ismacontrolli.com). The software allows to perform the following actions:

- **Send File:** sends a file to the device, displays the transfer progress bar at the bottom of the window, correct transfer is confirmed with a message "Transfer complete";
- **Reload Firmware:** uploads a firmware file–this operation must be preceded by a transfer of an adequate firmware files to the device. Upon update, the device shall be rebooted;
- **Device Reboot:** reboots the device;
- **Default Settings:** sets default values of IP address, RS485 parameters, and platform password;
- **Console:** displays the operating system console.

AAC20 Updater communicates with the device in two ways:

- **Modbus TCP:** using the Ethernet port;
- **Modbus RTU:** using the RS485 port–this type of communication requires the device to be in the bootloader mode.

The software allows to connect using the IP connection, RS485 port, or USB A-to-A cable connection (USB only for power supply or/and diagnostic to read console).

### 2.1 Connections

#### 2.1.1 IP Connection

To connect to the device using the IP connection, open the SedonaUpdater.exe tool, and click the Modbus TCP button. Activity under the IP connection does not require the device to be in Bootloader mode–it is enough to enter the device's IP address (default 192.168.1.123), Modbus TCP/IP port number (default 502), and the device's Modbus Address (default 1).

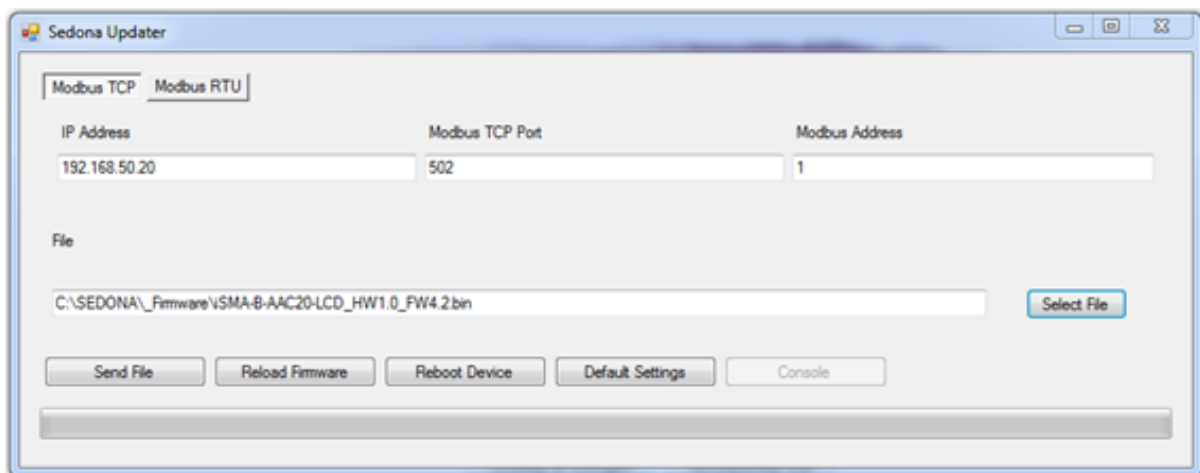


Figure 2. Sedona Updater

## 2.1.2 RS485 Connection

To connect to the device using the RS485 connection, run the SedonaUpdater.exe tool, and click the Modbus RTU button. In the COM Port text field, enter the RS485 port number of the PC, set the baud rate (default 115200), and the device's Modbus Address (default 1).

In order to operate using the RS485 port connection, the device must be in Bootloader mode.

### Bootloader in LCD Hardware Type (iSMA-B-AAC20-LCD)

**Step 1:** Disconnect the power and wait for the device to fully shut down.

**Step 2:** Hold the Esc button down, and turn the power on again. The screen should now display "Bootloader".

**Step 3:** Restart the device (restarting exits the Bootloader mode and returns to normal operation).

### Bootloader in Basic Hardware Type (iSMA-B-AAC20)

**Step 1:** Disconnect the power and wait for the device to fully shut down.

**Step 2:** With the device off, take the cover off, and move the DIP switch no. 8 to ON position, turn the power on again. Activation of the Bootloader mode is confirmed by alternating power and communication LEDs.

**Step 3:** To exit the Bootloader mode, move the DIP switch no. 8 to OFF, and restart the device.

## 2.1.3 Sending Files to Device

The files can be sent to the device using Modbus TCP protocol over the IP connection. This is the recommended method, as it does not require switching the device into the Bootloader mode, and provides the fastest way to transfer data.

If the files are sent using the RS485 port, the device must be first switched into the Bootloader mode, as described above. Then, using the Select File button, select a file to upload. The upload is performed through selecting the right protocol (Modbus TCP/ Modbus RTU) and approving the process by pressing the Send File button. Progress of the transfer is indicated by a progress bar at the bottom of the screen. After a successful upload, a Transfer Complete pop-up message is displayed.

## 2.2 Restoring Default Settings

Pressing the Default Setting button restores the factory settings such as:

- IP address: 192.168.1.123;
- Mask: 255.255.255.0;
- Default Gateway: 192.168.1.1;
- Modbus TCP/IP protocol port: 502;
- The password for the platform user: 1000.

## 2.3 System Console

The system console shows system logs of the controller operating system. There are two options to view the system console:

- by web page;
- by USB connection.

### 2.3.1 Web Page

To view the system console by the web page, enter the controller's IP address in web browser and log in to the system (default user: platform, default password: 1000). After logging in go to the Device Management section and press a Refresh Log button. All system logs will be displayed in the window below.

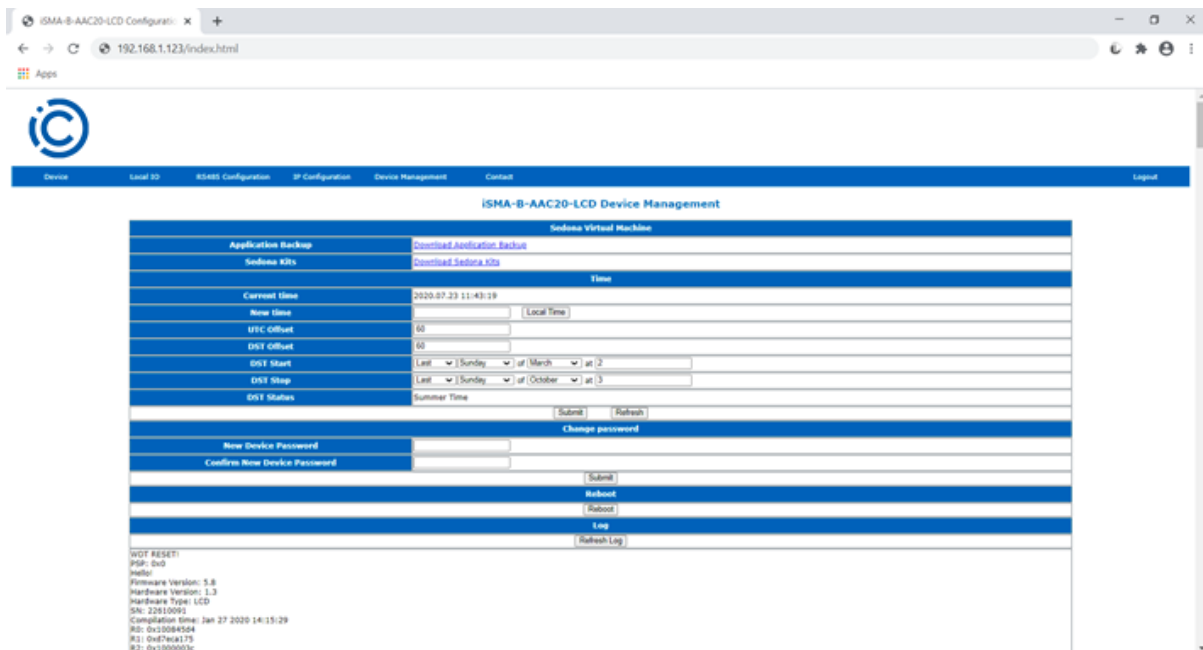
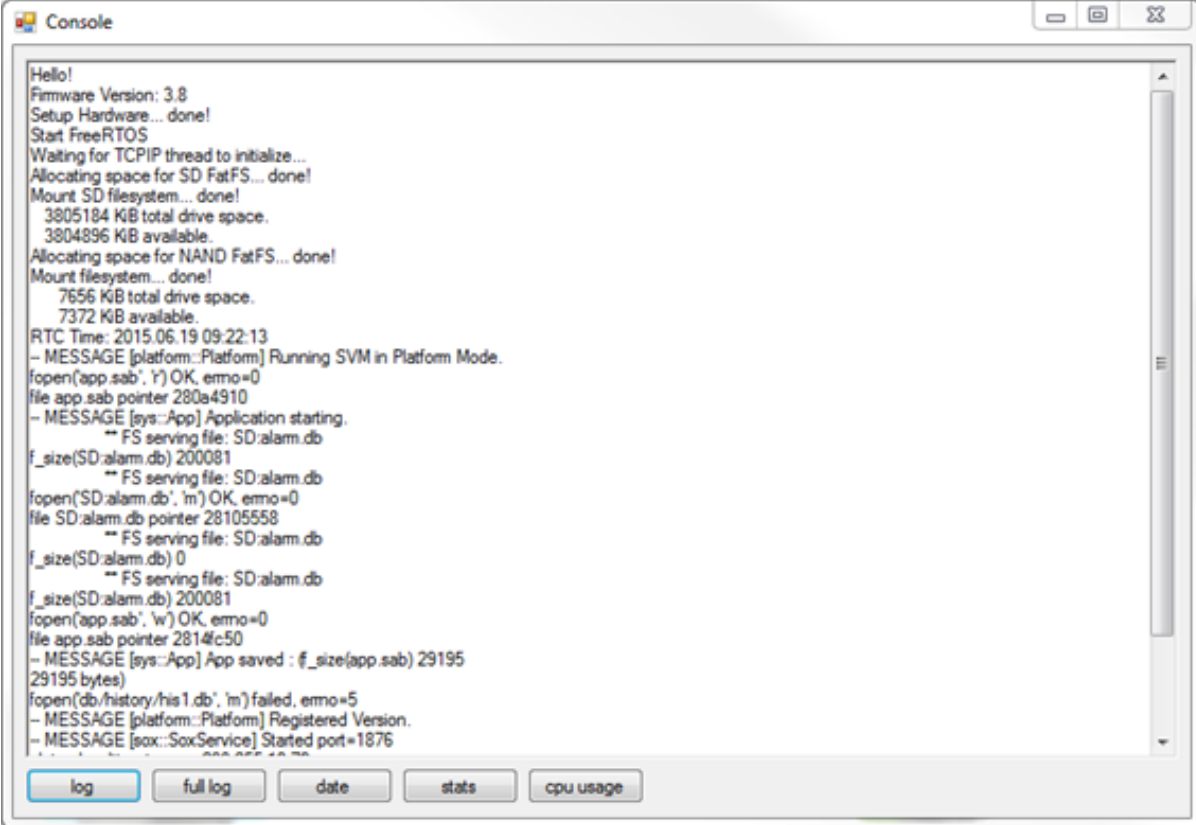


Figure 3. AAC20 web page Device Manager

### 2.3.2 USB Connection

To view the logs using the USB connection, use the SedonaUpdater.exe software, and connect the device to the PC using the A-A USB cable. After connection the system automatically recognizes the controller without installing additional drivers (HMI driver is a default one), and the Console button becomes active. Open the system console window by pressing the Console button. The following options are available in the system console:

- Log: print only last written data;
- Full log: print all log memory;
- Date: print controller current date;
- Stats: displays a list of all running task and amount of processing time that has been used by each task;
- CPU usage: displays a current CPU usage.



```

Hello!
Firmware Version: 3.8
Setup Hardware... done!
Start FreeRTOS
Waiting for TCPIP thread to initialize...
Allocating space for SD FatFS... done!
Mount SD filesystem... done!
 3805184 KB total drive space.
 3804896 KB available.
Allocating space for NAND FatFS... done!
Mount filesystem... done!
 7656 KB total drive space.
 7372 KB available.
RTC Time: 2015.06.19 09:22:13
- MESSAGE [platform::Platform] Running SVM in Platform Mode.
fopen(app.sab', 'r') OK, emmo=0
file app.sab pointer 280a4910
- MESSAGE [sys::App] Application starting.
  ** FS serving file: SD:alarm.db
f_size(SD:alarm.db) 200081
  ** FS serving file: SD:alarm.db
fopen(SD:alarm.db', 'm') OK, emmo=0
file SD:alarm.db pointer 28105558
  ** FS serving file: SD:alarm.db
f_size(SD:alarm.db) 0
  ** FS serving file: SD:alarm.db
f_size(SD:alarm.db) 200081
fopen(app.sab', 'w') OK, emmo=0
file app.sab pointer 2814fc50
- MESSAGE [sys::App] App saved : f_size(app.sab) 29195
29195 bytes)
fopen(db/history/his1.db', 'm') failed, emmo=5
- MESSAGE [platform::Platform] Registered Version.
- MESSAGE [sox::SoxService] Started port=1876

```

Figure 4. Sedona Updater console view

The USB connection method is recommended if the user cannot connect using the IP or RS485 ports or does not know the connection parameters, for example, the IP address.

## 2.4 Firmware - Upgrade and Versions

### 2.4.1 Firmware Upgrade

The controller's firmware can be updated by uploading a new firmware file to the device. The following files are necessary to upgrade the firmware (all files are available on the iSMA CONTROLLI website: [ismacontrolli.com](http://ismacontrolli.com)):

- SedonaUpdater.exe: the software sends files to the controller and performs system actions;
- Firmware file: binary file with a firmware code;
- The latest kits: all kits must be updated to the current version, they can be downloaded and imported as one bundle .zip file;
- Default app.sab file: (optional) default Sedona application file, adapted to the current firmware version;
- Default kits.scode: (optional) default Sedona kits image, adapted to the current firmware version.

**Step 1:** Download files from the iSMA CONTROLLI website, [ismacontrolli.com](http://ismacontrolli.com), to local PC drive.

**Step 2:** Upgrade kits' files in the iSMA Tool (see Chapter [Importing Kits to iSMA Tool](#)).

**Step 3a:** Send files using the IP connection (the controller will automatically run in Bootloader mode).

Open SedonaUpdater.exe and set up communication parameters :

- Modbus TCP;
- IP Address (default for new devices 192.168.1.123);
- Modbus TCP/IP port (default 502);
- Modbus Address (default 1).

**Step 3b:** Send files by RS485 connection.

**WARNING!** Using RS485 port, the controller must be manually switched to the Bootloader mode (see section [RS485 Connection](#)).

Open SedonaUpdater.exe and set up communication parameters :

- Modbus RTU;
- COM port–PC RS485 COM port number;
- Baud Rate–controller’s RS485 port baud rate (default 115200);
- Modbus Address (default 1).

**Step 4:** Select the firmware file (.bin file) using the Select File button, and send it to the controller using the Send File button. After successful upload a “Transfer OK” pop-up message is displayed.

**Step 5 (optional):** Send default app.sab and kits.scode files to the controller.

**WARNING!** This operation will erase controller’s application. It is not recommended if the application cannot be deleted from the controller. In order to avoid data loss back up the application on the PC drive.

Select the app.sab file and send it to the controller. Once a Transfer OK message is displayed, select the second file, kits.scode, and send it to the controller.

**Step 6:** Reboot the controller using the Reload Firmware button. The controller will load new firmware and restart.

**Step 7:** Check the controller’s firmware version.

## 2.4.2 Firmware Version

There are three options to check the controller’s current firmware version:

- using the iSMA Tool;
- using the web page;
- using the LCD menu (applicable only for iSMA-B-AAC20-LCD, iSMA-B-AAC20-LCD-M, iSMA-B-AAC20-LCD-D).

### iSMA Tool

To verify the current firmware version using the iSMA Tool, log in to the device, and go to the Plat component. The Plat component is located in the Service folder, directly below the App component (Device -> App -> Service -> plat). The Plat component contains the Firmware Version slot, which identifies the working firmware version.

## Web Page

To verify the current firmware version using the web page, open a browser, enter the controller's IP address into the address bar, and log in to the service (enter the username "platform" and 4 digits password—default password is 1000, it can be changed in Sedona -> App -> Service -> plat component in the Device Password slot). The firmware version is displayed in the Device tab in Basic Information.

## LCD System Menu

To verify the current firmware version with the LCD system menu, log in to the system menu by holding the F1 button (enter the "platform" username on the LCD and the 4 digits password—default password is 1000, it can be changed in Sedona -> App -> Service -> plat component in the Device Password slot), and open the Info page.

### 3 Sedona in iSMA Tool

As a significant part of an end-to-end iSMA solution, the iSMA Tool gives customer a convenient way to create and manage custom applications for a Sedona-based iSMA controller.

The iSMA Tool covers all requirements to create a perfect application: wire sheet for convenient visual programming, property sheets for details, kit management, real-time monitoring of system states and slot values, logs and historical data, deployment, and backup.

#### 3.1 iSMA Tool Installation

**Note:** Full description of the iSMA Tool functionalities is available in the iSMA Tool manual available at [ismacontrolli.com](http://ismacontrolli.com).

The iSMA Tool is a software created for modern Microsoft Windows system, such as Windows 10. The oldest supported version of the operating system is Windows 7. The iSMA Tool is delivered as a compressed folder, which needs to be extracted in a chosen location on a hard drive, unless the access to the extracted folder is restricted by the system (e.g., Program Files is not a recommended location).

In order to download the iSMA Tool Software Bundle, which includes all files necessary to run the program efficiently (a zipped file iSMATool\_Vx.x.x.zip), go to the iSMA CONTROLLI web page [ismacontrolli.com](http://ismacontrolli.com) and to the iSMA Tool/Software Bundle folder.

Extracting the zipped package reveals the folders and additional files described below. In order to run the iSMA Tool, open the iSMATool.exe file.

Nazwa	Data modyfikacji	Typ	Rozmiar
Config	26.02.2020 14:33	Folder plików	
de	26.02.2020 13:07	Folder plików	
es	26.02.2020 13:08	Folder plików	
External	26.02.2020 13:08	Folder plików	
fr	26.02.2020 13:08	Folder plików	
home	26.02.2020 13:09	Folder plików	
icons	26.02.2020 13:08	Folder plików	
it	26.02.2020 13:08	Folder plików	
ja	26.02.2020 13:08	Folder plików	
Localization	26.02.2020 13:08	Folder plików	
log	26.02.2020 13:09	Folder plików	
pl	26.02.2020 13:08	Folder plików	
Resources	26.02.2020 13:08	Folder plików	
ru	26.02.2020 13:08	Folder plików	
iSMATool	26.02.2020 13:08	Aplikacja	8 428 KB
LICENSE	07.07.2020 15:46	Dokument tekstowy	11 KB
iSMATool.exe.config	26.02.2020 13:08	Plik CONFIG	2 KB
iSMATool.visualelementsmanifest	26.02.2020 13:08	Plik XML	1 KB
DevExpress.BonusSkins.v18.2.dll	26.02.2020 13:08	Rozszerzenie aplik...	20 456 KB
DevExpress.Charts.v18.2.Core.dll	26.02.2020 13:08	Rozszerzenie aplik...	736 KB

Figure 5. Folders and files after extracting

The extracted folders have the following functions:



- **Config:** A folder containing a record of user's individual settings regarding windows location and other iSMA Tool work settings, such as a language chosen for the iSMA Tool interface.
- **External:** A folder containing an API .dll file.
- **home:** A folder where all the data created by user are saved, i.e., device backups, applications, etc. It is also a folder where the kits library, available the in iSMA Tool, is located.
- **icons:** A folder with graphical files such as the iSMA Tool interface icons.
- **Localization:** A folder with the text files providing the iSMA Tool language sources.
- **log:** A folder, where the logs of the iSMA Tool, which also appeared in Console window, are saved. When contacting iSMA CONTROLLI technical support, it is advised to copy the last file with logs form that folder
- **de, es, fr, it, ja, pl, Resources, ru:** Folders with system libraries.

To properly install and work with the iSMA Tool the computer must meet the following minimal requirements:

- Processor (CPU): Intel Core i3-3xxx or equivalent;
- Memory: 4GB RAM;
- Storage: 50 GB internal hard driver;
- Ethernet 100 Mbit or 1Gbit NIC;
- MS Windows 7 (recommended MS Windows 10);
- .NET Framework 4.6.2 or higher.

**WARNING!** If the iSMA Tool is being run for the first time, it asks to accept the EULA license. The license must be accepted to run the program. Failure to do so closes the iSMA Tool.

**Note:** For the iSMA Tool to work properly it needs to be run periodically at least once a month, on a computer connected to the Internet for about an hour, depending on the data transfer rate. It enables the iSMA Tool to automatically download the latest data, such as kits and updates.

The iSMA Tool is a portable software. It is transferable and it can be installed on a portable data storage device, such as a USB memory stick. It allows the iSMA Tool to be run directly from a portable data storage device on any PC, including offline ones.

### 3.2 Importing Kits to iSMA Tool

The iSMA Tool allows to import kits into the program (the latest kits and kits bundle can be downloaded from the [ismacontrolli.com](http://ismacontrolli.com) website) and to expand the default kit base with external kits, for example, user's own kits. To add them select the Import Sedona Files option, available in the main menu under Sedona. Once selected, a dialog window opens to specify the location of the imported files.

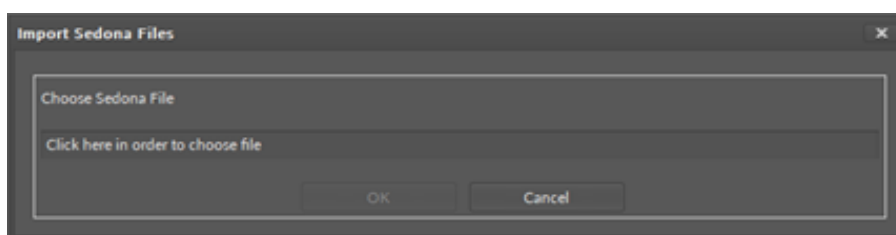


Figure 6. Dialog window for importing Sedona files

The iSMA Tool may import single files or compressed folders with .zip extension containing:

- a single kit; or
- whole packages containing kits, manifests, and .par files.

**Note:** The iSMA Tool can read the .zip files including other .zip files containing kits, manifests, and .par files, and can display a summary of how many files have been imported at the end of the process, in a window and in console, as shown on the figure below. If such package contains files which are not kits, manifests, or .par files, they are skipped.

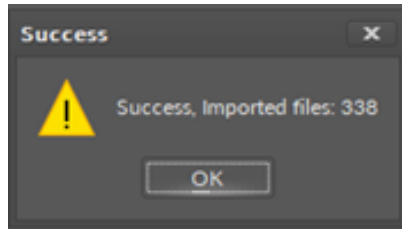


Figure 7. Summary of importing Sedona files

After a successful import, the added kits are uploaded to the Kit Manager. The list of kits, which can be installed on the selected device, is displayed in the bottom part of the Kit Manager view. It includes the kits, which were added manually. If the external kits do not appear on the list of available kits, it means they are not compatible with the selected device and cannot be uploaded. In this case, after deselecting the device, external kits will be displayed on the list in the lower part of the view, because in this mode the iSMA Tool shows all kits installed in it.

### 3.3 Connecting to Sedona Device

In order to connect to the device, right-click on the project folder and select an Add Device option.

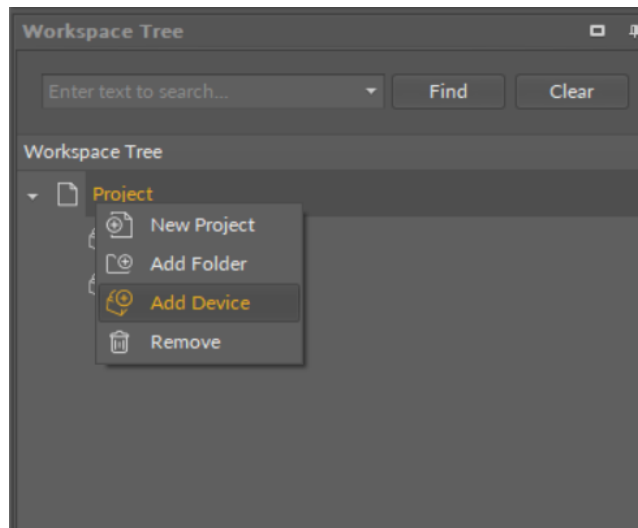


Figure 8. Adding a new device

After selecting the Add Device option, a device log in window pops up.

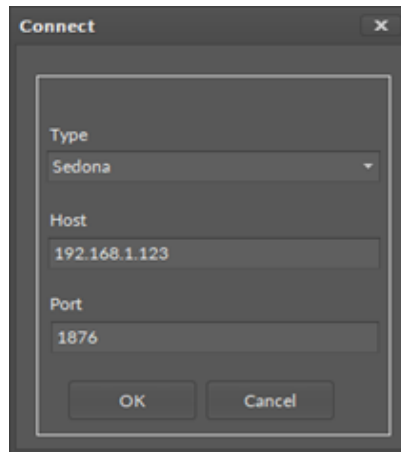


Figure 9. Sedona device connection window

By default, a new device has the following log in settings:

- IP address: 192.168.1.123;
- Port: 1876;
- User: admin;
- Password: empty box (no characters).

The connection parameters can be changed after connecting to the controller:

- IP address: in the plat component (see section Changing IP Address);
- Sox Port: in Sox service (see section Sox Protocol);
- Admin password/new user: in the user service (see section Users Service).

## 4 License

Sedona controllers have a built-in license mechanism. All out of the box controllers have a standard license version installed, and they are instantly ready to work. However, in case the license is changed (upgraded or downgraded) or it has to be re-uploaded after a memory clear it can be done either online, or offline.

The licenses are generated by the serial number or MAC address. The proper file name format is serialnumber.dat MACAddressWithoutDots.dat.

### 4.1 Updating License Online

The License Manager can upload the license to the device in online mode. The iSMA Tool connects to the license server, downloads, and saves the license to the controller. To open the License Manager, double click the device in the Workspace Tree window, and go to the Object Properties window, where the License Manager button is displayed. Once selected, it displays a pop-up window which enables to check the device license status and invoke one of two actions:

- Upload the license from the remote database;
- Upload the license from the file.

To download the license from the server, use the Get License from Remote Database option. While downloading, a pop-up window shows the progress. After completed download, use the Get License from Local Database option to send the license file to the controller. The new license will be implemented after the controller's reboot.

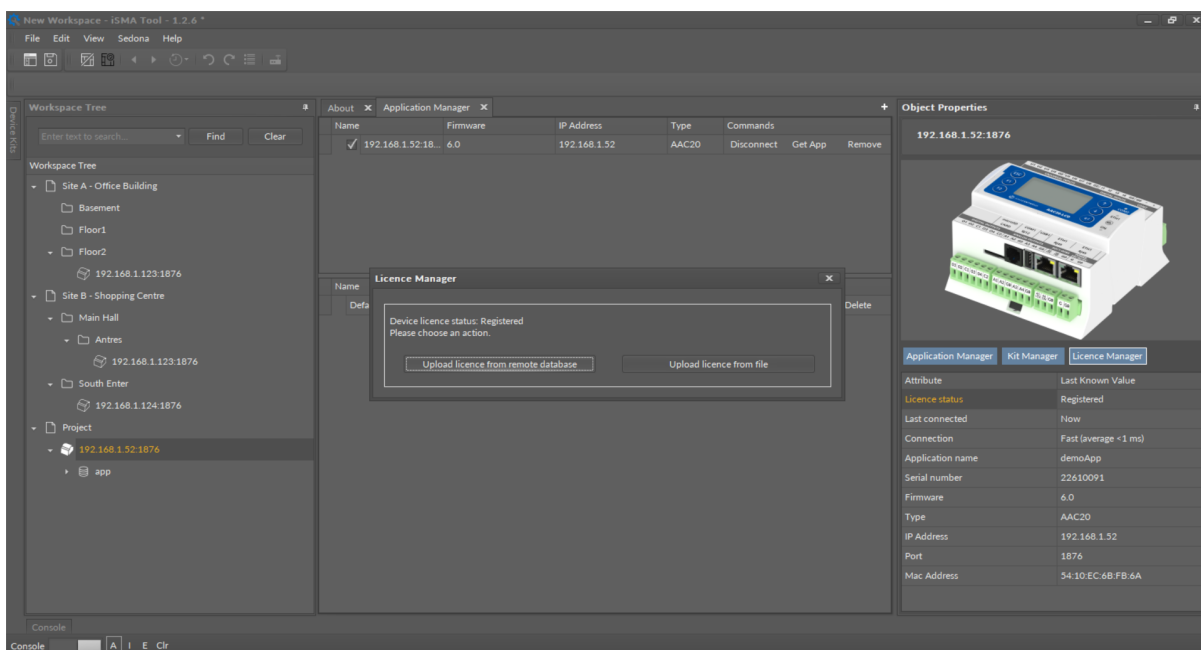


Figure 10. License Manager view

### 4.2 Updating License Offline

The license can be uploaded to the device offline using either the iSMA Tool's License Manager or AAC20 Updater. In order to use the offline License Manager, use the Upload License from File option. With the AAC20 Updater software the license file can be download using the ismaUI to local database (for Workbench AX users), copied from

another PC, or e-mailed from the local iSMA distributor. Open the SedonaUpdater.exe software and choose the license file (a proper file format is MACAddressWithoutDots.dat). After a successful upload, reboot the controller using the Reboot Device button. (For more information about sending files see Chapter [Sending Files to the Device](#)). The new license will be implemented after the controller's reboot.

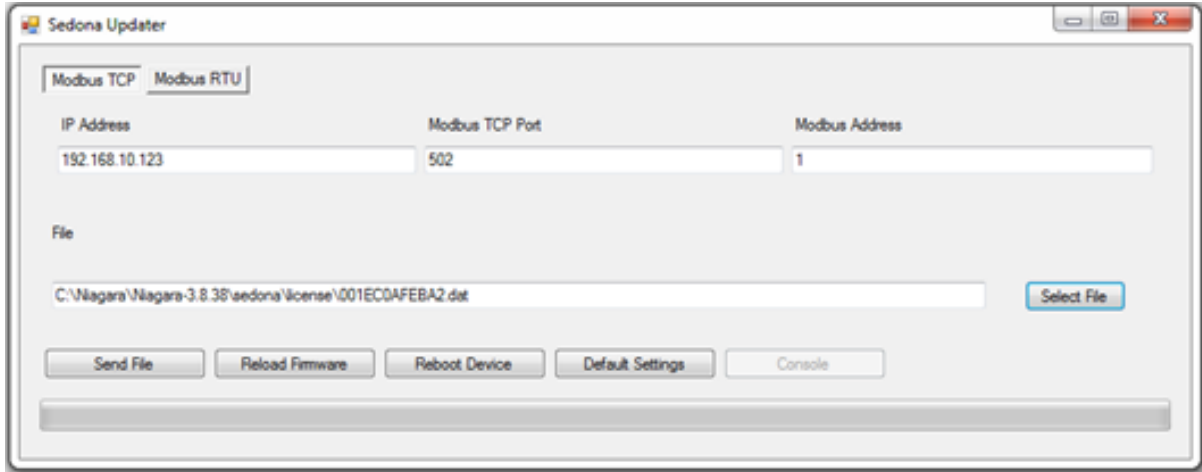


Figure 11. Sending Sedona Updater license file

## 5 Sedona Kits

The Sedona kits are sets of components for programming applications. The device is provided with a set of basic kits and, in order to develop applications, the set should be uploaded to the device. To add the new or update the kit, it must first be imported into the iSMA Tool (see Chapter [Importing Kits to iSMA Tool](#)). In the device the set of kits is stored in the kits.scode file. To manage controller's kits and compile the kits.scode, the iSMA Tool uses a Kit Manager tool.

### 5.1 Kit Manager

The Kit Manager Tool is used to manage kits on Sedona devices. The kits.scode file is a file which contains a set of kits in a Sedona Framework code image file with an .scode extension. The scode image is executed by the SVM (Sedona Virtual Machine) in the device. Using the Kit Manager, it is possible to add and remove kits, as well as change versions of kits deployed in the scode running on the device. Also, there is an option to force the kits.scode to be rebuilt. The kits.scode must be rebuilt whenever a change affects the schema. This ensures such changes are included in the recompiled binary .scode image. When any kit selection changes are made in the Kit Manager, it automatically selects and check this option. The only time the user would select this option is when the user wants to force the scode to be rebuilt (even if no change was made to kit selections). This option is most useful in a development environment where the actual code in a kit might change while the kit version and checksum do not. In this case, no change is required in the Kit Manager but the scode must be regenerated in order to deploy the new code on a device.

#### 5.1.1 Using Kit Manager

The Kit Manager tool is used to manage kits on Sedona devices. The Kit Manager shows a table with a list of kits. In the upper part of the table the kits, which are currently installed in the device, are grouped, and in the lower part of the table there are filtered kits, fitting to a selected device, which are available to be loaded into the device. After deselecting the device, the filter will be turned off, and a whole list of locally available kits will be shown in the iSMA Tool, see the figure below.

On Device	Name	Latest Local	Installed	Action	Status
<input checked="" type="checkbox"/>	datetime	1.2.28.103	1.2.28.103	1.2.28.103	
	Kit cannot be uninstalled because its components are used in the application				
<input checked="" type="checkbox"/>	inet	1.2.28	1.2.28	1.2.28	
<input checked="" type="checkbox"/>	iSMA_BACnet	1.2.28.105	1.2.28.108	1.2.28.108	
	Kit cannot be uninstalled because its components are used in the application				
<input checked="" type="checkbox"/>	iSMA_BACnetIpMaster	1.2.28.103	1.2.28.103	1.2.28.103	
<input checked="" type="checkbox"/>	iSMA_BACnetMSTPMaster	1.2.28.104	1.2.28.105	1.2.28.105	
<input checked="" type="checkbox"/>	iSMA_control	1.2.28.104	1.2.28.104	1.2.28.104	
	Kit cannot be uninstalled because its components are used in the application				
<input checked="" type="checkbox"/>	iSMA_controlApi	1.2.28.104	1.2.28.105	1.2.28.105	
	Kit cannot be uninstalled because its components are used in the application				
<input checked="" type="checkbox"/>	iSMA_LCD	1.2.28.106	1.2.28.106	1.2.28.106	
<input checked="" type="checkbox"/>	iSMA_localIO	1.2.28.101	1.2.28.104	1.2.28.104	
	Kit cannot be uninstalled because its components are used in the application				
<input checked="" type="checkbox"/>	iSMA_ModbusAsyncNetwork	1.2.28.105	1.2.28.105	1.2.28.105	
	Kit cannot be uninstalled because its components are used in the application				
<input checked="" type="checkbox"/>	iSMA_ModbusTcpNetwork	1.2.28.105	1.2.28.105	1.2.28.105	
<input checked="" type="checkbox"/>	iSMA_ModbusTcpSlaveNetwork	1.2.28.103	1.2.28.103	1.2.28.103	
<input checked="" type="checkbox"/>	iSMA_Modules	1.2.28.101	1.2.28.101	1.2.28.101	
	Kit cannot be uninstalled because its components are used in the application				
<input checked="" type="checkbox"/>	iSMA_NativeLibs	1.2.28.101	1.2.28.101	1.2.28.101	
<input checked="" type="checkbox"/>	iSMA_OneWire	1.2.28.103	1.2.28.103	1.2.28.103	
<input checked="" type="checkbox"/>	iSMA_platAAC20	1.2.28.106	1.2.28.107	1.2.28.107	
	Kit cannot be uninstalled because its components are used in the application				
<input checked="" type="checkbox"/>	sox	1.2.28.102	1.2.28.102	1.2.28.102	
	Kit cannot be uninstalled because its components are used in the application				
<input checked="" type="checkbox"/>	sys	1.2.28.104	1.2.28.104	1.2.28.104	
	Kit cannot be uninstalled because its components are used in the application				
<input type="checkbox"/>	all_actions_test	1.2.28.103			
<input type="checkbox"/>	basicSchedule	1.2.28			
<input type="checkbox"/>	control	1.2.28			

Figure 12. List of kits view

The columns in the above table are defined as follows:

- On Device: shows if a particular kit is already installed on the selected device;
- Name: the name of the kit;
- Latest Local: the number of the latest kit version installed locally in the iSMA Tool;
- Installed: the number of the kit version currently installed on the device;
- Action: the list of kits versions, which are available locally in the iSMA Tool and are ready to be installed on the device. A version number to be installed on the device is chosen from a drop-down menu (upgrade or downgrade process).
- Status: the column informs about an action that will be taken on the selected kit.

The user's role is limited to editing two columns: On Device and Action.

Below there are descriptions how to remove, replace, and add a kit to a device.

### Removing (Uninstalling) the Kit from the Device

If a user deselects the checkbox, the selected kit is chosen to be removed. The Uninstall command appears in the Status column, and the kit is removed once the user confirms the Update command in the upper Device panel of the Kit Manager.

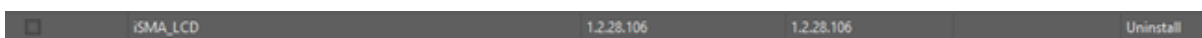


Figure 13. Choosing a kit to be removed

It may happen that the removal of the kit is not possible due to connections between kits, or because the component, which is used in the application, is a part of the removed kit. Such information is displayed under the kit's name.

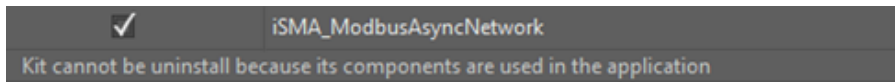


Figure 14. Information that the kit cannot be uninstalled

In order for the kit to be removed, the components used in the application shall be removed, or the kit needs to be left installed.

### Replacing the Kit Existing in Device to a Newer, or Older one

The kit installed on the device may be replaced by installing its newer or older version. Both upgrade and downgrade operations are done by choosing a proper number of the kit version in the Action column.

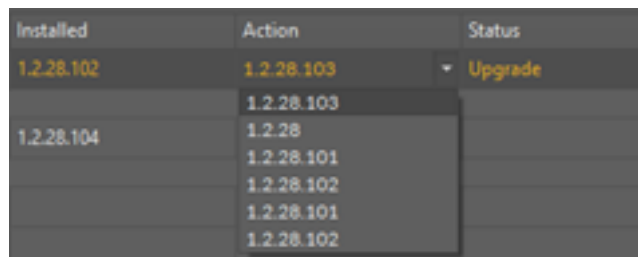


Figure 15. Choosing a kit version to upgrade or downgrade to

Depending if the current kit is replaced with a newer or older one, the iSMA Tool will display the planned action in the Status column, Upgrade, or Downgrade.

On Device	Name	Latest Local	Installed	Action	Status
✓	sox	1.2.28.102	1.2.28.102	1.2.28.103	Upgrade
Kit cannot be uninstalled because its components are used in the application					
✓	sys	1.2.28.104	1.2.28.104	1.2.28.101	Downgrade
Kit cannot be uninstalled because its components are used in the application					

Figure 16. Upgrade or downgrade info

### Adding (Installing) the Kit to the Device

In order to add the kit to the device, select its checkbox, and, if needed, define the version of added kit (by default, the newest version is selected). The Install command appears in the Status column, and the kit is added once the user confirms the Update command in the upper Device panel of the Kit Manager.

On Device	Name	Latest Local	Installed	Action	Status
✓	iSMA_DALI	1.2.28.105		1.2.28.105	Install

Figure 17. Choosing a kit to be added

### Updating Kits in the Device

After defining the kits to be added, removed, or changed the Update command needs to be confirmed in the upper Device panel of the Kit Manager. The Update command is displayed in the Commands column.

Name	Firmware	IP Address	Type	Commands
✓ 192.168.10.223	5.3	192.168.10.223	AAC20	Disconnect Update Remove

Figure 18. Update command



While updating the kits in the device, the iSMA Tool interface is blocked for the time.

**WARNING!** Finalizing the kits update requires restarting the device. After restarting the device iSMA Tool reconnects with the device.

**Note:** The update process is monitored in detail in the Console window, which helps in analyzing the situation in case the update could not be completed.

## 5.2 Application Manager

The Application Manager tool is used to manage the app.sax file. The app.sax is a Sedona application .xml file, which is an .xml representation of a Sedona framework app that is easily generated and consumed by Sedona framework software tools.

The Application Manager allows to:

- manage applications saved locally in the iSMA Tool;
- load applications to the device;
- download applications from the device.

**WARNING!** Loading an application to the device overwrites the application already saved in the device.

**WARNING!** Each loading of application to the device requires restarting the device.

### 5.2.1 Using Application Manager

There are a few ways to initiate the Application Manager:

- initiating the Application Manager from the context menu;
- initiating the Application Manager from the Object Properties window.

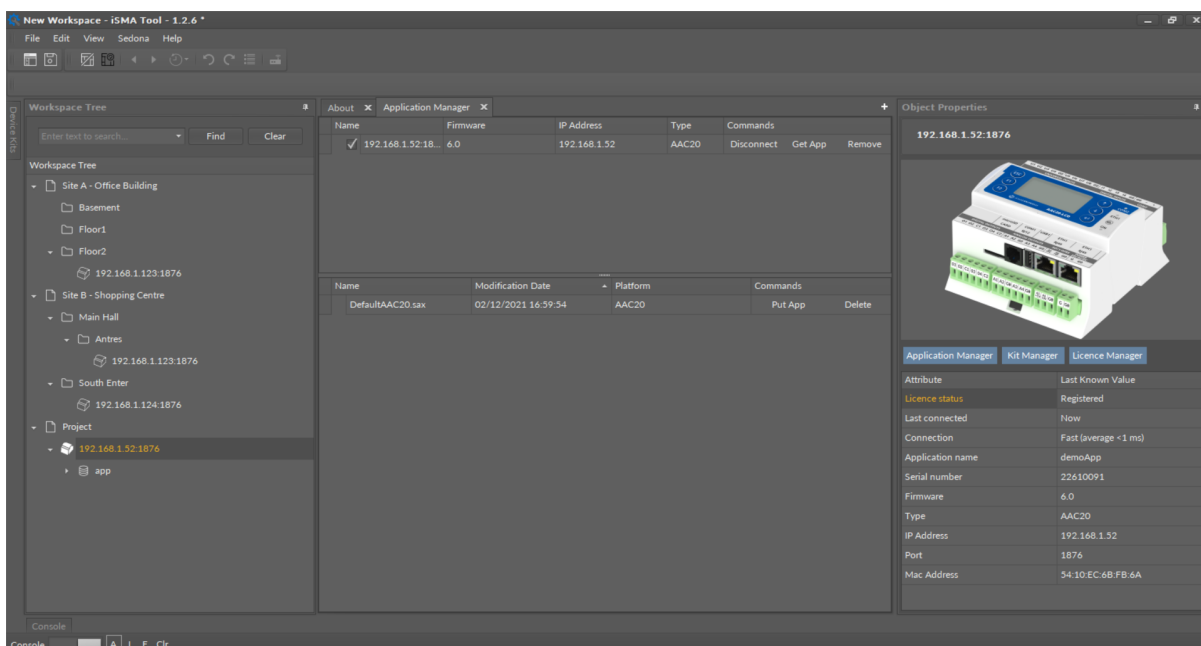
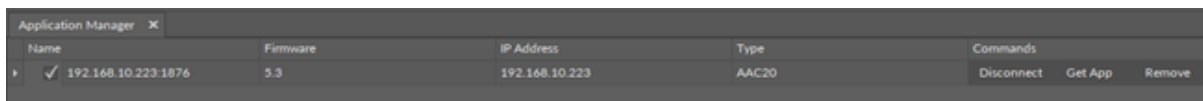


Figure 19. Application Manager

## Downloading Application from Device (Get App)

After connecting with a chosen device its application can be downloaded by pressing the Get App button, see the figure below.



Name	Firmware	IP Address	Type	Commands
<input checked="" type="checkbox"/> 192.168.10.223:1876	5.3	192.168.10.223	AAC20	Disconnect Get App Remove

Figure 20. Commands available for a selected device

After initiating the command, a starting process reads an application from the device and creates the .sax file (with a name consisting of the application name and the device's IP address). This process blocks the iSMA Tool for the time of its operation. The newly created file will be added to the list of available applications saved in the iSMA Tool, and the physical .sax file will be located in the iSMA Tool main folder (/home/Applications). The default name of the application file may be changed by editing the Name column.

**Note:** Downloading an application from the device does not stop or restart the device. Downloading does not disrupt the device's work in any way other than pausing its interface for the time of downloading.

**Note:** Application downloading process is monitored in detail in the Console window, which helps to analyze the situation, in case downloading the application could not be completed.

## Uploading Application to Device (Put App)

Application uploading procedure needs to begin with defining the device to work with Application Manager by selecting a checkbox for a particular device in the upper part of the Manager view.

Next, one of the available applications in the lower part of the Manager needs to be selected by pressing the Put App button in the Commands column.

**WARNING!** Pressing the Put App button will overwrite the application already installed in the device and reset the device in the final phase of the process.

The figure below shows a situation before beginning of the application upload into the iSMA-B-AAC20 controller, where the user is asked for confirmation due to overwriting of the application currently installed in controller.

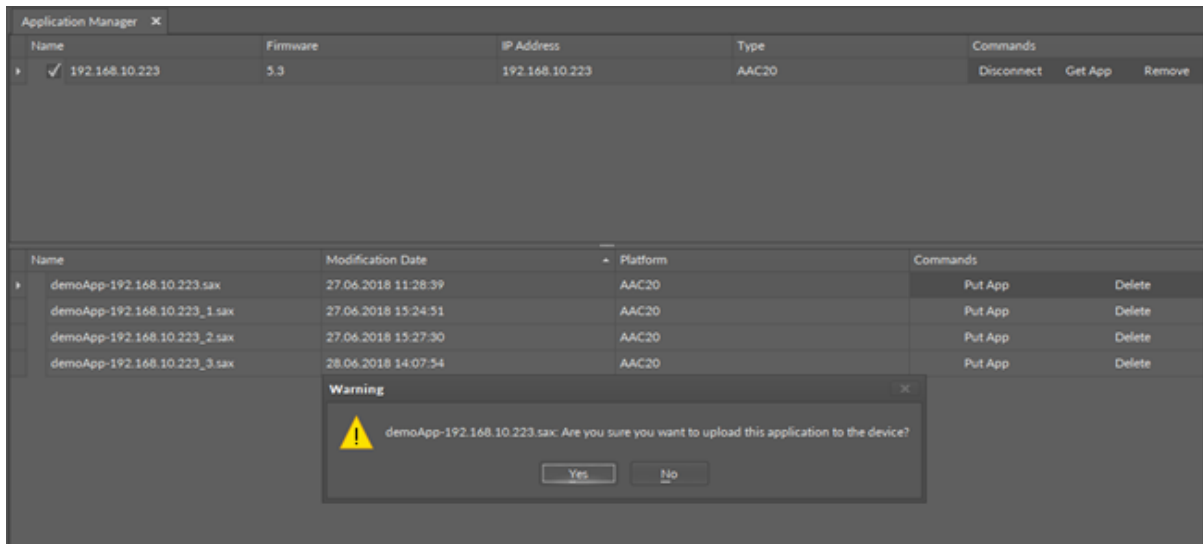


Figure 21. User confirmation before upload the application

After approving the confirmation, a process blocking the iSMA Tool interface runs for a period of time, when the iSMA Tool uploads a chosen application and restarts and reconnects the device.

**Note:** Application uploading process is monitored in detail in the Console window, which helps to analyze the situation when application upload could not finish.

## 6 App

The app component is the fundamental component of the Sedona framework. It embraces all services, drivers, and components that allow to manage a Sedona device and create an application. The application consists of services and components available in the form of kits. Components within the application are processed in every working cycle of the device. Services include certain components enabling system functions such as user management. All these items must be placed under the main app component. When the application is modified, the app icon is displayed with a graphic notification that the application should be saved. There is a possibility to turn on the application autosave option.

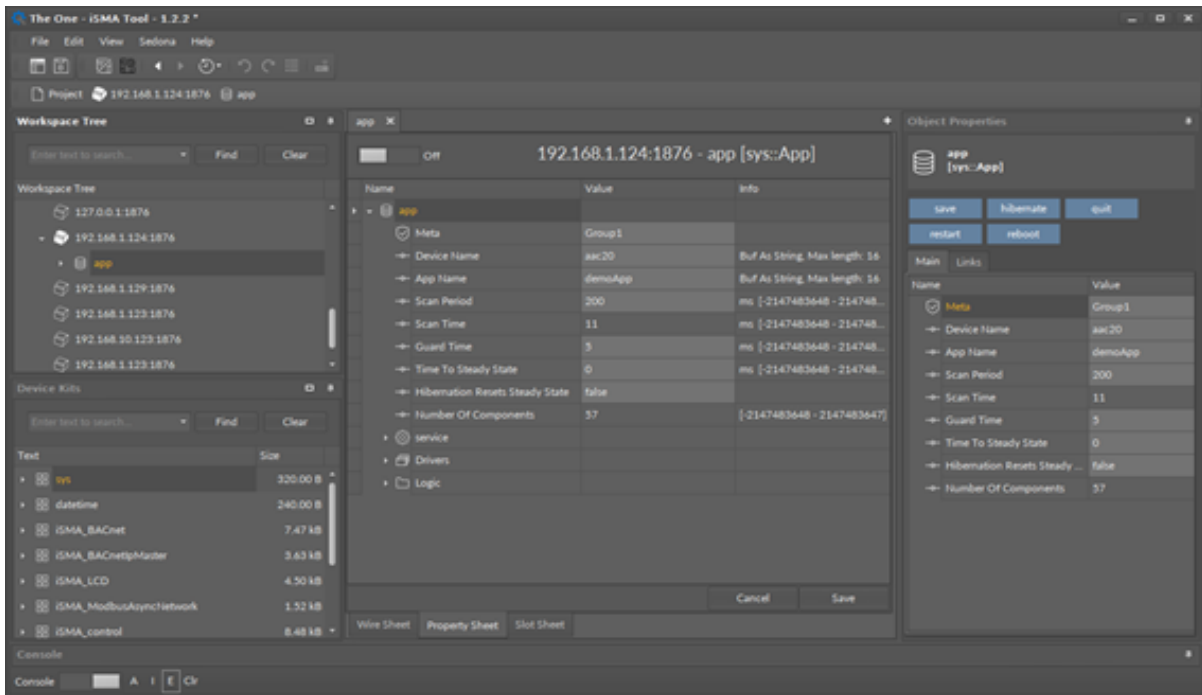


Figure 22. Sedona application structure view

The app component has the following slots:

- **Device Name:** shows the name of the device, may be edited manually by the user;
- **App Name:** shows the name of the application, may be edited manually by the user;
- **Scan Period:** allows to set one cycle execution time;
- **Scan Time:** shows the actual time of one cycle execution;
- **Guard Time:** allows to set time reserved to finish system tasks;
- **Time To Steady State:** allows to set the time from app start to steady state;
- **Hibernation Resets Steady State:** option not active for AAC20 controllers;
- **Number Of Components:** shows the number of components used in the application.

The app component has the following actions available at right-click or in the Object Properties window:

- **Save:** saves the application in the device's flash memory;
- **Restart:** restarts the application (Sedona Virtual Machine);
- **Reboot:** reboots the device;
- **Quit:** closes the SOX connection;
- **Hibernate:** deactivates the app component.

## 6.1 Plat

The Plat service is a component which shows device's main parameters. This component is placed under the Service folder and is associated with the device hardware. The component has to be placed under Service component in order to work properly.

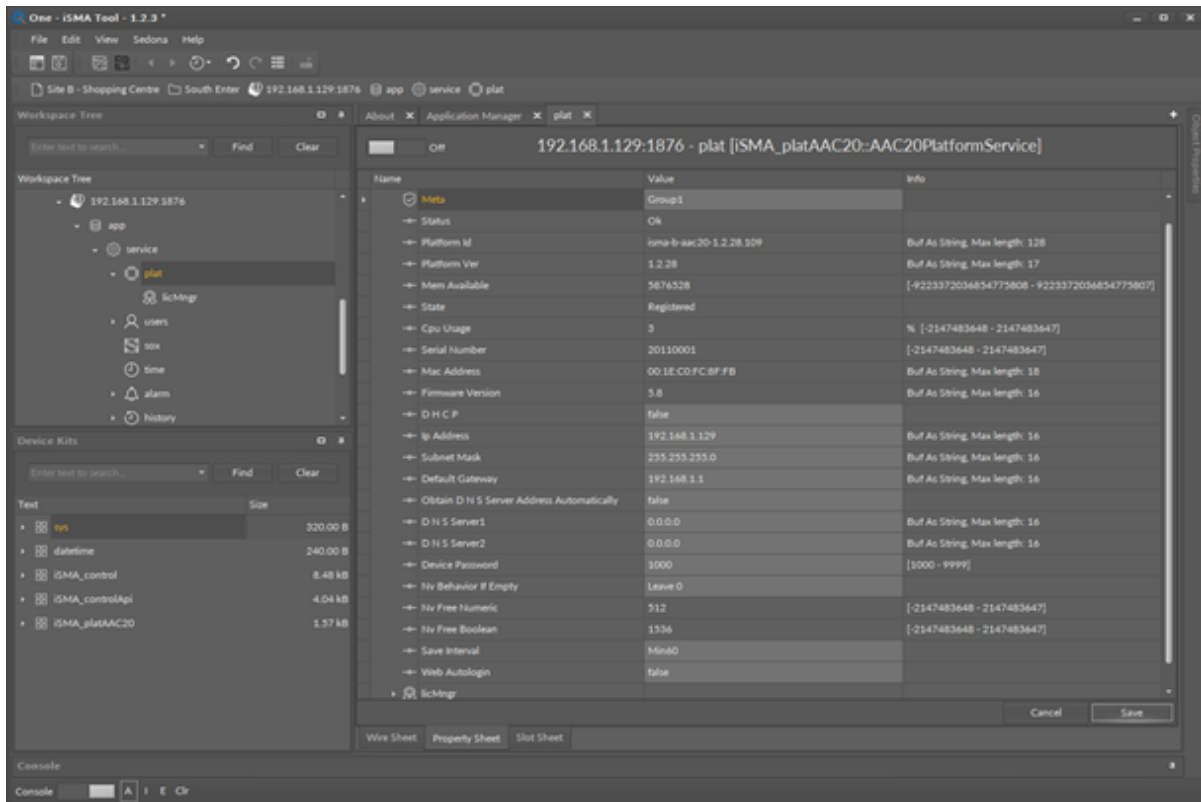


Figure 23. The Plat component view

The plat service has the following slots:

- **Status:** shows the component's status;
- **Platform Id:** shows the platform ID;
- **Platform Ver:** shows the platform's version;
- **Mem Available:** shows the RAM memory available in the controller;
- **State:** shows the license status;
- **Cpu Usage:** shows the CPU usage from last 5 seconds;
- **Serial Number:** shows the serial number of the device;
- **Mac Address:** shows the MAC address of the device;
- **Firmware Version:** shows the firmware version installed in the controller;
- **DHCP:** enables address setting by the DHCP server;
- **IP Address:** allows to set the device's IP address (if the DHCP slot is enabled, this slot shows the current IP address);
- **Subnet Mask:** allows to set the device's subnet mask (if the DHCP slot is enabled, this slot shows the current IP mask);
- **Default Gateway:** allows to set the device's default gateway IP address (if the DHCP slot is enabled, this slot shows the current gateway IP address);
- **Obtain DNS Server Address Automatically:** allows to obtain the DNS IP address automatically from the DHCP server (if the DHCP slot is enabled), or set it manually;
- **DNS Server 1:** allows to set a first DNS server IP address;
- **DNS Server 2:** allows to set a second DNS server IP address;

- **Device Password:** allows to set a password for the platform user;
- **Nv Behavior If Empty:** allows to adjust the non-volatile components behavior after copying the output value (available options: Leave 0, Copy from Default);
- **Nv Free Numeric:** shows a number of available numeric non-volatile components;
- **NV Free Boolean:** shows a number of available Boolean non-volatile components;
- **Save Interval:** allows to set the application autosave interval;
- **Web Autologin:** allows to enable or disable the password protection to access the web page.

The plat service has the following actions:

- **Restart:** restarts the application (Sedona Virtual Machine);
- **Reboot:** reboots the device;
- **Reload Firmware:** reboots the device and updates the firmware if a proper firmware file has been successfully sent to the device before;
- **CopyFromNvToDefault:** copies values from the Out slot to the Default slot in all NV components (see section NV Components);
- **CopyFromNvToUser:** copies values from the Out slot to the User slot in all NV components (see section NV Components);
- **CopyFromDefaultToNv:** copies values from the Default slot to the Out slot in all NV components (see section NV Components);
- **CopyFromUserToNv:** copies values from the User slot to the Out slot in all NV components (see section NV Components);
- **SetAllNvInAuto:** sets all NV components in auto mode (see section NV Components).

### 6.1.1 Changing IP Address

iSMA-B-AAC20 controllers have two built-in Ethernet ports working in switch mode. By default, the new device's address is set to 192.168.1.123, subnet mask to 255.255.255.0, and default gateway to 192.168.1.1. The device offers the option to change the IP address at three levels:

- the iSMA Tool application;
- the website;
- the device display (available only for devices with a built-in display: iSMA-B-AAC20-LCD, iSMA-B-AAC20-LCD-M, iSMA-B-AAC20-LCD-D).

All these options allow to set a static IP address or enable an option of addressing by the DHCP server.

#### Changing IP Address in Application

To change the IP address in the application, log in to the device (admin or user with authorization to change the address in the plat component). Then go to the plat service (Device -> App -> Service -> plat) and make changes to the slots: IP Address, Subnet Mask, Default Gateway, and save the application (App Component -> Save action). To make changes, restart the device using the Reboot action in the App component. The device restarts with the new IP address.

## Changing IP Address over Web Page

To change the IP address of the device, go to the device's website—enter the current IP address in the URL field of any browser, log in using a “platform” username and a numerical password from the Device password slot in the plat component (default: 1000). Go to the IP Configuration tab and make appropriate changes in the following slots: IP Address, Subnet Mask, Gateway (Mac Address slot is read-only), click Submit to save the application, and restart the device using the Reboot button. The device will start up with the new IP address.

**WARNING!** Once changing of the IP address is implemented with a reboot, change the URL address in the browser accordingly in order to enter the device's website.

## Changing IP Address Using System Display (iSMA-B-AAC20-LCD, iSMA-B-AAC20-LCD-M, iSMA-B-AAC20-LCD-D)

To change the IP address from the system display, hold the F1 function key down until the screen shows "Enter password". Then enter a numeric password (plat component -> Device Password slot; the default value is 1000). In the system menu, use arrows on the right side to go to the Network Config line and press Enter. Then select the appropriate line and press Enter again. The changes make the arrow on the right side (+ / -) move to the next position by pressing the Enter key. To validate the change, hold Enter down until transferred to the system menu and then select Reboot. The device starts up with the new IP address.

## 6.2 Users Service

The users service allows to manage users of the controller. The service includes a User Manager view, which shows a list of registered users and allows to adjust their access rights to individual components (each Sedona application component has a Meta slot used to assign it to one or more groups of access rights; Sedona has 4 predefined groups, which are accessible in the User Manager). The User Manager also enables adding and removing users.

**WARNING!** In the users service only Sedona users can be modified. The “platform” user is the control operating system and can only be modified (password change) from the plat component, built-in display, or from the controller's web page.

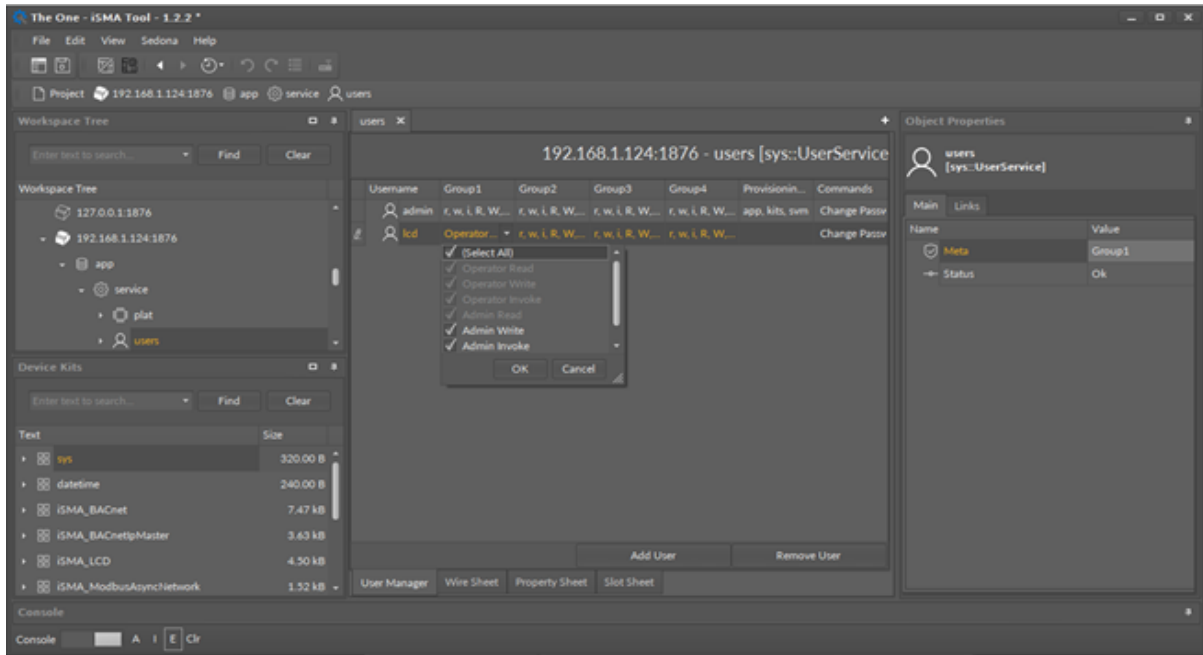


Figure 24. User Manager view

## 6.2.1 User Rights and Permissions

Users can be assigned the following types of rights:

- Operator Read: allows to read components, read values of operator properties;
- Operator Write: allows to change values of operator properties;
- Operator Invoke: allows to invoke operator actions;
- Admin Read: allows to read values of properties, read links, generate components links;
- Admin Write: allows to change values of properties, add components, sort dub components, rename components, generate links to components, delete links to components;
- Admin Invoke: allows to invoke admin actions of components;
- Admin User: allows to manage users (read, write, edit, delete).

Users can also be assigned the following provisioning permissions:

- Can provision app: can read/write app.sab file;
- Can provision app: can read/write kits.scode file;
- Can provision app: can read/write SVM files.

For devices with a built-in LCD, displaying components such as action editing/invoking is defined by assigning the given component to a group and defining access rights for the user from this group.

## 6.3 DateTime

The DateTimeService is a component, which operates the built-in real time clock (RTC). The clock can be synchronized with a local PC's clock, or by using the iSMASox driver, with the Niagara device. For more information regarding the DateTimeService see the iSMA Tool manual.



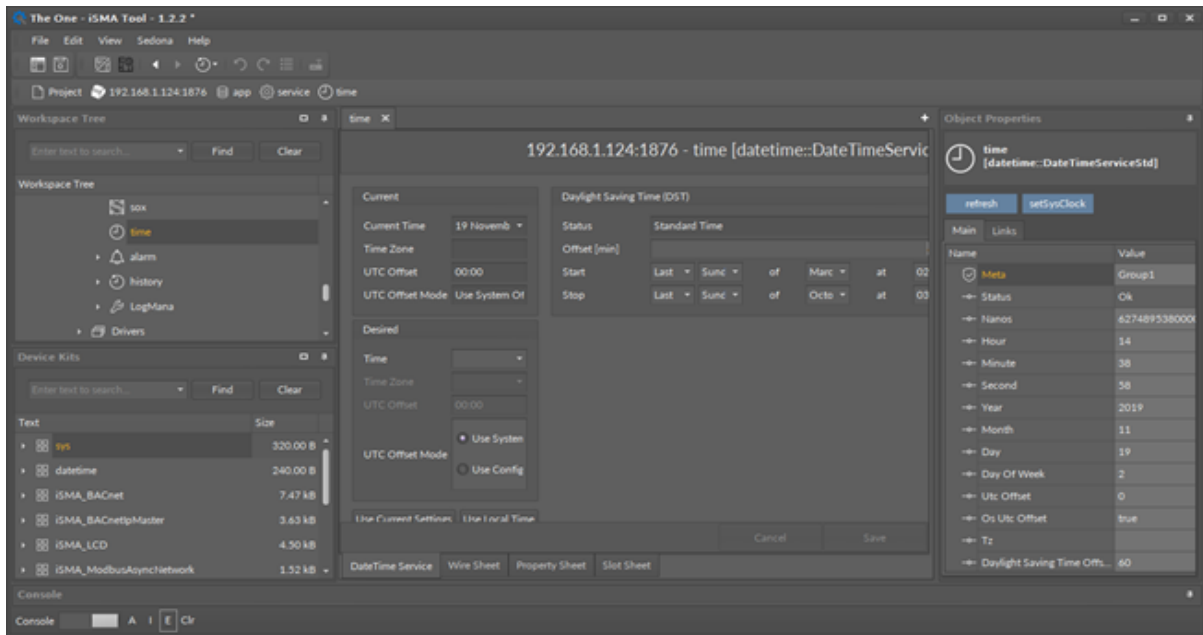


Figure 25. DateTimeService

## 7 NV Components

The NV components (non-volatile) are the components which values can be recorded in an EEPROM device's non-volatile memory. Whenever the device is restarted or the power is down, the values of NV components remain saved. The device has three types of NV components, broken down by the types of variables they support, which include:

- Boolean variables: NVBooleanWritable component;
- Integer variables: NVIntegerWritable component;
- Numeric (float) variables: NVNumericWritable component.

NV components can operate in the Auto mode (the In slot values are transferred to the Out slot) or in the Hand mode (the Out value is entered manually by the user and cannot be changed by the application).

There are available 512 memory cells for numeric (float/numeric and integer) values and 1536 memory cells for Boolean values in the iSMA-B-AAC20 controllers. NVNumeric and NVInteger components use one numeric cell memory for the Out value and one Boolean memory cell for the Auto/Hand switch mode. NVBoolean components use two Boolean memory cells, one for the Out value and one for the Auto/Hand switch mode.

Since the values of the components are not stored in the Sedona application but in the non-volatile memory of the device, when an application is copied between two devices, output values are not saved and will assume the values stored in the local EEPROM memory. To copy NV components to another device along with their values (e.g., setpoint), use global actions of the plat component:

**Step 1:** Use global actions CopyFromNvToDefault / CopyFromNvToUser;

**Step 2:** Save the application and copy it to another device;

**Step 3:** Use global actions on the target device CopyFromDefaultToNv / CopyFromUserToNv.

### 7.1 NVBooleanWritable

The NVBooleanWritable is the component that stores the output value in the non-volatile EEPROM memory of the device. After rebooting the device or in case of the power failure, the component value is restored from this memory. The iSMA-B-AAC20 controllers have 1536 Boolean memory cells. The occupied space meter for EEPROM is embedded in the plat component. The NVBooleanWritable component occupies two Boolean memory cells (value of the component and the position of the Auto/Hand switch).

The NVBooleanWritable component is also used to integrate Boolean variables from various sources. This is done using the 'reverse following the link' function. The Out slot is connected to the In slots of various protocols, for example, LCD or Modbus variable. When changing a value in one of the components, the device will perform the Set action on the NV component to synchronize the values in all the connected components.

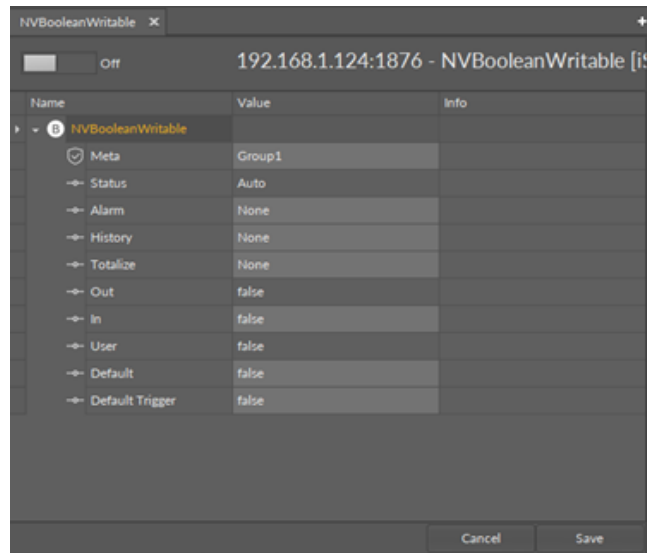


Figure 26. NVBooleanWritable component

The NVBooleanWritable component has the following slots:

- **Status:** shows the current status of the component (Auto/Hand);
- **Alarm:** alarm extension;
- **History:** history extension;
- **Totalize:** totalize extension;
- **Out:** the output slot,
- **In:** the input slot,
- **User:** the user value slot (introduced by the Set action);
- **Default:** the default value slot (set by global command from the plat component);
- **Default Trigger:** copies trigger from the Default slot to the Out slot.

The NVBooleanWritable component has the following actions:

- **Set:** allows to manually set the User slot and the In slot if there is no link to the In slot;
- **Set In Hand:** this option sets the value on Out slot and blocks changing from any other slots;
- **Set In Auto:** this option switches off the Hand mode and sets Out slot according to the In slot's value.

The NVBooleanWritable component allows adding extensions such as:

- **Alarm Change Of State:** generates alarms when the component is in a particular state;
- **History:** records the value at a specific point in time, over a defined period of time at a change by a certain value, or in both of these cases;
- **Totalize:** counts the time over which the value of a point is in a particular state.

## 7.2 NVIntegerWritable

The NVIntegerWritable is a component that stores the output value in non-volatile EEPROM memory of the device. After rebooting the device or in case of the power failure, the component value is restored from this memory. The iSMA-B-AAC20 controllers have 1536 Boolean memory cells and 512 numeric cells. Space meter of the occupied EEPROM's memory is located in the plat component. The NVIntegerWritable component occupies one memory cell of the numeric type (component value) and one memory cell of the Boolean type (switch position Auto/Hand).

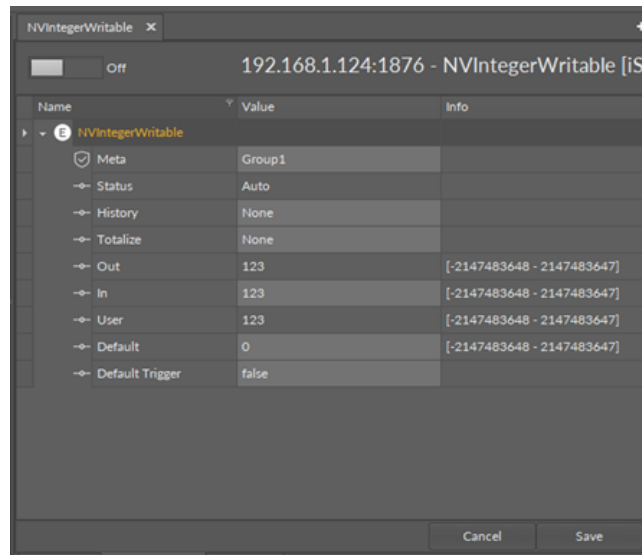


Figure 27. NVIntegerWritable component

The NVIntegerWritable component has the following slots:

- **Status:** shows the current status of the component (Auto/Hand);
- **History:** history extension;
- **Totalize:** totalize extension;
- **Out:** the output slot,
- **In:** the input slot,
- **User:** the user value slot (introduced by the Set action);
- **Default:** the default value slot (set by global command from the plat component);
- **Default Trigger:** copies trigger from the Default slot to the Out slot.

The NVIntegerWritable component has the following actions:

- **Set:** allows to manually set the User slot and the In slot if there is no link to the In slot;
- **Set In Hand:** this option sets the value on Out slot and blocks changing from any other slots,
- **Set In Auto:** this option switches off the Hand mode and sets Out slot according to the In slot's value.

The NVIntegerWritable component allows to add extensions such as:

- **History:** records the component's value at a specific point in time over a defined period of time or at a change by a certain value, or in both of these cases;
- **Totalize:** counts the time when the point's value is not zero.

### 7.3 NVNumericWritable

The NVNumericWritable is the component that stores the output value in non-volatile EEPROM memory of device. After rebooting the device or in case of the power failure, the component value is restored from this memory. The iSMA-B-AAC20 controllers have 1536 Boolean memory cells and 512 numeric cells. Space meter of the occupied EEPROM's memory is located in the plat component. The NVNumericWritable component occupies one memory cell of the numeric type (component value) and one memory cell of the Boolean type (switch position Auto/Hand).

The NVNumericWritable component is also used to integrate numeric (float) variables from various sources. This is done using the "reverse following the link" function. The Out

slot is connected to the In slots of various protocols, for example, LCD or Modbus variable. When changing the value in one of the components, the device will perform the Set action on the NV component to synchronize the values in all the connected components.

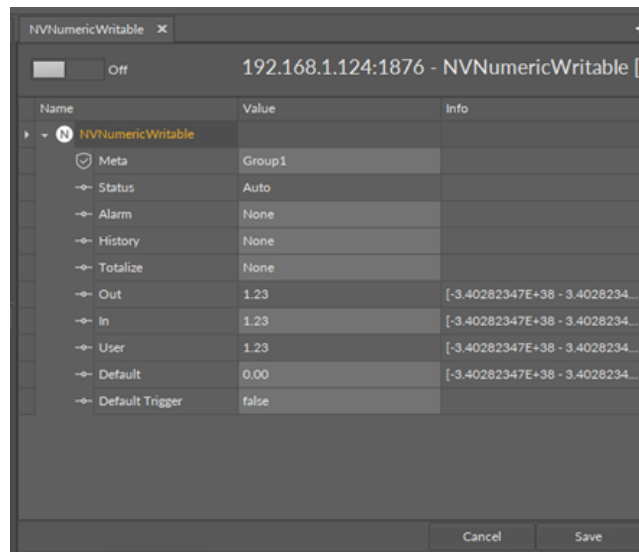


Figure 28. NVNumericWritable

The NVNumericWritable component has the following slots:

- **Status:** shows the current status of the component (Auto/Hand);
- **Alarm:** alarm extension;
- **History:** history extension;
- **Totalize:** totalize extension;
- **Out:** the output slot,
- **In:** the input slot,
- **User:** the user value slot (introduced by the Set action);
- **Default:** the default value slot (set by global command from the plat component);
- **Default Trigger:** copies trigger from the Default slot to the Out slot.

The NVNumericWritable component has the following actions:

- **Set:** allows to manually set the User slot and the In slot if there is no link to the In slot;
- **Set In Hand:** this option sets the value on Out slot and blocks changing from any other slots,
- **Set In Auto:** this option switches off the Hand mode and sets Out slot according to the In slot's value.

The NVNumericWritable component allows to add extensions such as:

- **History:** records the component's value at a specific point in time over a defined period of time or at a change by a certain value, or in both of these cases;
- **Totalize:** counts the time when the point's value is not zero.

## 7.4 NVMultiStateWritable

The NVMultiStateWritable is a component that stores the output value in non-volatile EEPROM memory of device. After rebooting the device or in case of the power failure, the component value is restored from this memory. The iSMA-B-AAC20 controllers have 1536 Boolean memory cells and 512 numeric cells. Space meter of the occupied EEPROM's

memory is located in the plat component. The NVMultiStateWritable component occupies one memory cell of the numeric type (component value) and one memory cell of the Boolean type (switch position Auto/Hand).

In the NVMultiStateWritable component it is possible to define sixteen string outputs depending on the Integer value on the input of the component.

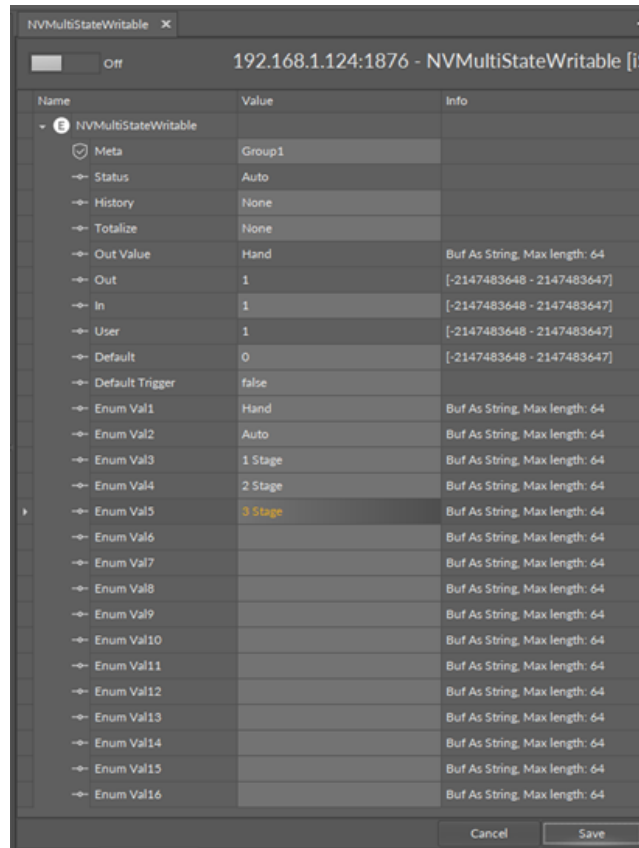


Figure 29. NVMultiStateWritable

The NVMultiStateWritable component has the following slots:

- **Status:** shows the current status of the component (Auto/Hand);
- **History:** history extension;
- **Totalize:** totalize extension;
- **Out:** the output slot,
- **In:** the input slot,
- **User:** the user value slot (introduced by the Set action);
- **Default:** the default value slot (set by global command from the plat component);
- **Default Trigger:** copies trigger from the Default slot to the Out slot;
- **Enum Val1-Val16:** string values which will be shown on the output depending on the input value.

The NVMultiStateWritable component has the following actions:

- **Set:** allows to manually set the User slot and the In slot if there is no link to the In slot;
- **Set In Hand:** this option sets the value on Out slot and blocks changing from any other slots,
- **Set In Auto:** this option switches off the Hand mode and sets Out slot according to the In slot's value.

The NVMultiStateWritable component allows you to add extensions such as:

- **Alarm Out Of Range:** generates alarms whenever the value of the component exceeds a given value;
- **History:** records the component's value at a specific point in time over a defined period of time or at a change by a certain value, or in both of these cases;
- **Totalize:** counts the time when the point's value is not zero.

## 8 History Extension

The iSMA-B-AAC20 controllers have an embedded historical extension for writing trends in the microSD card memory. By default, the device is not equipped with an SD card, historical service SD card should be installed when necessary. The historical extension can be added only in the NVBooleanWritable, NVIntegerWritable, and NVNumericWritable components. To add the extension, choose one of three available types in the NV History slot components. Every historical type has predefined 2500 recordable samples. After reaching the limit, the oldest recordings are overwritten. While creating a historical record, the device opens a database file on the SD card. Any such file can serve up to 200 extensions. Once the limit is reached, the new database file is opened.

### 8.1 History Service

The history service is a component, which is responsible for writing historical values in the microSD memory. The history service is available in the iSMA\_controlApi kit palette and the component must be placed under the service folder.

After any historical extension is added on the NV component, a historical database will be created under the history service component in order to store NV points of historical components.

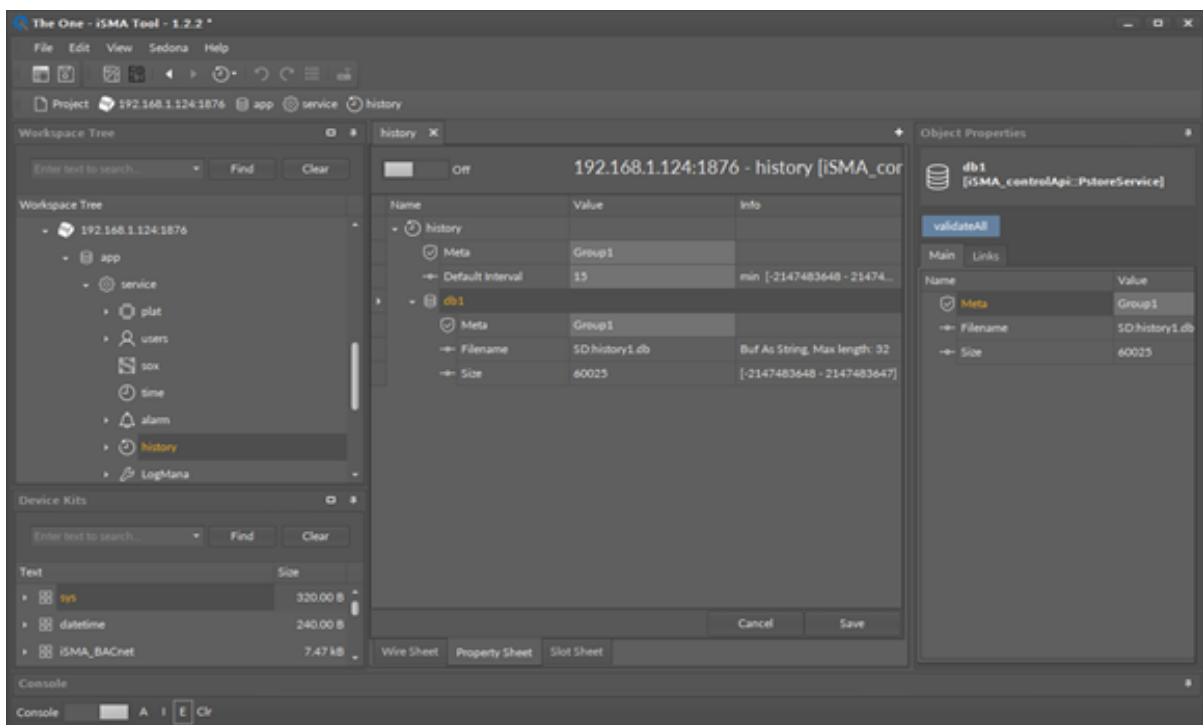


Figure 30. The History service in the Property Sheet view

### 8.2 COV

The COV (Change of Value) history extension is used to collect data whenever a specific change of value occurs. If the COV option is chosen in the NV component, a history COV component is created under the history service, and a link with NV point Out slot is made. For configuration settings please refer to historical components under the history service.



**WARNING!** To delete or change a historical extension type, do not remove it manually from the history service. Go to the NV component, choose the None option in the history slot, and save it (extension will be deleted by the system, along with all the database settings). In order to change the type, choose the None option first, save, and after that choose the required option.

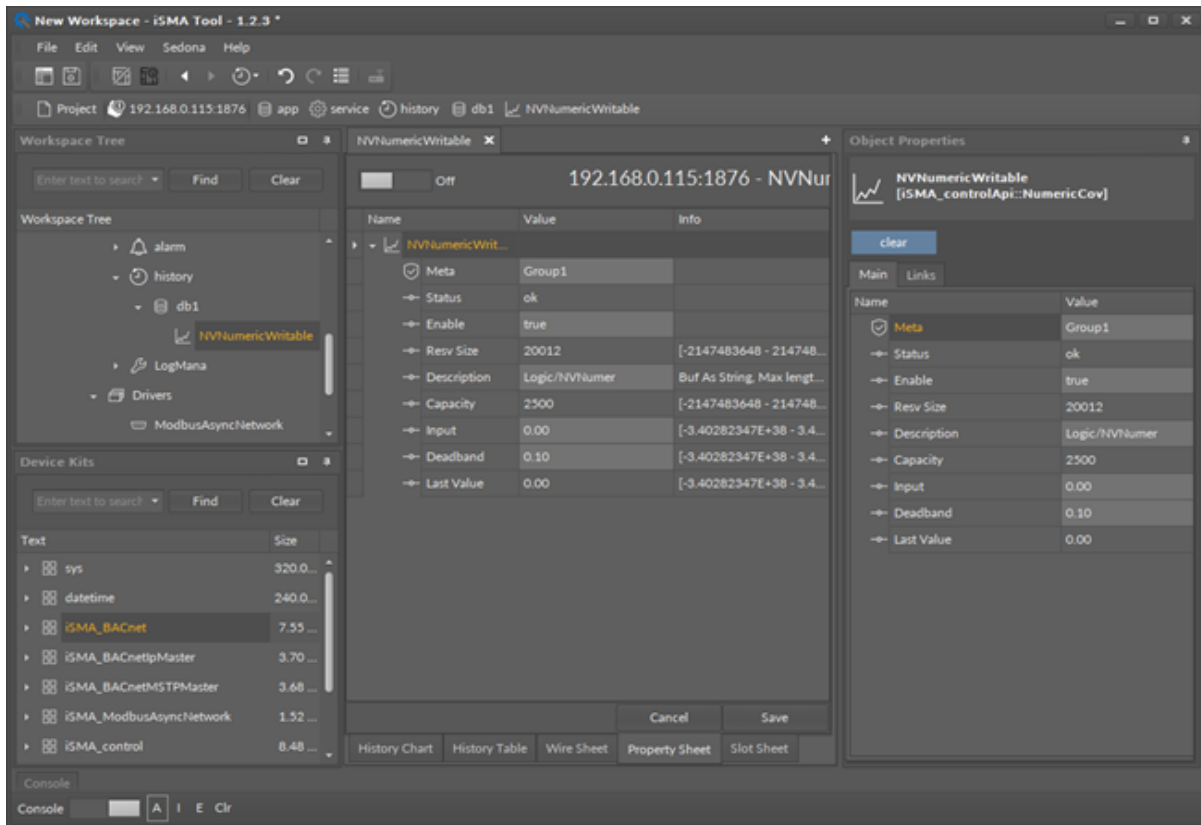


Figure 31. History COV in the Property Sheet view

The component has the following slots:

- **Status:** shows the history component status;
- **Enable:** allows to enable or disable collecting the history logs;
- **Resv Size:** allows to set the history memory reserve size;
- **Description:** allows to enter a component's description;
- **Capacity:** shows the number of available history records;
- **Deadband:** allows to save hysteresis,
- **Input:** current value;
- **Last Value:** shows the last saved value.

### 8.3 Interval

Interval history extension is used to collect data at specified time intervals. When you choose interval option in the NV component, a history interval will be created under the history service and a link to the NV point Out slot will be created. For configuration and settings, please refer to historical components under the history service.

**WARNING!** To delete or change a historical extension type, do not remove it manually from the history service. Go to the NV component, choose the None option in the History slot, and save it (extension will be deleted by the system, along with all the database settings). In order to change the type, choose the None option first, save, and after that choose the required option.

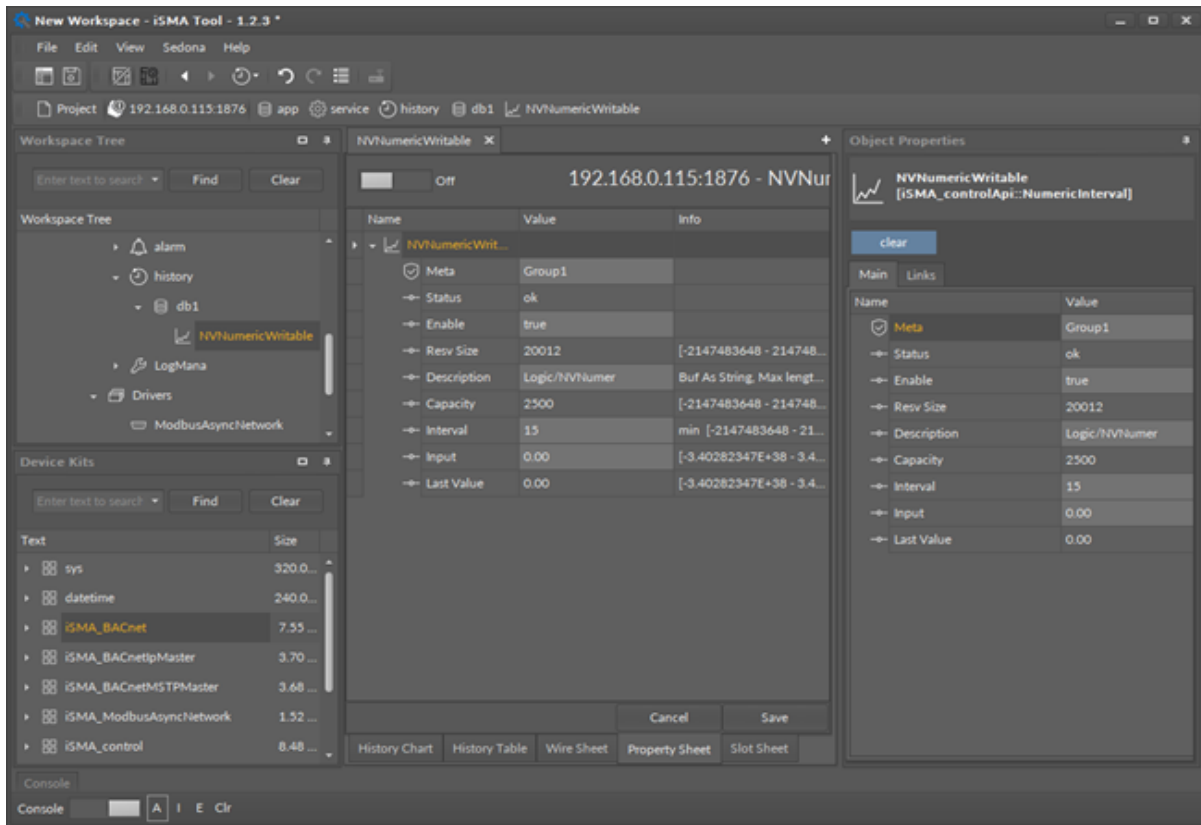


Figure 32. History interval in the Property Sheet view

The component has the following slots:

- **Status:** shows the history component status;
- **Enable:** allows to enable or disable collecting the history logs;
- **Resv Size:** allows to set the history memory reserve size;
- **Description:** allows to enter a component's description;
- **Capacity:** shows the number of available history records;
- **Interval:** allows to set the saving time interval;
- **Input:** current value;
- **Last Value:** shows the last saved value.

## 8.4 COV\_Interval

The COV\_Interval history extension is used to collect data whenever required changes has been made or at specified time intervals (whatever happens first). When the COV\_Interval option is chosen in the NV component, a history COVInterval component is created under the history service, and a link with NV point Out slot will be made. For configuration settings please refer to historical components under the history service.

**WARNING!** To delete or change a historical extension type, do not remove it manually from the history service. Go to the NV component, choose the None option in the history slot, and save it (extension will be deleted by the system, along with all the database settings). In order to change the type, choose the None option first, save, and after that choose the required option.

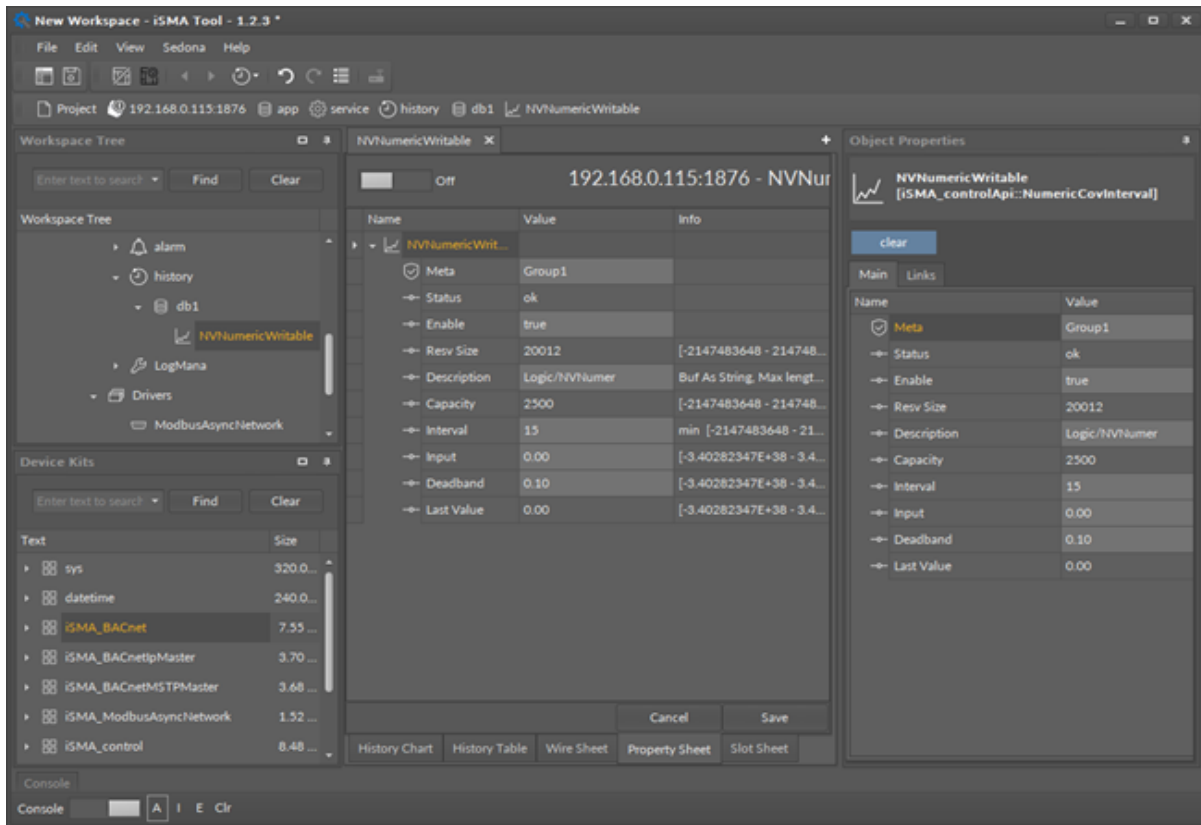


Figure 33. History\_COV\_Interval in the Property Sheet view

The component has the following slots:

- **Status:** shows the history component status;
- **Enable:** allows to enable or disable collecting the history logs;
- **Resv Size:** allows to set the history memory reserve size;
- **Description:** allows to enter a component's description;
- **Capacity:** shows the number of available history records;
- **Deadband:** allows to save hysteresis;
- **Interval:** allows to set the saving time interval;
- **Input:** current value;
- **Last Value:** shows the last saved value.

## 9 Alarm Extension

The iSMA-B-AAC20 controllers have a service that allows recording events / alarms. Alarms can be generated off the NV-type components only. Alarms can be recorded only on the SD card. By default, the device is not equipped with an SD card. In order to use the alarm service, SD card should be installed. When an extension of the alarm is created, the database file is created on the SD card. The device stores up to 2500 alarm events. If this number is exceeded, the new event will overwrite the oldest records.

To add an extension to the component alarm you must select an appropriate option in the Alarm slot (Change Of State for Boolean components, and Out Of Range for Numeric components). After changing and saving the settings, an alarm extension is created under the component, where all the settings associated with the process of generating an alarm event can be adjusted.

### 9.1 Alarm Service

The history service is a component, which is responsible for writing historical values in the microSD memory. The history service is available in the iSMA\_controlApi kit palette and the component must be placed under the service folder.

After any historical extension is added on the NV component, a historical database will be created under the history service component in order to store NV points of historical components.

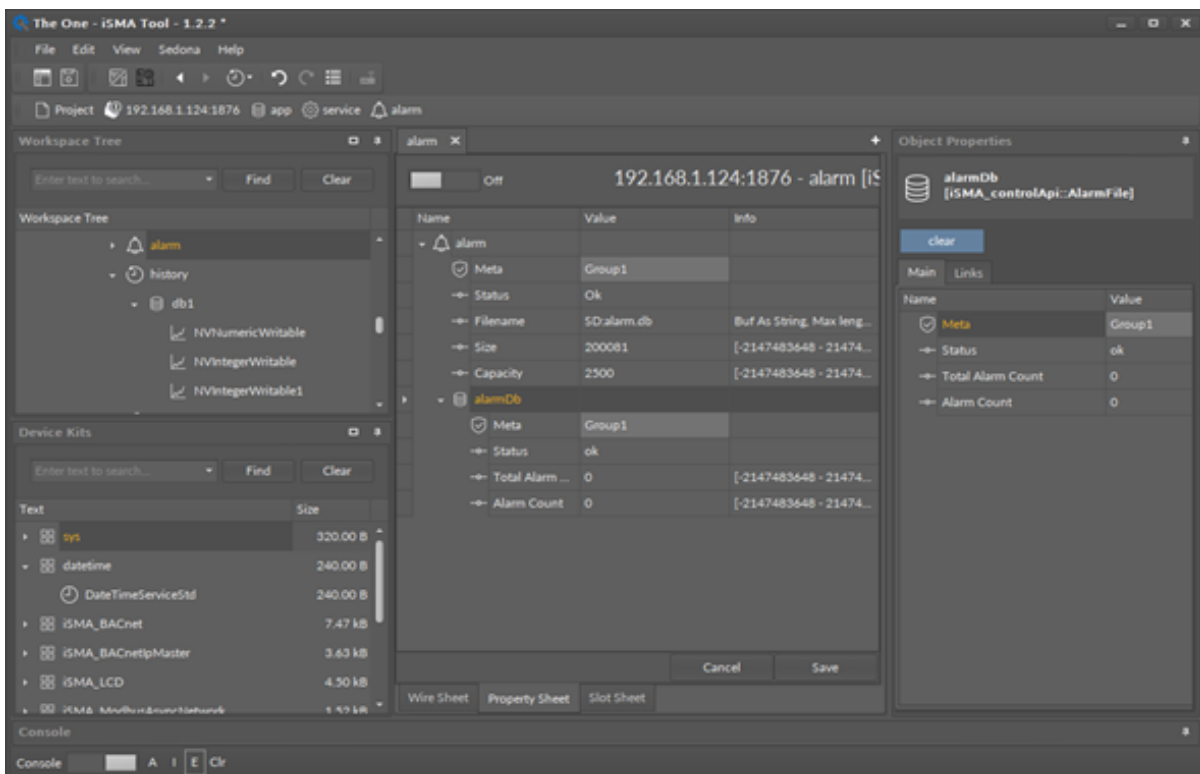


Figure 34. Alarm service in the Property Sheet view

## 9.2 Alarm Boolean Points

The Boolean alarm extension can be added only in the NVBooleanWritable components. To add the extension, choose the Change Of State option in the alarm slot, and an alarm extension will be created automatically under the NV component.

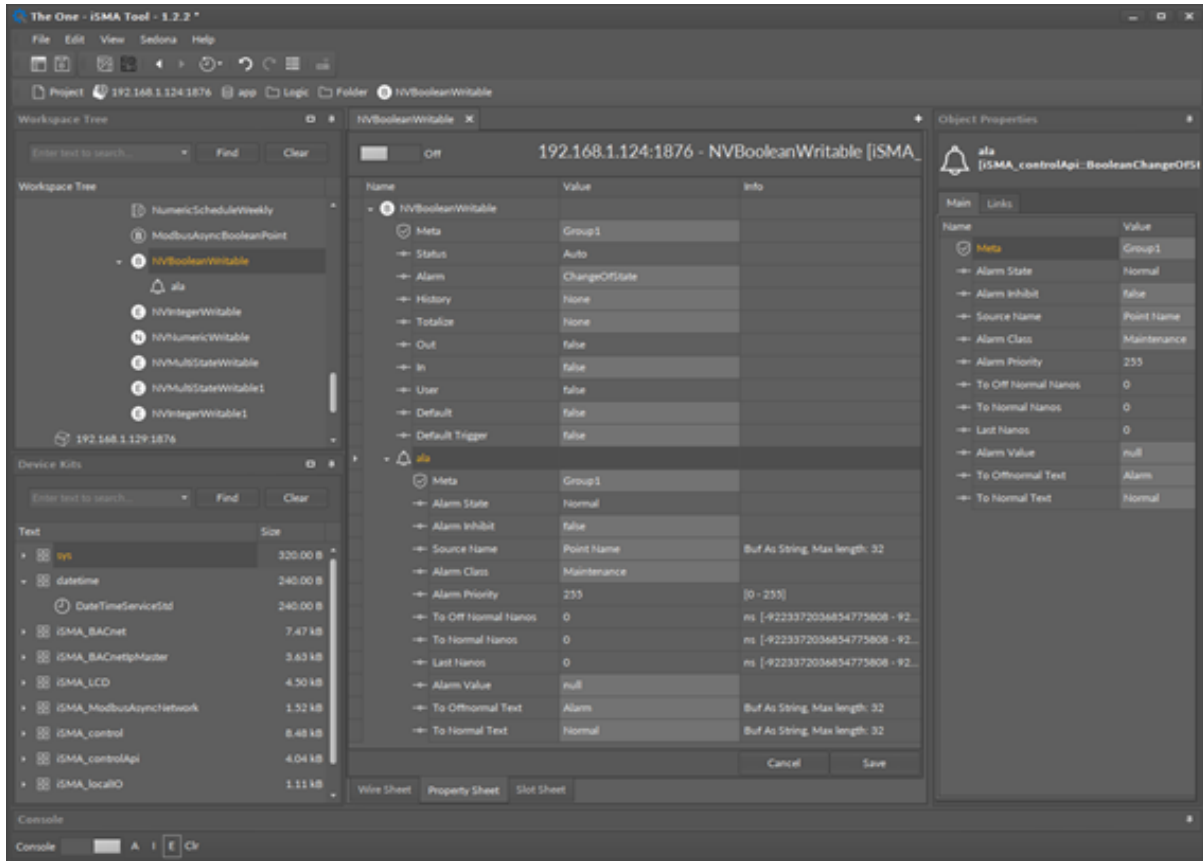


Figure 35. Alarm Boolean extension in the Property Sheet view

The alarm extension has the following slots:

- **Alarm Inhibit:** allows to enable or disable the alarm function;
- **Source Name:** allows to set the alarm name in the alarms database;
- **Alarm Class:** allows to set the alarm class and priority definition;
  - Available options: Live Safety (priority 15), Critical (priority 75), Maintenance (priority 155);
- **Alarm Priority:** shows the alarm priority number defined in the alarm class slot (default value is 255);
- **To Off Normal Nanos:** shows the time point of an alarm condition;
- **To Normal Nanos:** shows the time point of a normal condition;
- **Alarm State:** shows the actual alarm state;
- **Alarm Value:** allows to set an alarm generation value;
- **To Offnormal Text:** allows the enter a description in alarm state;
- **To Normal Text:** allows the enter a description in normal state.

## 9.3 Alarm Numeric Points

The numeric alarm extension can be added only in NVNumericWritable components. To add the extension, choose the Out Of Range option in the Alarm slot, and the alarm extension will be created automatically.

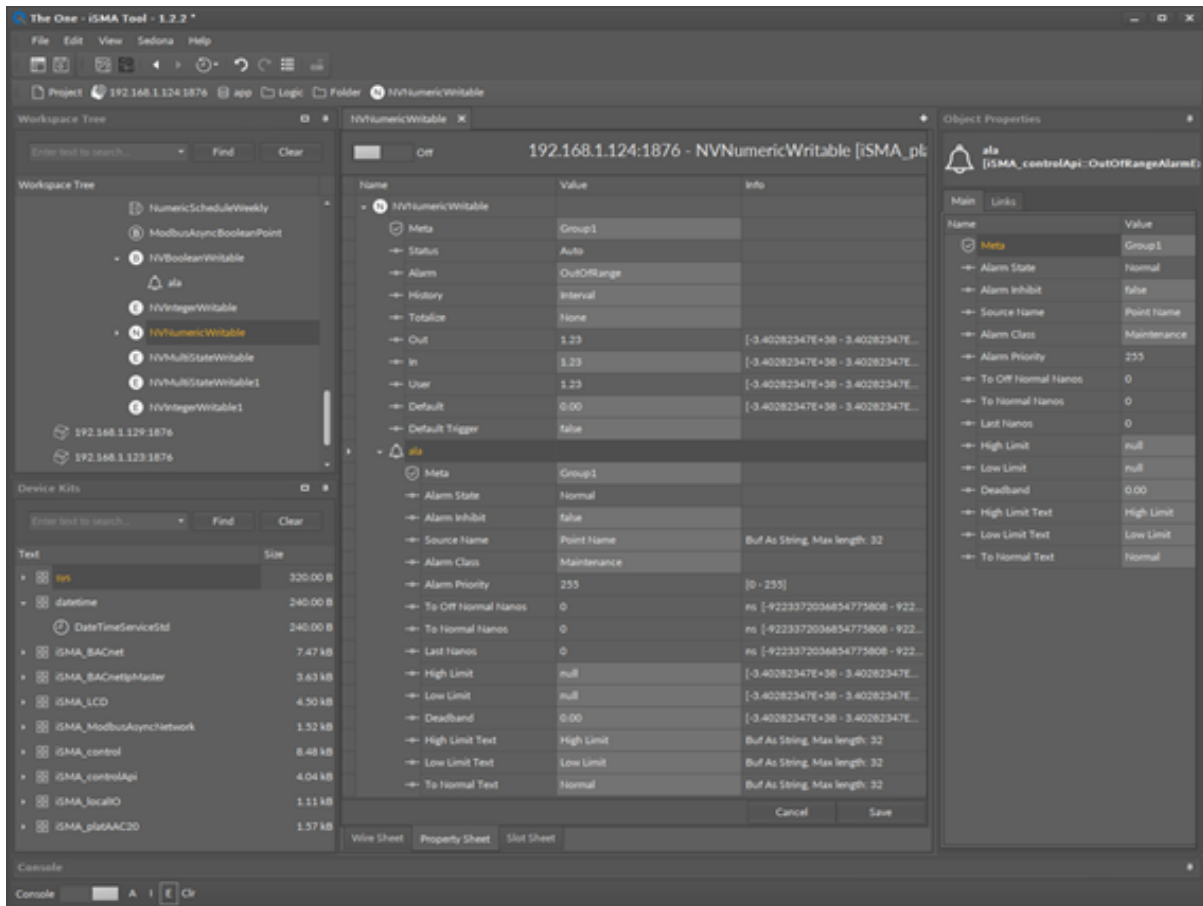


Figure 36. Alarm numeric extension in the Property Sheet view

The component has the following slots:

- **Alarm Inhibit:** allows to enable or disable the alarm function;
- **Source Name:** allows to set the alarm name in the alarms database;
- **Alarm Class:** allows to set the alarm class and priority definition;
  - Available options: Live Safety (priority 15), Critical (priority 75), Maintenance (priority 155);
- **Alarm Priority:** shows the alarm priority number defined in the alarm class slot (default value is 255);
- **To Off Normal Nanos:** shows the time point of an alarm condition;
- **To Normal Nanos:** shows the time point of a normal condition;
- **Alarm State:** shows the actual alarm state;
- **High Limit:** allows to set a high limit alarm generation value;
- **Low Limit:** allows to set a low limit alarm generation value;
- **Deadband:** allows to set a high and low limit deadband value;
- **High Limit Text:** allows to enter a description in alarm high state;
- **Low Limit Text:** allows to enter a description in alarm low state;
- **To Normal Text:** allows to enter a description in normal state.

## 10 Scheduler

The schedules in iSMA-B-AAC20 controllers are being created using schedule components, as found in the iSMA\_controlApi kit (kit is installed as part of a default application). There are two types of scheduling components available- BooleanScheduleWeekly for Boolean values and NumericScheduleWeekly for numeric values. For both types there are available max. 8 events for 7 week days. In a scheduling component the start time and value is defined. If value is null (for Boolean) or nan (for numeric), the event is discarding. For non-defined event scheduler will take value from the Def Val slot.

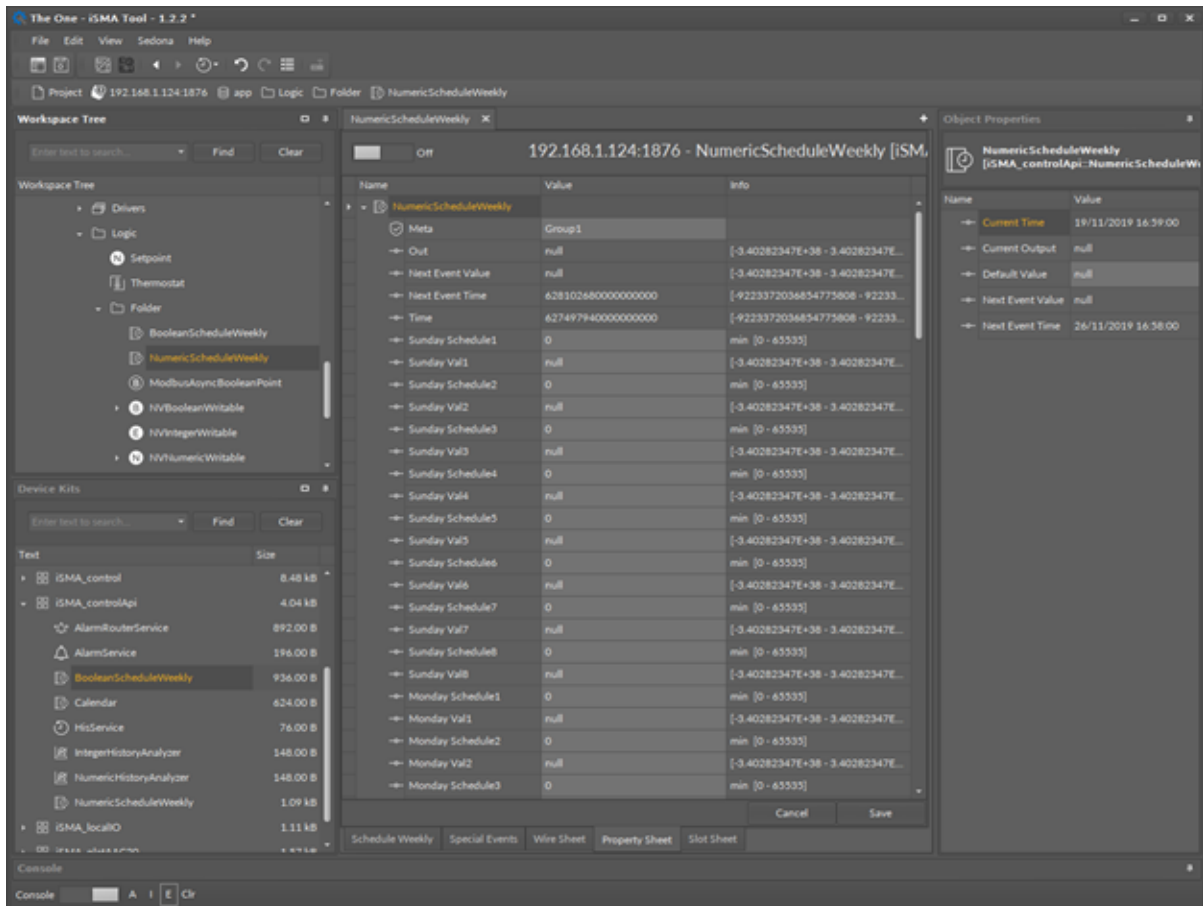


Figure 37. Schedule in the Property Sheet view



## 11 SOX Protocol

Sox is a standard protocol used to communicate with Sedona devices. The Sox protocol is also used by the iSMA Tool to program controllers. Note that Sox is of a service type and it is executed after application components. Therefore, if a difference between scan period and Scan Time (see App component) is minor, the services do not have enough time to be executed, and the programming interface can slow down. Sox is designed to be run over UDP/IP protocol (default port is 1876).

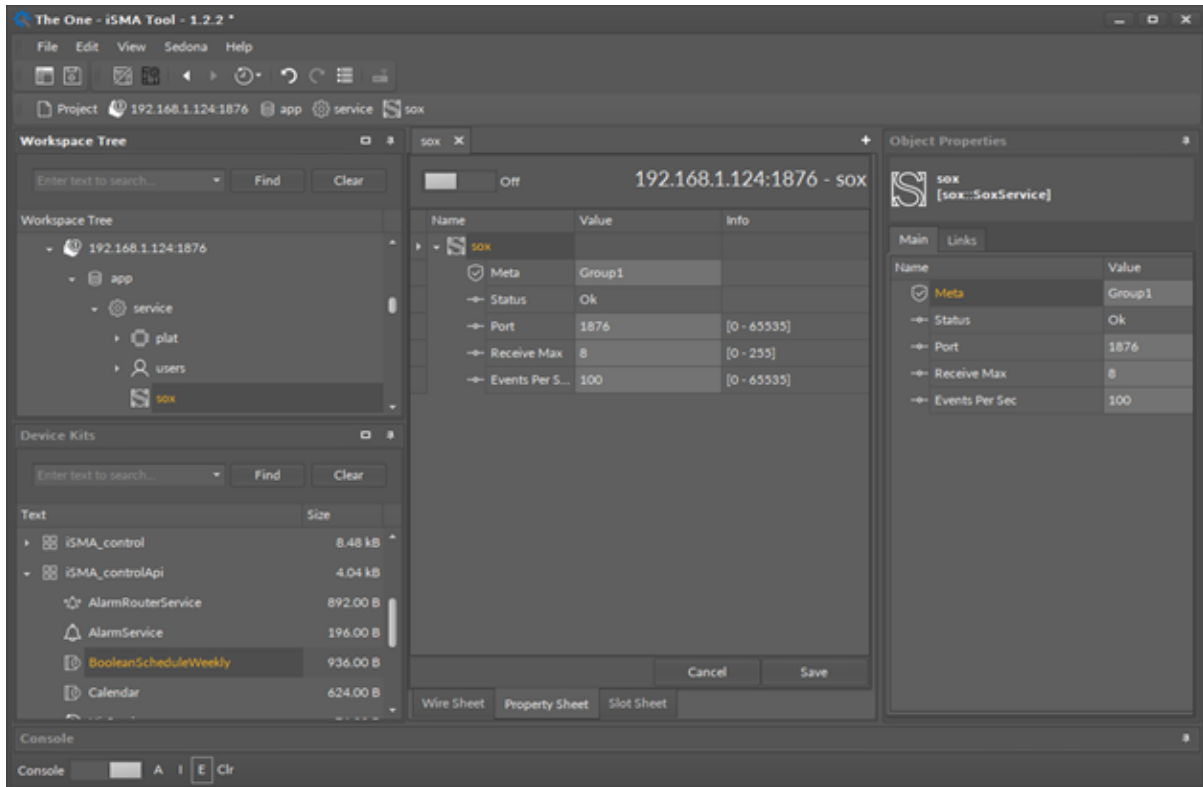


Figure 38. Sox protocol component in the Property Sheet view

The sox component has the following slots:

- **Status:** shows the sox driver actual status;
- **Port:** allows to set the sox UDP port (default value is 1876);
- **Receive Max:** allows to set a maximum number of messages in receiving window;
- **Events Per Sec:** allows to set a maximum number of async events (telegrams) sent per second.



## 12 1-Wire

1-Wire is a special protocol for device which is made by the Dallas company. Temperature sensors use DS18D20 chip. The 1-Wire bus uses 3 wire cable (+5 VCC, Data, GND) of maximum 100 m long (it is recommended to use shorter distance) and up to 32 sensors. All iSMA-B-AAC20 devices are equipped with a 1-Wire port which uses two analog outputs, AO5 and AO6.

**WARNING!** Before connecting a 1-Wire device to the controller, please add a 1-Wire network first. It will block the possibility of increasing voltage above 5 V and protect the 1-Wire sensor against damage.

### 12.1 Adding 1-Wire Network

To use the 1-Wire protocol, the iSMA\_OneWire kit needs be installed on the controller using Kit Manager (see Chapter [Kit Manager](#)). Then OneWireNetwork component needs to be placed under the Drivers folder.

**Note:** If a 1-Wire network has been added to the controller, the AO5 and AO6 are blocked for the 1-Wire type and cannot be used otherwise, for example, as regular outputs. This restriction cannot be changed manually.

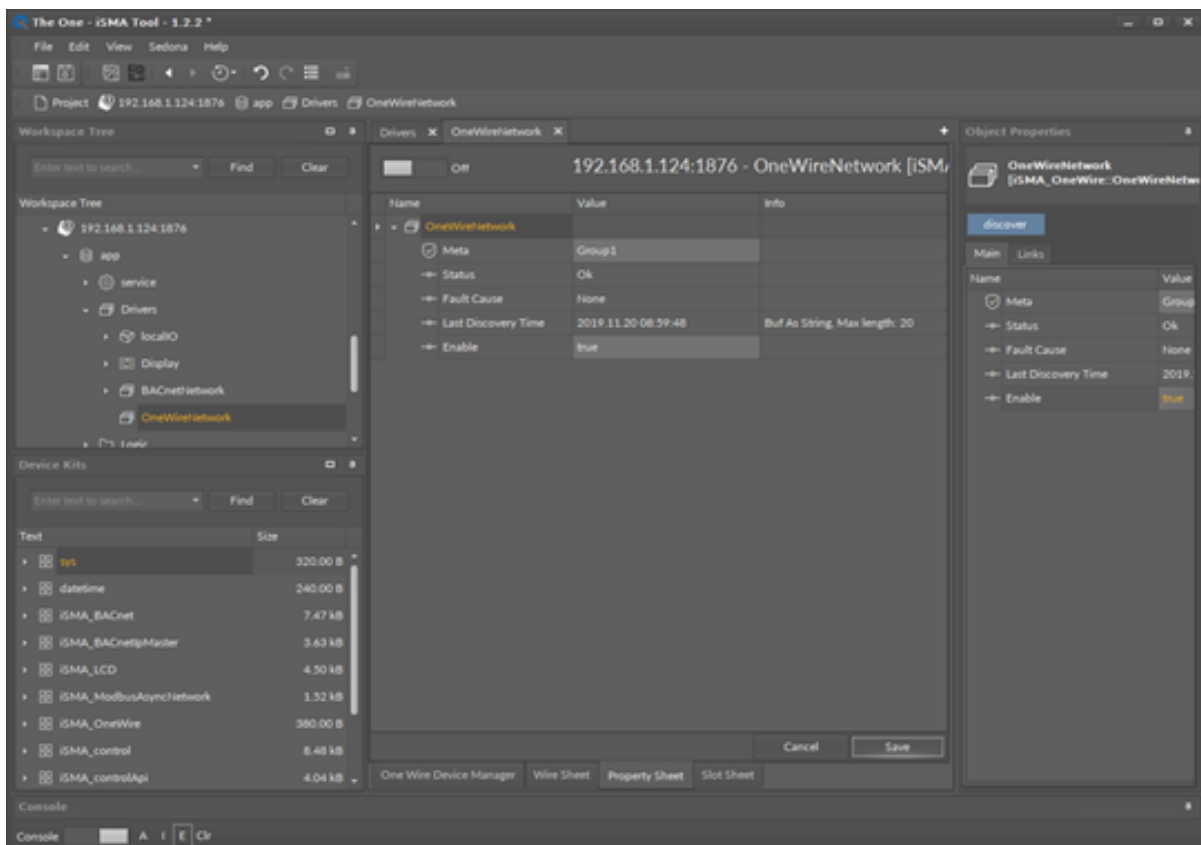


Figure 39. One Wire in the Property Sheet view

### 12.2 Discovering 1-Wire Sensors

The 1-Wire network has a discover action (under right-click). This action will automatically search and detect all sensors connected to the bus. It will also create a discover folder

and place all found sensors there. All sensors have a unique address assigned by the manufacturer (slot Address). There is also a Description slot to describe sensor function / place using max. 20 characters. All sensors components can be moved and grouped in OneWireFolders (folders must be also placed under the OneWireNetwork component).

### **12.3 Adding 1-Wire Sensors Manually**

To add a sensor manually, the OneWireThermometer component needs to be moved from the iSMA\_OneWire kit palette and be placed under the OneWireNetwork. Then sensor address needs to be entered and the application must be saved. If the connection and address are correct, the Status slot should have the Ok value, and the Out slot should show sensor temperature given in Celsius degrees.

## 13 LocalIO Driver

Local I/Os in the iSMA-B-AAC20 controller are supported by the iSMA\_localIO kit. The iSMA\_localIO kit consists of the following components:

- localIO driver: main component servicing physical I/Os;
- LocalIOConfig: component allowing to configure parameters of physical inputs and outputs of the device;
- LocalIOFolder: folder for grouping I/O components;
- 9 components servicing physical local I/Os:
  - AODigital: component for servicing analog output in digital mode (false: 0 V, true: 10 V);
  - AOVoltage: component for servicing analog output in voltage mode;
  - DI: component for servicing digital inputs;
  - DICounter: component reading high-speed counters of digital inputs;
  - DO: component for servicing digital outputs;
  - UIDigital: component for servicing universal inputs in dry contact mode;
  - UIResistance: component for servicing universal inputs in resistance mode;
  - UITemperature: component for servicing universal inputs in temperature mode (in order to get reliable readings, the appropriate temperature sensor type has to be selected in the LocalIOConfig component);
  - UIVoltage: component for servicing universal inputs in voltage mode (in order to improve readings, the LocalIOConfig component has to be activated for voltage reading).

In order to work properly components of this kit must be placed in a special LocalIOFolder under the localIO driver.

**Note:** It is recommended to pass the inputs and outputs signals through NV components.

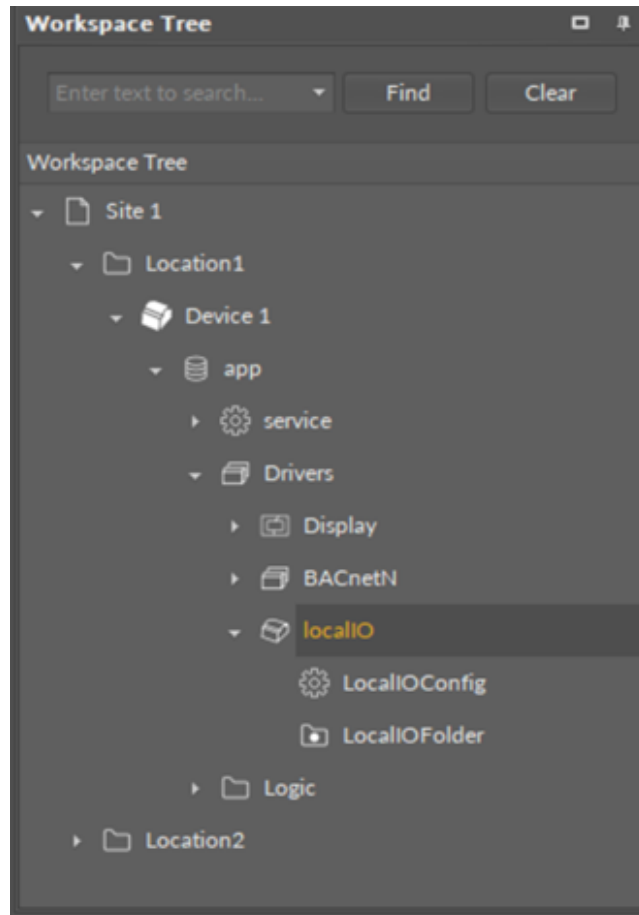


Figure 40. LocalIO driver

### 13.1 LocalIOConfig

The LocalIOConfig component is designed to configure the physical inputs and outputs of the device.

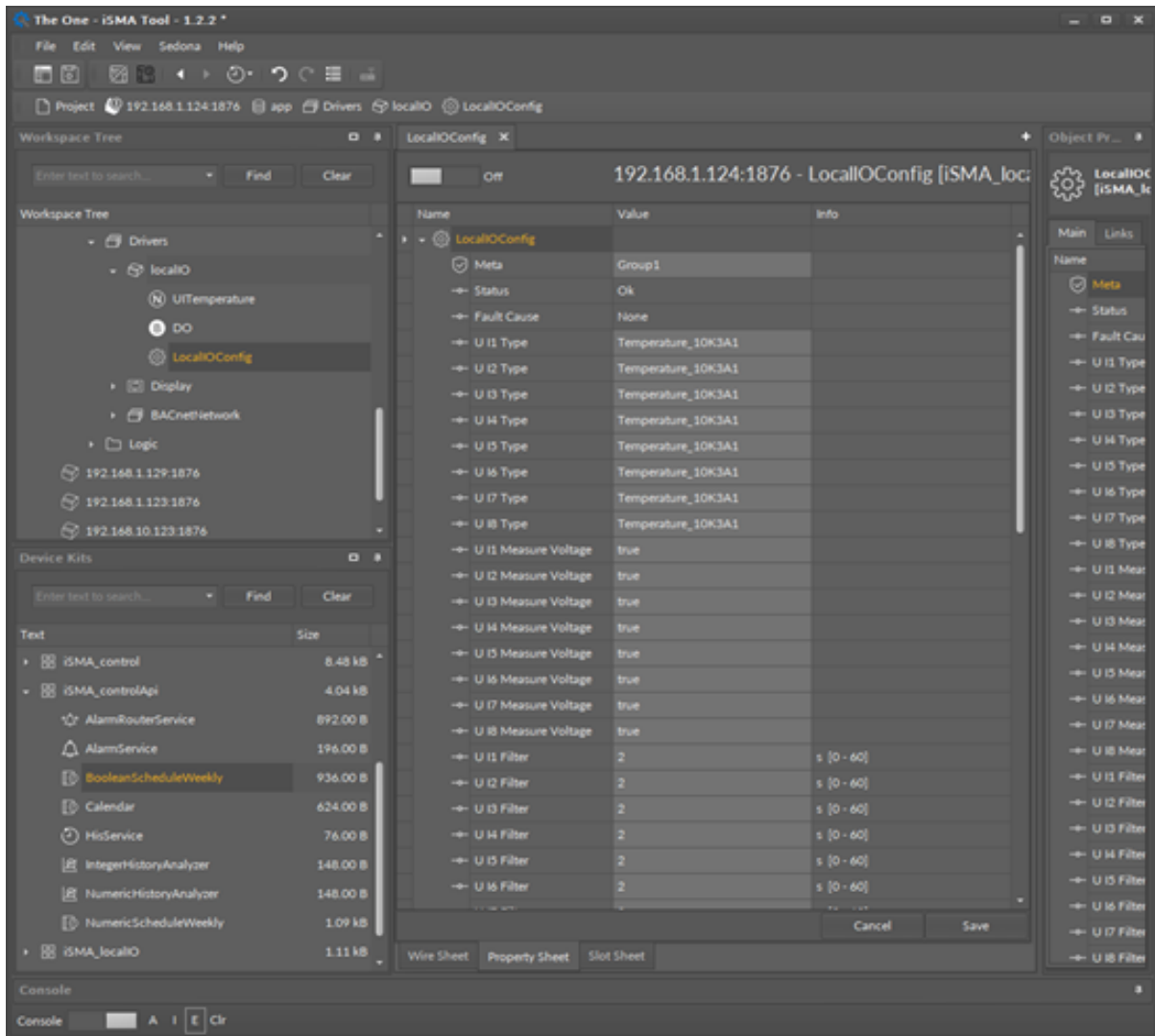


Figure 41. LocalIOConfig

The LocalIOConfig component has the following slots:

- **Status:** shows the component’s status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **U11-8 Type:** allows to select a temperature sensor for each universal input; table stored in the device allows to convert the sensor value from resistance to temperature;
  - Available options: Disable\_Resistance, Temp\_10K3A1, Temp\_10K4A1, Temp\_10K, Temp\_20K6A1, Temp\_2\_2K3A1, Temp\_3K3A1, Temp\_30K6A1, Temp\_SEI1, Temp\_TAC1, Temp\_SAT1, Temp\_PT1000, Temp\_NI1000, Temp\_Ni1000\_21C, Temp\_Ni1000\_LG;

**Note:** PT1000 and NI1000 sensors work only with 16-bit resolution.

- **U11-8 Measure Voltage:** allows to enable or disable voltage measurement for each universal input;
- **U11-8 Filter:** the time constant of the low pass filter (to eliminate signal noise);
- **U11-8 Resolution:** allows to set measurement resolution of each universal input;

**WARNING!** 16-bit resolution increases the time necessary to read a single entry. It should be used only when sensors PT1000 and NI1000 are connected.

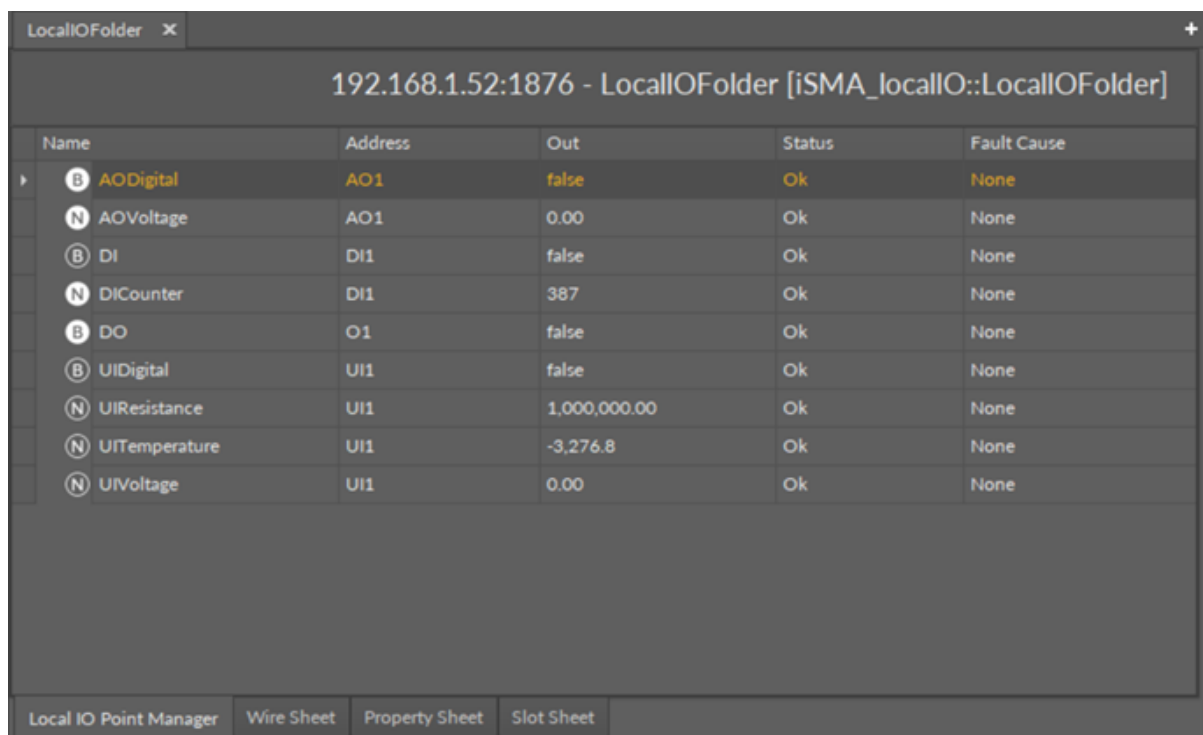
- **AO1-6 Type:** allows to set an analog output mode:
  - Available options: voltage 0-10 V, PWM (option available only for AO1-4; AO5 and 6 do not support PWM mode);
- **Default State Of Analog Output:** allows to set a default value of the analog output after the controller has been rebooted (expressed in mV);
- **Default Digital State Of Analog Output:** allows to set a default value of the analog output working in digital mode after the controller has been rebooted;
- **Default State Of Digital Output:** allows to set a default value of the digital output after the device has been rebooted.

**Note:** Adding the LocalIOConfig component to the application disables the possibility of I/O configuration from the website and Modbus array.

Any settings of the LocalIOConfig component are stored in the component and can be transferred to other devices as part of a saved application (quick setup of multiple devices).

## 13.2 LocalIOFolder

I/O components service the physical inputs and outputs of the iSMA-B-AAC20 controller. The components are designed according to the input or output type and signal. In order to work properly, the I/O components have to be placed in the LocalIOFolder. Double-click on the LocalIOFolder opens the Local IO Point Manager, which is a view listing all added local I/Os and showing their basic data.



The screenshot shows a web browser window titled "LocalIOFolder" with a sub-header "192.168.1.52:1876 - LocalIOFolder [iSMA\_localIO::LocalIOFolder]". Below the header is a table with the following columns: Name, Address, Out, Status, and Fault Cause. The table lists several I/O components with their respective values and statuses.

Name	Address	Out	Status	Fault Cause
<b>B</b> AODigital	AO1	false	Ok	None
<b>N</b> AOVoltage	AO1	0.00	Ok	None
<b>B</b> DI	DI1	false	Ok	None
<b>N</b> DICounter	DI1	387	Ok	None
<b>B</b> DO	O1	false	Ok	None
<b>B</b> UIDigital	UI1	false	Ok	None
<b>N</b> UIResistance	UI1	1,000,000.00	Ok	None
<b>N</b> UITemperature	UI1	-3,276.8	Ok	None
<b>N</b> UIVoltage	UI1	0.00	Ok	None

At the bottom of the interface, there are four tabs: "Local IO Point Manager" (selected), "Wire Sheet", "Property Sheet", and "Slot Sheet".

Figure 42. LocalIOFolder

## 13.2.1 AODigital

The AODigital component allows to control the analog output in dry contact mode.

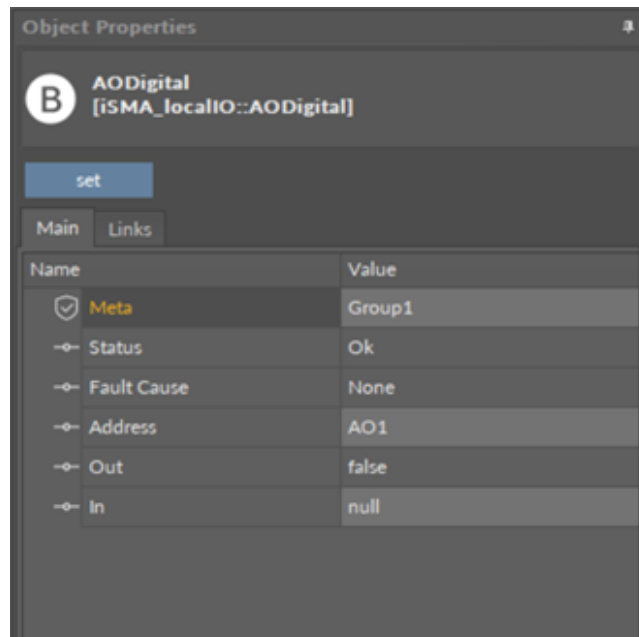


Figure 43. AODigital component

### Slots

The AODigital component has the following slots:

- **Status:** shows the component's status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **Address:** allows setting an address of a physical output of the device; once the component has been added to the folder, the slot's default value is 1—for the component to operate properly, the unique address value must be set in this slot;
  - Available settings: AO1-6.
- **Out:** a value transferred from the In slot and then to the physical output;
- **In:** a value read from an application or network and then transferred to the Out slot.

### Action

The AODigital component has one action available:

- **Set:** allows to manually set the In slot value.

## 13.2.2 AOVoltage

The AOVoltage component allows to control the analog output in voltage mode. The analog output in voltage mode transmits values from 0 to 10 V, which controls 0-100% of fan or pump operation.

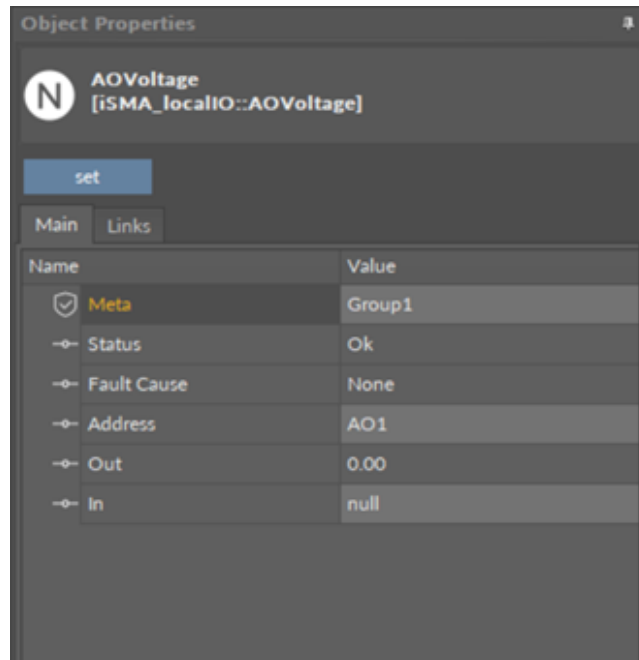


Figure 44. AOVoltage component

## Slots

The AOVoltage component has the following slots:

- **Status:** shows the component's status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **Address:** allows setting an address of a physical output of the device; once the component has been added to the folder, the slot's default value is 1—for the component to operate properly, the unique address value must be set in this slot.
  - Available settings: AO1-6.
- **Out:** a value transferred from the In slot and then to the physical output;
- **In:** a value read from an application or network and then transferred to the Out slot (expressed in mV, range 0-10000 mV).

## Action

The AOVoltage component has one action available:

- **Set:** allows to manually set the In slot value.

### 13.2.3 DI

The DI component allows to control the digital input in the controller.



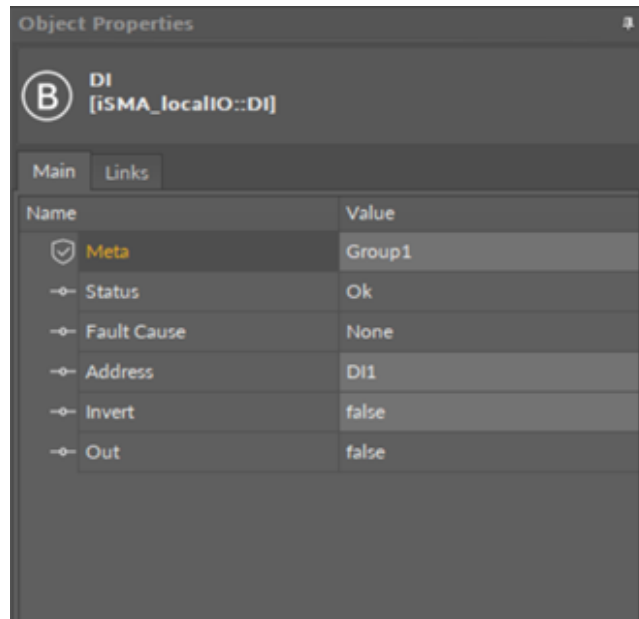


Figure 45. DI component

## Slots

The DI component has the following slots:

- **Status:** shows the component's status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **Address:** allows setting an address of a physical input of the device; once the component has been added to the folder, the slot's default value is 1—for the component to operate properly, the unique address value must be set in this slot.
  - Available settings: DI1-4.
- **Invert:** a Boolean slot allowing to invert the value read from the digital input of the device;
- **Out:** a real value read from the digital input of the device.

### 13.2.4 DICounter

The DICounter component allows to reading high-speed counters of digital inputs in the controller.

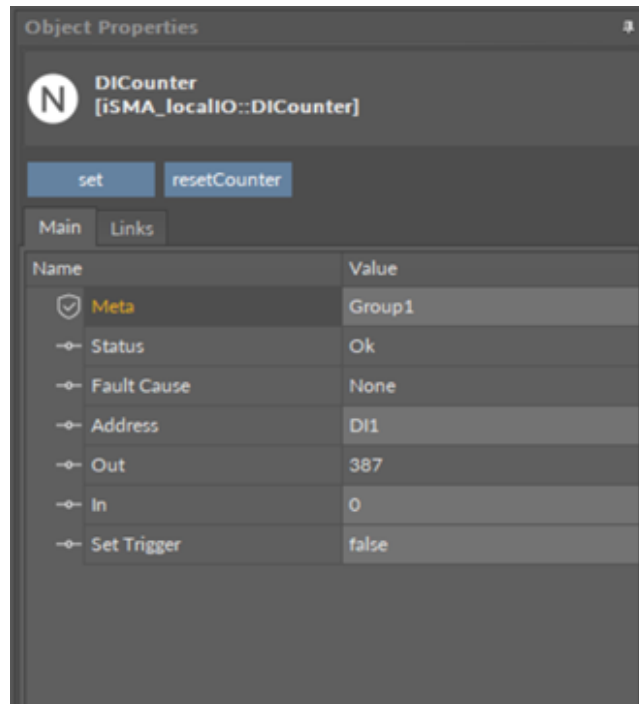


Figure 46. DICounter component

## Slots

The DICounter component has the following slots:

- **Status:** shows the component's status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **Address:** allows setting an address of a physical input of the device; once the component has been added to the folder, the slot's default value is 1—for the component to operate properly, the unique address value must be set in this slot.
  - Available settings: DI1-4.
- **Out:** a number of pulses on rising edge in a physical digital input of the device;
- **In:** the input slot receiving a value to be counted;
- **Set Trigger:** allows to activate or deactivate counting pulses on rising edge.

## Actions

The DICounter component has actions available:

- **Set:** allows to manually set the In slot value;
- **resetCounter:** allows to reset the counter value to 0.

### 13.2.5 DO

The DO component allows to control the digital output in dry contact mode.

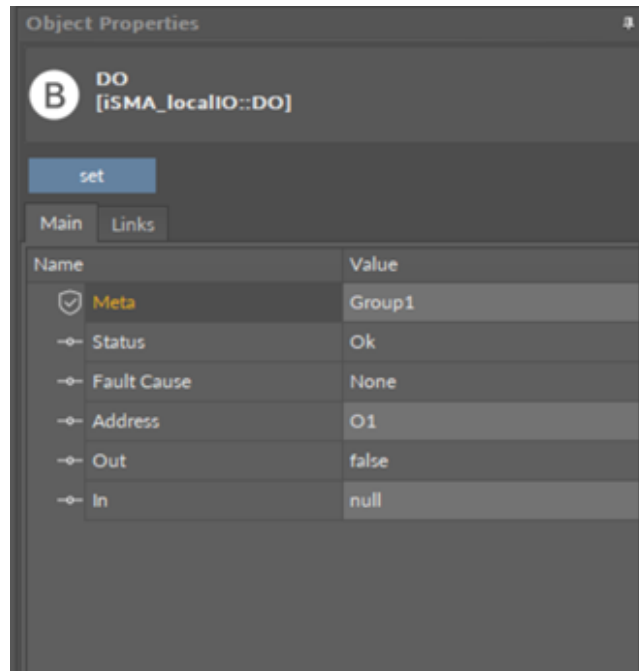


Figure 47. DO component

## Slots

The DO component has the following slots:

- **Status:** shows the component's status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **Address:** allows setting an address of a physical output of the device; once the component has been added to the folder, the slot's default value is 1—for the component to operate properly, the unique address value must be set in this slot.
  - Available settings: O1-4.
- **Out:** a value transferred from the In slot and then to the physical output;
- **In:** a value read from an application or network and then transferred to the Out slot.

## Action

The DO component has one action available:

- **Set:** allows to manually set the In slot value.

### 13.2.6 UIDigital

The UIDigital component allows to control the universal input in dry contact mode.

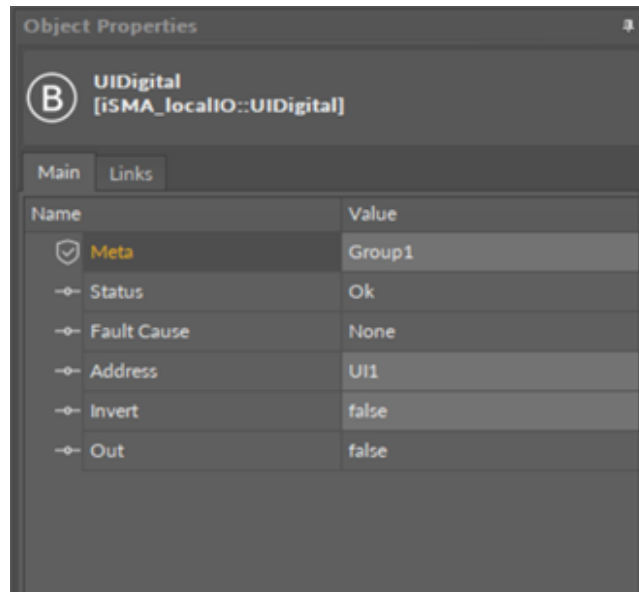


Figure 48. UIDigital component

## Slots

The UIDigital component has the following slots:

- **Status:** shows the component's status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **Address:** allows setting an address of a physical input of the device; once the component has been added to the folder, the slot's default value is 1—for the component to operate properly, the unique address value must be set in this slot.
  - Available settings: UI1-8.
- **Invert:** a Boolean slot allowing to invert the value read from the universal input of the device;
- **Out:** a real value read from the universal input of the device.

### 13.2.7 UIResistance

The UIResistance component allows to control the universal input in resistance mode.

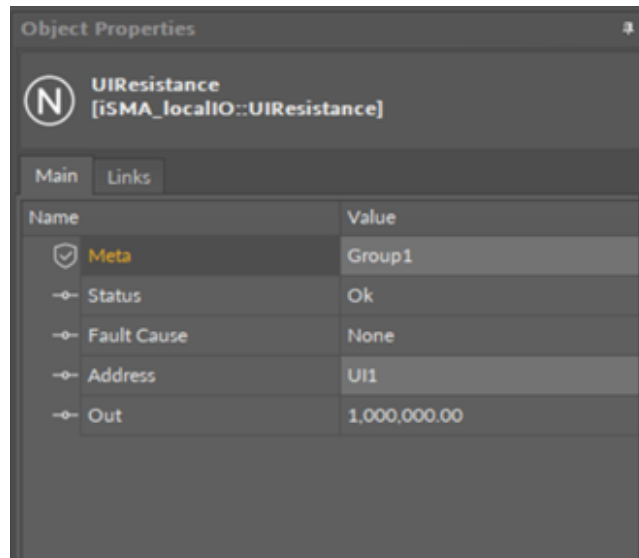


Figure 49. UIResistance component

## Slots

The UIResistance component has the following slots:

- **Status:** shows the component's status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **Address:** allows setting an address of a physical input of the device; once the component has been added to the folder, the slot's default value is 1—for the component to operate properly, the unique address value must be set in this slot.
  - Available settings: UI1-8.
- **Out:** a real value read from the universal input of the device.

### 13.2.8 UITemperature

The UITemperature component allows to control the universal input in temperature mode. The component's readings are based in the type of temperature sensor selected in the LocalIOConfig component.

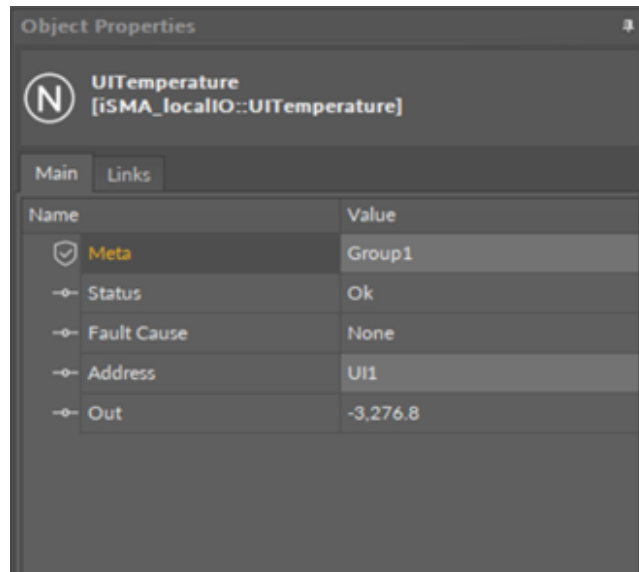


Figure 50. UITemperature component

## Slots

The UITemperature component has the following slots:

- **Status:** shows the component's status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **Address:** allows setting an address of a physical input of the device; once the component has been added to the folder, the slot's default value is 1—for the component to operate properly, the unique address value must be set in this slot.
  - Available settings: UI1-8.
- **Out:** a real value read from the universal input of the device.

### 13.2.9 UIVoltage

The UIVoltage component allows to control the universal input in voltage mode. The component receives values from 0 to 10 V.

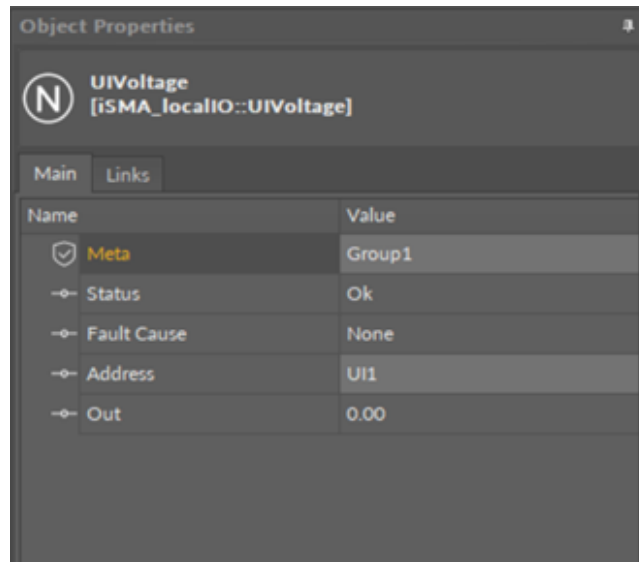


Figure 51. UIVoltage component

## Slots

The UIVoltage component has the following slots:

- **Status:** shows the component's status;
  - Available information: OK (the component is working properly), Fault (the component is disabled);
- **Fault Cause:** shows the reason of the Fault status;
- **Address:** allows setting an address of a physical input of the device; once the component has been added to the folder, the slot's default value is 1—for the component to operate properly, the unique address value must be set in this slot.
  - Available settings: UI1-8.
- **Out:** a real value read from the universal input of the device.