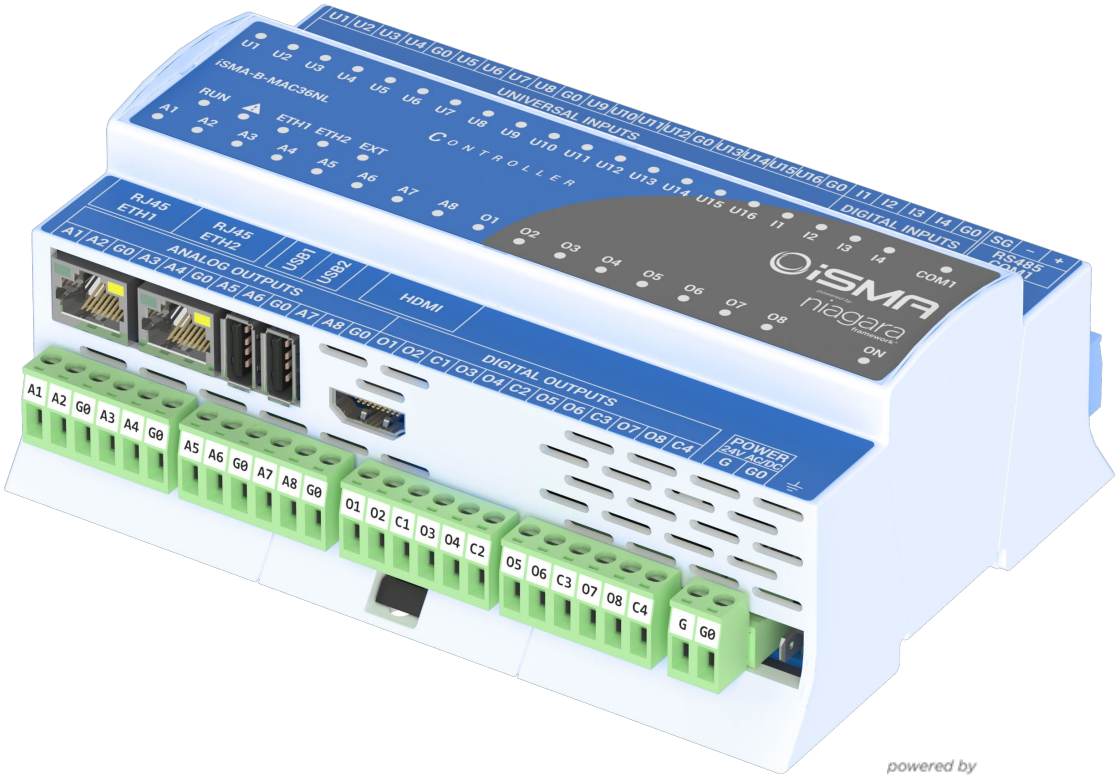
Intelligent Solution Managing Automation

iSMA-B-MAC36NL

User Manual

Install and Start-up



powered by niagara framework

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1 Introduction

1.1 Revision history

Rev	Date	Description
1.0	01.10.2018	First edition
1.1	10.12.2018	Data Recovery Service, Support for Niagara 4.4 and later

Table 1 - Revision history

1.2 Safety rules

- Note: Incorrect wiring of this product can cause its damage and may result in other hazards. Make sure the product has been correctly wired before turning the power ON.
- Before wiring or removing / mounting the product, be sure to turn the power OFF. Failure to do so might cause electric shock.
- Do not touch electrically charged parts such as the power terminals. Doing so might cause electric shock.
- Do not disassemble the product. Doing so might cause electric shock or faulty operation.
- Use the product within the operating ranges recommended in the specification (temperature, humidity, voltage, shock, mounting direction, atmosphere etc.). Failure to do so might cause fire or faulty operation.
- Tighten the wires firmly to the terminal. Insufficient tightening of the wires to the terminal might cause fire.

1.3 Overview

The iSMA-B-MAC36NL is a compact Master Application Controller with built-in different types of I/O and operating in Niagara Framework environment. Using the specific local I/O set 16x UI, 8x AO, 4x DI and 8x DO allows to use the device in different applications. The Controller provides control, data logging, alarming, scheduling, integration and visualisation.

To allow IP connectivity there are 2x Fast Ethernet ports which operate as two independent ports. Built-in 1x RS485 can be used to expand the number of I/O by connecting MINI or MIX series I/O modules or to integrate with other subsystems.

Dedicated microSD card stores real-time data, history and alarms as well as Operating System, Niagara Framework and licenses.

There are 2x USB ports, one of them operates as a host and the other one in OTG mode.

1.4 Key Features:

- Niagara 4.4 and later
- Real-time programming
- 2x Fast Ethernet (independent)
- 1x RS485 (opto-isolated), optional extension as second RS485 port
- 2x USB (1x OTG, 1x Host)
- 16x UI, 8x AO, 4x DI and 8x DO
- HDMI to connect external display (*coming soon*)
- Built-in Web server provides graphical user interface available from Web browser level
- SD card to collect real-time data, history and alarms
- Hardware replacement by SD Card
- Different licensing models for various application types

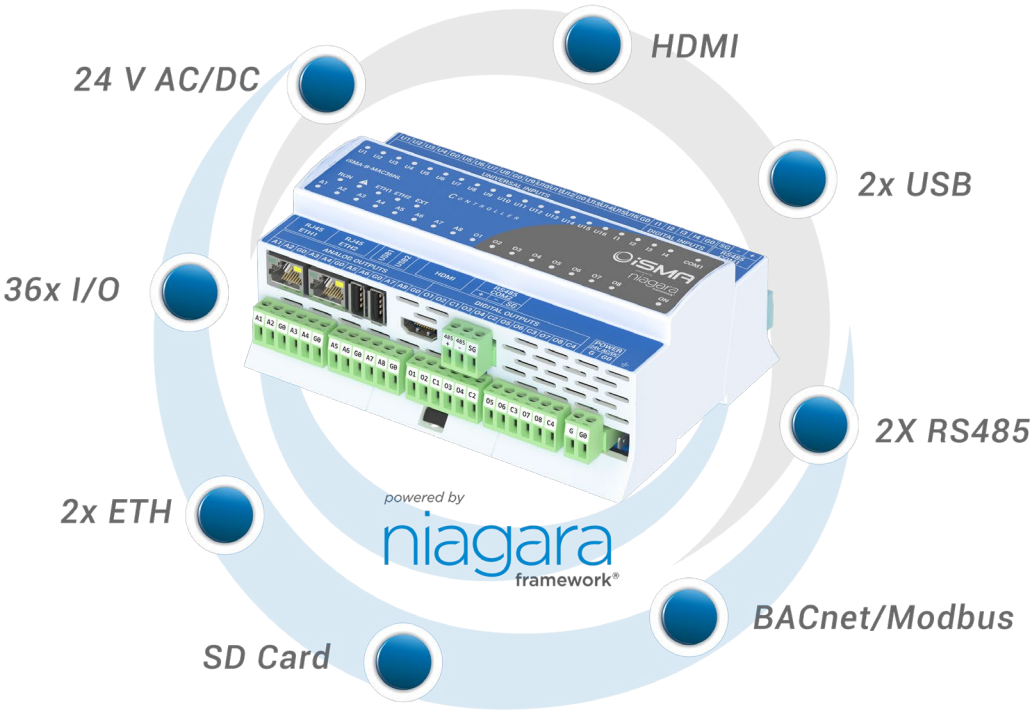


Figure 1 – iSMA-B-MAC36NL Key Features

1.5 Technical specification

Power Supply	Voltage	24 V AC/DC ± 20% isolated
	Power consumption	14 W @ 24 V DC; 24 VA @ 24 V AC
Universal Inputs	Temperature input	• Measurement with attached RTDs • Accuracy ±0,1˚C • For sensor Pt1000 and Ni1000 use 16-bit resolution
	Voltage input	• Voltage measurement from 0 - 10 V • Input impedance 100 kΩ • Measurement accuracy ±0,1% • Measurement resolution 3 mV@12-bit and 1 mV@ 16-bit
	Current input	• Current measurement 0 - 20 mA • Required external resistor 200 Ω • Measurement accuracy ±1,1% • Measurement resolution 15 µA @ 12-bit and 5 µA @ 16-bit
	Resistive input	• Measurement of resistance from 0 to 1000 kΩ • Measurement resolution for 20 kΩ load 20 Ω@12-bit and 1 Ω@16-bit • Measurement resolution for PT1000 and NI1000 0,1Ω@16bit
	Resistance measurement method	The voltage divider
	Dry contact input	Output current ~1 mA Switching threshold: ON <5kΩ, OFF >8kΩ
	Measurement resolution	12-bits (default) or 16-bits
	Processing time	• 10 ms/channel @ 12-bits • 140 ms/channel @ 16-bits
Digital Inputs	Type	Dry contact
	Switching threshold	ON <5kΩ, OFF >8kΩ
	Max input frequency	100 Hz
Analog Outputs	Voltage range	0 to 10 V DC
	Max. load current	20 mA
	Resolution	12-bits
	Accuracy	±0.5%
Digital Outputs (relays)	Contact material	AgSnO2
	Resistive load	3 A @ 230 V AC/30 V DC
RS485 Interface (base and optional)	RS485	Up to 128 devices
		Half-duplex, Opto-isolated
	Communication protocols	Modbus RTU/ ASCII, BACnet MS/TP

Ethernet	Baud rate	From 2400 to 115,200
	Address	1 to 247
	2x Fast Ethernet	independent mode
	Baud rate	10/100 Mb/s
USB	2x USB	1x OTG, 1x Host
HDMI	1x HDMI	Standard type A
SD Card	1x microSD	2 GB system reserved / 2 GB user storage
Ingress protection	IP	IP30
Temperature	Storage	-40˚C to 85˚C (-40˚F to 185˚F)
	Operating	0˚C to 50˚C (32˚F to 122˚F)
Humidity	Relative	5% to 95% RH
Connectors	Type	Removable screw terminals
	Maximum cable size	2.5 mm^2
Housing	Construction	UL approved, self-extinguishing plastic (PC/ABS)
	Mounting	DIN (DIN EN 50022 norm)
Dimension	Width	111 mm (4,4″)
	Length	160 mm (6,3″)
	Height	62 mm (2,45″)

Table 2 – Technical Specification

1.6 Software license notice

This product contains code covered by the GNU General Public License (GPL).

1.7 Dimensions

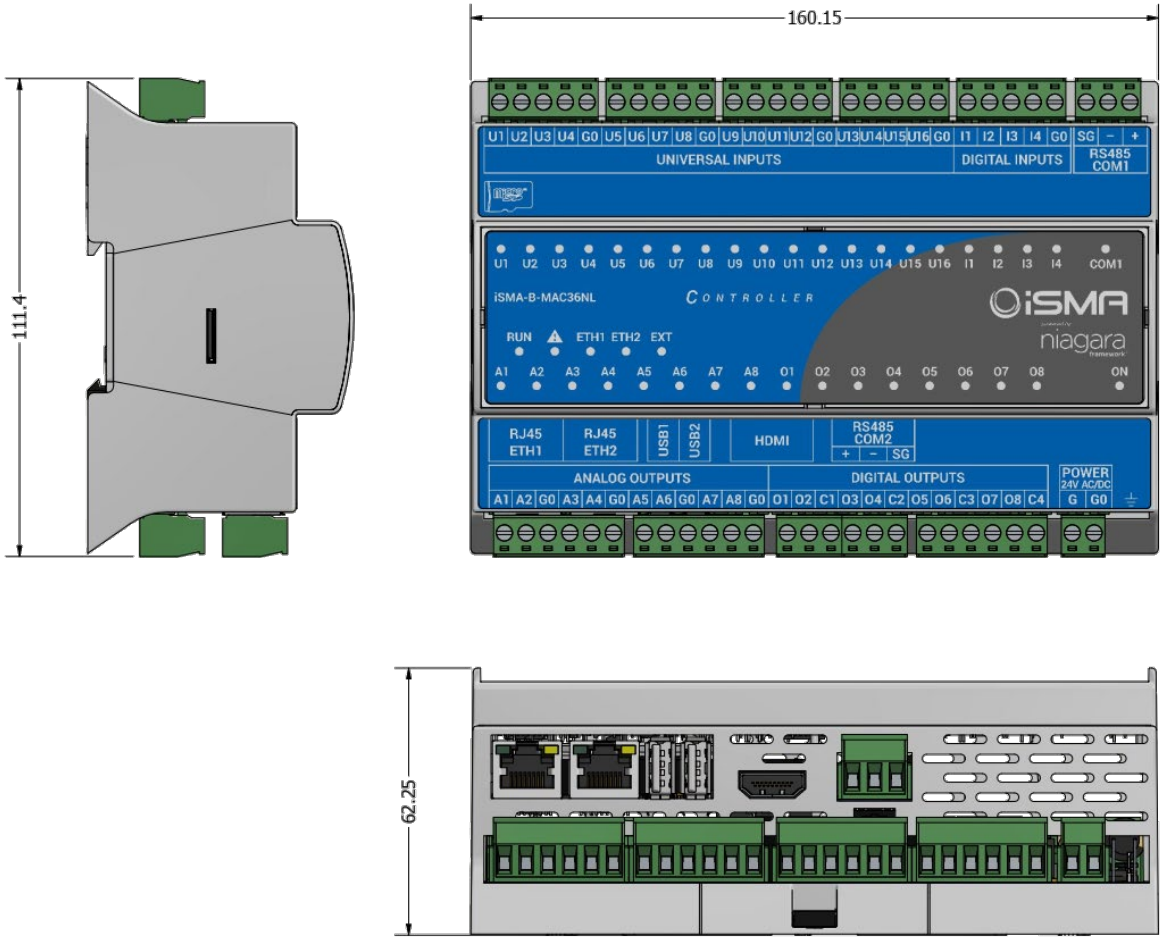


Figure 2 – iSMA-B-MAC36NL Dimensions [mm]

2 Hardware Specification

2.1 Terminals and Internal Connection Diagram

The iSMA-B-MAC36NL controller can be supplied by 24 V AC/DC. The power supply block is separated. The grounding pin located next to power supply terminals must be connected to the ground.

The device has 36x local IO on board:

- 8x Digital Outputs (8DO), relay output with max. load 3 A @ 230 V AC/30 V DC.
- 8x Analog Outputs (8AO), voltage output 0-10 V DC maximum load up to 20 mA.
- 16x Universal Inputs (16UI), temperature, voltage, current, resistive or dry contact.
- 4x Digital Inputs (4DI), dry contact inputs or fast counter up to 100 Hz.

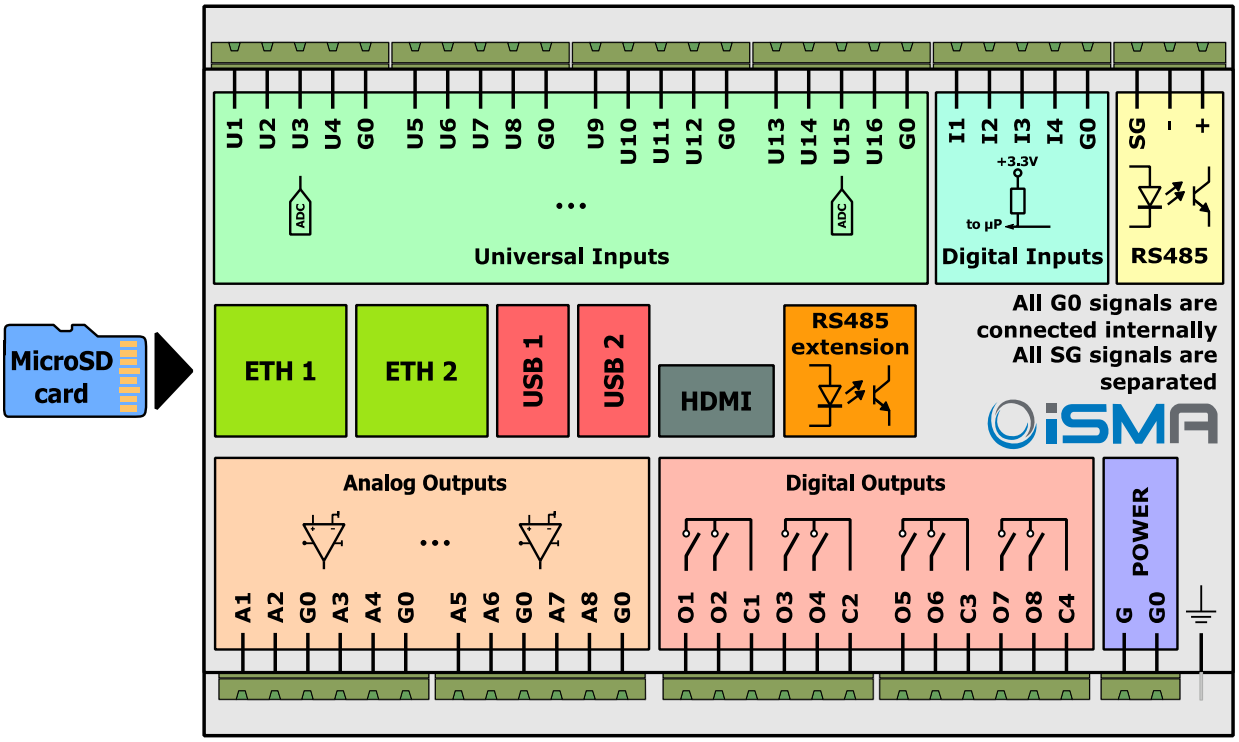


Figure 3 – iSMA-B-MAC36NL Block Diagram

2.2 Power Supply Connection

The device is designed to work with 24 V AC/DC separated power supply.

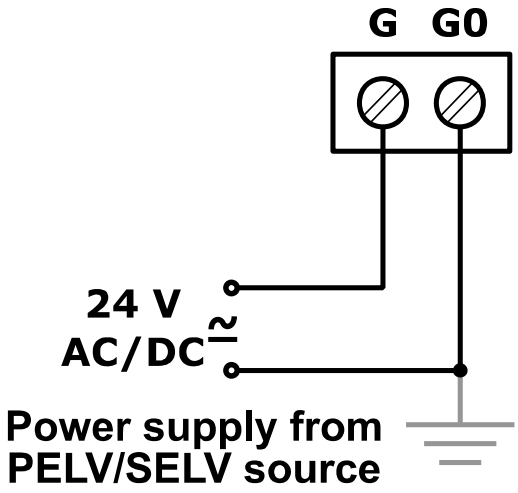


Figure 4 24 V AC/DC power supply connection

2.2.1 Earth Grounding

Earth grounding provides protection from electrostatic discharge or other forms of EMI.

The way to connect the controller's ground spade lug to a nearby earth ground is shown in the figure below.

2.3 Communication Bus Connection (RS485)

The device is equipped with opto-isolated RS485 base port, which allows to connect the device to the BMS in order to communicate with other devices in the network. The optional controller version has an extension as second RS 485 port. All rules are the same as in the base port. The way of proper bus cable connection is shown in the figure below.

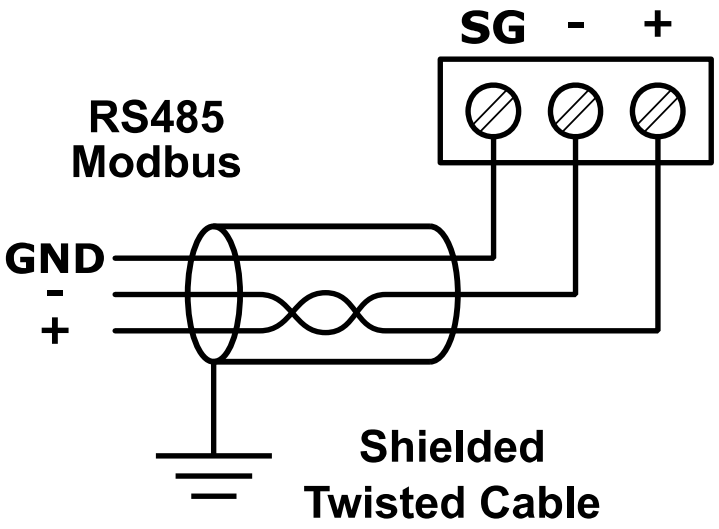


Figure 6 RS485 communication bus connection

2.3.1 RS485 Grounding and Shielding

The device can be exposed to electromagnetic environment. The electromagnetic radiation can induce electrical noise into both power and signal lines, as well as direct radiation into the device causing negative effects to the device functioning. Appropriate grounding, shielding and the other protective steps should be taken at the installation stage to prevent undesirable effects. The preventions include making control cabinets grounding, cables shield grounding, using protective elements for electromagnetic switching devices, using correct wiring as well as appropriate cable types selection and cable cross sections.

2.3.2 RS485 Network Termination and Biasing

The transmission line often creates communication problems. These problems include reflections and signal attenuation.

To eliminate the presence of reflections at the ends of the bus cable, it must be terminated at both ends with a resistor across the line. The resistor value has to be the same as a characteristic impedance of the bus cable. Both ends must be terminated since the direction of propagation is bidirectional. In the case of an RS485 twisted pair cable the termination is typically 120 Ω.

In the iSMA-B-MAC36NL version there is a built-in 3 position Switch on the back side of the device (access after removing the back cover) which is dedicated to connect termination resistor and/or biasing resistors. In the iSMA-B-MAC36NL-RS version 3 position Switch is a built-in below terminal connector as shown in the figure below on the right side.

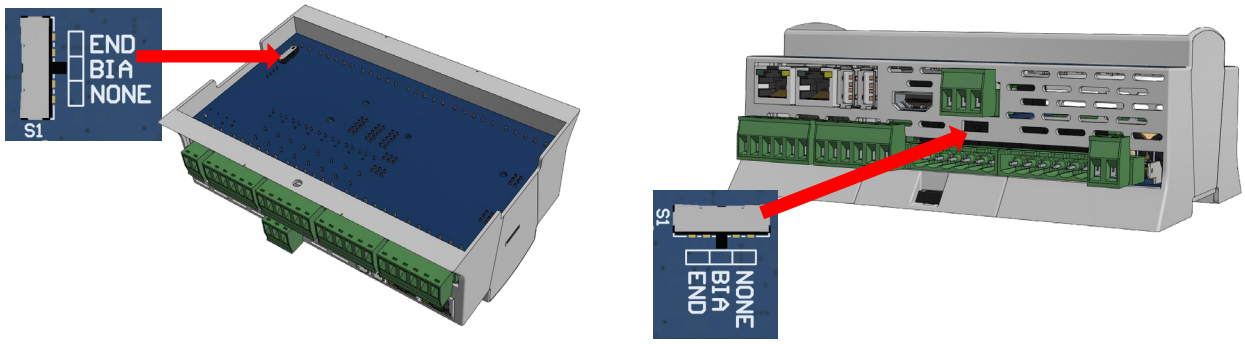


Figure 7 Switch for termination and biasing for base (on left) and optional extension port (on right)

Switch position	Biasing	Termination 120 Ω + Biasing
END	OFF	ON
BIA	ON	OFF
NONE	OFF	OFF

Table 3 Switch Termination and biasing

When the switch is in the END position it connects the termination resistor 120 Ω and biasing resistors 680 Ω (pull-down to ground SG and pull-up to +5VDC) to the RS485 bus.

So instead of using additional resistors, the termination and biasing can be easily done by simple switch activation.

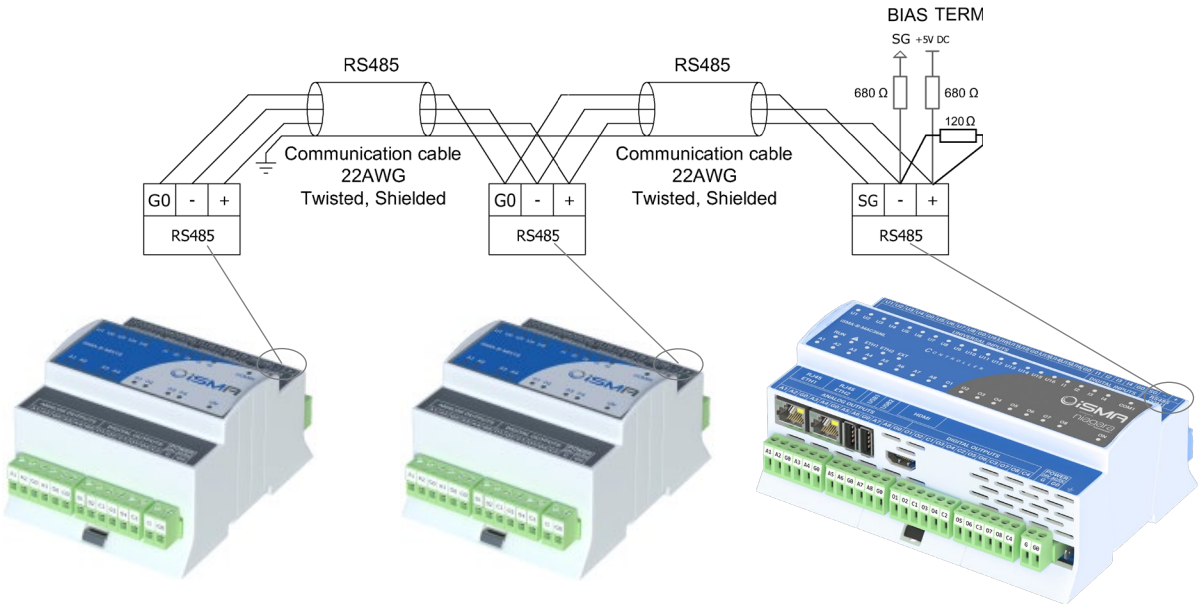


Figure 8 RS485 network termination and biasing

When the switch is in the BIA position it connects the biasing resistors 680 Ω (pull-down to ground SG and pull-up to +5VDC) to the RS485 bus. The biasing is added to the RS485 bus in order to reduce communication failures.

WARNING! Only one single device on the network can have biasing resistors connected. Connecting biasing resistors on two or more devices on the one single RS485 bus will take an opposite effect – increase the number of the communication problems.

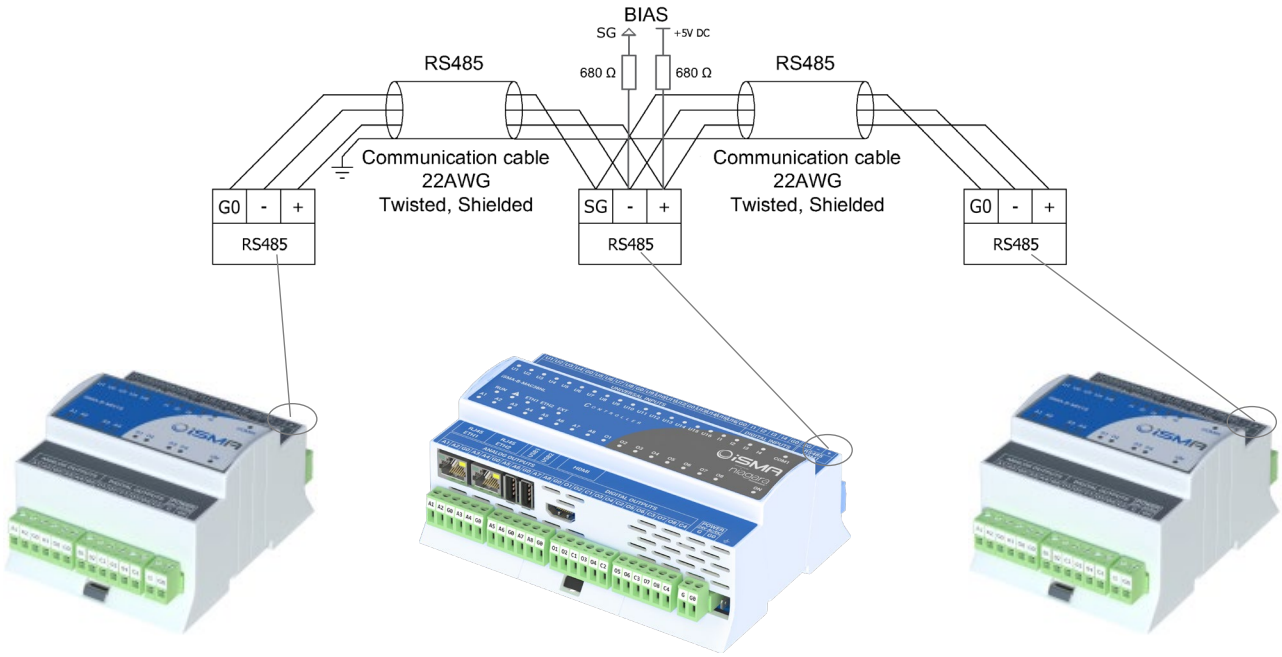


Figure 9 RS485 network biasing

2.4 LED Indicators

The device is equipped with LEDs for quick status checking and diagnostics:

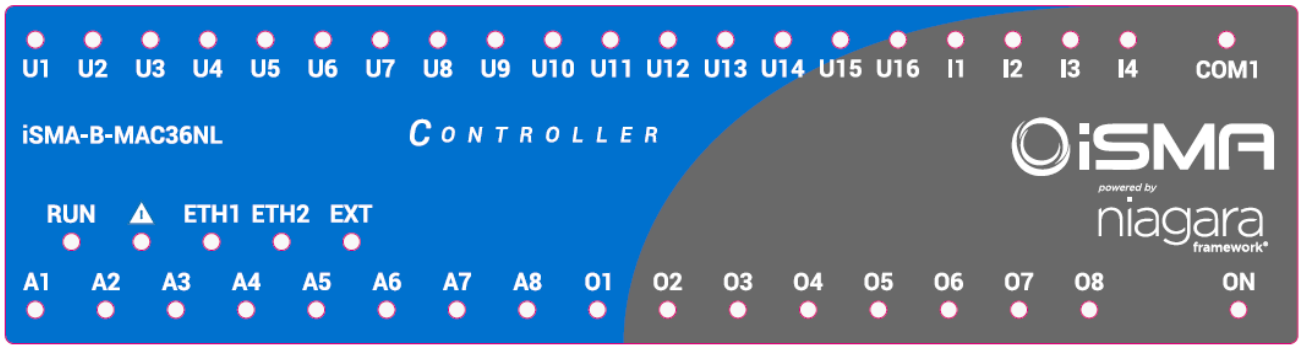


Figure 10 LEDs on the front panel of iSMA-B-MAC36NL.

- The Power LED ON lights up (green) and then turns the power supply on.
- The Communication LED COM1 lights up (orange) for 20 ms in the transmit state for sending each package through the main RS485 port. As long as the device sends packages, the Communication LED blinks continuously.
- The Communication LED EXT lights up (orange) for 20 ms in the transmit state for sending each package through the extension RS485 port. As long as the device sends packages, the Communication LED blinks continuously.
- The Communication LEDs ETH1 and ETH2 light up (orange) in the transmit or receive state when sending/receiving each packages through the particular Ethernet port. As long as the device sends/receives packages, the Communication LEDs blink continuously.
- The Universal Inputs LEDs U1-U16 indicate the statuses of the Universal Inputs. When the LED is ON, the resistance value connected to the input is lower than the switching threshold value (Dry Contact input is active).

Note: The LED also lights up when voltage connected to the input has very low potential.

- The Digital Inputs LEDs I1-I4 indicate the statuses of the Digital Inputs. When the LED is ON, the Input is active (resistance value connected to the input is lower than the switching threshold value).
- The Analog Outputs LEDs A1-A8 indicate the statuses of the Analog Outputs. When the LED is ON, the Output voltage or PWM factor is different than 0.
- The Digital Outputs LEDs O1-O8 indicate the statuses of the Digital Outputs. When the LED is ON, the Outputs is active (closed circuit).

- The Status LED **RUN** does not light when the power is connected. After Operating System (Linux) has started up, the LED RUN lights up continuously (green). Next, after the Platform has started up, the LED RUN also flashes very quickly. If a station exists in a controller, after the station has been started up and it operates correctly, the LED RUN flashes slowly (1Hz).
- The Alarm LED Δ (triangle with an exclamation mark) lights up in red color when there is no SD Card inserted or there is a problem with SD Card connection/reading/writing.

2.5 Mini USB

The mini USB port is dedicated to debugging connection through the console.

You can find a description of how to connect to the system console in Connection to the console chapter.

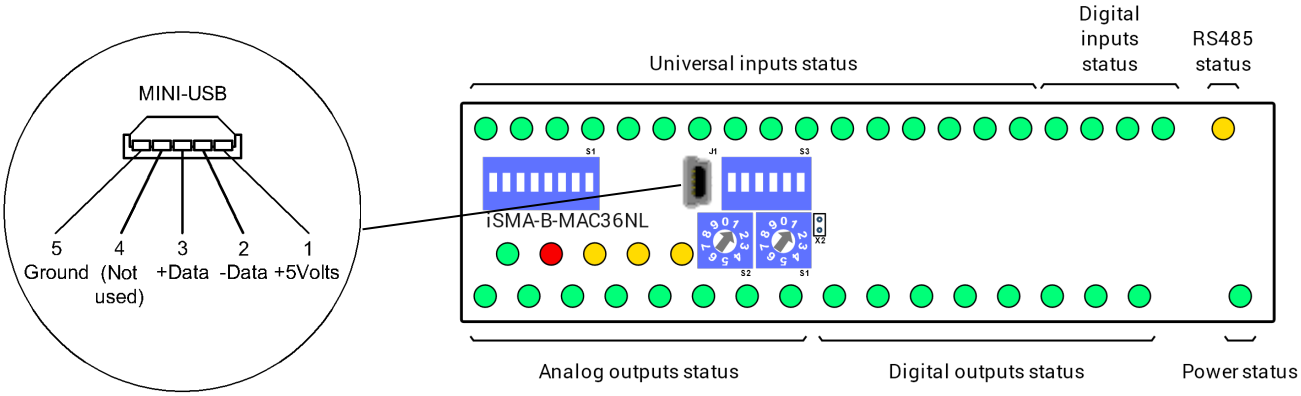


Figure 11 LEDs on the front panel of iSMA-B-MAC36NL.

2.6 Local I/O

The iSMA-B-MAC36NL has built-in different types of I/O. The specific local I/O set 16x UI, 8x AO, 4x DI and 8x DO allows to use the device in different applications.

2.6.1 Universal Inputs (16x UI)

All the Universal Inputs have 16-bit ADC, which supports the following types of the input signals:

- Voltage Input (0 – 10 V DC)
- Current Input (0 – 20 mA)
- Resistive Input (0-1000 kΩ)
- Temperature Input
- Dry Contact Input (Digital Input)

2.6.1.1 Voltage Input connection (0 – 10 V DC)

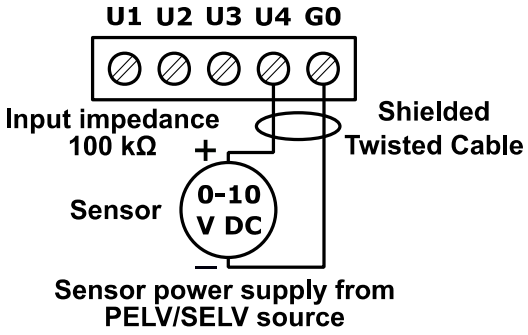


Figure 12 Connection of UI to measure voltage 0-10 V DC.

2.6.1.2 Current Input connection (0 – 20 mA)

Current measurement is realized by voltage measurement and 200 Ω resistance.

According to the Ohm's law the current is directly proportional to the voltage and the resistance is the constant of proportionality.

$$I = \frac{U}{R}$$

According to the Ohm's law equation for 20 mA current with 200 Ω resistance the output voltage is 4 V.

It means that the 4 V voltage measured on the Universal Input corresponds to 20 mA current.

The result is expressed in millivolts.

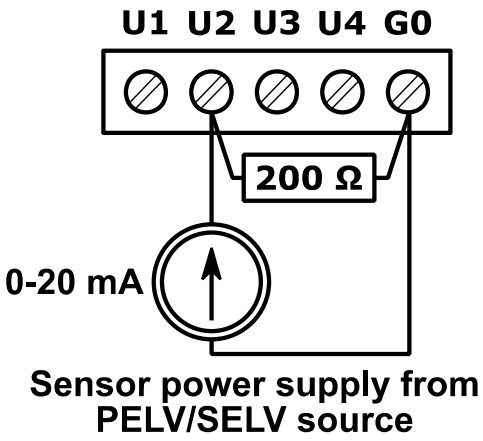


Figure 13 Connection of UI to measure current 0-20 mA.

2.6.1.3 Temperature Input connection

Temperature measurement is based on resistance.

The Universal Inputs working as Temperature Inputs support the following types of sensors: series NTC 10K3A1, 10K4A1, Carel 10K, 20K6A1, 2.2K3A1, 3K3A1, 30K6A1, SIE1, TAC1, SAT1 and Pt1000, Ni1000.

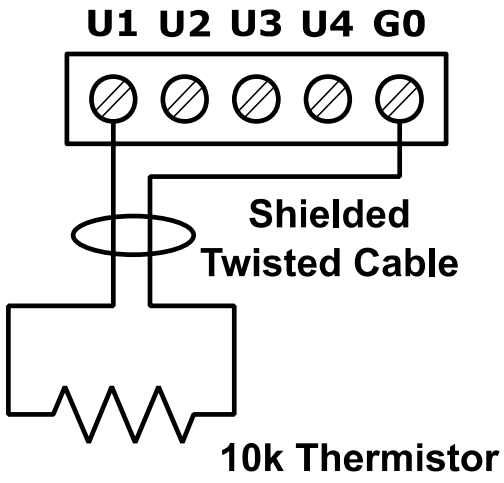


Figure 14 Connection of UI to measure temperature

2.6.1.4 Dry Contact Input connection (Digital Input)

The Universal Inputs can operate as standard Digital Inputs (Dry Contact Inputs).

The Input is active when it is connected to the ground (G0).

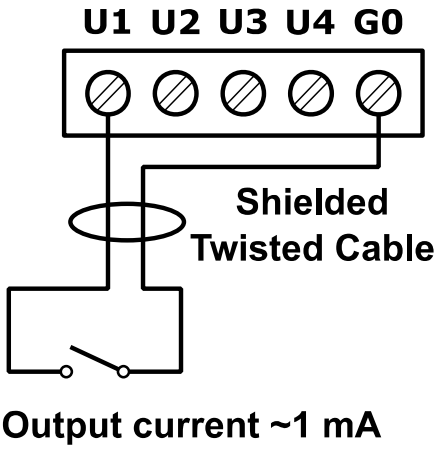


Figure 15 Connection of UI as Dry Contact Input (Digital Input)

2.6.2 Digital Inputs (4x DI)

In addition to the standard Dry Contact Input the Digital Inputs can operate as fast pulse counters with up to 100 Hz impulse frequency counting.

The Input is active when it is connected to the ground (G0).

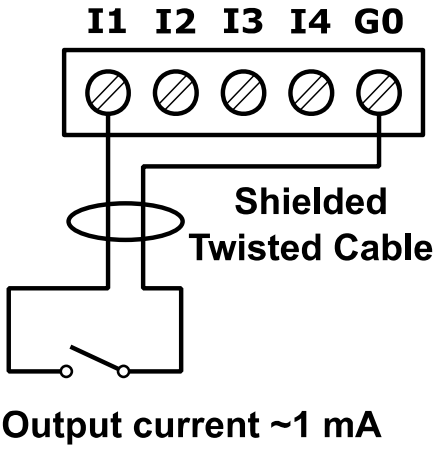


Figure 16 Connection to the Digital Input.

2.6.3 Analog Outputs (8x AO)

All the Analog Outputs have 12-bit ADC, provide 10 mV resolution and accuracy less than ±0,5%. They support the following types of the output signals:

- Voltage Output (0 – 10 V DC) with max. load up to 20 mA
- PWM: 0,01 Hz, 0,1 Hz, 1 Hz, 10 Hz, 100 Hz

2.6.3.1 Voltage Output connection (0 – 10 V DC)

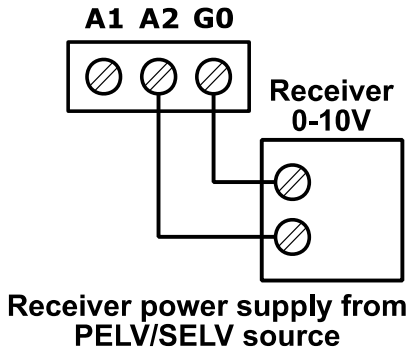


Figure 17 Connection of the 0 – 10 V DC signal from the Analog Output.

2.6.3.2 Connection of an actuator 24 V AC/DC

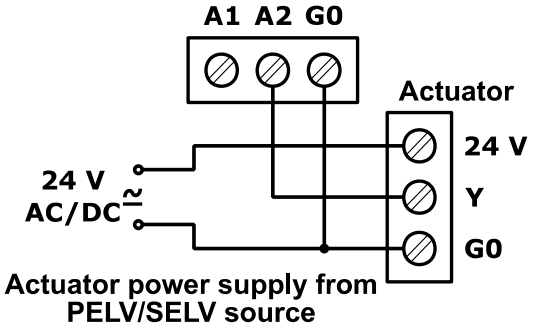


Figure 18 Connection of the 0 – 10 V DC signal from the Analog Output.

2.6.3.3 Relay to Analog Output connection

There is an option to control the 12 V DC relay from the Analog Outputs (max. load cannot exceed 20 mA!).

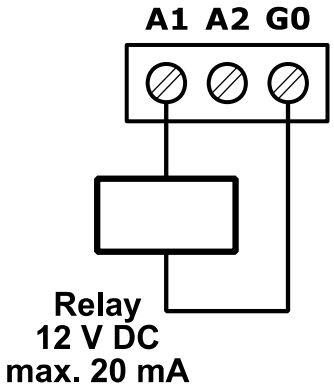


Figure 19 Relay connection to the Analog Output.

2.6.4 Digital Outputs (8x DO)

Relay Outputs (NO) have max. resistive load up to 3 A @ 30 V DC and up to 3 A @ 230 V AC..

2.6.4.1 Resistive Load connection

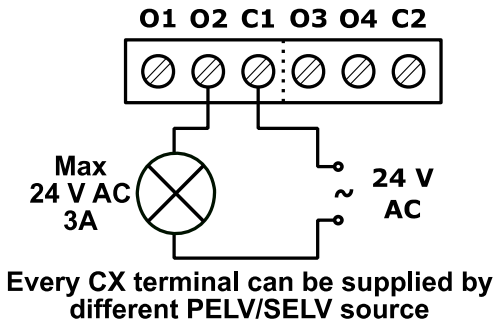


Figure 20 Connection of the resistive load to the Digital Output.

2.6.4.2 Solenoid Valve connection

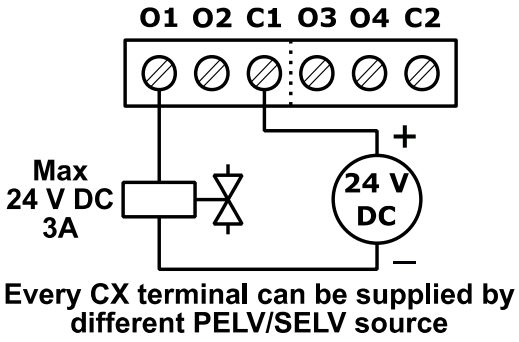


Figure 21 Connection of the solenoid valve to the Digital Output.

3 Start-up

3.1 Before the start

To be able to operate normally the device needs to have the following:

1. SD Card (fitted in SD Card box)
2. License assigned

Hardware itself is only the base for SD Card which consists all the software parts needed for hardware management.

SD Card is not assigned with a particular hardware unit. It can be moved to another hardware. This function allows easy hardware replacement. Together with SD Card all the parameters such as Communication Settings, station, Niagara, JVM and Operation System are moved.

License file provides limited number of points which can be used to build your application. Without the license file user is not allowed to run the station on the device.

3.2 SD Card

Without the microSD Card it is impossible for the device to operate properly.

MicroSD Card contains all main software parts which are crucial for the device functioning:

1. Linux Operating System
2. Java Virtual Machine
3. Niagara N4

The Card slot is placed on the left side of the device as it is shown in the figure below

The micro SD card must be inserted into the unit prior to the mounting process. However, it is possible to move an SD card from one unit to another (microSD Card is not assigned with the particular hardware iSMA-B-MAC36NL unit). For example, you might want to remove the SD card from a unit that suffered a hardware failure and use it in a replacement unit.

Prerequisites:

All power to the controller needs to be shut down before inserting/removing the microSD card, otherwise equipment damage may occur.

The controller needs to be unmounted from any DIN rail or screw tab mounting, as accessing the card uses space behind the mounting base.

Discharge any static electricity that you may have accumulated by touching a known, securely grounded object.

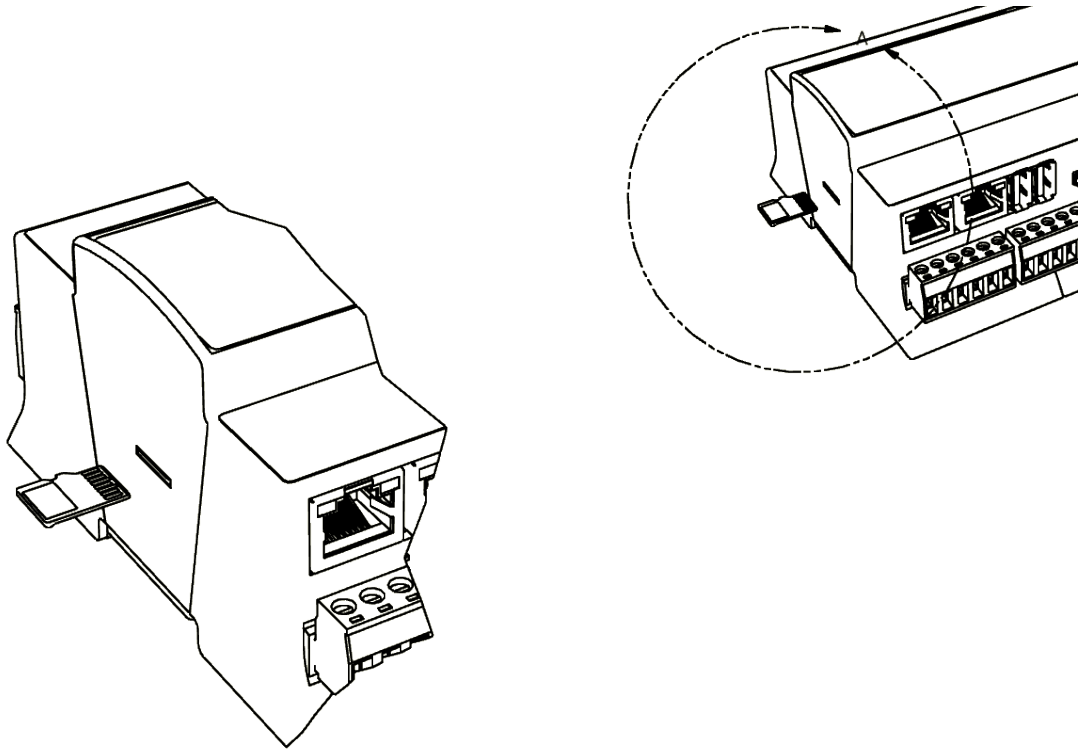


Figure 22 SD Card Mounting

Insert the micro SD card by sliding the card into the card socket, label side down, until the spring catch engages. If properly inserted, the card is behind the shutter track.

Remove the micro SD card by pushing the card in, until the spring release pushes the card partially out of the card socket. Grasp the card and pull it completely out of the unit. Store the micro SD card in a static free protective case.

3.3 Factory settings

Out of the box the SD Card Image has the factory settings. Every time when the controller is restored via clean or update distribution file, the default settings are restored. Please refer to the Controller System Update chapter for more details.

WARNING! The cleaning deletes the station – please save it before update!

The factory settings can be divided into two groups:

3.3.1 Factory communication settings

- IP Address: 192.168.1.123
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1
- Nameserver (DNS): 192.168.1.1
- Host Name : MACNL

3.3.2 Factory platform credentials

- User: tridium
- Password: niagara

Note: In Niagara 4.4 and later version User is requested to change the factory platform credentials at the first platform logging.

Out of box the controller has no default station installed.

3.4 First login to the controller platform in Workplace

After opening the Workplace Software to log into the controller for the first time please do the following steps:

From the menu bar, click File > Open > Open Platform.

The Open Platform window appears.

Fill the fields in the Open Platform window as follows:

Type — Select Image Platform Connection, if not already selected.

NOTE: Workbench may default to a secure Image Platform TLS Connection. If so, for any new controller, change type to a regular (non-TLS) platform connection. After conversion, you should always use the recommended TLS platform connection.

Host — Leave at default IP, and type in the default IP address of the new controller (the default IP address is 192.168.1.123).

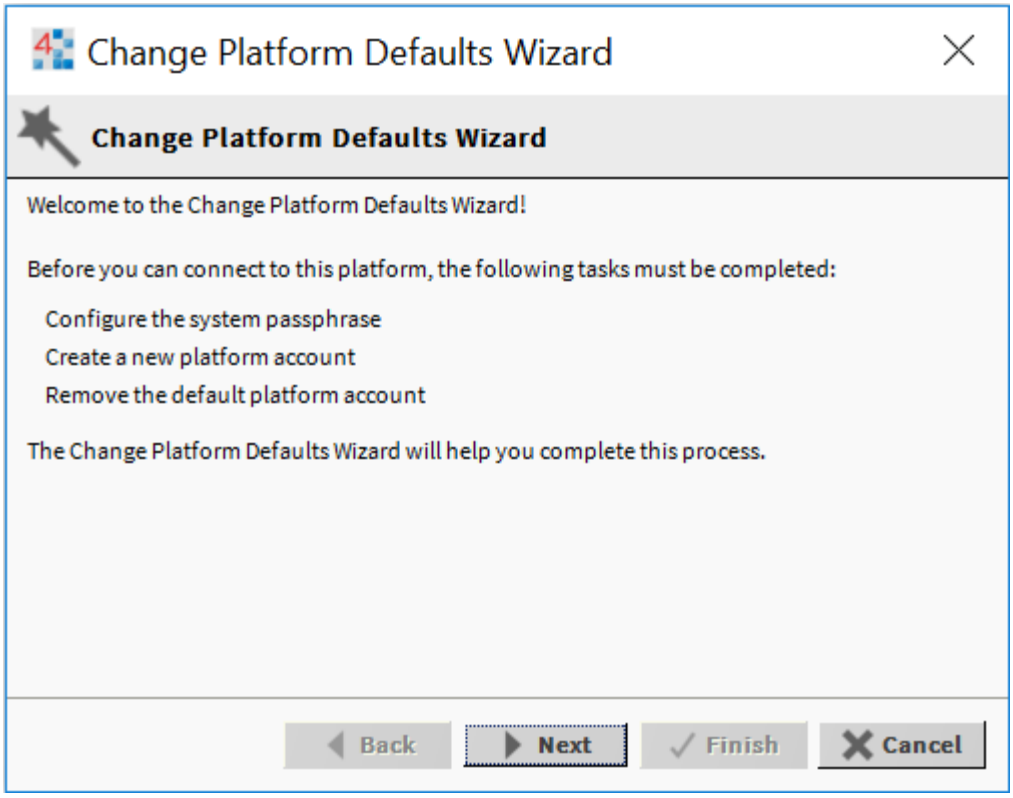
Port — Leave at default 3011.

Credentials:

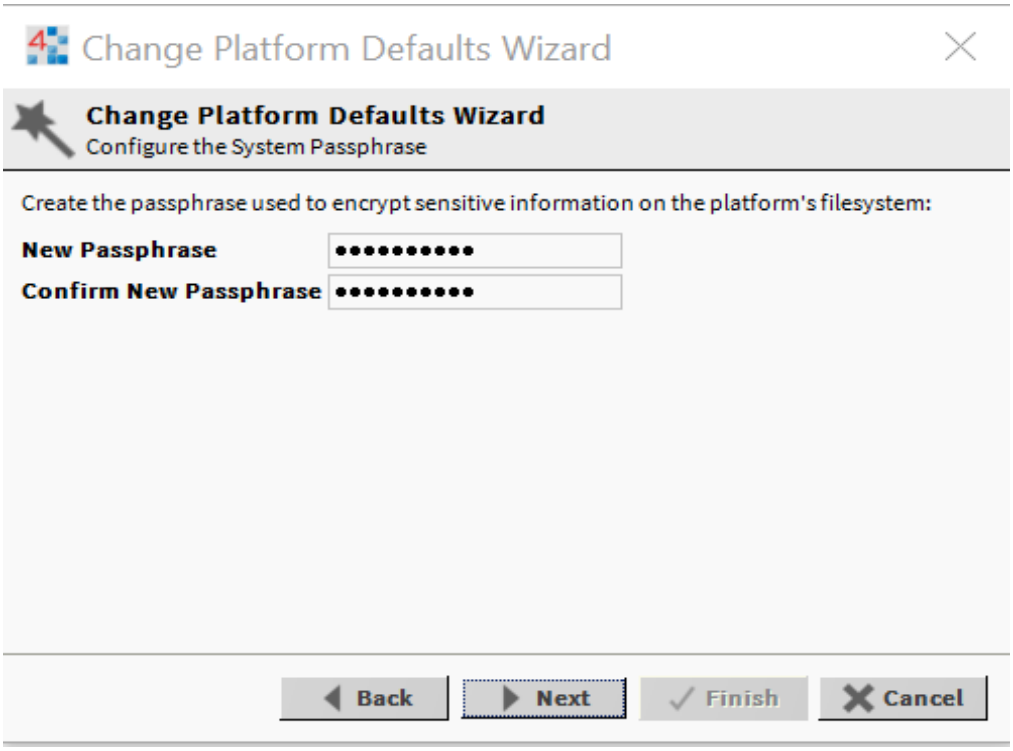
Username — Type in the factory default User name (tridium)

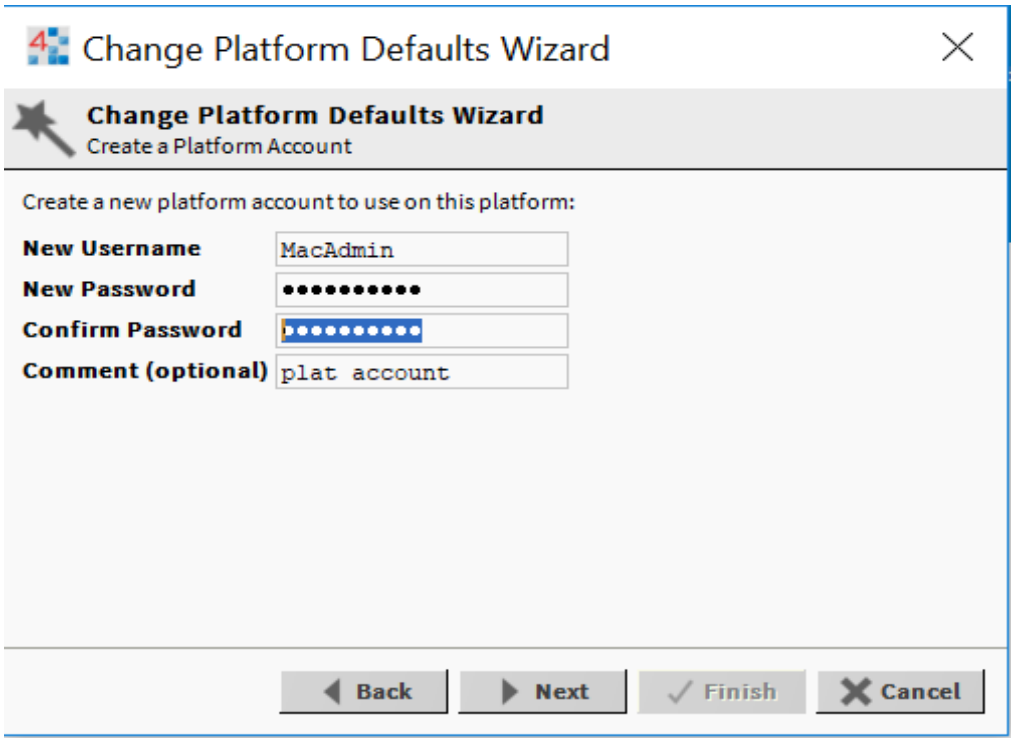
Password — Type in the factory default password (niagara)

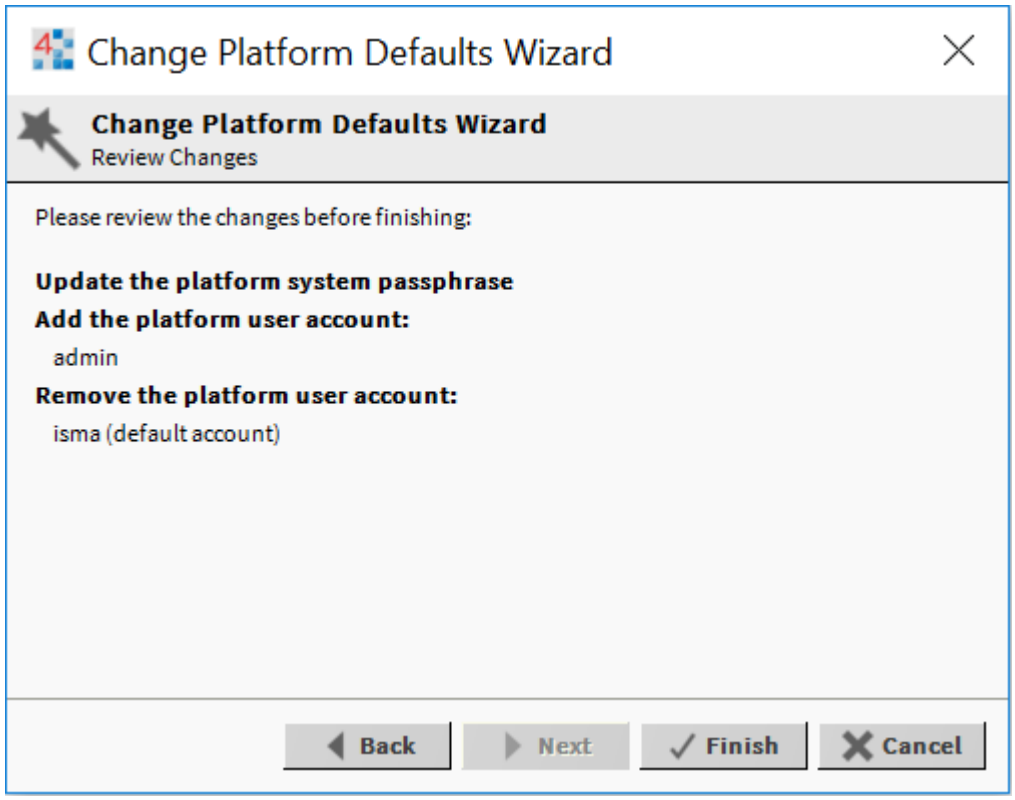
Click the OK button to accept all settings.



If the Change Platform Defaults Wizard displays, click Next to step through creating a system passphrase, creating a new platform account, and removing the default platform account, as shown below.







Click Finish to complete these changes.

The system completes making the connection between the host and Workbench and displays the Nav Container View.

3.5 TCP/IP Configuration

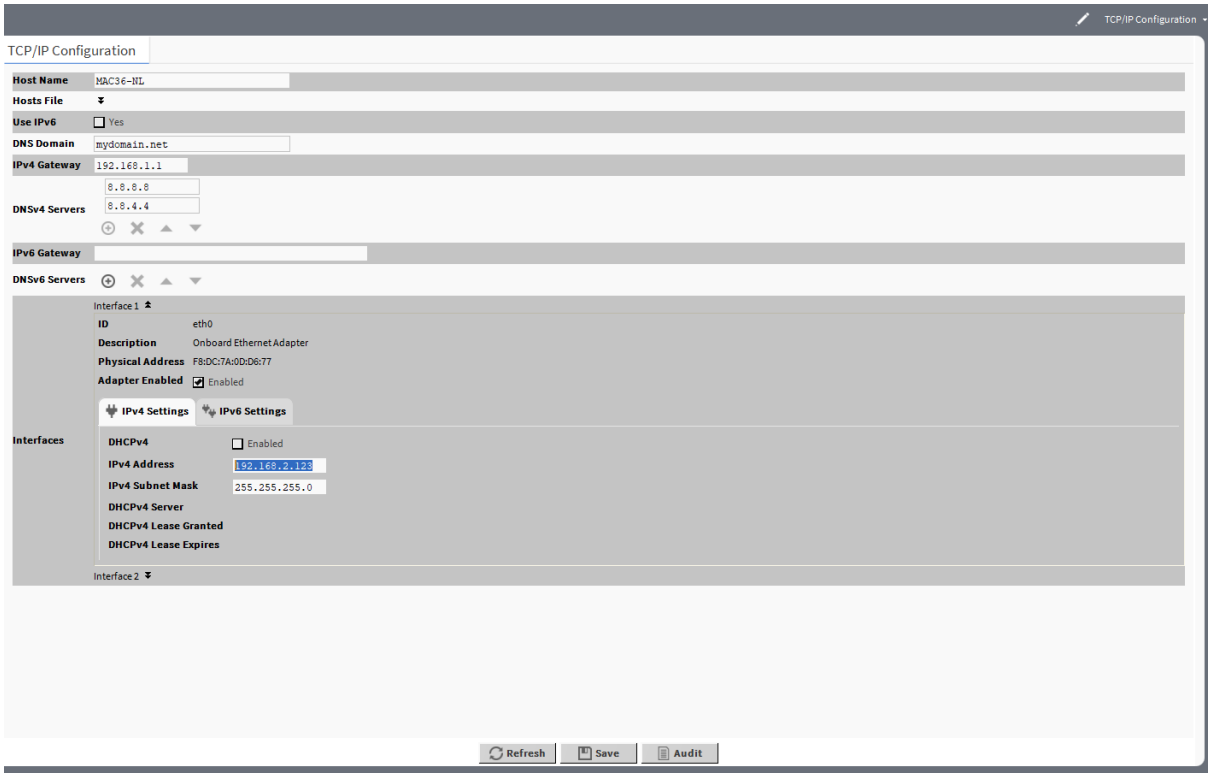
TCP/IP Configuration is one of several platform views. Typically, you use it to initially configure a remote controller's TCP/IP settings.

Configuring TCP/IP communication settings is a task for the systems integrator while initially setting up a controller.

Perform the following steps:

Open a connection to the platform.

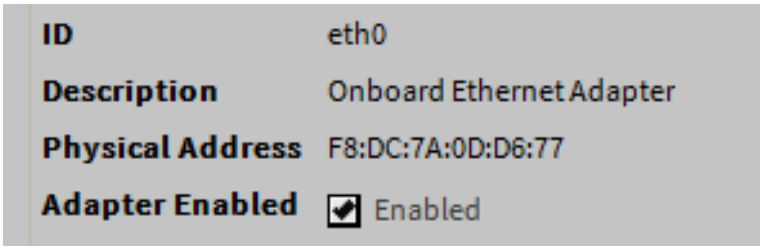
Expand the Platform container in the Navigation tree and double-click the TCP/IP Configuration container.



Click the drop-down arrows to expand a group of properties.

For each Ethernet port on the connected platform, the TCP/IP Configuration platform view provides an expandable Interface in Image section.

All compatible iSMA-B-MAC36NL controllers have two Ethernet ports: ETH1 and ETH2. In the TCP/IP Configuration view, they are listed as Interface 1 (eth0) and Interface 2 (eth1).



As shown above, each Interface has the following properties at the top:

ID

A read-only OS identifier for the hardware interface, such as “eth0” for a iSMA-B-MAC36NL controller, or, for a Windows platform, either a 128-bit GUID (globally unique identifier) or a Windows network connection name, such as “Local Area Connection 2”.

Description

A read-only text string such as “Onboard Ethernet Adapter eth0” for a iSMA-B-MAC36NL controller, or i.e. “Intel(R) PRO/100 VE Network Connection” for a Win32-based host, describing a NIC model.

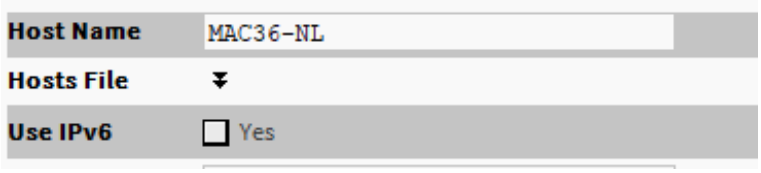
Physical Address

The unique 48-bit MAC address of the Ethernet adapter, in six two-hexadecimal digits. For example, for the “eth0” Interface 1 port of a iSMA-B-MAC36NL controller: F8:DC:7A:0D:D6:77

Adapter Enabled

Checkbox to specify whether the Ethernet port is usable.

The top of the TCP/IP Configuration view provides the platform's TCP/IP host settings.



These available host fields are as follows:

Host Name

Synonymous with "computer name," this is a string that can be processed by a DNS server to resolve to an IP address. On Windows-based systems, this hostname is the computer's identification in its workgroup or domain. If using hostnames, each Niagara platform should have a unique hostname.

Hosts File

The hosts file is a standard TCP/IP hosts file, where each line associates a specific IP address with a known host name. To review, click the expand control to see all entries.

For the iSMA-B-MAC36NL controller, you can edit its host file.

To add an entry, click at the end of the last line and press Enter.

Then type the IP address, at least one space, then enter a known host name.

To delete an entry, drag to highlight the entire line, then press Backspace.

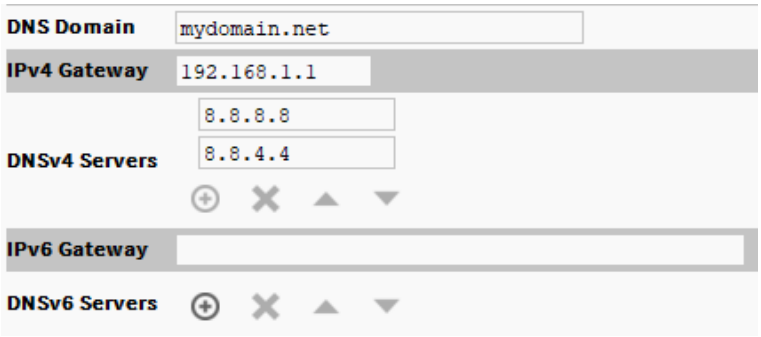
Click the expand control again to collapse the Hosts File editor.

Use IPv6

Default is No (unchecked). If set to Yes (checked), Niagara (platform daemon and station) responds to IPv6 requests, that is, creates IPv6 server sockets (daemon) and IPv6 fox multicast sockets.

If connected to the iSMA-B-MAC36NL controller, the DNS and gateway settings are also “host-level” parameters in the TCP/IP Configuration view, as shown below.

* For a Windows-based host, DNS and gateway settings are available under each Interface section.



The available fields for iSMA-B-MAC36NL controllers are as follows:

DNS Domain

The TCP/IP Domain Name System (DNS) domain this host belongs to, if used.

IPv4 Gateway

The IP address of the router that forwards packets to other IPv4 networks or subnets. A valid gateway address is required in multi-station (MAC36) jobs to allow point discoveries under Niagara Networks.

DNSv4 Servers

The IP address of one or more DNS servers (if available), where each can automate associations between hostnames and IPv4 addresses. Included are icon-buttons to Add (enter IP address of server), Delete and move Up/Down (set the DNS search order).

IPv6 Gateway

The IPv6 address for the router that forwards packets to other IPv6 networks or subnets.

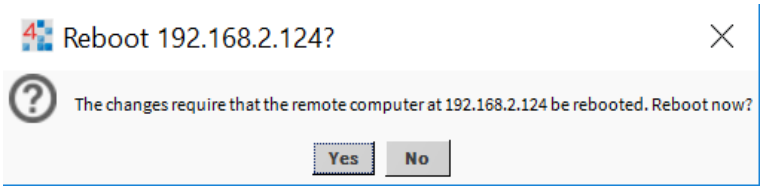
DNSv6 Servers

The IPv6 address for one or more IPv6 DNS servers (if available), where each can automate associations between hostnames and IPv6 addresses. Included are icon-buttons to Add (enter IP address of server), Delete and move Up/Down (set the DNS search order).

To save yourself some time when making multiple changes, enter all changes before you continue.

When you finish the configuration, click Save.

The system displays:



Reboot the controller for the changes to take effect.

3.6 Connection to the console

If a more complex troubleshooting, analysis or changes of the iSMA-B-MAC36NL controller are required, console mode could be used. Console mode is often used to connect to the controller with unknown Network Settings. To put the controller into the debug system console mode, plug-in the USB-to-MiniUSB cable. This makes the system console available at the debug port, at a predefined serial rate: 115200, 8, N, 1. After connection it is possible to login with platform credentials.

More detailed instruction is described below:

1. Connect to controller's debug port using the USB cable.
2. Start terminal emulation software on your PC. We recommend PuTTY, which can be downloaded from https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html
3. In the category tree expand "Connection" branch and choose "Serial".
4. Set the "Serial line to connect to" USB COM port, in which the controller has been detected. It is possible to check which port is in use in Windows Device Manager.
5. Set the "Configure the serial line" fields as shown in the figure below

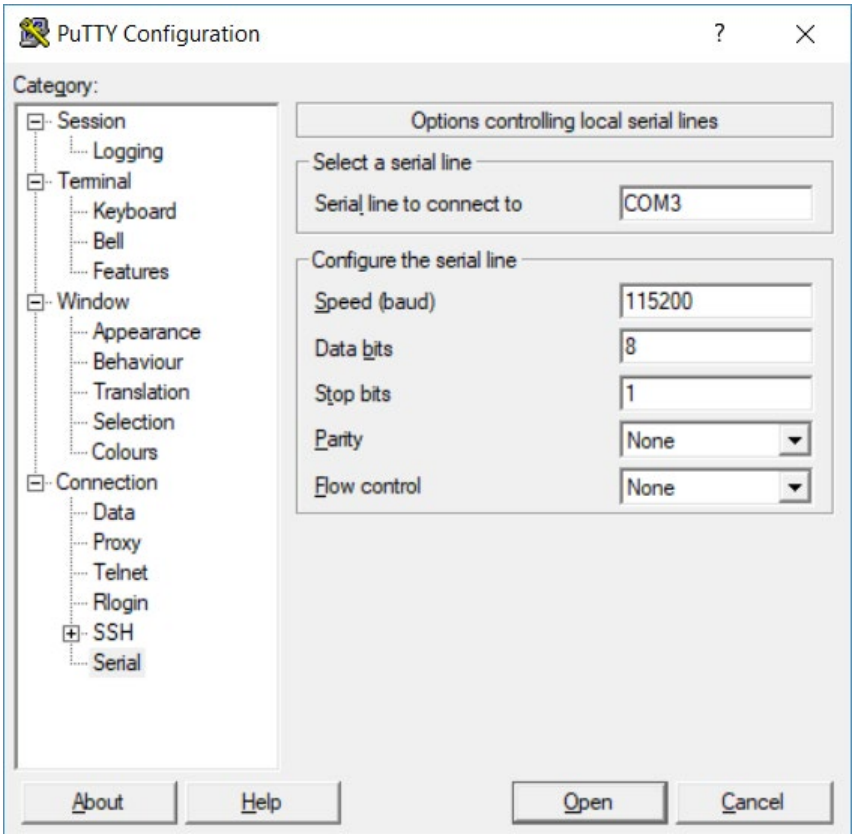


Figure 19 COM port settings in PuTTY

6. In the category tree click “Session” and choose “Connection type” as a “Serial”.
7. Click “Open” button at the bottom of the PuTTY window.
8. Enter a platform user name and password (factory platform user: tridium, password: niagara)

3.7 Controller system update

Preparations for updating

If the GC5 releases an update of one or more components of the controller system (OS, NEL, JVM), we can perform its remote update using a distribution files without the need for physical access to the SD card.

After downloading the appropriate update from the GC5's support website, the zip file should be unpacked to the appropriate folder depending on the version of Niagara. You will receive three files - the first is a configuration file (file nre-config-iSMA-ISMA-MAC-HARDWARE.dist), the second and third files containing the appropriate updated system component (iSMA-isma-os.dist and nre-core-iSMA-OS-armv7l.dist). Both files should be copied to the directory C:\Users\{User folder}\Niagara4.6\vykon\sw\inbox and/or C:\Users\{User folder}\Niagara4.7\vykon\sw\inbox and to later version of Niagara. Next you must restart the Workplace.

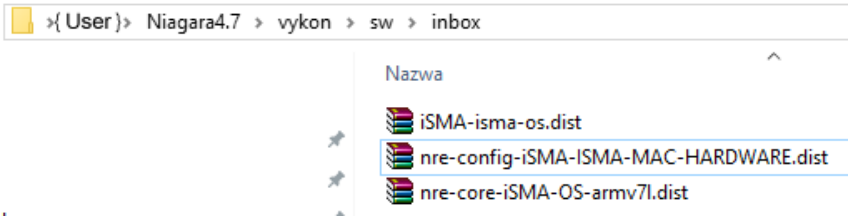


Figure 20 Folder for update files

The files will be copied to the appropriate folders with the version numbers under the C:\ Niagara\Niagara-4.6.96.28\sw (C:\ Niagara\Niagara-4.7.109.20\sw and later) folder during the Commissioning Wizard process or after launching from the Platform a Distribution File Installer process.

Installing the update

After logging into the Platform of the controller, click the right mouse button on the Platform and run the Commissioning Wizard process

Passing through the next wizard windows, an additional window will appear informing you about the need to update the appropriate controller system component (OS, NEL, JVM).

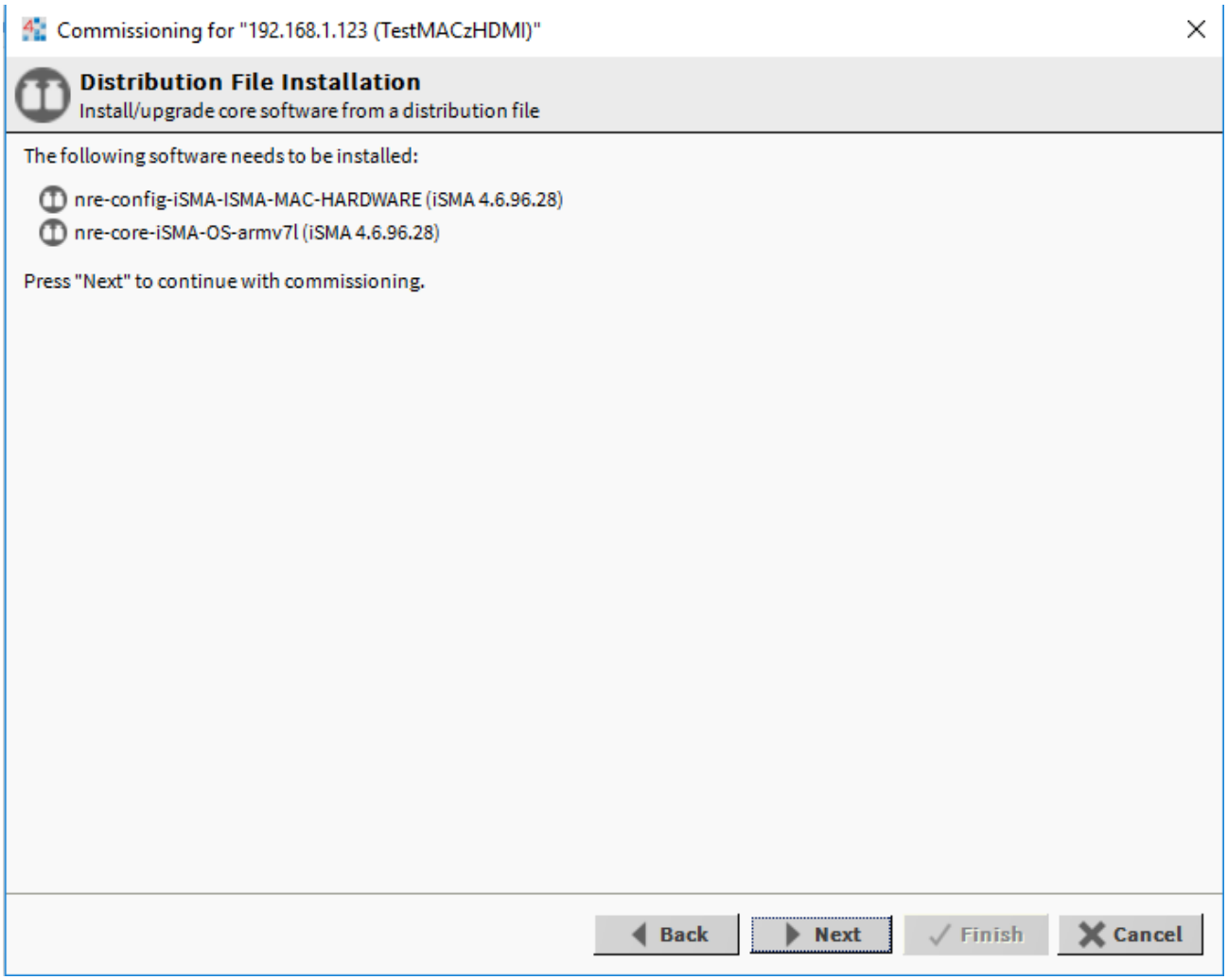


Figure 21 Commissioning Wizard with tab informing about the needs to update

Note: No additional window in the Commissioning Wizard means that the controller has the current version of the system component and there is no need to be update - you can cancel the Commissioning Wizard process.

Go to the last window of wizard and click on the Finish button. And there is an automatic update of the controller system component.

After the update is completed, the controller is rebooted. After the reboot, we have the latest available version of controller's system component.

Current version numbers of the controller's system component can be checked in the Platform / Platform Administration.

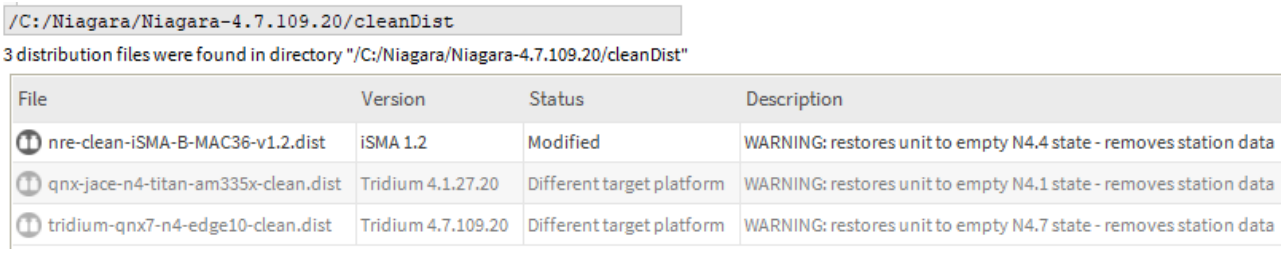
3.8 Restore controller to the default state

At times it may be necessary to restore an controller to a known good empty state, either to recommission it with the current release build, or before recommissioning it with an earlier build. To do this, you can install a clean dist (distribution) file.

After downloading the clean dist from the manufacturer's website, the file should be copied to the appropriate folder depending on the version of Niagara - C:\Niagara\Niagara-4.6.96.28\cleanDist, C:\Niagara\Niagara-4.7.109.20\cleanDist and later version of Niagara. Next you must restart the Workplace.

Note: Installing a clean dist wipes the entire file system and installs an appropriate version of Niagara platform daemon, resetting the unit to a near factory state. All other data is deleted from the file system, including station bog files, Px files, modules, etc. The unit's TLS private key information is also deleted. In addition, installing a clean dist deletes all configured platform users, restoring the factory-default platform credentials and port (3011). Only TCP/IP settings, license file and secure communication configuration (TLS) will be preserved.

To perform the restore to the default state, open a Platform connection to the controller. To access the cleanDist directory, open the Distribution File Installer and click the Cleaning button. Each clean dist file has the suffix -clean in its name. Clean distribution files are located in C:\Niagara\Niagara-4.6.96.28\cleanDist,C:\Niagara\Niagara-4.7.109.20\cleanDist and the appropriate folder for later version of Niagara.


/C:/Niagara/Niagara-4.7.109.20/cleanDist

3 distribution files were found in directory "/C:/Niagara/Niagara-4.7.109.20/cleanDist"

File	Version	Status	Description
nre-clean-iSMA-B-MAC36-v1.2.dist	iSMA 1.2	Modified	WARNING: restores unit to empty N4.4 state - removes station data
qnx-jace-n4-titan-am335x-clean.dist	Tridium 4.1.27.20	Different target platform	WARNING: restores unit to empty N4.1 state - removes station data
tridium-qnx7-n4-edge10-clean.dist	Tridium 4.7.109.20	Different target platform	WARNING: restores unit to empty N4.7 state - removes station data

Figure 22 Distribution File list with Clean Dist files

Next select the appropriate clean dist file for the platform and click Install. Removing a file system takes a few minutes, then the controller automatically reboots. Wait for the reboot to complete.

Note: Always use a newest version of clean dist which you can download from support web page. Previous versions should be removed as they may cause the device to be blocked.

Note: After reboot from a clean dist install, the controller requires port (3011).

After that you must re-install the software versions to the controller, open a version of Workbench that uses the same software version (N4.4, N4.6, N4.7 or later) that you want on the controller, and use the Platform \ Commissioning Wizard to install the desired software build.

3.9 Data Recovery Service

The Data Recovery Service is the station platform service that provides NV-RAM support for MAC36NL. Providing the platDataRecovery module is installed, this service automatically appears under Platform Services.

Niagara 4.6 and up includes support for MAC36NL operation, where a MAC36NL uses NV-RAM (non-volatile random access memory), to preserve RAM-resident data when a power outage occurs. This includes station data not yet committed to non-volatile flash memory.

Note: A station running in a MAC36NL has no seamless immunity to “power bumps”. Although all station data, including components, histories, and alarms, are automatically restored to “pre-event” values as part of station startup (following power restoration), the briefest power outage results in a controller reboot.

In MAC36NL solves that problem, as all station-generated data (changed from that stored in its non-volatile flash memory at the time of power loss) is always preserved in NV-RAM. Upon power restoration, this data is “played back” in the station during startup, then saved in its non-volatile flash memory.

Note: NV-RAM does not preserve data or files external to station.

Please note that if a MAC36NL power event occurs when station users have unsaved file changes, say in a Px file or Nav file being edited, those unsaved changes are lost.

Station users may be aware of such an event and react by saving changes (click Save button in the active view).

Providing that communications are still established, the file edited may be saved. Or, power may be lost only momentarily, and then remain stable until the user does a normal save.

Note: MAC36NL does not provide a similar save opportunity after a power bump — it is already busy rebooting. Therefore, as a best practice, you should advise system users of MAC36NLs to save often when editing items like Px graphics and Nav files.

The Data Recovery Service writes current values as they occur to a block of NV-RAM. When a block is full, the service copies it from NV-RAM to the controller’s flash memory. A station that creates rapid COV (change of value) histories may fill the NV-RAM data blocks too frequently, triggering a database save possibly every couple of minutes. Ideally, such database saves to flash memory should occur no more than once an hour.

Saving the database too frequently results in inefficient use of controller CPU time and potential flash problems.

Flash memory is designed to be written to a certain number of times. A number of variables contribute to how often the database needs to be saved, including:

- Rate of changes that need to be persisted
- Size of the changes (histories, alarms, and setpoint changes differ in size)
- Amount of free flash memory space

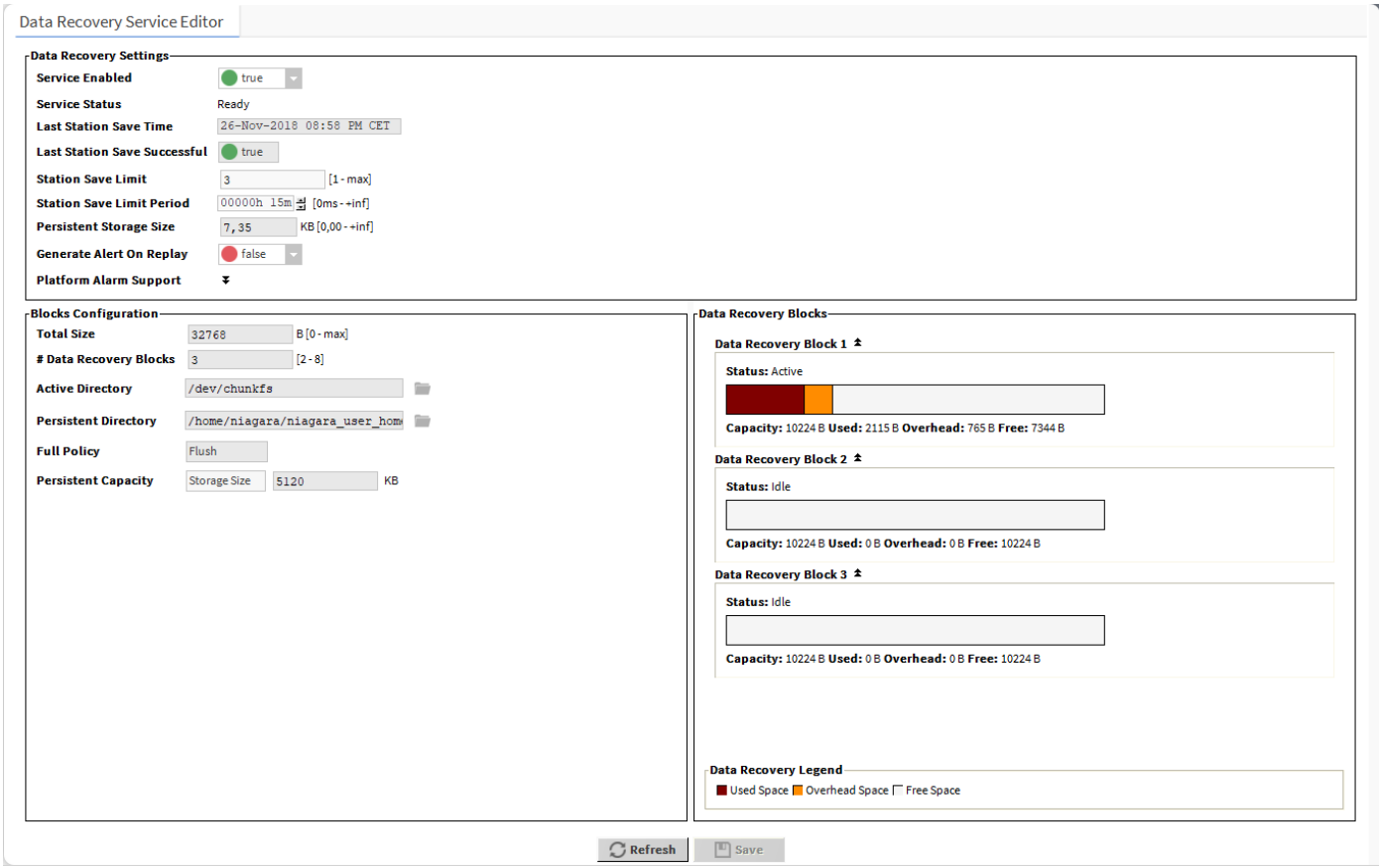


Figure 23 Data Recovery Service Editor in PlatformServices of MAC36NL

The figure above shows the default view for the service: the Data Recovery Service Editor.

Note the example above reflects a scenario where a station save has occurred since the service was created. Some NV-RAM “data recovery blocks” have already been flushed to flash (“Persistent Storage Size” is not 0.00 kB).

Data Recovery Service Editor

This Data Recovery Service Editor is the default view of the Data Recovery Service.

The Data Recovery Service Editor view has the following three main areas:

- Data Recovery Settings
- Blocks Configuration
- Data Recovery Blocks

Data Recovery Settings include the following:

- Service Enabled

  Defaults to true, to enable NV-RAM support via this service.

- Service Status

  The current status of the DataRecoveryService, which is typically “Ready”. Other states include “Starting”, “Configuring”, “Replaying”, “Saving”, “Stopping”, “Stopped”, “Fault” and “Unknown”.

- Last Station Save Time

  Reflects the last time a station save occurred (config.bog written to flash memory). This save may (or may not) have occurred as a result of the DataRecoveryService.

- Last Station Save Successful

  Boolean that reflects if last station save attempt was successful, as either “true” or “false”. This save may (or may not) have occurred as a result of the DataRecoveryService. Note in the case of a newly-created DataRecoveryService, this is “false” until the next save occurs.

- Station Save Limit

  Configurable in N4.6 and later. Number of station saves that are allowed to occur during the Station Save Limit Period before it is determined that the station is spending too much time saving. Exceeding the limit throws the Data Recovery Service into fault since too much data is being generated.

- Station Save Limit Period

Configurable in N4.6 and later. The period of time for Station Save Limit. If enough saves occur during Station Save Limit Period to exceed the Station Save Limit then the service goes into fault. For example, more than 5 station saves in 3 minutes period triggers a fault.

- Persistent Storage Size

  Reflects the total size of all the “flushed to flash” data block files (“.drdb” files) that exist in the station’s /dataRecovery folder, in kB. Initially, this will be 0, until the first NV-RAM block flushes to flash. It will then increment by that kB amount for each subsequent NV-RAM block flushed. Note this value is continually compared to the “Persistent Capacity” property in the Blocks Configuration property section.

- Generate Alert On Replay

  Configurable in N4.6 and later. Boolean (true/false) value, generates an alert (low priority alarm type) that will indicate that a Data Recovery Replay (power was lost) occurred. This is a persistent artifact that will show up in the alarm console, since it can be useful to know when power loss occurred. Default is false. If set to true, upon any controller boot sequence in which NV-RAM recorded data is discovered and played back, a corresponding alert is routed to the Alarm Class named in the Data Recovery Alarm Support container. The following figure shows details for such an example alert.

- Data Recovery Alarm Support

  Configurable in N4.6 and later. This is the standard container slot for routing platform service-generated alarms or alerts, in this case an alert from the DataRecoveryService upon any controller boot sequence in which NV-RAM recorded data is discovered and played back. These properties work in the same fashion as those in an alarm extension for any control point.

Blocks Configuration

These status properties include the following:

- Total Size

  Reflects, in bytes, the total amount of NV-RAM buffer memory available to the service. For example, this is “32768” for the 128 kB NV-RAM memory.

- Number of Data Recovery Blocks

  Reflects the number of data block partitions of NV-RAM used, for example, 3.

- Active Directory

  Reflects the directory used in NV-RAM for the active data block.

- Persistent Directory

  Reflects the full flash file directory path used to store flushed ".drdb" files, which equates to: /dataRecovery

- Full Policy

  Reflects the current policy when an NV-RAM data block becomes full (currently "Flush").

- Persistent Capacity

  Reflects the size limit, in kB, for the total of all "flushed to flash" data block files (".drdb" files). If this limit is exceeded (see property "Persistent Storage Size"), the service automatically triggers a station save operation.

Data Recovery Blocks

This area provides expandable bar graphs for each of the NV-RAM buffer data blocks, to visually represent the current amount of used space, overhead space, and available free space, along with numerical values. By default, the currently active NV-RAM block is expanded, showing a bar graph of current buffer usage.

Above the bar graph of each block, its Status is described, typically as either: "Active", "Idle", or sometimes "Flushing", with other states "Purging", "Awaiting Idle", "Flush Queued", "Defragmenting", "Reserved", "Fail", and "Unknown".

Below the bar graph of each block, numerical amounts display, in bytes, for its total Capacity, currently Used space, calculated Overhead Space, and available Free Space.

Data Recovery Service properties

In addition to the (default) Data Recovery Service Editor view, the Data Recovery Service also has properties on its Platform Service Properties view, many of which are shown here.

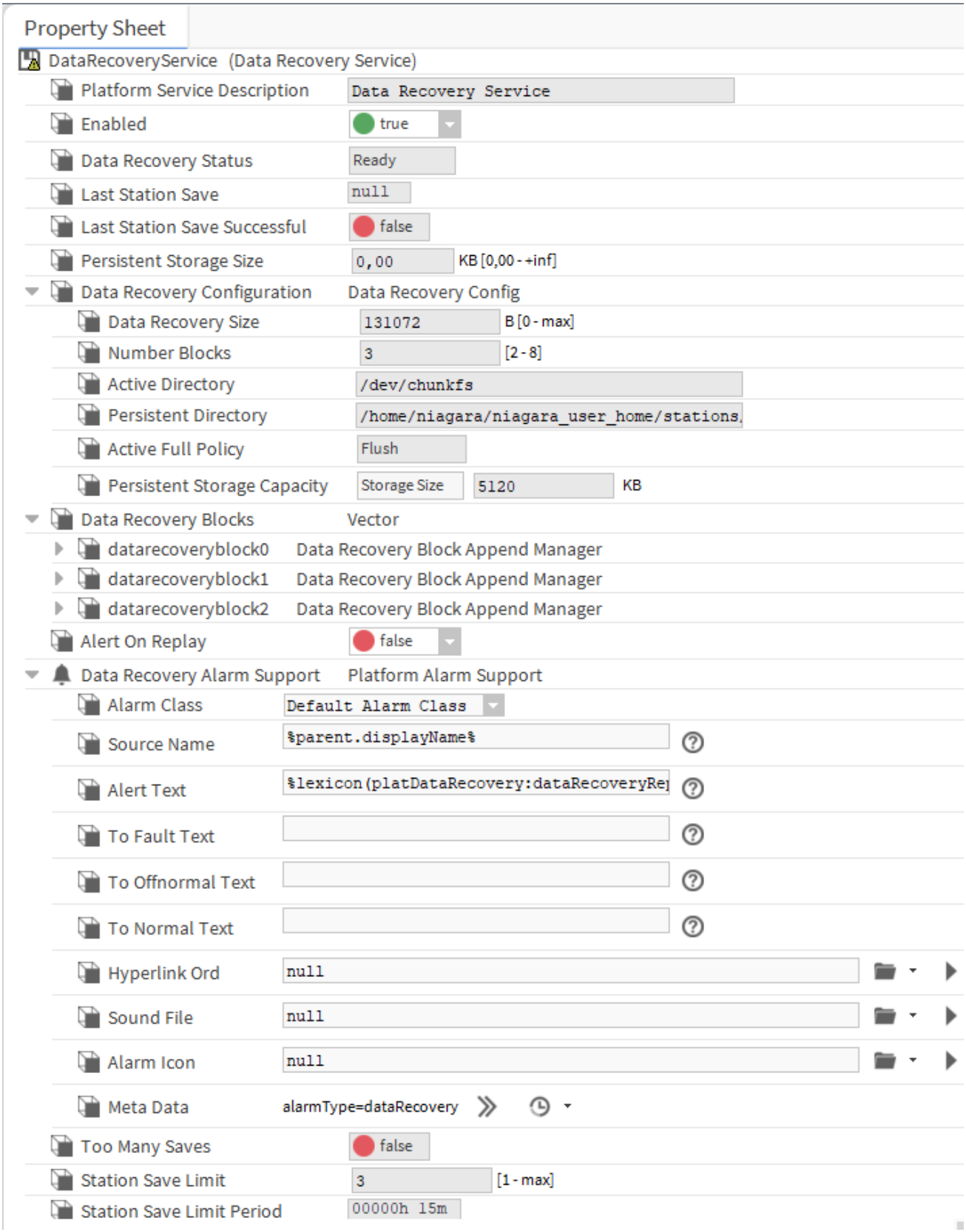


Figure 24 MAC36NL Platform Service Properties view of DataRecoveryService

Most of these properties are also on the Data Recovery Service Editor default view.