

USER GUIDE
MAN0155 rev 5

Cylon® MATRIX-2 Series



Style conventions used in this document:

UI Text: Text that represents elements of the UI such as button names, menu options etc. is presented with a grey background and border, in Tahoma font which is traditionally used in Windows UIs. For example:

Ok

Standard Terms (Jargon): Text that is not English Language but instead refers to industry standard concepts such as Strategy, BACnet, or Analog Input is represents in slightly condensed font. For example:

BACnet

Code: Text that represents File paths, Code snippets or text file configuration settings is presented in fixed-width font, with a grey background and border. For example:

```
$config_file = c:\CYLON\settings\config.txt
```

Parameter values: Text that represents values to be entered into UI fields or displayed in dialogs is represented in fixed-width font with a shaded background. For example

10°C

Product Names: Text that represents a product name is represented in bold colored text. For example

INTEGRA™

Company Brand names: Brands that are not product names are represented by bold slightly compressed text:

ABB Cylon

PC Keyboard keys: Text representing an instruction to press a particular key on the keyboard is enclosed in square brackets and in bold font. For example:

[Ctrl]+[1]

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1 The MATRIX-2 Series

CYBERSECURITY DISCLAIMER:

This product is designed to be connected to and to communicate information and data via a network interface. It is your sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be). You shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, secure VPNs, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

DESCRIPTION

The MATRIX-2 is an IoT (Internet of Things) embedded ASPECT® Control Engine now available in the familiar Cylon controller form factor. It is designed to provide flexible site control applications for medium to large scale building automation systems. It can be used to connect with Cylon **CB Series** and **AAM NB Series** of BACnet® MS/TP field level controllers. The MATRIX-2 supports serial communications protocols such as BACnet, AAM PUP, and Modbus®. Additionally, TCP/IP communications using FT/Net, BACnet, Modbus and Cylon's Unitron (when used with the UC32.netK) protocols are available when using the RJ-45 connection.

APPLICATION

A capacity-based licensing model makes the MATRIX-2 family of controllers scalable for medium to large buildings applications, including a campus environment when combined with the **ASPECT-Enterprise** server software. The MATRIX-2 provides network management and integration of the supported field level RS-485 and TCP/IP communication protocols.

When deployed with embedded ASPECT Runtime Engine, the MATRIX-2 is capable of supervisory-based control functions including but not limited to energy management routines, custom sequencing, alarm and event annunciation, historical alarming and trending, and master control scheduling. Additionally, streaming of live connected data is displayed rich HTML5 graphics using a web browser.

ASPECT uses secure web technologies to enrich the user experience through common internet applications (appropriate security measures required, such as VPN or firewall) for alarm annunciation and scheduling. Receive alarms either from the integrated alarm console or through e-mail clients, or Twitter®. Schedule your building equipment through an integrated scheduler or by using common scheduling platforms such as Microsoft® Outlook®, Apple iCal, Google Calendar™.

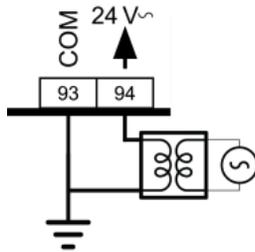
2 Installation

APPLY POWER TO THE DEVICE

For the initial configuration of the device, the controller must first be powered on.

Note: Service Port (USB connection) must not be connected until after the device is powered on.

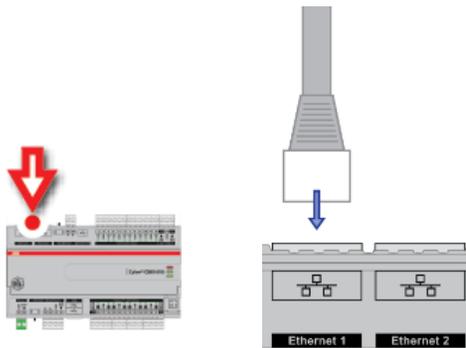
The MATRIX-2 requires 24 V AC/DC supplied from an externally mounted power transformer. One conductor of the transformer must be grounded to an earth ground to avoid damage to the controller. This conductor will be wired to the COM (common) terminal of the controller. The wiring diagram is shown here:



Note: Ensure the 24 V AC/DC and Common wires are correctly connected to the controller. If the wires are swapped, it may cause damage to anything connected to the controller.

CONNECT THE MATRIX-2 TO AN IP NETWORK

Place an Ethernet cable from the Network's Ethernet switch into one of the 2 Ethernet ports on the top of the MATRIX-2:

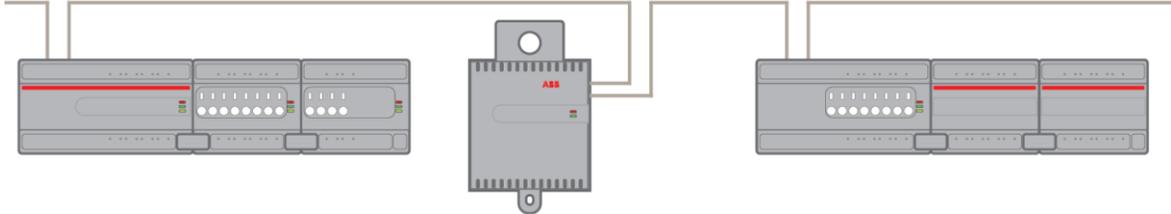


IP Cabling requirements

Cable	Standard patch cable, Cat 5e with 4 pairs of wires fitted with RJ-45 connectors
RJ-45 pin connections	Straight-through wiring
Characteristic impedance	100-130 Ohms
Distributed capacitance	Less than 100 pF per meter (30 pF per foot)
Maximum Cable length between IP devices	328 ft. (100 m) maximum

THE MATRIX-2 INTEGRATED ETHERNET SWITCH

The **MATRIX-2** includes an integrated Ethernet Switch, with 2 ports. This allows the device to forward IP packets from each port to the other, allowing **MATRIX-2**, **FBXi**, **FBVi** and **CBXi** devices to be connected in a Daisy-Chain topology:



It is recommended that both ends of a **MATRIX-2** / **FBXi** / **FBVi** / **CBXi** daisy chain network are connected to a single switch that supports the Spanning Tree network switch protocol (STP). In this scenario a single line break or controller failure in the loop will allow all controllers to continue to communicate.

For example, if controllers **A**, **B**, **C**, **D** and **E** are daisy-chained, connected on both sides, with a single switch supporting Spanning Tree Protocol:

- If controller **B** loses power, controller **A** will be on one trunk, and **C** / **D** / **E** will be on another all communicating.
- If controllers **B** and **D** lose power, controllers **A** and **E** will communicate, but controller **C** will not.

Note: The **FBVi Series** controller has a pass-through across its IP switches, such that if it loses power controllers ‘downstream’ will continue to be connected. Only the **FBVi Series** has this feature.

Note: If you plug both ends of the daisy chain network into a switch that does not support the Spanning Tree Protocol, it will flood the network with requests. The switch will send and receive the same messages over and over again, until something breaks.

CONNECT THE MATRIX-2 TO BACNET MS/TP

If the **MATRIX-2** unit will be used with a BACnet MS/TP fieldbus, connect it as described in the following section.

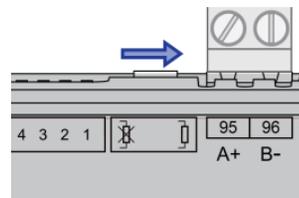
MS/TP Cabling Requirements

Note: Use Copper or Copper Clad Aluminum 70 °C conductors only.

Terminals	PCB mounted plug terminal connections
Conductor Area	Max: AWG 12 (3.31 mm ²) Min: AWG 22 (0.355 mm ²)
Max cable length	1.2 km @ 38K4 baud

TERMINATE THE MS/TP NETWORK

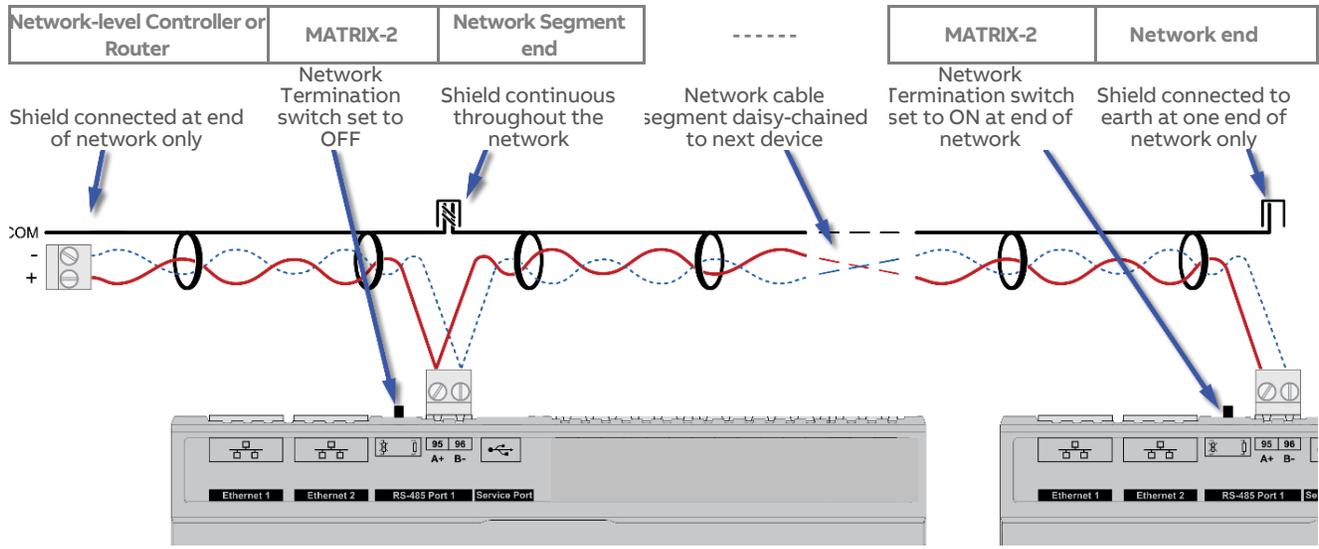
If the **MATRIX-2** is the first or last device on the RS-485 network, then its MS/TP subnet terminator switch must be set to “in” 



ATTACH RS-485 COMMUNICATION WIRES TO THE MS/TP SUBNET PORT

Wiring the RS-485 network involves connecting the A+ (95) and B- (96) terminals in a daisy-chained configuration. One end of the network will be connected to the Fieldbus of the Network-level controller or BACnet® router. At the other end of the network, the last device must be “terminated” by either installing a 100 Ω ... 120 Ω resistor or, if the last device is a MATRIX-2, users can switch the MS/TP Subnet terminator switch (located beside the MS/TP port) towards the  icon. This will effectively terminate the network.

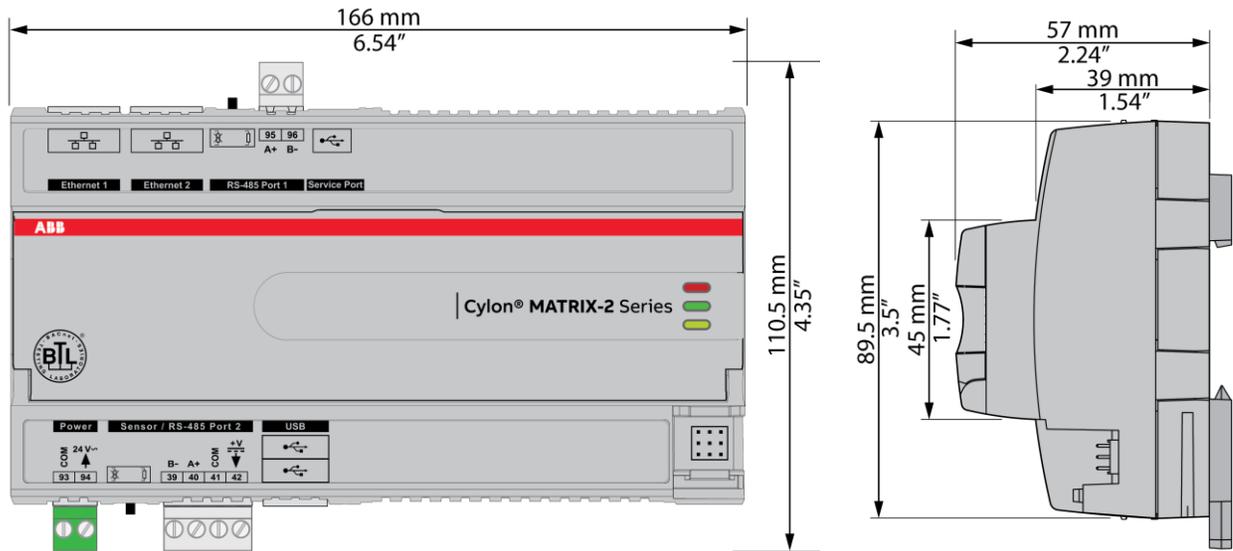
The shield (screen) must be carried through the entire network, and must be grounded at one point on the network as shown below:



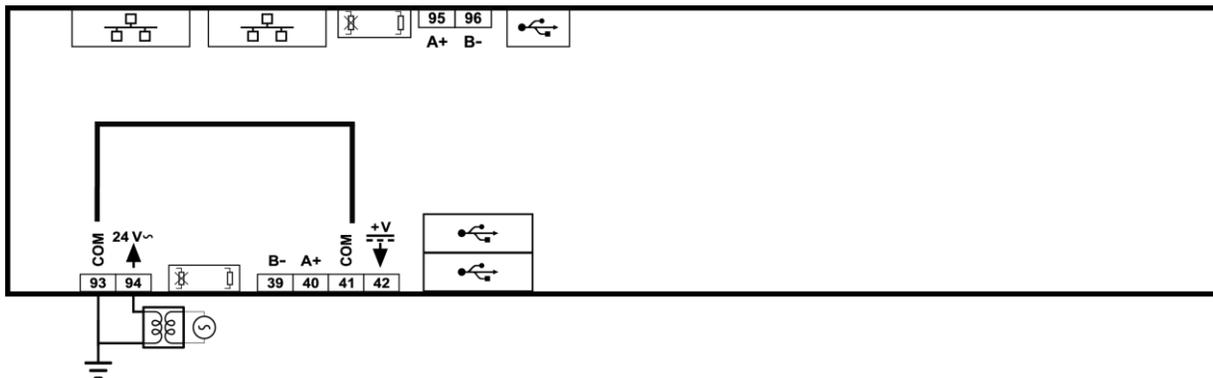
Note: If the RS-485 network is wired to an eSC, then the shield will be grounded at the eSC.

3 MATRIX-2 Operation

PHYSICAL LAYOUT DIMENSIONS



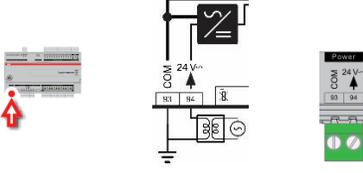
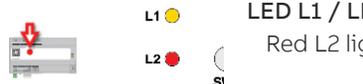
WIRING



CAUTION - DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISPOSE OF USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

Supply Requirements	24 V AC ±20 % 50/60 Hz
Supply Rating	20 VA
BACnet Loading	¼ unit load device

TERMINALS

	Terminal Numbers	Description
	95, 96	RS-485 Port 1 (BACnet® MS/TP) screw terminal MS/TP subnet terminator switch is located beside the port. If the switch is towards the  icon, then termination is <i>in</i> and if the switch is towards the  icon then termination is <i>out</i> .
	39 ... 42	RS-485 Port 2 (BACnet® MS/TP or Modbus RTU) The bus Terminator Switch is located beside the port. If the switch is towards the  icon, then termination is <i>in</i> and if the switch is towards the  icon then termination is <i>out</i> .
<div style="display: flex; align-items: center;">  <div style="flex-grow: 1;"> <p>Indicator LEDs</p> <p>Note: During typical operation, the Red LED should be on, the Green LED should be blinking and the Yellow LED should be off.</p> </div>  </div>		
	Ethernet Ports	
	Service Port (Micro USB)	
	USB ports Reserved for firmware upgrade	
	<p>Push buttons</p> <p>Reset Ethernet settings (IP address) only :</p> <ul style="list-style-type: none"> While the controller is <i>running</i>, press SW1 for 1 second. On release, LED L2 will light up. All ethernet settings will be returned to factory defaults 192.168.1.251/24. Groups and Users (passwords) will remain intact <p>Reset everything to factory defaults :</p> <ul style="list-style-type: none"> while the controller is <i>running</i>, press and hold SW1. After 3 seconds LED L2 will light up, continue to hold SW1 for at least 10 seconds. Release SW1. All ethernet settings will be returned to factory defaults 192.168.1.251/24. Groups and Users (passwords) will be reset to factory defaults. <p>Restart the device leaving all ethernet settings and passwords intact:</p> <ul style="list-style-type: none"> while the controller is <i>running</i>, press SW2 for 1 second. The red indicator LED will remain on. The Green indicator LED will stay off until reboot is complete. The Green indicator LED will begin to flash when reboot is done. The Yellow indicator LED will be off unless there is a problem 	
	<p>LED L1 / LED L2</p> <p>Red L2 lights up when reset is triggered.</p>	

INDICATOR LED SIGNALS

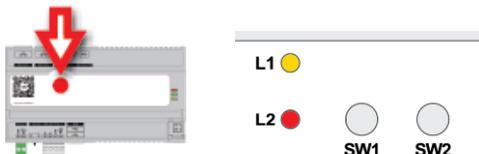
	Off	On	Slow Blink	Fast blink
 Red LED (Power)	Power is off	Power is on	— Unit Rebooting —	
 Green LED (Status)	Unit is not running		Unit is running	
 Yellow LED (FLX)	— Not Used —			

Note: During typical operation, the Red LED should be on, the Green LED should be blinking and the Yellow LED should be off.



RESTARTING, RESETTING AND UPGRADING THE MATRIX-2

The MATRIX-2 controller can be restarted or reset using the two buttons located on the front panel (under the flap) marked SW1 and SW2. Beside these buttons there are two LEDs marked L1 and L2, which are used to signal the progress of the reset or upgrade:



RESETTING THE WEBUI LOGIN

If the WebUI username / password or IP address have been changed to unknown values so that you cannot log in to the WebUI, you can reset them to known values, i.e. the Factory defaults:

- username: `aamuser`
- password: `default`
- IP address: `192.168.1.251`

To reset the IP address and password:

- While the controller is *running*, press **SW1** for 1 second.
- On release, LED **L2** will light up.
- All ethernet settings will be returned to factory defaults above.
- Groups and Users (passwords) will remain intact

FACTORY RESET

To restore Ethernet configuration in the MATRIX-2, as well as user and group configurations:

- while the controller is *running*, press and hold **SW1**.
- After 3 seconds LED **L2** will light up, continue to hold **SW1** for at least 10 seconds.
- Release **SW1**.
- All ethernet settings will be returned to factory defaults `192.168.1.251/24`.
Groups and Users (passwords) will be reset to factory defaults.

RESTARTING THE CONTROLLER WITHOUT POWER CYCLING

To restart the MATRIX-2 without disconnecting the power,

- while the controller is *running*, press **SW2** for 1 second.
- The red indicator LED will remain on.
- The Green indicator LED will stay off until reboot is complete.
- The Green indicator LED will begin to flash when reboot is done.
- The Yellow indicator LED will be off unless there is a problem

4 Software Configuration

INTRODUCTION

The following provides details on the software configuration of the **MATRIX-2 Series** hardware. Please follow the steps contained within this section for proper setup and configuration.

TOOLS REQUIRED

The following tools will be required for proper configuration of the system:

- PC/Laptop
- Ethernet cross-over cable, or other network connection to your **MATRIX-2 Series** device
- Standard web-browser such as Windows Edge, Mozilla Firefox, Apple Safari, or other.
- **MATRIX-2 Series** License file pre-installed
- 24 V AC power source

CONNECTING TO A MATRIX-2 SERIES DEVICE

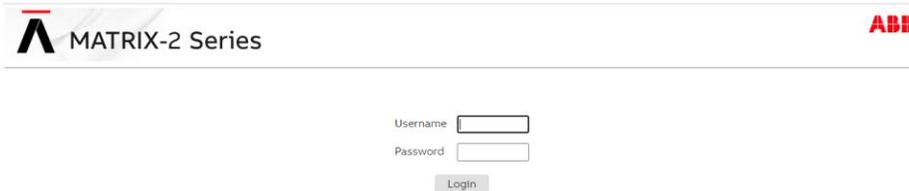
The **MATRIX-2 Series** device is shipped with a default IP address (192.168.1.251) and subnet mask (255.255.255.0) on the primary Ethernet Port. Your laptop's network card must be configured in a manner where it may access this IP network setting. Refer to your operating system documentation for details on how to configure your network card.

See *Ethernet Settings* on page 22 for details on how to reconfigure **MATRIX-2 Series** device IP Address.

LOG-IN

To log-in to the **MATRIX-2 Series** device:

1. With your PC's network card configured, open any standard web browser.
2. Browse to the IP address of your **MATRIX-2 Series** device as defined during installation.
3. If your connection is successful, the main login page of ASPECT will be displayed:

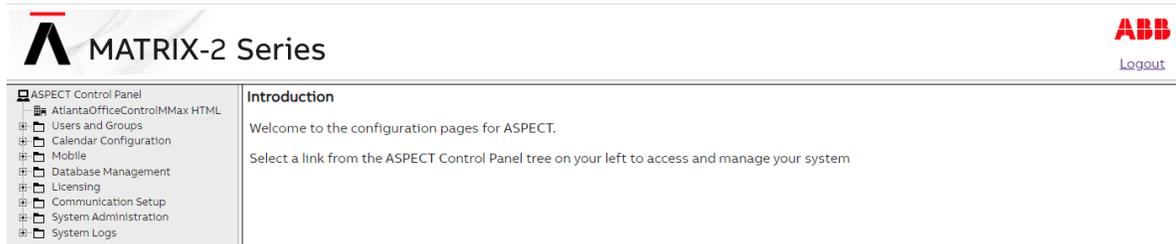


The screenshot shows the login interface for the MATRIX-2 Series device. At the top left, there is a stylized 'A' logo followed by the text 'MATRIX-2 Series'. At the top right, the 'ABB' logo is displayed in red. Below the header, there are two input fields: 'Username' and 'Password'. A 'Login' button is located below the password field.

4. Enter the case-sensitive default username and password into the fields provided.
5. Click the **Log In** button.

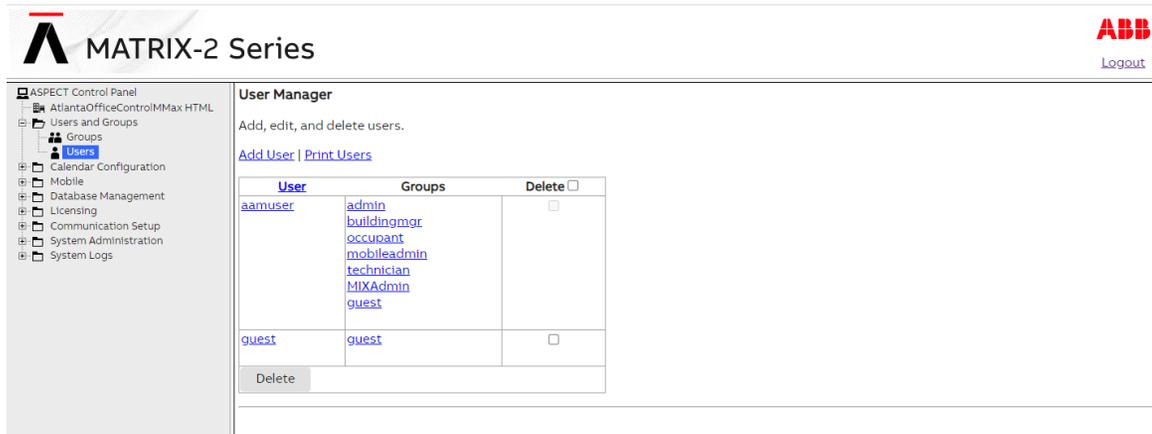
CONTROL PANEL

When you successfully log-in, you will be directed to the **Control Panel**. The **Control Panel** contains a **Navigation Tree** to the left of the web user interface; allowing users to select different configuration areas of the product.



USERS AND GROUPS

Users and Groups are included within each instance in the **MATRIX-2 Series** device. This provides the ability to manage users in the **ASPECT** control instance it serves.

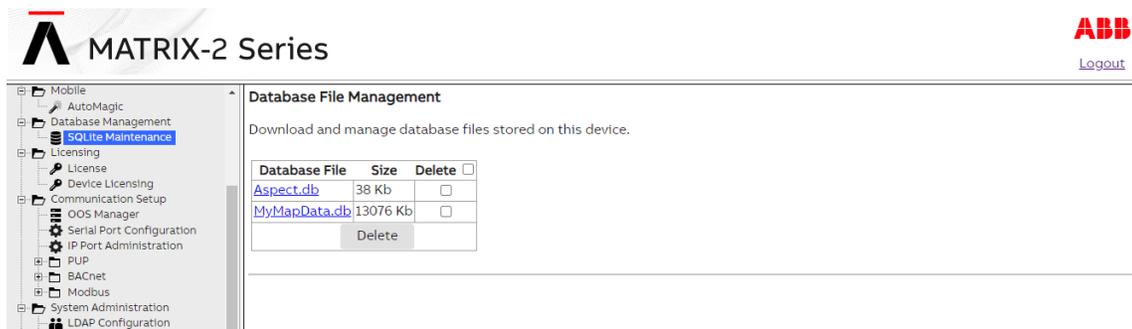


DATABASE MANAGEMENT

Database Management is the centralized location for all database storage and contains paths to SQLite Maintenance.

SQLITE MAINTENANCE

The **SQLite Maintenance** page provides users with the ability to manage the **SQLite** database. This page shows the database files and sizes.



LICENSING

The **License** page provides the ability to view the current license status of the **MATRIX-2 Series** device as well as a method to upload/download license files. If a license file is uploaded, ABB Cylon recommends rebooting the **MATRIX-2 Series** device to ensure the license file is successfully applied.

MATRIX-2 Series ABB
Logout

License Management

Hardware ID: FBMAX123456A
 License ID: FBMAX123456A
 License ID Match
 License Signature Valid

Upload License file:
 No file chosen

Contents of license file: [Download](#)

```
# Aspect Matrix license file

# General Information
DateGenerated = 09/26/2022
HardwareID = FBMAX123456A
HardwareType = 111
Dealer = PD Matrix Staging
SiteID = 100
Comment = Test
SerialNumber = 123456
SalesOrder = 200
OEM = Cylon

# Licenses
Variant = AspectMAX
ScheduleEnabled = True
WebUIEnabled = True
```

COMMUNICATION SETUP

The **Communication Setup** page provides administrators the ability to configure manual Out of Service entries, SDP Network Properties, BACnet IP Router, BBMD and Time Synchronization settings.

OUT OF SERVICE MANAGER (OSS)

The **Out Of Service Manager (OSS)** provides a single location that allows administrators to manually mark devices out of service using the Manual OOS check boxes.

BACNET SETTINGS

The **BACnet Configuration** area allows configuration of read/write retries, port configuration, and router settings for BACnet/IP.

BACnet IP Configuration	
UDP Port	47808
IP ADPU Timeout (seconds)	3.0
IP Write Retries	1
IP Read Retries	1
IP Out Of Service Time (seconds)	60
IP Discovery Timeout (seconds)	3
Cache Size	0

BACnet MSTP Configuration	
MSTP ADPU Timeout (seconds)	3.0
MSTP Write Retries	1
MSTP Read Retries	1
MSTP Out Of Service Time (seconds)	60

BACnet Router Configuration	
Device Name	MATRIX-RTR
BACnet Device Instance Number	100
eSC Support	No
CBR Virtual Device Support	No
BACnet Ethernet Enabled	No
BACnet IP Enabled	Yes
BACnet IP Network Number	43724
BACnet Internal Network Number	506
BACnet NAT Network Enabled	No
Segmentation Enabled	No
Router Debug Level	0
BACnet Debug Level	1

BBMD SETTINGS

The BBMD settings area is used to configure the BACnet/IP Broadcast Management Device (BBMD) table setup for BACnet networks.

The screenshot shows the 'MATRIX-2 Series' web interface. On the left is a navigation tree with 'BBMD Settings' selected. The main content area is titled 'BBMD Configuration' and contains the following elements:

- Header: 'Configure BBMD.' and a link 'Add Device'.
- Form: Two identical rows, each with a header 'IP AddressUDP PortSubnet MaskDelete' and a checkbox.
- Text: 'Entries may only be added to the BBMD NAT configuration when BACnet NAT is enabled'.
- Form: A second identical row with the same header and checkbox.
- Button: A 'Submit' button at the bottom of the form area.

MODBUS NETWORK PROPERTIES

The Modbus Network Properties page is used to set the configuration for Modbus communications.

The screenshot shows the 'MATRIX-2 Series' web interface. On the left is a navigation tree with 'Modbus Settings' selected. The main content area is titled 'Modbus Network Properties' and contains the following elements:

- Section: 'Modbus Configuration'.
- Form: A table of configuration parameters:

Modbus Timeout(seconds)	3.0
Modbus Write Retries	0
Modbus Read Retries	2
Modbus Out Of Service Time (seconds)	30
IP Gap Delay	20
- Button: A 'Submit' button at the bottom of the form area.

TIME SYNC SETTINGS

The Time Sync Settings area provides the ability to configure BACnet network time synchronizations.

The screenshot shows the 'MATRIX-2 Series' web interface. On the left is a navigation tree with 'Time Sync Settings' selected. The main content area is titled 'Time Sync Configuration' and contains the following elements:

- Text: 'Configure the BACnet Network configuration.'
- Form: A 'Time Sync Interval' dropdown menu set to '1 Hour'.
- Form: A section for 'Time Sync Recipients (Up to four networks)' with four empty input fields.
- Button: A 'Submit' button at the bottom of the form area.

SYSTEM ADMINISTRATION

The **System Administration** area contains system settings for the **MATRIX-2 Series** device. These fields include the User Manager, System Services, System Status, System Updates, Ethernet Settings, Time Settings Web Server Configuration, Process Status, Image Proxy Configuration, and CalDAV Server Configuration.

LDAP CONFIGURATION

The **LDAP Configuration** area allows you to configure Active Directory authentication

SYSTEM SERVICES

The **System Services** area provides administrators with the ability to control key services relative to the target. Through this area, users can restart specific services of the **MATRIX-2 Series** device. Simply select an option from the drop-down and click **Submit**. A message will indicate that the service has been stopped/started/restarted successfully.

SYSTEM STATUS

The System Status page provides details on the current health of the system including Uptime, memory (RAM) utilization, disk space and all information pertaining to revision levels.

MATRIX-2 Series **ABB**
Logout

ASPECT Control Panel

- AtlantaOfficeControlMMMax HTML
- Users and Groups
 - Groups
 - Users
- Calendar Configuration
 - Calendar File
 - Calendar User
- Mobile
 - AutoMagic
- Database Management
 - SQLite Maintenance
- Licensing
 - License
 - Device Licensing
- Communication Setup
 - OOS Manager
 - Serial Port Configuration
 - IP Port Administration
 - PUP
- BACnet
 - BACnet Settings
 - BBMD Settings
 - Time Sync Settings
- Modbus
 - Port Two - Modbus
 - Modbus Settings
- System Administration
 - LDAP Configuration
 - System Services
 - System Status
 - Process Status
 - License Item Status
 - Project Performance
 - System Updates
 - Backup/Restore
 - Persistence Manager
 - Project Removal
 - Project Source
 - Ethernet Settings
 - Network Diagnostics
 - Time Settings
 - Web Server Configuration
 - Web Server SSL Configuration
 - Client SSL Configuration

Status

View system status details.

Processor
ARMv7 Processor rev 2 (v7l)

Mac Address
14:42:fc:c0:a7:f4

Memory
97% used: 475 M of 493 M

Disc usage
/ on /dev/root - 16% used: 509M of 3.5G

/dev on devtmpfs - 0% used: 0 of 246M

/dev/shm on tmpfs - 0% used: 0 of 247M

/run on tmpfs - 2% used: 4.4M of 247M

/sys/fs/cgroup on tmpfs - 0% used: 0 of 247M

/etc/machine-id on tmpfs - 2% used: 4.4M of 247M

/tmp on tmpfs - 1% used: 164K of 247M

/media/sda1 on /dev/mmcblk1p1 - 1% used: 13M of 7.4G

Uptime
14 days, 20:34, 0 users
load average: 1.08, 1.06, 1.08

Serial Number
123456

Aspect Version
v3.07.02-a13

Aspect Runtime Version
v3.07.02-a13 - 5654388 bytes

Supervisor Version
R_03_07_02_a13

PUP Driver Version
R_03_07_02_a13

FTNet Driver Version
R_03_07_02_a13

Bacnet Driver Version
R_03_07_02_a13

OS Version
Linux 5.4.27-yocto-g4

PHP Version
7.3.11

License Status
Hardware ID: FBMAX123456A
License ID: FBMAX123456A
License ID Match
License Signature Valid

PROCESS STATUS

This shows the result of a `top` command which produces an updating list of current processes running.

MATRIX-2 Series **ABB**
Logout

ASPECT Control Panel

- AtlantaOfficeControlMMMax HTML
- Users and Groups
 - Groups
 - Users
- Calendar Configuration
 - Calendar File
 - Calendar User
- Mobile
 - AutoMagic
- Database Management
 - SQLite Maintenance
- Licensing
 - License
 - Device Licensing
- Communication Setup
 - OOS Manager
 - Serial Port Configuration
 - IP Port Administration
 - PUP
- BACnet
 - BACnet Settings
 - BBMD Settings
 - Time Sync Settings
- Modbus
 - Port Two - Modbus
 - Modbus Settings
- System Administration
 - LDAP Configuration
 - System Services
 - System Status
 - Process Status
 - License Item Status
 - Project Performance
 - System Updates

top - 15:09:06 up 14 days, 20:37, 0 users, load average: 1.07, 1.06, 1.07
Tasks: 70 total, 2 running, 40 sleeping, 0 stopped, 0 zombie
Cpu(s): 7.3%us, 3.7%sy, 0.0%ni, 88.7%id, 0.2%wa, 0.0%hi, 0.1%si, 0.0%st
Mem: 504600k total, 485676k used, 18924k free, 85084k buffers
Swap: 0k total, 0k used, 0k free, 68788k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
7194	root	20	0	69616	1612	1404	S	1.9	0.3	156:54.67	mix-com-srv
11426	www-data	20	0	2168	1676	1496	R	1.9	0.3	0:00.03	top
1	root	20	0	4060	3140	2460	S	0.0	0.6	0:07.31	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:01.19	kthreadd
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_par_gp
8	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_percpu_wq
9	root	20	0	0	0	0	S	0.0	0.0	3:33.95	ksoftirqd/0
10	root	20	0	0	0	0	R	0.0	0.0	12:32.93	rcu_preempt
11	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtmpfs
12	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
13	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_kthre
15	root	20	0	0	0	0	S	0.0	0.0	0:00.00	oom_reaper
16	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	writeback
17	root	20	0	0	0	0	S	0.0	0.0	0:00.39	kcompactd0
77	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kblockd
78	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	blkcg_punt_bio
79	root	RT	0	0	0	0	S	0.0	0.0	0:00.00	watchdogd
80	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rpciod
81	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/u3:0
82	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	xprtiod

PROJECT PERFORMANCE

The Project Performance area provides the ability to dynamically view and monitor the status of Threads, Maps, and Ports being used by the ASPECT project loaded into the target.

By default, the Tabs will update information every 15 seconds. You may adjust this update timer by choosing the Settings Tab, and changing the Global Settings Update time.

MATRIX-2 Series **ABB**
Logout

Threads | Maps | Port Pool | Serial Port Queue | Transaction Times | Settings

Thread Status at 11:17:58 GMT-0400 (Eastern Daylight Time)
Total Timers: 35
Total Targets: 52

	Timebase	Target Class	HashCode	Target Count	Elapsed Time (ms)	Last Tick Time (s)	Load
●	5.0	NetworkDevice	105858536	1	77	4.1s ago	1.54%
●	5.0	Services	105859712	1	58	0.2s ago	1.16%
●	60.0	Map	105083232	1	608	54.0s ago	1.01%
●	5.0	NetworkDevice	105858200	1	48	3.2s ago	0.96%
●	60.0	Map	105083408	1	322	39.0s ago	0.54%
●	15.0	Map	115532952	1	46	2.0s ago	0.31%
●	14.0	Default	107320808	1	28	12.9s ago	0.20%
●	1.5	NetworkDevHiPri	105859376	7	1	0.2s ago	0.07%
●	5.0	Map	105859208	7	3	0.4s ago	0.06%
●	15.0	Default	107322824	6	8	3.8s ago	0.05%
●	60.0	Map	115755648	1	12	4.7s ago	0.02%
●	5.0	NetworkDevice	105858368	1	1	2.4s ago	0.02%
●	5.0	NetworkDevice	105859040	1	1	0.4s ago	0.02%
●	86400.0	Map	115755312	1	5939	114.3s ago	0.01%

SYSTEM UPDATES

The System Updates area is used to perform firmware upgrades to the ASPECT device.

MATRIX-2 Series **ABB**
Logout

SQLite Maintenance | Licensing | License | Device Licensing | Communication Setup | OOS Manager | Serial Port Configuration | IP Port Administration | PUP | BACnet | BACnet Settings | BBMD Settings | Time Sync Settings | Modbus | Port Two - Modbus | Modbus Settings | System Administration | LDAP Configuration | System Services | System Status | Process Status | License Item Status | Project Performance | **System Updates** | Backup/Restore | Persistence Manager | Project Removal | Project Source | Ethernet Settings | Network Diagnostics

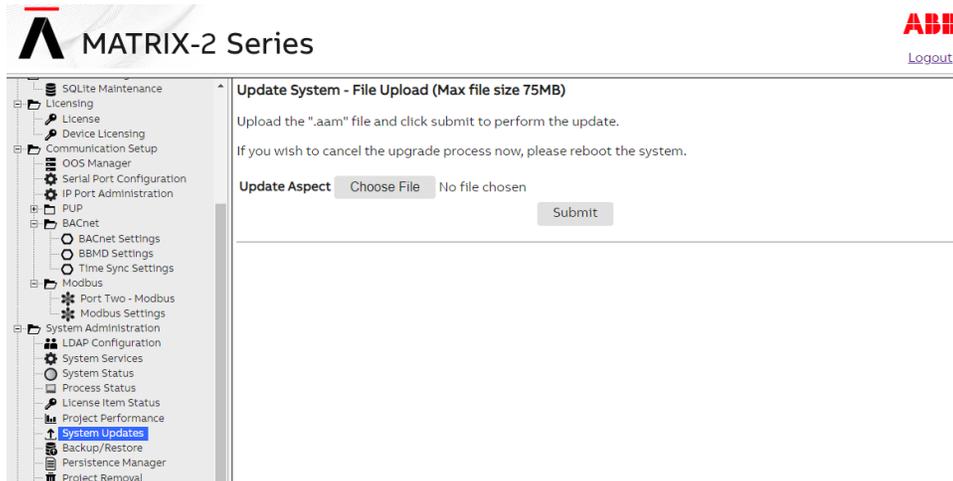
Update System - Confirm

CAUTION: Please be aware that the Aspect Control Engine will be shut down once you click continue.

It is recommended to download a **Configuration Backup** using [Backup/Restore](#) before applying updates.

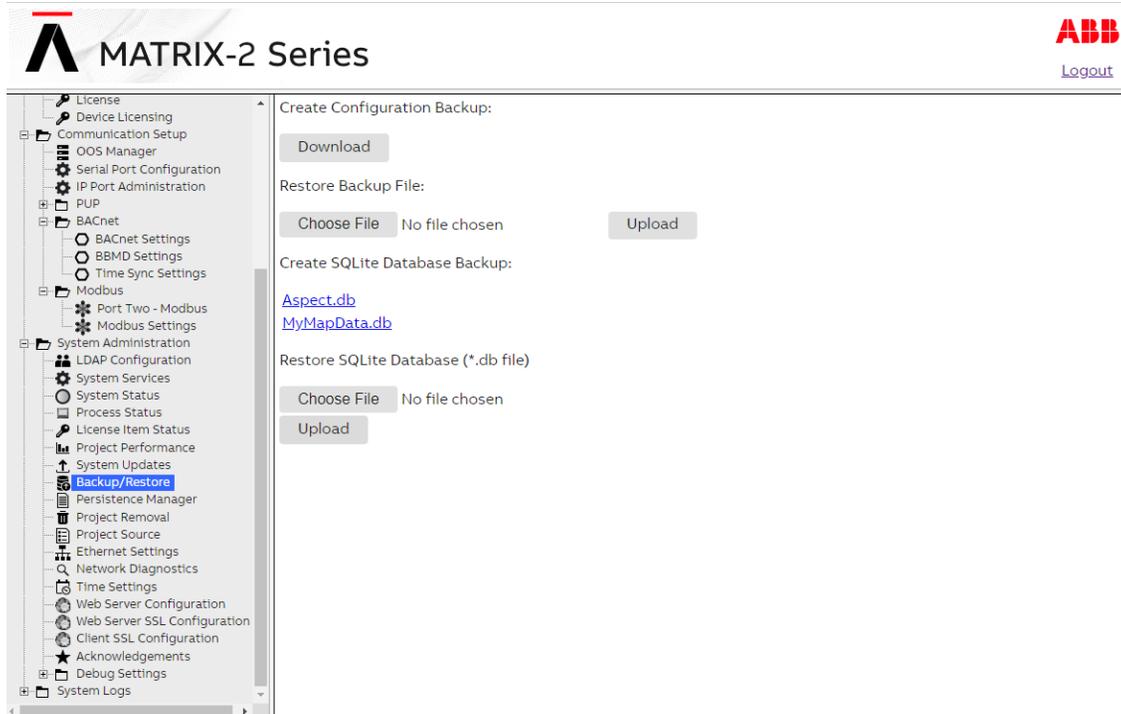
Click "Continue" to proceed to upload stage.

Clicking on the **Continue** button opens the upload page:



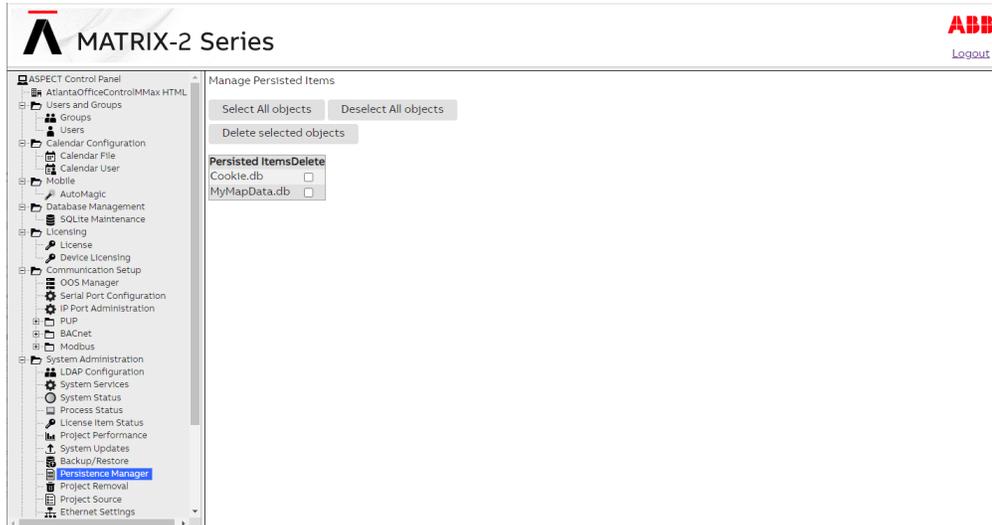
BACKUP/RESTORE

Backup /Restore provides the means to backup an ASPECT target's device configuration (network addresses, port and driver configuration, etc). To create a backup, simply click the **Download** button.



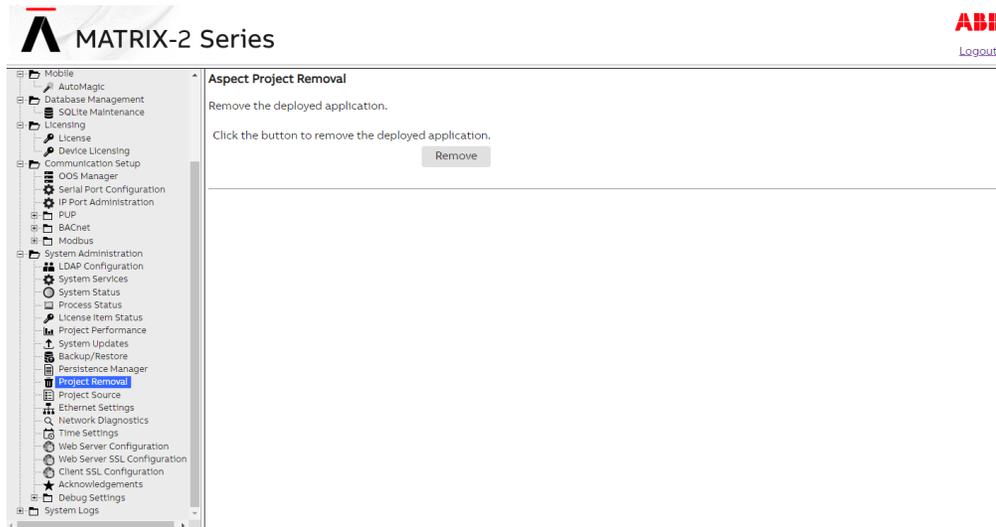
PERSISTENCE MANAGER

The Persistence Manager area is used to manage and delete Persisted data. Persisted data is localized data stored from Persisted Elements that may be present in an ASPECT project when such functionality is implemented in a delivered solution.



PROJECT REMOVAL

The Project Removal page provides administrators the ability to remove a currently deployed project from an Aspect instance.



PROJECT SOURCE

The Project Source page provides administrators with the ability to download a password protected copy of the Aspect project deployed to the Instance. When selecting this in the Control Panel, you will be prompted to re-enter your credentials in order to download a copy of the project.

The required credentials will be the same as the ones used to originally deploy the project.

MATRIX-2 Series **ABB**
Logout

Deployed Project Information

Project Version	Deployment Date	Archive Size
AtlantaOfficeControlMMMax.zip (Source + Original Map Configuration)	2023-06-26 06:37:42	27.5 MB
AtlantaOfficeControlMMMax_CurrentConfig.zip (Source + Current Map Configuration)		

ETHERNET SETTINGS

The Ethernet Settings area permits for Ethernet address configuration of the MATRIX-2 Series device. The MATRIX-2 Series device can support static IP addresses or DHCP addressing from a valid DHCP server. Simply select the appropriate address setting for your application.

- To configure the device to use DHCP addressing, select the **Obtain an IP Address Automatically** radio button. In most DHCP environments, a resolvable DNS name or reserved IP address is assigned to the MATRIX-2 Series device by the local network administrator prior to configuring the device for this option.
- To configure the device to use a static IP address, select the **Use the following IP Address** radio button, then enter your **IP address**, **Subnet Mask**, **Gateway**, and DNS information into the boxes provided below.

MATRIX-2 Series **ABB**
Logout

Ethernet Settings

Manage ethernet settings.

Detected IP:

Obtain an IP Address Automatically

Use the following IP Address:

IP Address: 192 . 168 . 55 . 31

Subnet Mask: 255 . 255 . 255 . 0

Gateway: 192 . 168 . 55 . 1

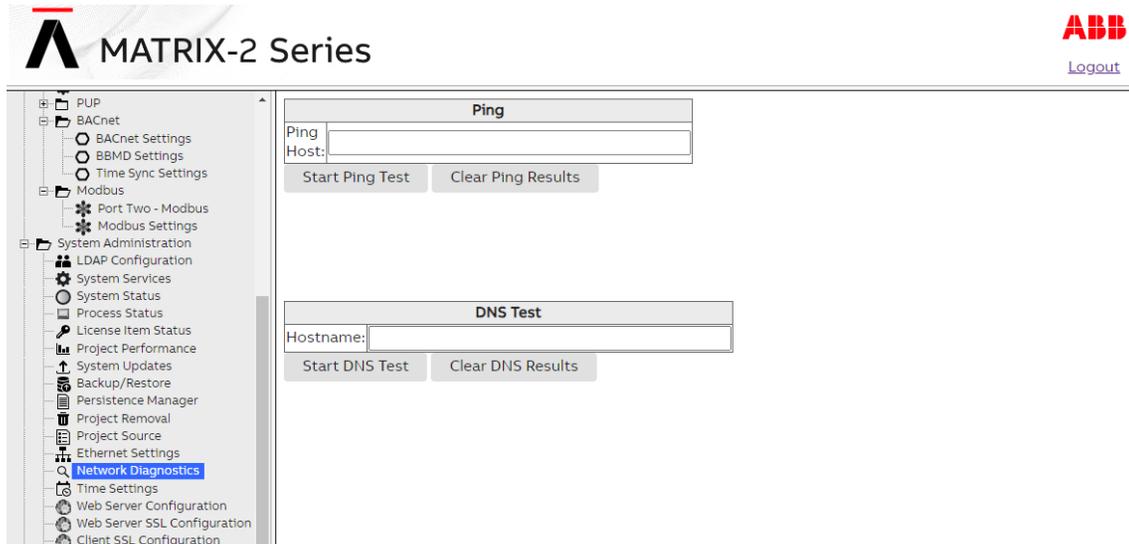
Preferred DNS Server: 192 . 168 . 0 . 22

Alternate DNS Server: 192 . 168 . 0 . 47 (Optional)

Submit

NETWORK DIAGNOSTICS

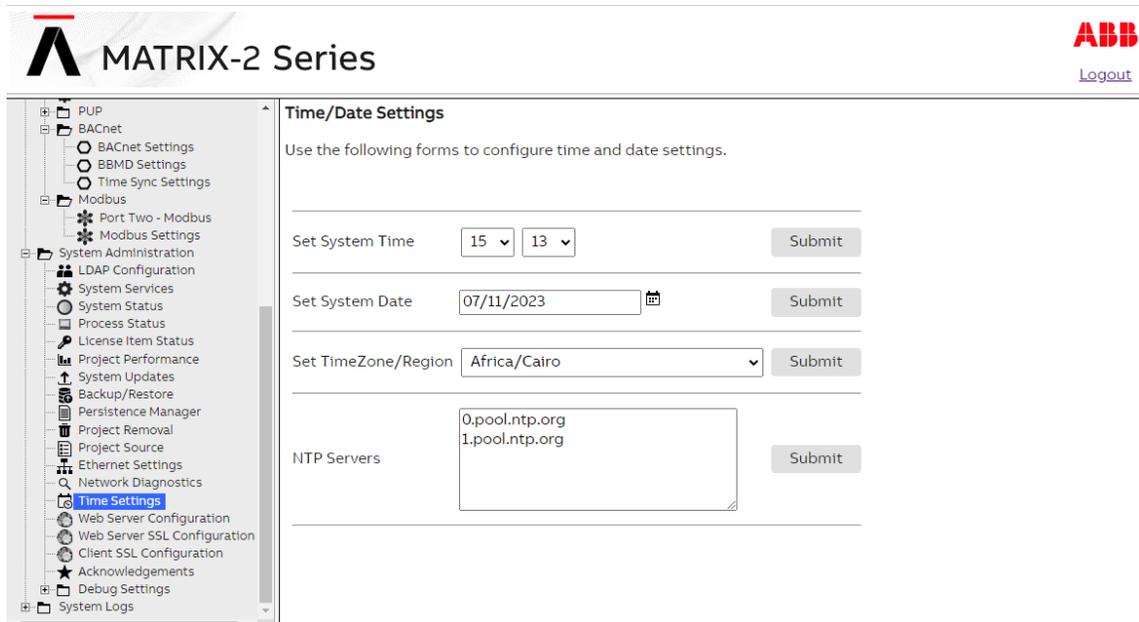
The **Network Diagnostics** area contains useful troubleshooting methods for network connectivity problems without the need for additional tools.



TIME SETTINGS

The **Time Settings** area allows users to configure the **MATRIX-2 Series** device Time and Date parameters. In this section, users can set the following items using the appropriate drop-downs and editors:

- **System Time** - specified in 24-hour format
- **System Date** - specified in MM/DD/YYYY
- **TimeZone/Region** - specified in one of many configurable options
- **Time Server Synchronization** - Specifies an NTP time server on the Internet with which to which to sync the system time (via firewall). Refer to pool.ntp.org for information relative to other available NTP servers available.



WEB SERVER CONFIGURATION

The Web Server Configuration area is used to set a label for the login screen and change port settings for the following:

- Aspect HTTP Port - defaults to port 80 (HTTP)
- Aspect Control Engine Port - defaults to port 7226

The screenshot displays the ABB MATRIX-2 Series software configuration interface. At the top left is the ABB logo and the text "MATRIX-2 Series". At the top right is the ABB logo and a "Logout" link. On the left side, there is a navigation tree with various configuration categories. The "Web Server Configuration" option is highlighted in blue. The main content area is titled "Web Server Configuration" and contains the instruction "Configure web server settings." Below this, there are three configuration fields, each with a "Submit" button: "Device Label" with the value "Atlanta Office Control Matrix", "Aspect HTTP Port" with the value "80", and "Aspect Control Engine Port" with the value "7226".

SYSTEM LOGS

The System Logs area provides users with the ability to view and download messages generated by the MATRIX-2 Series device and the Aspect control engine. The System Logs area provides the following logs:

- **Aspect Control Engine log** – provides debugging information relating to the health of the deployed project. This log combines multiple instances of identical messages to simplify the list.
- **Aspects Throttled Logs** – lists the same debugging information as the **Aspect Control Engine log**, but where multiple instances of the same message are received, this log indicates how many times each message has been repeated.
- **Diagnostic Buffer** - provides kernel operating system output for the device. The information shown here is for diagnostic purposes and may be referenced during troubleshooting session with **ABB Cylon**.
- **Remote Logging** - The Remote Logging page is used to allow or disallow centralized syslog messaging. All **ASPECT** targets support the ability to send their log information to a centralized Aspect target or IT-supported syslog server.
- **System Log** - contains information processed by the sub-level operating system outside of Aspect

ASPECT CONTROL ENGINE LOG

The **Aspect Control Engine log** provides administrators and technicians the ability to view project status and debugging information relating to the health of the deployed **ASPECT** project. Up to 10 pages of **ASPECT** logs are contained and individual logs can be downloaded.

The screenshot shows the 'Aspect Control Engine Log' page. On the left is a navigation tree with 'Aspect Control Engine Log' selected. The main area displays a list of log messages with a search filter set to 'All'. A 'Download the Aspect Control Engine Log' link is visible. The log messages include:

```

INFO : 2023-07-11 15:16:13,932 WATCHDOG PET - petInterval=[14.0] [ix.mix.server.Controller@71980]
INFO : 2023-07-11 15:16:06,163 Initializing thread pool [ScheduleDist] targetType[Matrix-2], corePoolSize[10], maximumPoolSize[20], maximumQueueSize[256] [edules.ScheduleSubsystem@8a7e8]
INFO : 2023-07-11 15:16:04,509 Topology 15 second delay completed. [r for Map "Map" - Value "0"0"]
INFO : 2023-07-11 15:16:01,198 RESETTING WATCHDOG TIMEOUT - watchdogTimeout=[136] [ix.mix.server.Controller@71980]
INFO : 2023-07-11 15:16:01,194 WATCHDOG THREAD priority is currently NORM_PRIORITY [main]
INFO : 2023-07-11 15:16:01,081 LOAD COMPLETE (LOGIC INIT/START DONE) FOR PROJECT>>> [AtlantaOfficeControlMMax] [main]
    
```

ASPECT THROTTLED LOGS

The screenshot shows the 'Throttled Log Messages' page. It features a 'Refresh Log Table' button and a 'Download' button. Below is a table of log messages with columns for 'Last', '#', 'Message', and 'Severity'. The messages are sorted by time, showing various system events and errors.

Last	#	Message	Severity
2023-07-11 15:31:15	8	NetworkPathService-/bacnet:192.168.55.31/11569/192.168.55.7-47808-1/8-419430375-0/Integer/0/errorCode=...	Error
2023-07-11 15:30:11	6	NetworkPathService-/bacnet:192.168.55.31/11569/192.168.55.7-47808-1/8-419430375-0/Integer/0/errorCode=...	Error
2023-07-11 15:16:13	0	WATCHDOG PET - petInterval=[14.0]	Info
2023-07-11 15:16:06	0	Initializing thread pool [ScheduleDist] targetType[Matrix-2], corePoolSize[10], maximumPoolSize[20], maxim...	Info
2023-07-11 15:16:04	0	Topology 15 second delay completed.	Info
2023-07-11 15:16:01	0	Lifecycle Start Complete for [MainLogic] Elapsed Time [0] milliseconds	Info
2023-07-11 15:16:01	0	LOAD COMPLETE (LOGIC INIT/START DONE) FOR PROJECT>>> [AtlantaOfficeControlMMax]	Info
2023-07-11 15:16:01	0	Lifecycle Start [GlobalDataLogic]	Info
2023-07-11 15:16:01	0	Lifecycle Start Complete for [GlobalDataLogic] Elapsed Time [15] milliseconds	Info
2023-07-11 15:16:01	0	WATCHDOG THREAD priority is currently NORM_PRIORITY	Info
2023-07-11 15:16:01	0	RESETTING WATCHDOG TIMEOUT - watchdogTimeout=[136]	Info
2023-07-11 15:16:01	0	Lifecycle Start Complete for [GlobalConfigLogic] Elapsed Time [43868] milliseconds	Info
2023-07-11 15:16:01	0	Lifecycle Start [MainLogic]	Info
2023-07-11 15:16:00	0	invisibleMapAlarmEmailer.sendMessage() unable to notify; Could not connect to SMTP host: smtp.gmail.com...	Error
2023-07-11 15:15:56	0	InitializeNetworks() - complete, Initialized [7] devices on [7] networks	Info

DIAGNOSTIC BUFFER

The **Diagnostic Buffer** provides diagnostic information regarding the MATRIX-2 Series device hardware and OS details.

MATRIX-2 Series ABB Logout

Diagnostic Buffer

View the output of kernel's diagnostic buffer

[Download the output of the buffer](#)

```

Booting Linux on physical CPU 0x0
Linux version 5.4.27-yocto-g4 (oe-user@oe-host) (gcc version 9.3.0 (GCC)) #1 PREEMPT Tue Mar 24 19:10:14 UTC 2020
CPU: ARMv7 Processor [413fc082] revision 2 (ARMv7), cr=10c5387d
CPU: PIPT / VIPT nonaliasing data cache, VIPT aliasing instruction cache
OF: fdt: Machine model: Cylon IPC
Memory policy: Data cache writeback
On node 0 totalpages: 131072
Normal zone: 1152 pages used for memmap
Normal zone: 0 pages reserved
Normal zone: 131072 pages, LIFO batch:31
CPU: All CPU(s) started in SVC mode.
AM335X ES2.1 (neon)
pcpu-alloc: s0 r0 d32768 u32768 alloc=1*32768
pcpu-alloc: [0] 0
Bullt 1 zonelists, mobility grouping on. Total pages: 129920
Kernel command line: console=ttyO0,115200n8;root=PARTUUID=00000000-02 rootfstype=ext4 rootwait ro swupdate=off
Dentry cache hash table entries: 65536 (order: 6, 262144 bytes, linear)
Inode-cache hash table entries: 32768 (order: 5, 131072 bytes, linear)
mem auto-init: stack:off, heap alloc:off, heap free:off
Memory: 503576K/524288K available (10240K kernel code, 814K rwdata, 2296K rodata, 1024K init, 297K bss, 20712K reserved, 0K cma-
reserved, 0K highmem)
SLUB: HWalign=64, Order=0-3, MinObjects=0, CPUs=1, Nodes=1
ftrace: allocating 32593 entries in 64 pages
rcu: Preemptible hierarchical RCU implementation.
Tasks RCU enabled.
rcu: RCU calculated value of scheduler-enlistment delay is 20 jiffies.
NR_IRQS: 16, nr_irqs: 16, preallocated irqs: 16
IRQ: Found an INTC at 0x(ptrval) (revision 5.0) with 128 interrupts
random: get_random_bytes called from start_kernel+0x330/0x4f8 with crng_init=0
OMAP clockevent source: timer2 at 24000000 Hz
sched_clock: 32 bits at 24MHz, resolution 41ns, wraps every 89478484971ns
clocksource: timer1: mask: 0xffffffff max_cycles: 0xffffffff, max_idle_ns: 79635851949 ns
OMAP clocksource: timer1 at 24000000 Hz
timer_probe: no matching timers found
    
```

REMOTE LOGGING

The **Remote Logging** page is used to allow or disallow centralized syslog messaging. All ASPECT targets support the ability to send their log information to a centralized ASPECT target or IT-supported syslog server.

MATRIX-2 Series ABB Logout

Remote Logging Settings

Manage application logging settings.

Disable Remote Logging

Log to the following IP Address:

IP Address:

Log as hostname:

SYSTEM LOG

The System Log area provides complete syslog information for the hardware. Information provided within this log includes boot up details and lower level information regarding runtime of the system.

MATRIX-2 Series ABB
Logout

System Logs

View System Logs.
[Download the System Log](#)

```

Jul 11 15:23:26.517505 MatrixMAX sudo[13659]: www-data : TTY=unknown ; PWD=/home/MIX_CMIX/htmlroot ; USER=root ;
COMMAND=/bin/journalctl --lines=10000 --output=short-precise

Jul 11 15:22:37.908487 MatrixMAX sudo[13461]: www-data : TTY=unknown ; PWD=/home/MIX_CMIX/htmlroot ; USER=root ;
COMMAND=/bin/dmesg

Jul 11 15:15:38.069423 MatrixMAX lighttpd[192]: (mod_proxy.c.1372) proxy - re-enabled: 127.0.0.1 3005

Jul 11 15:15:32.023771 MatrixMAX lighttpd[192]: (mod_proxy.c.1327) no proxy-handler found for: /sslWebServer/httpsPort

Jul 11 15:15:32.021719 MatrixMAX lighttpd[192]: (mod_proxy.c.919) proxy-server disabled: 127.0.0.1 3005 17

Jul 11 15:15:32.018931 MatrixMAX lighttpd[192]: (mod_proxy.c.1019) establishing connection failed: Connection refused

Jul 11 15:15:10.855553 MatrixMAX supervisor[196]: Supervisor, proc 10 up (TO=20)

Jul 11 15:15:00.401639 MatrixMAX supervisor[196]: Started 10

Jul 11 15:15:00.401585 MatrixMAX supervisor[196]: Startup : /usr/local/aam/bin/aspect1 start >/dev/null 2>/dev/null &

Jul 11 15:14:56.370524 MatrixMAX supervisor[196]: Started 9

Jul 11 15:14:56.370454 MatrixMAX supervisor[196]: Startup : /usr/local/aam/init.d/nodesjsWebUI start >/dev/null 2>/dev/null &

Jul 11 15:14:52.394373 MatrixMAX supervisor[196]: Supervisor, proc 3 up (TO=15)

Jul 11 15:14:52.357587 MatrixMAX supervisor[196]: Started 3

Jul 11 15:14:52.357523 MatrixMAX supervisor[196]: Startup : /usr/local/aam/etc/routerd start >/dev/null 2>/dev/null &

Jul 11 15:14:48.378535 MatrixMAX supervisor[196]: Supervisor, proc 2 up (TO=15)
    
```

UPDATE LOG

The Update Log shows all recent updates to the operating system.

MATRIX-2 Series ABB
Logout

System Logs

```

Upgrade started at: 2023-06-26T18:56:59Z
Detected existing license file.
Variant Check [OK]
License FTMax Check [OK]
Licensed for variant: ASPECTMAX
ISUPGRADE=true
Detected system arch: max
/home/MIX_CMIX
StartPort: 7226 | Count: 1 | EndPort: 7226
Saving MIX_CMIX for restore later...
Copying new MIX_CMIX...
Upgrade Detected: Backing up custom settings...
Restoring user and group settings...
Saving ethernet settings...
Saving HTTP server settings...
Saving backup of new runtime...
Restoring existing runtime...
Inserting runtime version as runtime.ver=v3.07.02-a13
into release.properties ...
Restoring existing project source...
Restoring existing project
Restoring automagic
Restoring ngadmin
Restoring Persisted Items
Restoring WebDAV calendar user file...
Saving ppp-pap-secrets
Pre-installing in-use applications...
mode of '/usr/local/bin' changed from 0755 (rwxr-xr-x) to 0775 (rwxrwxr-x)
Installing command
Installing new applications...
Building MIX_CMIX configuration files...
Cleaning up config files...
Fixing permissions in /usr/local/aam
Restoring WebDAV deployment user file...
chmod so WebDAV server can have read access...
Restoring ethernet settings...
Restoring HTTP server settings...
Restoring pap-secrets...
mode of '/etc/sudoers.d/sudoers' changed from 0644 (rw-r--r--) to 0440 (r--r--r--)
Perform Minimal Touch update
Minimal Touch installation already exists
Update project index page
    
```




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