

LED Gateway Manual

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1 Introduction

Electro-Matic's LED Gateway is a device that allows users to more easily send commission and interact with our signs. A gateway is often not necessary to use our signs, but it can reduce the amount of code you need on your system. Occasionally, the gateway is necessary. In these cases it allows for legacy protocol compatibility. Finally, the gateway provides modern interfaces, custom functionality (when requested), and expanded options for our LED sign products.

1.1 Architecture

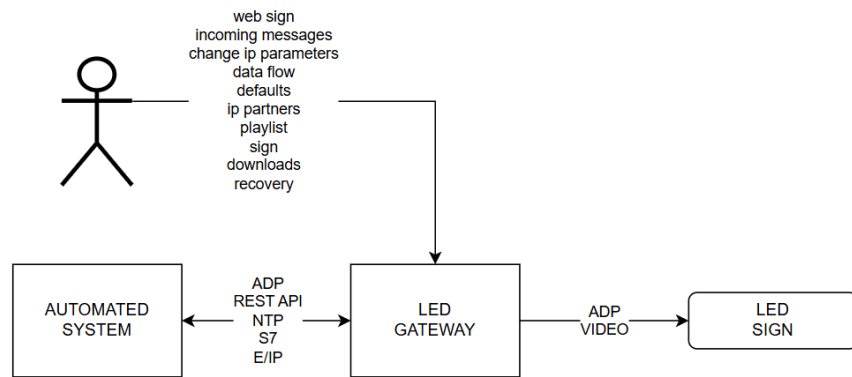


Figure 1: Generic Use Case

Physically, the LED Gateway is generally integrated into the body of a sign. When necessary, it can be mounted elsewhere and send either video or Ethernet signals to the sign.

The following sections briefly describe LED Gateway use cases.

1.1.1 ADP Server

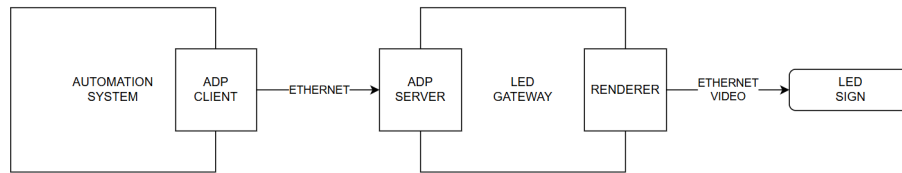


Figure 2: ADP Server Use Case

The LED Gateway can be used as an ADP Server to provide legacy protocol support for ADP on modern signs. In this mode, the gateway receives ADP messages and displays them via display port on modern LED panels. This mode is designed to provide 100% emulation for ADP.

1.1.2 Restful API Endpoints

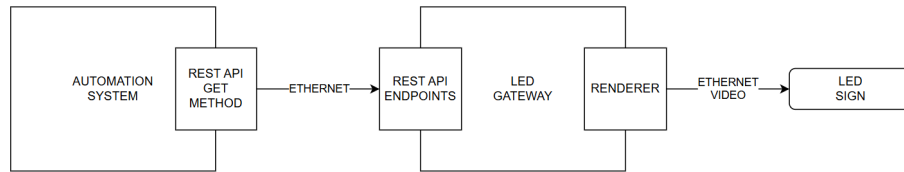


Figure 3: REST API Use Case

The LED Gateway provides Restful API endpoints for controlling sign content. Rest API's have many benefits over ADP such as more human readable data packets and pre-packaged, encapsulated connection management. Restful API endpoints are intended to be a modern solution for sending content from automated systems to our LED signs.

1.1.3 PLC Client

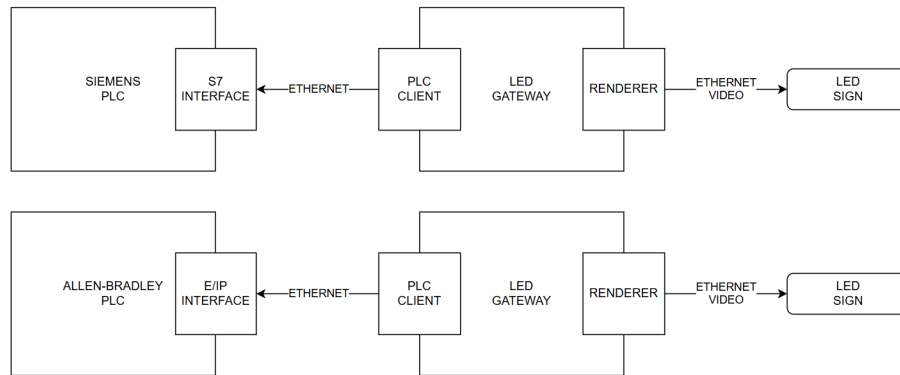


Figure 4: PLC Client Use Case

The LED Gateway can be used to read data from a PLC. Currently, Siemens S7 and Allen-Bradley E/IP protocols are supported over Ethernet connection. The gateway will scan a plc at 2 Hz for a list of pre-determined tags and display the data in those tags on the LED sign. There is no connection and communication management required on the PLC; the gateway uses the relevant driver to establish an HMI-like connection to the PLC.

2 Web Sign

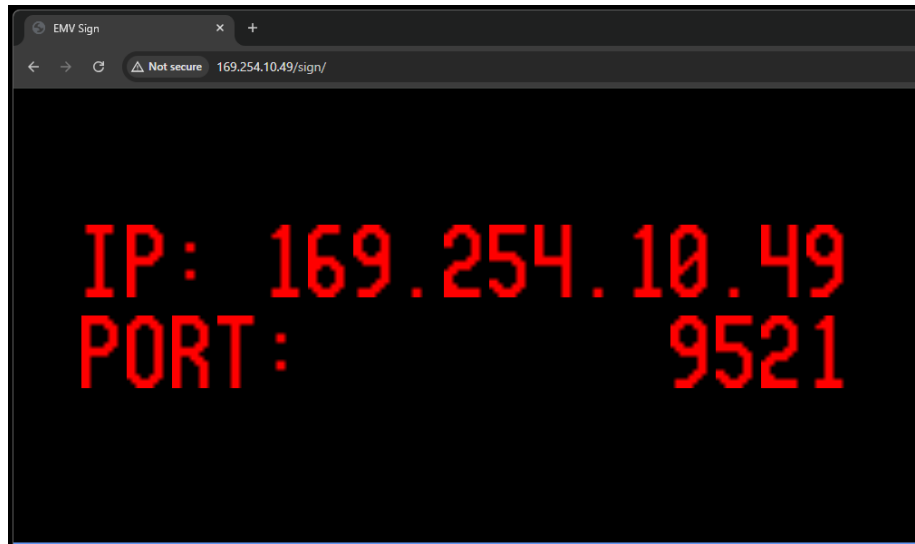


Figure 5: Web Sign Example

An image of the sign is rendered at `http://[led-gateway-ip]/sign`. The LED Gateway's default IP address is 169.254.10.49 so the web sign rendering would be at `http://169.254.10.49/sign`. Currently, there is no https site.

The web sign rendering performs best on Google's Chrome browser in incognito mode. The web sign is rendered at a 1:1 pixel ratio with respect to a physical sign, so you will likely need to zoom in to be able to read the sign. Fractional zoom multiples may result in odd rendering behavior. Stick to 2x, 3x, etc.

3 User Interface

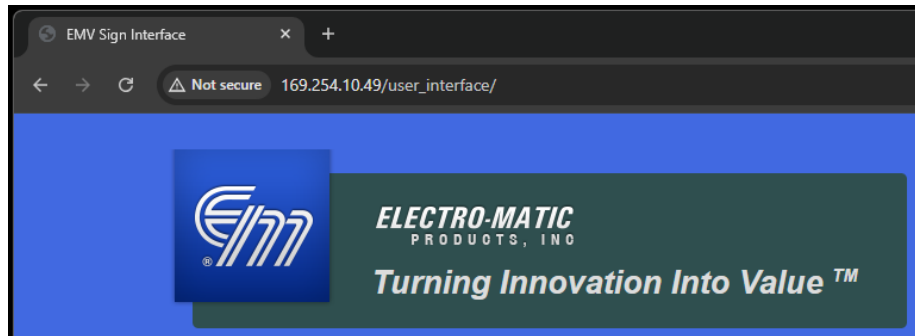


Figure 6: User Interface Example

The web user interface (UI) of the sign is available at [http://\[led-gateway-ip\]/user_interface](http://[led-gateway-ip]/user_interface). The LED Gateway's default IP address is 169.254.10.49 so the UI would be at http://169.254.10.49/user_interface. Currently, there is no https site.

The UI performs best on Google's Chrome browser in incognito mode.

3.1 Incoming Messages

The screenshot displays the Electro-Matic software interface. At the top, the Electro-Matic logo and tagline "Turning Innovation Into Value™" are visible. On the right, a blue banner contains the text "For Tech Support Call 248-478-1182". The left sidebar features a menu with options: "Incoming Messages" (highlighted in orange), "Change Ip Parameters", "Data Flow", "Defaults", "Ip Partners", "Playlist", "Sign", "Downloads", and "Recovery". The main area is titled "Logs >> Incoming Messages" and contains a table with columns "id", "timestamp", and "message". The table lists 10 incoming messages, each with a unique ID, a timestamp, and a hex-encoded message body. The messages are numbered 14516 through 14506, with timestamps ranging from 2024-10-01 10:07:45 to 10:07:17. The message bodies are hex strings representing byte arrays, such as "\x01200\x02AA\x1B b\x1C3\x070x1A1 622-E \x070 42\x0D\x070x1A1 411-L \x071 25\x0D\x070x1A1 562-L \x070 25\x0D\x070x1A1 197-L \x070 25\x0D\x070x1A1 928-L \x070 25\x0D\x070x1A1 209 E \x070D31\x0D\x070x1A1 \x070 \x0D\x070x1A1*****\x070***\x04".

id	timestamp	message
14516	2024-10-01 10:07:45	\x01200\x02AA\x1B b\x1C3\x070x1A1 622-E \x070 42\x0D\x070x1A1 411-L \x071 25\x0D\x070x1A1 562-L \x070 25\x0D\x070x1A1 197-L \x070 25\x0D\x070x1A1 928-L \x070 25\x0D\x070x1A1 209 E \x070D31\x0D\x070x1A1 \x070 \x0D\x070x1A1*****\x070***\x04
14515	2024-10-01 10:07:40	\x01200\x02AA\x1B b\x1C3\x070x1A1*****\x070***\x0D\x070x1A1 \x070 \x0D\x070x1A1 S T O \x071P \x0D\x070x1A1 \x070 \x0D\x070x1A1*****\x070***\x04
14514	2024-10-01 10:07:38	\x01200\x02AA\x1B b\x1C3\x070x1A1 197-L \x070 25\x0D\x070x1A1 928-L \x070 25\x0D\x070x1A1 209 E \x070D31\x0D\x070x1A1 295-E \x070 31\x0D\x070x1A1 7423 L \x070 42\x04
14513	2024-10-01 10:07:27	\x01200\x02AA\x1B b\x1C3\x070x1A1 11:37:\x07020 \x0D\x070x1A1 \x070 \x0D\x070x1A1 T R I \x070M \x0D\x070x1A1 TRACK \x070925 \x0D\x070x1A1 \x070 \x04
14512	2024-10-01 10:07:36	\x01200\x02AA\x1B b\x1C3\x070x1A1 997-L \x070 18\x0D\x070x1A1 547 E \x070 42\x0D\x070x1A1 1937 E \x070 42\x0D\x070x1A1 769-L \x070 32\x0D\x070x1A1 17334-L \x070 42\x04
14511	2024-10-01 10:07:33	\x01200\x02AA\x1B b\x1C3\x070x1A1 13:59:\x07000 \x0D\x070x1A1 \x070 \x0D\x070x1A1 T R I \x070M \x0D\x070x1A1 TRACK \x070921 \x0D\x070x1A1 \x070 \x04
14510	2024-10-01 10:07:31	\x01200\x02AA\x1B b\x1C3\x070x1A1*****\x070***\x0D\x070x1A1 \x070 \x0D\x070x1A1 S T O \x071P \x0D\x070x1A1 \x070 \x0D\x070x1A1*****\x070***\x04
14509	2024-10-01 10:07:28	\x01200\x02AA\x1B b\x1C3\x070x1A1 13:59:\x07000 \x0D\x070x1A1 \x070 \x0D\x070x1A1 T R I \x070M \x0D\x070x1A1 TRACK \x070921 \x0D\x070x1A1 \x070 \x04
14508	2024-10-01 10:07:26	\x01200\x02AA\x1B b\x1C3\x070x1A1 334-L \x070 42\x0D\x070x1A1 524 E \x070 42\x0D\x070x1A1 622-E \x070 42\x0D\x070x1A1 769-L \x070 32\x0D\x070x1A1 17334-L \x070 42\x04
14507	2024-10-01 10:07:21	\x01200\x02AA\x1B b\x1C3\x070x1A1 617 L \x070 42\x0D\x070x1A1 873-L \x070 42\x0D\x070x1A1 1997-L \x070 18\x0D\x070x1A1 547 E \x070 42\x0D\x070x1A1 1937 E \x070 42\x04
14506	2024-10-01 10:07:17	\x01200\x02AA\x1B b\x1C3\x070x1A1 742-L \x071D37\x0D\x070x1A1 673-L \x071D27\x0D\x070x1A1 599-L \x070 42\x0D\x070x1A1 769-L \x070 32\x0D\x070x1A1 17334-L \x070 42\x04

Figure 7: Incoming Message Log

The UI holds the last 100 incoming messages in a log shown on the **Incoming Messages** page. This log show the exact byte array received by the adp server along with a time stamp and message id. The output format is compatible with adp-terminal-sender.exe and adp-gui-sender.exe (available on request). ADP messages are composed of key/value pairs where keys are a single byte. The “\x[nn]” character groupings you see in the logs are representations of the hex [nn] value of that byte. For example, a hex 04 would appear as “\x04”.

3.2 Change IP Parameters

ELECTRO-MATIC PRODUCTS, INC.
Turning Innovation Into Value™

For Tech Support Call
248-478-1182

Incoming Messages

Change Ip Parameters

Data Flow

Defaults

Ip Partners

Playlist

Sign

Downloads

Recovery

Settings >> Change Ip Parameters

X1P1		X1P1 Staged		X1P1 Saved	
Mode	static	Mode	static	Mode	static
IP Address		IP Address	169.254.10.49	IP Address	169.254.10.49
Subnet Mask		Subnet Mask	255.255.255.0	Subnet Mask	255.255.255.0
Gateway		Gateway		Gateway	
STAGE X1P1					

X1P2		X1P2 Staged		X1P2 Saved	
Mode	static	Mode	static	Mode	static
IP Address		IP Address	172.30.0.1	IP Address	172.30.0.1
Subnet Mask		Subnet Mask	255.255.255.0	Subnet Mask	255.255.255.0
Gateway		Gateway		Gateway	
STAGE X1P2					

Figure 8: Change IP Parameters Interface

IP interface parameter changed can be made on the **Change Ip Parameters** page. The LED Gateway has two network interfaces, though the second (X1P2) may not be used. Changes to the IP address are initial staged and then applied. This process takes up to 10 seconds, but should be considered irreversible. Once the changes propagate from **Staged** to **Saved** the gateway will be available on the new IP address. No restart is required.

Recovery methods are available in the event of a forgotten IP address, but they require physical access to the gateway.

3.3 Data Flow



Figure 9: Data Flow Interface

The operating mode of the LED Gateway can be set on the **Data Flow** page. The gateway should ship in the correct mode but you may need to use this page for troubleshooting purposes.

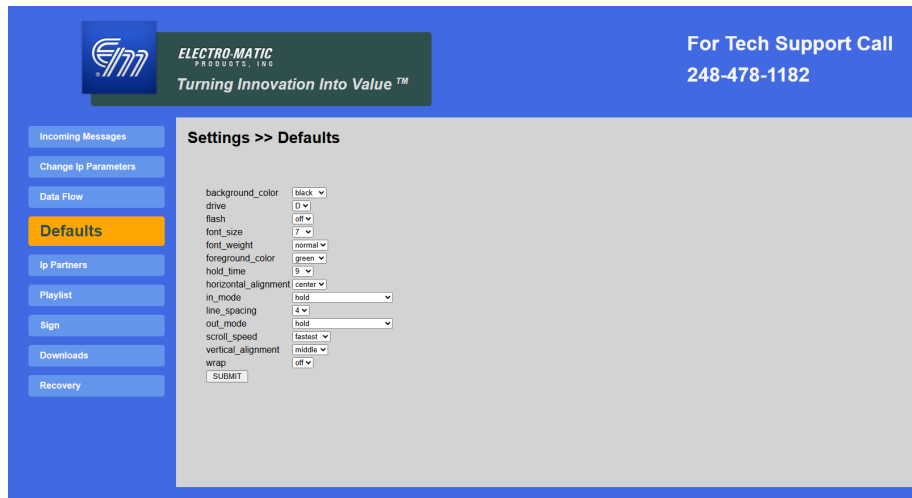


Figure 10: ADP Defaults Interface

3.4 Defaults

Default formatting options for messages can be set on the **Defaults** page. Any API or ADP message not specifying a given format option will instead take the default value for that option.

3.5 IP Partners

ELECTRO-MATIC
PRODUCTS, INC.
Turning Innovation Into Value™

For Tech Support Call
248-478-1182

Incoming Messages
Change Ip Parameters
Data Flow
Defaults
Ip Partners
Playlist
Sign
Downloads
Recovery

Settings >> Ip Partners

Input Partner

New Parameters
Partner Type: Allen Bradley
IP Address:
Rack:
Stage Input Partner Parameters

Staged Parameters
Partner Type: none

Saved Parameters
Partner Type: none

Output Partner

New Parameters
Partner Type: Sign
IP Address:
Port:
Save Output Partner Parameters

Saved Parameters
Partner Type: none

Figure 11: IP Partners Interface

The **Ip Partners** interface is used to specify parameters for input and output partners.

An **Input Partner** is a device that the gateway will scan for data. **Input Partner** parameters are necessary for services on the gateway that connect to and read data from an **Input Partner**. Currently, this is used in a PLC scanning use case where the gateway reads PLC data and puts it onto a sign.

An **Output Partner** is a device to which the gateway will send TCP/IP traffic.

3.6 Playlist

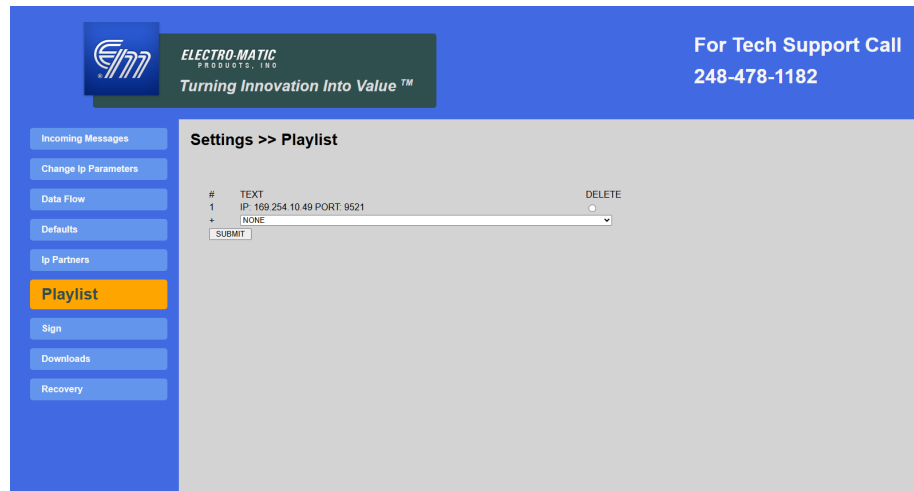


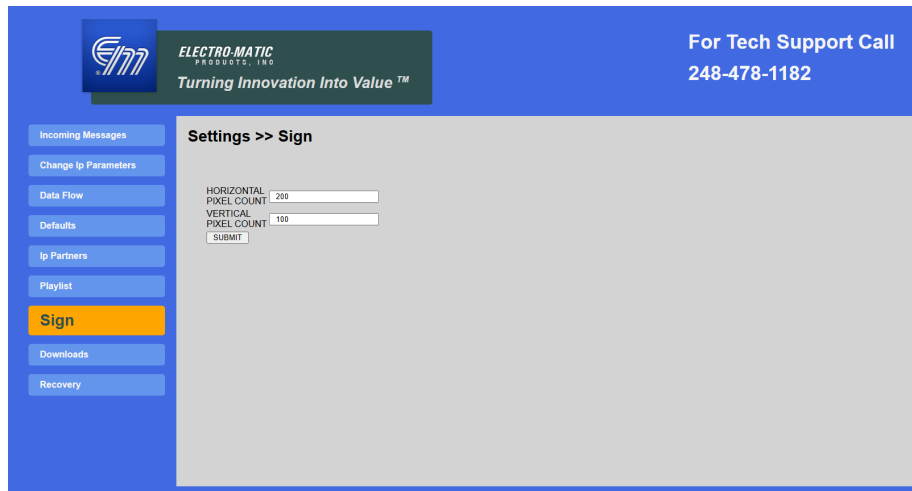
Figure 12: Playlist Interface

The **Playlist Interface** provides a GUI for interacting with the sign's ADP **Playlist**. User's can **add** and **remove** saved ADP files to the **Playlist**. **Playlists** are an ADP feature and may not be supported in all use cases.

To **add** a file, select it from the **+ dropdown** and click **SUBMIT**.

To **remove** a file, click on the **DELETE radio button** and click **SUBMIT**.

3.7 Sign



The screenshot displays the Electro-Matic Sign interface. At the top, the Electro-Matic logo and tagline "Turning Innovation Into Value™" are visible, along with a tech support contact number. A left sidebar contains navigation buttons: "Incoming Messages", "Change Ip Parameters", "Data Flow", "Defaults", "Ip Partners", "Playlist", "Sign" (highlighted in orange), "Downloads", and "Recovery". The main content area is titled "Settings >> Sign" and contains two input fields: "HORIZONTAL PIXEL COUNT" with a value of 200, and "VERTICAL PIXEL COUNT" with a value of 100. A "SUBMIT" button is located below these fields.

Setting	Value
HORIZONTAL PIXEL COUNT	200
VERTICAL PIXEL COUNT	100

Figure 13: Sign Interface

The **Sign** interface allows the user to specify the pixel dimension for the rendering of the **sign** face. This setting is only applies in use cases where the sign is rendered by the gateway.

3.8 Downloads

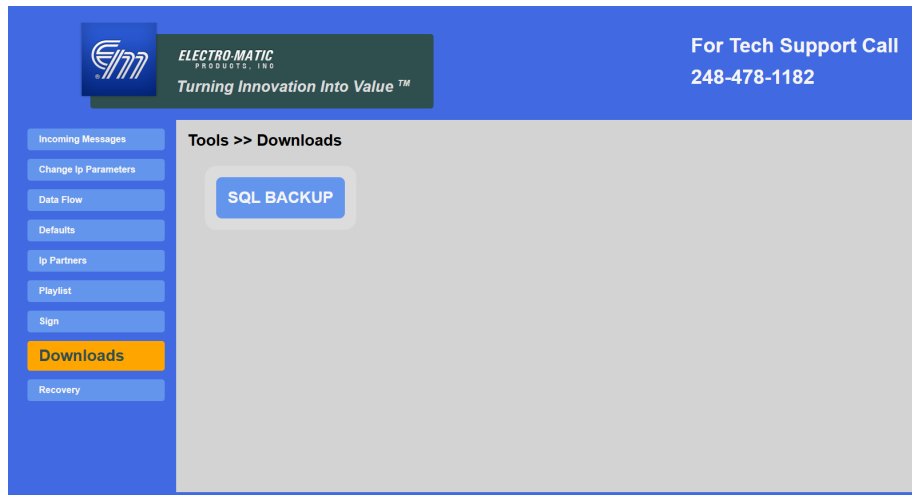


Figure 14: Downloads Interface

The **Downloads** interface allows a user to download a copy of the database used by the gateway. Other downloadable features may be added in the future.

3.9 Recovery

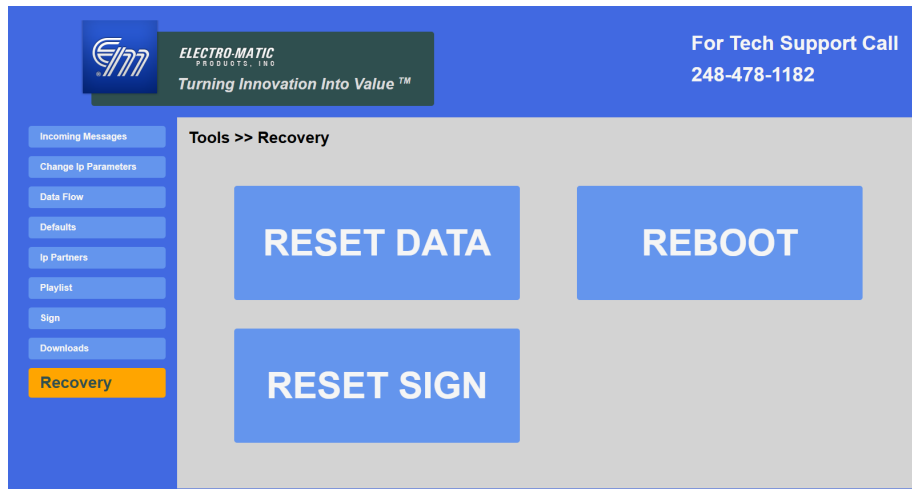


Figure 15: Recovery Interface

The **Recovery** interface allows the user to perform trouble shooting tasks.

- **Reset Data** clears the gateway's message database.
- **Reboot** reboots the gateway.
- **Reset Sign** reboots a sign connected to the gateway.

4 Automation Interfaces

Automation Interfaces are services on the gateway that allow it to interact with automated systems. There are a variety of these so the following sections will describe how to use these interfaces in a checklist format.

4.1 ADP

The **ADP Interface** is a server service that listens for ADP messages and displays them on an LED sign. ADP is a legacy protocol and this server is intended to **completely** emulate the functionality of ADP.

To use the **ADP Interface**:

1. set ip parameters of **X1P1** so that it can be address by your automated system

X1P1		X1P1 Staged		X1P1 Saved	
Mode	static	Mode	static	Mode	static
IP Address		IP Address	169.254.10.49	IP Address	169.254.10.49
Subnet Mask		Subnet Mask	255.255.255.0	Subnet Mask	255.255.255.0
Gateway		Gateway		Gateway	

STAGE X1P1

2. the gateway's port is 9521
3. Data Flow should be set to ADP in and either Display Port and Web or just Web out

Data Flow Settings

Input

☒ ADP
☐ API
☐ PLC

Output

☐ ADP
☒ Display Port
☒ WEB

Set Flow

4. The gateway is now configured to receive ADP messages. It is recommended that you connect directly to the sign and send a test message with FlexSender, ADP Terminal Sender, or ADP GUI Sender.
5. refer to the manual **WI-0322 4U2SEE ADP Protocol Manual_4.20.11.pdf** for instructions on using ADP protocol

4.2 Restful API Endpoints

Restful API Endpoints allow the sign to display content sent in json packages. Restful APIs are convenient because connection management is handled as part of a web stack, unlike ADP. Additionally, the json packages used by endpoints is much more human readable than ADP.

To use **Restful API Endpoints**:

1. set ip parameters of **X1P1** so that it can be address by your automated system

Settings >> Change Ip Parameters

X1P1		X1P1 Staged		X1P1 Saved	
Mode	static ▼	Mode	static	Mode	static
IP Address		IP Address	169.254.10.49	IP Address	169.254.10.49
Subnet Mask		Subnet Mask	255.255.255.0	Subnet Mask	255.255.255.0
Gateway		Gateway		Gateway	
<input type="button" value="STAGE X1P1"/>					

2. you may need to set the ip parameters of **X1P2** to communicate with a sign (depends on the type of sign)

- (a) if this step is necessary, the ip parameters of this interface must be addressable by the sign specified in step 4

X1P2		X1P2 Staged		X1P2 Saved	
Mode	static ▼	Mode	static	Mode	static
IP Address		IP Address	172.30.0.1	IP Address	172.30.0.1
Subnet Mask		Subnet Mask	255.255.255.0	Subnet Mask	255.255.255.0
Gateway		Gateway		Gateway	
<input type="button" value="STAGE X1P2"/>					

3. in Data Flow

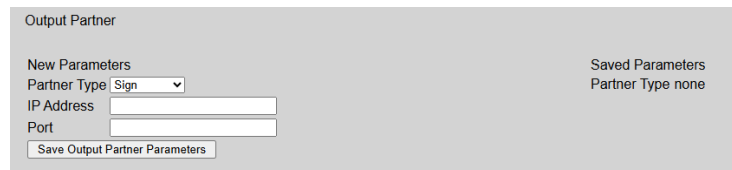
- (a) set input to API
- (b) output can be anything (depends on sign)

Settings >> Data Flow

Data Flow Settings

Input	Output
<input type="radio"/> ADP	<input type="checkbox"/> ADP
<input checked="" type="radio"/> API	<input checked="" type="checkbox"/> Display Port
<input type="radio"/> PLC	<input checked="" type="checkbox"/> WEB
<input type="button" value="Set Flow"/>	

4. in Output partner set the ip address of the sign if needed (depends on sign)
 - (a) if this step is necessary, the ip parameters of the sign must be addressable by interface X1P2 in step 2



Output Partner

New Parameters

Partner Type

IP Address

Port

Saved Parameters

Partner Type none

5. the gateway is now configured to receive content via Restful API messages
6. refer to manual **LED-Gateway-API-Documentation.pdf** for instructions on using Restful API endpoints

4.3 PLC

1. set ip parameters of **X1P1** so that it can address your PLC
 - (a) the interface X1P1 must be able to address the PLC in step 4.(a)

Settings >> Change Ip Parameters

X1P1		X1P1 Staged		X1P1 Saved	
Mode	static	Mode	static	Mode	static
IP Address		IP Address	169.254.10.49	IP Address	169.254.10.49
Subnet Mask		Subnet Mask	255.255.255.0	Subnet Mask	255.255.255.0
Gateway		Gateway		Gateway	
<input type="button" value="STAGE X1P1"/>					

2. you may need to set the ip parameters of **X1P2** to communicate with a sign (depends on the type of sign)
 - (a) if necessary, interface parameters must be able to address sign from step 4.(b)

X1P2		X1P2 Staged		X1P2 Saved	
Mode	static	Mode	static	Mode	static
IP Address		IP Address	172.30.0.1	IP Address	172.30.0.1
Subnet Mask		Subnet Mask	255.255.255.0	Subnet Mask	255.255.255.0
Gateway		Gateway		Gateway	
<input type="button" value="STAGE X1P2"/>					

3. in Data Flow
 - (a) set input to PLC
 - (b) output can be anything (depends on sign)

Settings >> Data Flow

Data Flow Settings

Input	Output
<input type="radio"/> ADP	<input checked="" type="checkbox"/> ADP
<input type="radio"/> API	<input checked="" type="checkbox"/> Display Port
<input checked="" type="radio"/> PLC	<input checked="" type="checkbox"/> WEB
<input type="button" value="Set Flow"/>	

4. in Output Partner
 - (a) the gateway will scan the PLC addressable by these parameters
 - i. PLC must be addressable by interface X1P1 from step 1

Input Partner

New Parameters	Staged Parameters	Saved Parameters
Partner Type: Allen Bradley	Partner Type: none	Partner Type: none
IP Address:		
Rack:		
<input type="button" value="Stage Input Partner Parameters"/>		

- (b) set the ip address of the sign if needed (depends on sign)
 - i. if necessary, sign parameters must be addressable by interface X1P2 in step 2

Output Partner

New Parameters

Partner Type Sign

IP Address

Port

Save Output Partner Parameters

Saved Parameters

Partner Type none

- 5. the gateway is now set configured to scan a PLC for content
- 6. refer to manual for your PLC make:
 - (a) **LED-Gateway-Siemens-Communications-Manual.pdf**
 - (b) **LED-Gateway-Allen-Bradley-Communications-Manual.pdf**