

EasyIO Neo Series EC Controllers User Guide

EC-1208, EC-1616

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Introduction

Figure 1: EasyIO Neo Series EC controllers



EasyIO Neo Series EC network controllers are dual-processor controllers that support BACnet IP and MS/TP protocols, and Modbus RTU and TCP protocols.

EC controllers are advanced network controllers equipped with a 1.2GHz Quad-Core ARM A7 for main processing functions and an ARM Cortex-M0 for input/output (I/O) management and A-D processing. They operate on a Linux kernel 6.6.22, providing high performance. These controllers support BACnet as a server and provide enhanced performance with TCom, Niagara AX, and N4.

You can use the built-in bootloader remotely, without the use of a manual service button. You can also upgrade firmware remotely, through a file transfer protocol (FTP) client.

EC controllers have universal input (UI), universal output (UO), and digital output (DO) ports, an Ethernet port, and EIA-485 ports.

Table 1: EasyIO Neo Series EC controllers I/O configuration and supported protocols

Code number	I/O ports			Ethernet	EIA-485	Supported protocols
	UI	UO	DO			
EC-1208	12	6	2	1	2	<ul style="list-style-type: none"> BACnet IP Client/Server BACnet MS/TP Client/Server Modbus TCP Master/Subordinate Modbus RTU Master/Subordinate web service HTML5 SOX
EC-1616	16	8	8			

Overview

Figure 2: EC-1208 front view

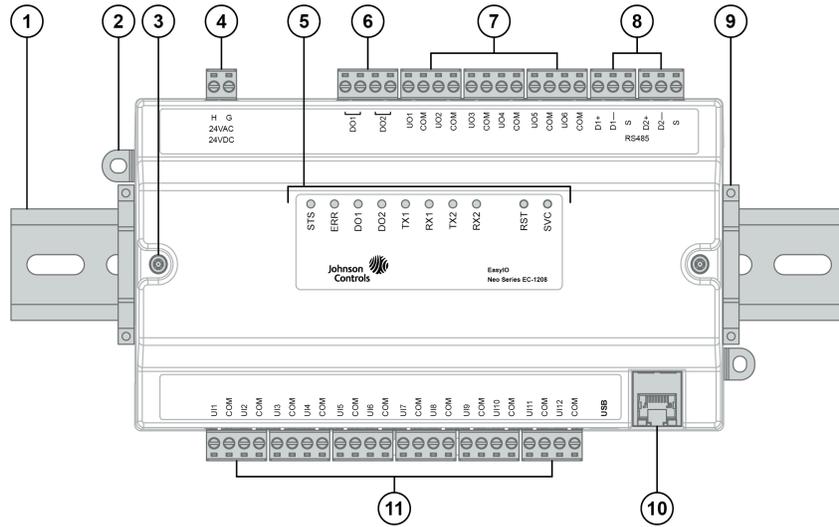
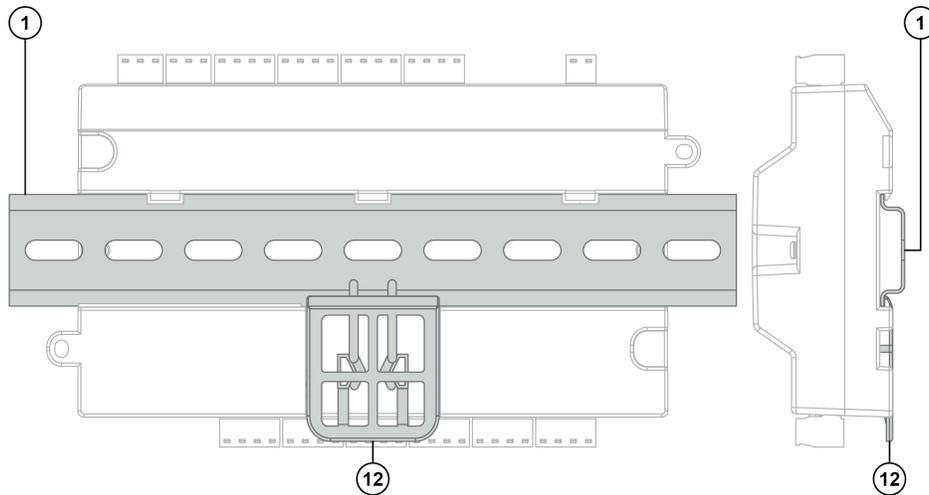


Figure 3: EC-1208 rear and side views



Callout	Description
1	DIN rail
2	Optional mounting bracket
3	Top cover screw
4	H and G terminals
5	LED status indicators and buttons
6	DO terminals
7	UO and COM terminals
8	RS-485 serial port terminals
9	DIN rail end clip
10	Ethernet port

Callout	Description
11	UI and COM terminals
12	Mounting clip

Figure 4: EC-1616 front view

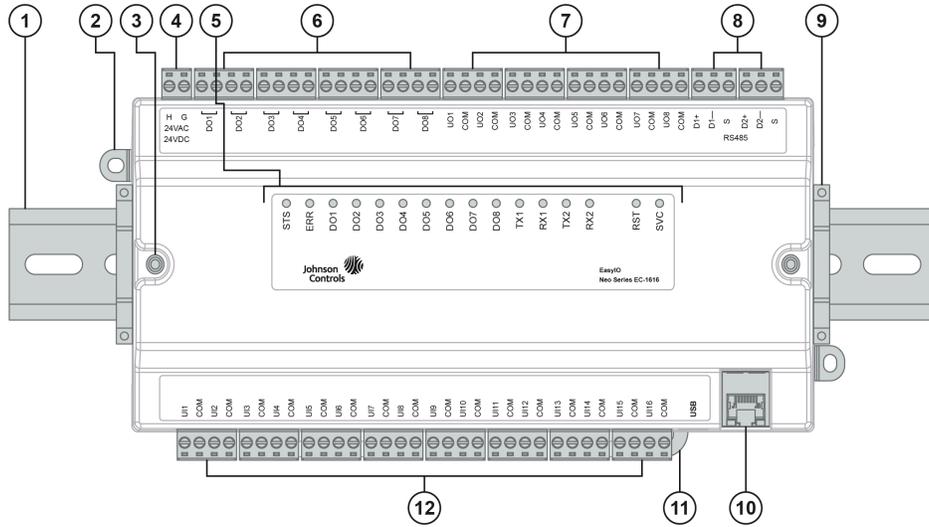
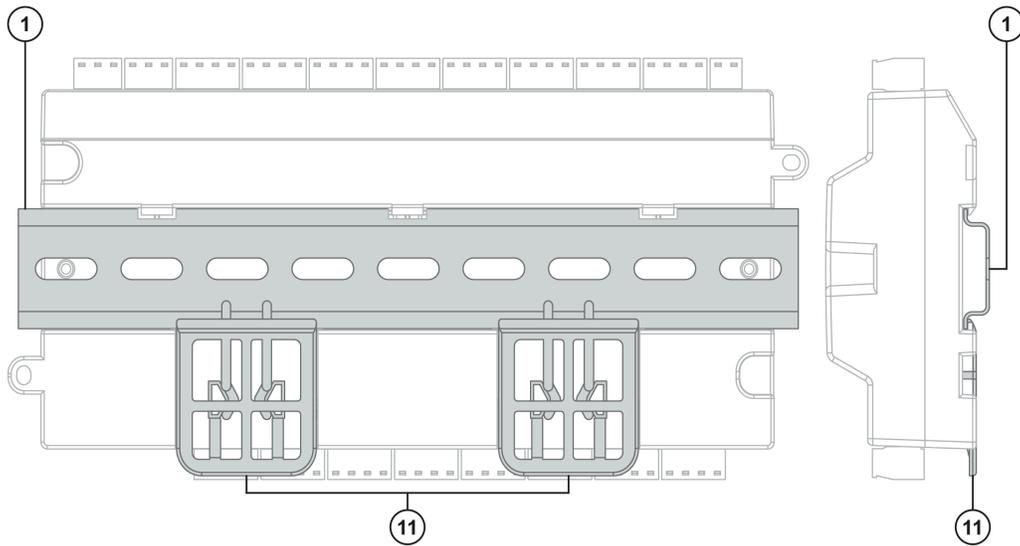


Figure 5: EC-1616 rear and side views



Callout	Description
1	DIN rail
2	Optional mounting bracket
3	Top cover screw
4	H and G terminals
5	LED status indicators and buttons
6	DO terminals
7	UO and COM terminals

Callout	Description
8	RS-485 serial port terminals
9	DIN rail end clip
10	Ethernet port
11	Mounting clip
12	UI and COM terminals

Hardware specifications

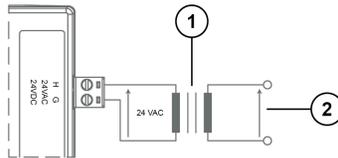
Power supply specifications

EC controllers can operate with both AC and DC power. See the following table for the acceptable working range. To prevent damage to input/output devices and RS485 connections, use a separate power supply for each controller. If you use a single power supply, ensure that the power supplies for the controllers connect with the same polarity.

Table 2: EC controllers working range

Specification	Description
Power supply	24 VAC, $\pm 5\%$ or 24 VDC, $+20\%/-15\%$
Power consumption	750 mA at 24 VAC/VDC
Operating temperature	0°C to 65°C (32°F to 150°F)
Storage temperature	-20°C to 85°C (-4°F to 185°F)
Operating humidity	10% to 90% RH, non-condensing

Figure 6: 24 VAC power supply wiring



Callout	Description
1	Stepdown transformer 50/60 Hz
2	Primary AC supply

Figure 7: 24 VDC power supply wiring

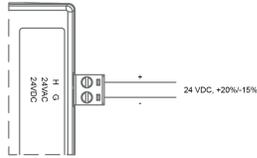
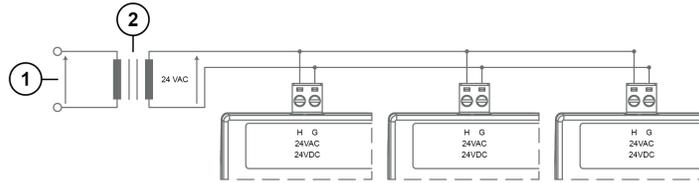


Figure 8: Multiple controllers on a single transformer wiring



Callout	Description
1	Primary AC supply
2	Stepdown transformer 50/60 Hz

RS-485 specifications

Terminate the RS485 connection at both ends with a 120 Ω termination resistor. Use shielded twisted pair (STP) wire for the wiring.

EC controllers do not include a built-in 120 Ω resistor.

Install a lightning protection circuit at one end of the wiring. Wire the controller in a daisy chain network topology as shown in the following image. Avoid wire branches when possible, keep them as short as possible, and do not connect more than one device to a wire branch.

➤ **Important:** If you use a single power supply for all connected RS-485 devices, ensure that all devices share the same ground connection. Connect the same wire to each corresponding terminal position, ensuring that all H terminals connect to the same wire.

Table 3: EC controllers RS-485 specifications

Specification	Description
Port 1 and 2	EIA-485 (BUS 1, 2) two-wire, half duplex Connection 1 is BACnet/MSTP, connection 2 is Modbus/RTU
Modbus baud rate	Speed: 9.6k bit/s, 19.2k bit/s, 38.4k bit/s, 57.6k bit/s, 115.2k bit/s Data Bit: 8 bits Parity: None, Even, Odd
BACnet baud rate	Speed: 9.6k bit/s, 19.2k bit/s, 38.4k bit/s, 76.8k bit/s Data Bit: 8 bits Parity: None

Figure 9: Daisy chain network topology

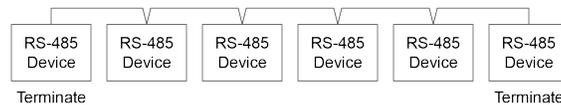
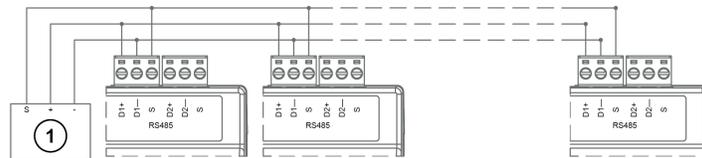


Figure 10: RS-485 wiring



Callout	Description
1	BACnet client

ⓘ **Note:** You can connect up to 31 devices without a repeater.

Wiring

WARNING

Risk of Electric Shock

Disconnect the power supply before you make electrical connections. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

NOTICE

Risk of Property Damage

Do not apply power to the controller before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

Important

Do not exceed controller electrical ratings. This can result in permanent damage to the controller and void warranties.

Important

Only use copper conductors. Wire the controller in accordance with local, national, and regional regulations

Important

Use the correct electrostatic discharge precautions throughout installation, setup, and service to avoid damage to the controller and controller components.

Universal input wiring

EC controllers have non-isolated universal inputs. Each channel comes with programmable gain amplifiers (PGAs) which improve accuracy at lower range. Universal input ports support resistance, voltage, and current modes through hardware jumpers and internal register settings.

Table 4: Universal input wiring specifications

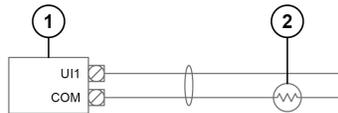
Specification	Description
Voltage	0 VDC to 10 VDC, $\pm 3\%$
Current	0 mA to 20 mA, $\pm 3\%$
Resistance	500 Ω to 500k Ω , $\pm 3\%$
Thermistor	10k Ω 10k Ω Shunt 1k Ω Platinum resistance temperature detector (RTD)
UI as digital input	Voltage-free contact

Resistance input

Resistance input mode has a working range of 500 Ω to 500k Ω . You can use a 10k Ω resistor, a 10k Ω shunt resistor, or a 1k Ω platinum RTD.

- **Important:** Electrical noise may interfere with narrow band sensors. Use a 470 μF 30 V capacitor to suppress electrical noise and prevent inaccurate or erratic sensor readings.

Figure 11: Resistance input wiring



Callout	Description
1	Controller
2	Thermistor, RTD, or potentiometer

Voltage input

Voltage input mode has a working range of 0 V to 10 V. The minimum input impedance is 100k Ω .

Figure 12: Voltage input wiring

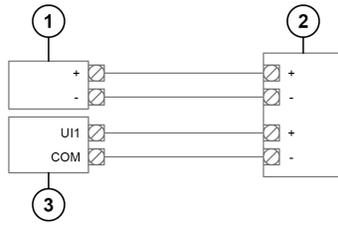


Callout	Description
1	Controller
2	Field device

Current input

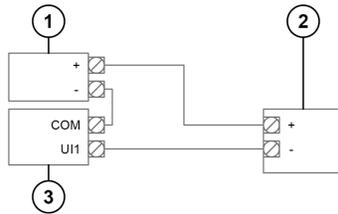
Current input mode has a working range of 0 mA to 20 mA. The current input impedance is 160 Ω.

Figure 13: Current input with external source wiring



Callout	Description
1	Power supply
2	Field device
3	Controller

Figure 14: Current input with internal source wiring



Callout	Description
1	Power supply
2	Field device
3	Controller

Pulse input

All universal input configurations can receive high-speed pulses. The minimum on-off time for pulse input is 25 ms.

Figure 15: Pulse input minimum on-off time

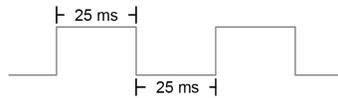


Figure 16: Pulse input wiring



Callout	Description
1	Controller
2	Field device

Universal output wiring

EC controllers have universal outputs. Universal output ports support current, voltage, and digital modes through hardware jumpers and internal register settings.

Table 5: Universal output wiring specifications

Specification	Description
Current	0 mA to 20 mA, $\pm 3\%$, maximum load impedance of 400 Ω
Voltage	0 VDC to 10 VDC, minimum load impedance of 2k Ω
Digital mode	Maximum sinking current rating of 0.2 A for each channel

Current output

Current output mode has a working range of 0 mA to 20 mA.

Figure 17: Current output wiring



Callout	Description
1	Controller
2	Field device

Voltage output

Voltage output mode has a working range of 0 V to 10 V.

⚠ CAUTION: To avoid damaging the output port, do not drive a relay directly from universal voltage output.

Figure 18: Voltage output wiring



Callout	Description
1	Controller
2	Field device

Universal output as digital output

Use a digital output block to use a universal output port for digital output. See the following table for a cross-reference of physical universal output ports to digital output.

Table 6: EC-1208 universal output to digital output cross-reference

Physical universal output port	Digital output block channel
U01	DO9
U02	DO10
U03	DO11
U04	DO12
U05	DO13
U06	DO14

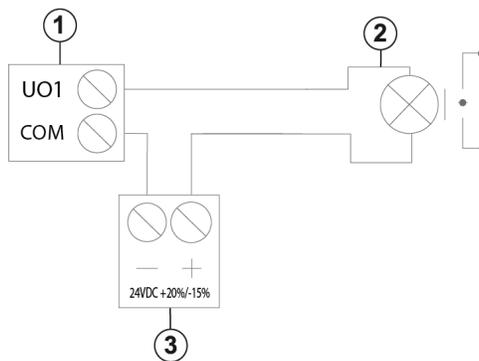
Table 7: EC-1616 universal output to digital output cross-reference

Physical universal output port	Digital output block channel
U01	DO9
U02	DO10
U03	DO11
U04	DO12
U05	DO13
U06	DO14
U07	DO15
U08	DO16

Use a power source of 24 VDC in digital output mode.

⚠ CAUTION: To avoid damaging the output port, do not use an AC power source.

Figure 19: Universal output as digital output wiring



Callout	Description
1	Controller
2	Field device
3	24 VDC power supply

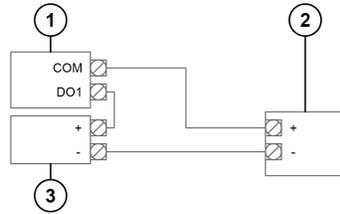
Digital output wiring

Use EC controllers digital output for general-purpose isolated digital output connections. This configuration is a dry relay contact that does not output voltage or current.

Table 8: Digital output wiring specifications

Specification	Description
Relay contacts	Single pole single throw, normally open (SPST NO), 48 VA at 24 VAC

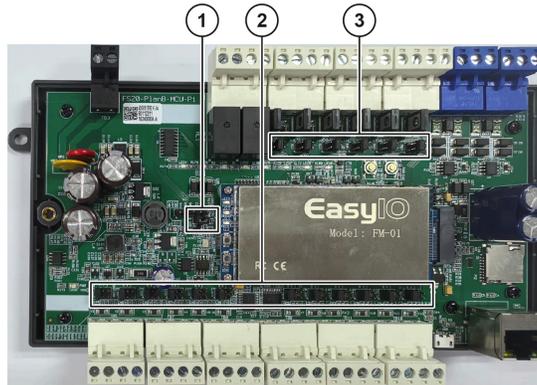
Figure 20: Digital output wiring



Callout	Description
1	Controller
2	Field device
3	Power supply

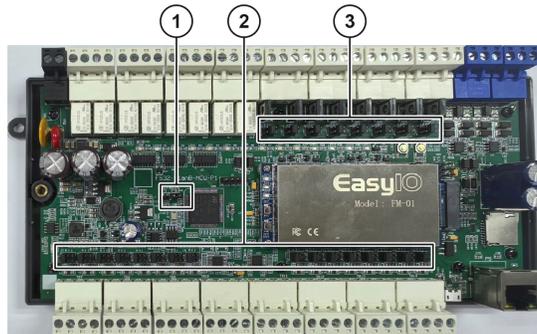
Jumper configuration

Figure 21: EC-1208 jumpers



Callout	Description
1	Watchdog jumper
2	Universal input jumpers
3	Universal output jumpers

Figure 22: EC-1616 jumpers



Callout	Description
1	Watchdog jumper
2	Universal input jumpers
3	Universal output jumpers

Watchdog jumper configurations

The watchdog jumper failsafe in EC controllers restarts the controller in the event of a hardware or software watchdog circuit crash. To enable the watchdog circuit, position the jumper on the two watchdog pins.

Figure 23: Watchdog jumper disabled



Figure 24: Watchdog jumper enabled



Universal input jumper configurations

EC controllers support resistance, voltage, and current universal input modes. For resistance mode, position the jumper on the two left pins. For voltage mode, position the jumper on the two middle pins. For current mode, position the jumper on the two right pins.

Figure 25: Resistance mode

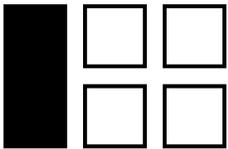


Figure 26: Voltage mode

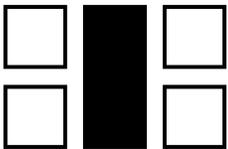
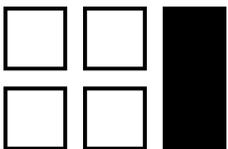


Figure 27: Current mode



Universal output jumper configurations

EC controllers support current, voltage, and digital universal output modes. For current mode, position the jumper on the two left pins. For voltage mode, position the jumper on the two middle pins. For digital mode, position the jumper on the two right pins.

Figure 28: Current mode

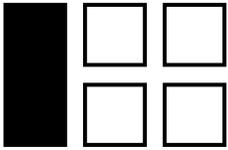


Figure 29: Voltage mode

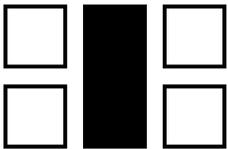
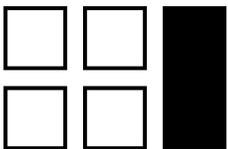


Figure 30: Digital mode

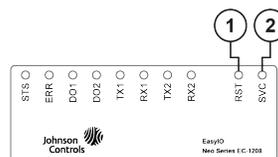


LED indicators and buttons

Press the **Reset** button to manually restart an EC controller if you need to perform a hardware reset.

Press the **Service** button to activate the built-in bootloader program for software upgrades. Each DO port has a corresponding LED to indicate its current state.

Figure 31: EC-1208 LED indicators and buttons



Callout	Description
1	Reset button
2	Service button

Logon details

See the following tables for the default logon details for EC controllers through EasyIO Programming (EP) tools and through a web browser.

Table 9: Sedona logon details with EP tools

Property	Description
Username	admin
Password	—

Table 10: FTP client web user logon details

Property	Description
Username	webuser
Password	123456

Note: You can use an FTP client to perform graphics deployments.

Table 11: IP address, subnet, and gateway details

Property	Description
Default IP address	192.168.10.12
Default subnet	255.255.255.0
Default gateway	192.168.10.1

Note: In order to log on, the host PC has to be in the same subnet.

Example:

IP address: 192.168.10.123

Subnet: 255.255.255.0

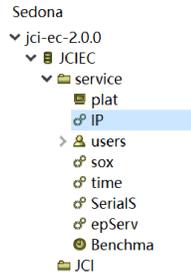
Changing the controller IP address

The default EC controller IP address is 192.168.10.12. You can change the IP address with EP tools or through a web browser.

Changing the controller IP address with EP tools

1. Log on to the EC Controller through EP tools. Locate the **IP** object in the **service** folder.

Figure 32: The IP object in EP



2. Click the **IP** object and view its properties in the **Properties** pane. Enter the new IP address specifications in the **newIpAddress**, **newSubnetMask**, and **newGateway** fields.

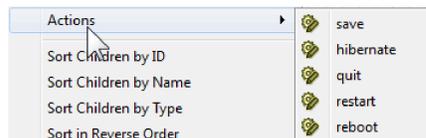
- ⓘ **Note:** If you input invalid values, the controller cannot connect to the network. Restore factory settings if the controller is unable to connect to the network. See [Restoring factory settings](#) for more information.
- ⓘ **Note:** The **currentDhcp** and **newDhcp** properties are only supported by EC controllers.

Figure 33: IP object properties

jciEC::IPConfig[IP]	
名字	IP
uuid	6-e2C0W2L3-070609
status	Ok
currentIpAddress	192.168.10.180
currentSubnetMask	255.255.255.0
currentGateway	192.168.10.1
newIpAddress	192.168.10.180
newSubnetMask	255.255.255.0
newGateway	192.168.10.1
currentDhcp	Disabled
newDhcp	Disabled

3. Click **Actions** > **save** to save the new IP address properties. Click **Actions** > **restart** to restart the controller.

Figure 34: Actions menu

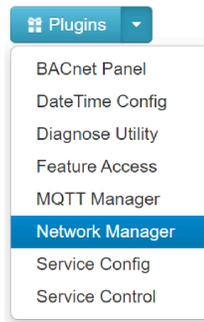


4. Use EP tools to reconnect to the controller with the new IP address.

Changing the controller IP address with a web browser

1. Log on to the EasyIO Neo Series EC controller browser. Click **Plugins** > **Network Manager**

Figure 35: Plugins menu options



2. On the **Network Manager** page, configure the new IP address. Save the new IP address properties by clicking **Save**. The controller automatically restarts. When the controller restarts, you must manually reconnect to the controller with the newly assigned IP address.

Note: If the new IP address is in the same subnet, the controller will automatically reconnect.

Figure 36: Enabling the Using DHCP IP address option



3. **Optional:** EC Series controllers support DHCP IP addresses. To enable DHCP Client mode, click **Wired**. In the **IP Address** drop-down menu, select **Using DHCP**.

Restoring factory settings

Restore factory settings by pressing the reset button and holding down the service button while the controller is booting up.

Restoring factory settings will:

- Restore the default IP address of 192.168.10.12.
 - Reset the Sedona application in the Sedona VM back to the default empty application.
 - Restore the default Sedona logon details. See [Logon details](#) for more information.
1. Back up and save any existing Sedona applications on the controller onto your computer.
 2. Cycle power to the controller or press the **RST** button. Press and hold the **SVC** button within five seconds until the **ERR** LED starts to flash.
- Note:** This process takes approximately 15 seconds.
3. Release the **SVC** button and press it again to finish restoring factory settings.

Repair information

If the product fails to operate within its specifications, replace the unit. For a replacement, contact the nearest Johnson Controls representative.

Product warranty

This product is covered by a limited warranty, details of which can be found at

<http://www.johnsoncontrols.com/buildingswarranty>.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information, and other terms set forth at <https://www.johnsoncontrols.com/techterms>. Your use of this product constitutes an agreement to such terms.

Patents

Patents: <https://jciapat.com>

Single point of contact

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