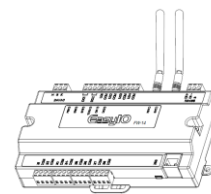# EasyIO FW Series
User Reference

Document Change Log

16th May 2017
Document created.

3rd Oct 2017
Updated AO min load impedance to 10,000 ohms.

11th Jan 2018
Updated Login details IP address.

20th Jan 2018
Updated AO specification and include a warning.

25th May 2018
Updated jumper settings images.

17th Dec 2018
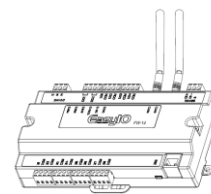Updated disclaimer and support channel emails addresses
Updated Utility Menu selection explanation.

23rd Jan 2019
Updated wiring diagram.

23rd May 2019
Update to include FW-28

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Worldwide and Asia Pacific Support	: support@easyio.com
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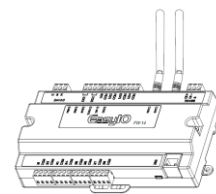
Federal Communication Commission Interference Statement This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

RF Exposure: A distance of 20 cm shall be maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna.
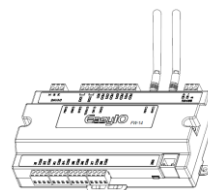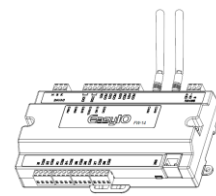
Table of Contents

Introduction

EasyIO FW Series is the most powerful wireless Sedona controller in the market. It is equipped with two 32-bit Processors, the first in the Automation industry, with a 580MHz MTK processor and an ARM M0 Cortex for the I/O management and A-D processing, and also with a Linux 3.18 OS for premium performance. Supports BACnet as server and TCom or premium performance with Niagara AX and N4.

- The Build in boot loader can be carried out remotely. No more manual service button needed is used.
- Firmware upgrading can be done remotely and without any assistant.
- Firmware upgrading is via ftp client.

This document describe about basic connection and technical specifications.

It applies for EasyIO FW Series family.

FW Model	UI	AO	DO	Pressure Sensor	Ethernet	EIA-485	Protocol Supported
FW-14	8	4 (Voltage only)	2	-	2	1	Sedona BACnet IP and MSTP Client BACnet IP server
FW-08	4	4 (Voltage only)	-	-	2	1	Sedona BACnet IP and MSTP Client BACnet IP server
FW-08V	4	4 (Voltage only)	-	1	2	1	Sedona BACnet IP and MSTP Client BACnet IP server

Table shown above show the IO configuration
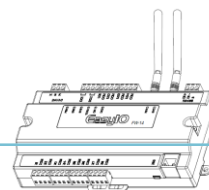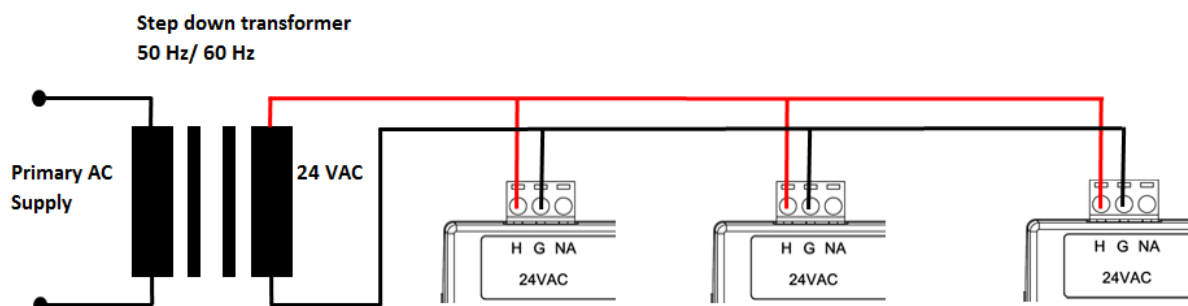
Hardware Configurations

Power supply Connection

Both AC and DC can be used for EasyIO FW Series controller. Refer to electrical specification for the working range. In order to avoid damage on the controller input/output devices and RS485 connection, use individual power supply for each controller. If a single power supply is used to power up multiple EasyIO FW series, make sure controller power supplies are connected with the same polarity.
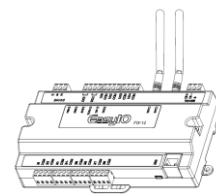
Electrical	
Power Supply	24V AC +/- 5% or 24V DC +20%/-15%
Consumption	500 mA
Operating Temperature	32 to 150 Deg-F (0 to 65 Deg-C)
Storage Temperature	-4 to 150 Deg-F (-20 to 65 Deg-C)
Operating Humidity	10% to 70% relative humidity non-condensing
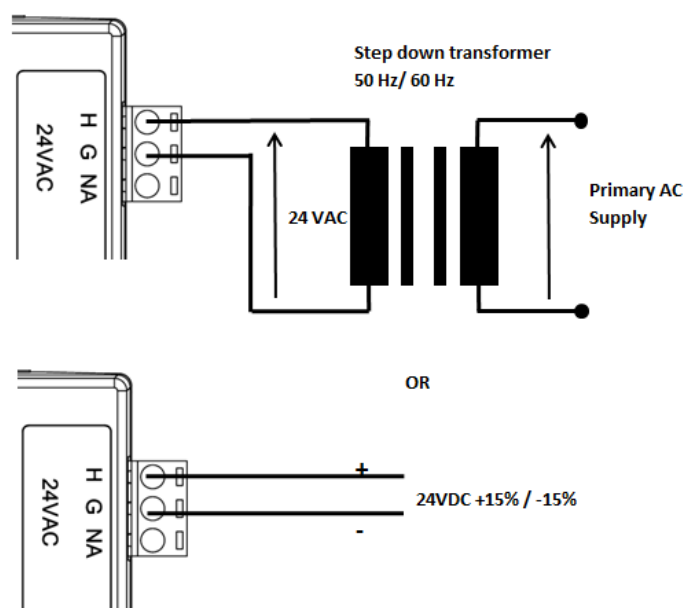
Power Supply Connection

Multiple controllers share single transformer connection

Input Output configuration

FW Series range of products comes in few options.
Options are referring to IO (Input/Output) configurations.

FW Model	UI	AO	DO	Pressure Sensor	Ethernet	EIA-485	Protocol Supported
FW-28	16	4 (Voltage only)	8	0	2	1	Sedona BACnet IP and MSTP Client BACnet IP server Modbus RTU Master
FW-14	8	4 (Voltage only)	2	0	2	1	Sedona BACnet IP and MSTP Client BACnet IP server Modbus RTU Master
FW-08	4	4 (Voltage only)	0	0	2	1	Sedona BACnet IP and MSTP Client BACnet IP server Modbus RTU Master
FW-08V	4	4 (Voltage only)	0	1	2	1	Sedona BACnet IP and MSTP Client BACnet IP server Modbus RTU Master

RS485 Connection

RS485 connection must be terminated at both ends with termination resistor, typically 120 Ohms. It is recommended to use shielded twisted pair wire (STP) for the wiring.

Lightning protection circuit is highly recommended to be installed at one end of the wiring. The controller should be wired in daisy chain network topology as shown as image below. If wire branch can be avoided, keep it as short as possible, and never connect more than one device to the wire branch (it is not recommended).

Be careful if single power supply is used for all connected RS485 device, make sure all devices are having the same ground connection. Make sure you are connecting the same wire for the same terminal position, all "H" terminals connected to the same wire.

| Physical Interface	Remark
EIA-485	BUS A,B Two Wire, Half Duplex Speed: BACnet MSTP (9.6K, 19.2k, 38.4K) Modbus RTU (9.6K, 19.2k, 38.4K, 57.6K, 115.2K),
Ethernet 10/100 Mbps	IP, TCP, UDP, ICMP, HTTP,FTP
Application Support (IP) (Serial)	Sedona, BACnet IP Server , Tcom BACnet MSTP Client **OR** Modbus RTU Master
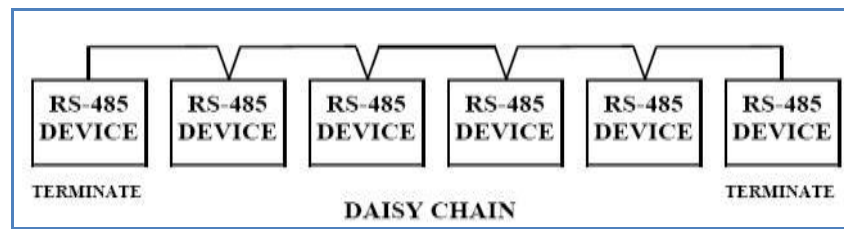
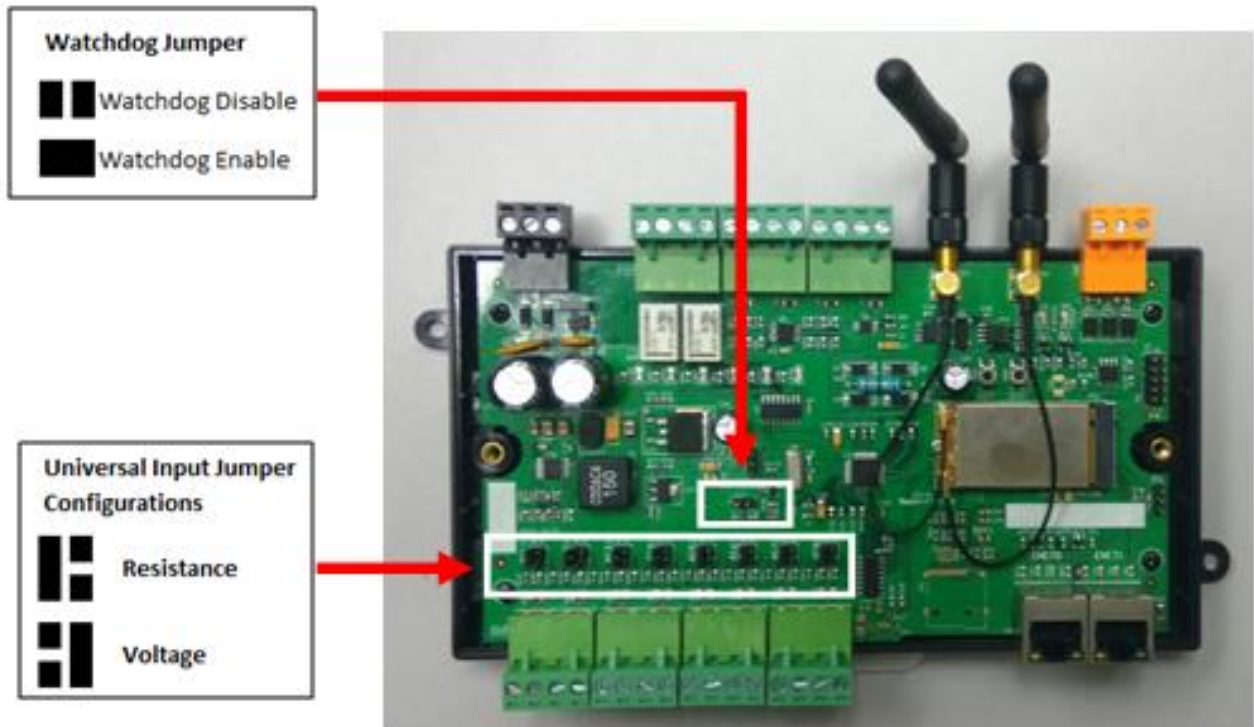*Daisy Chain Network Topology*

Jumpers Configurations

FW-28

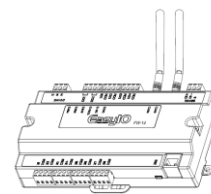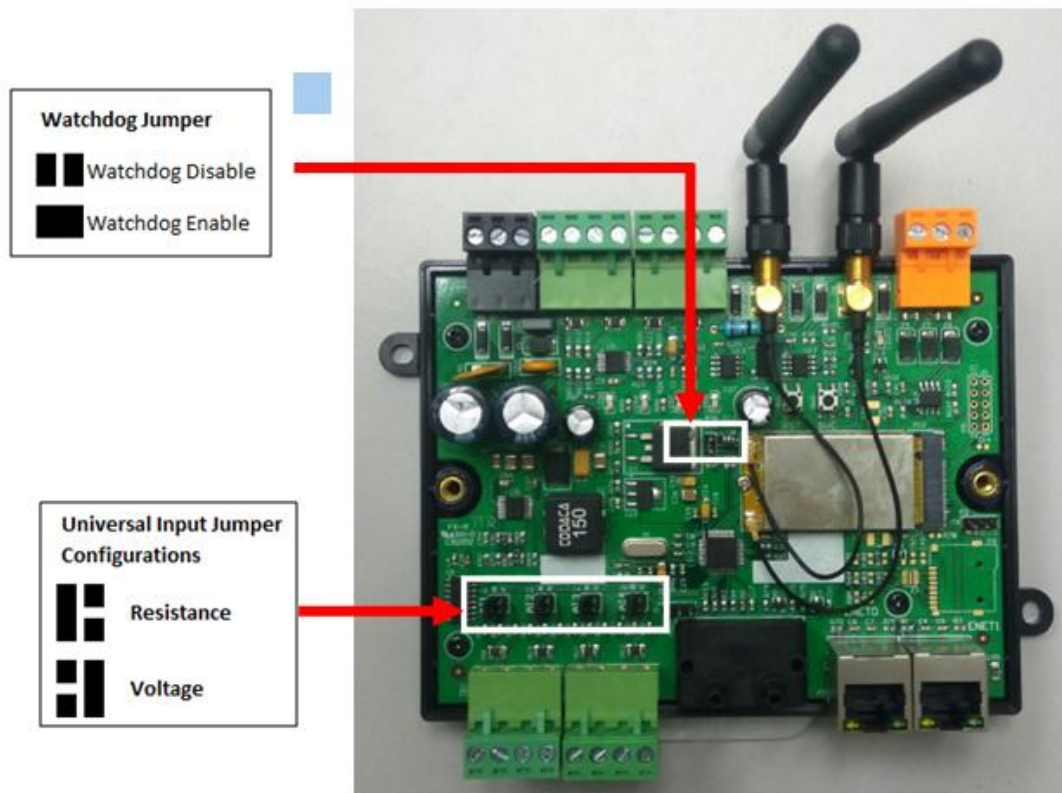Below image shows the jumper setting for Universal Input and Watchdog Jumper
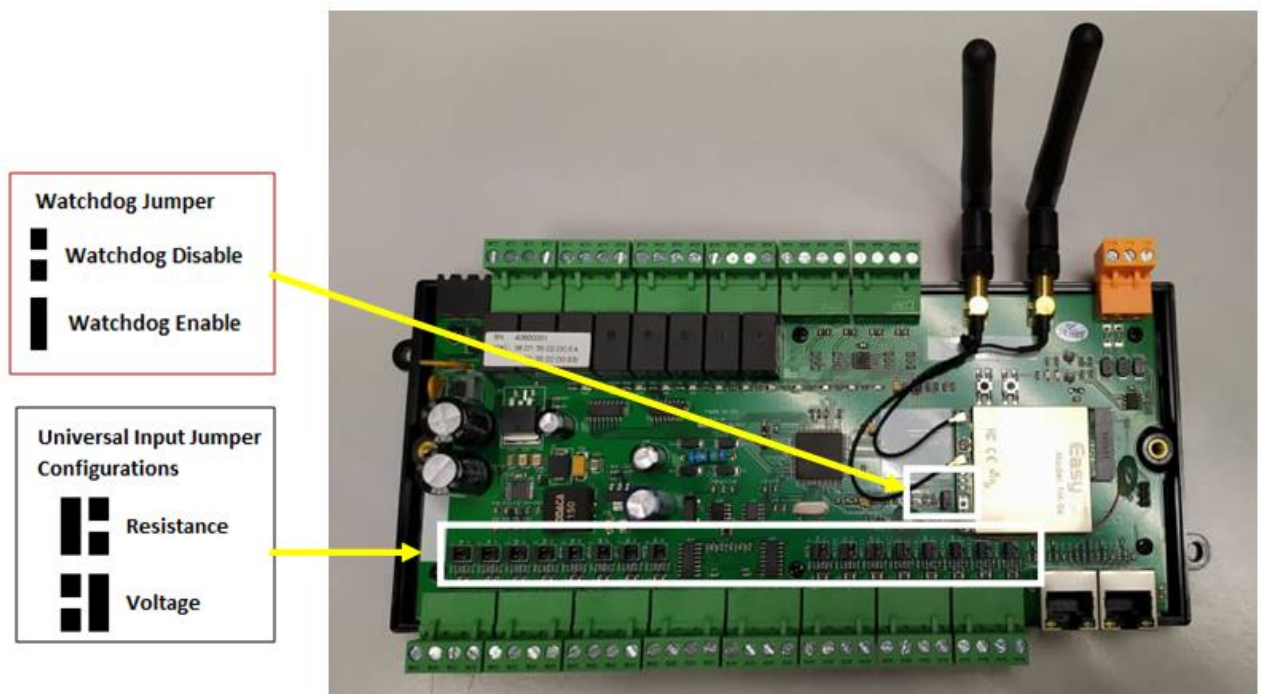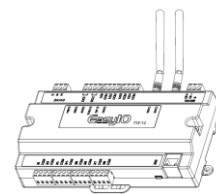
FW-14

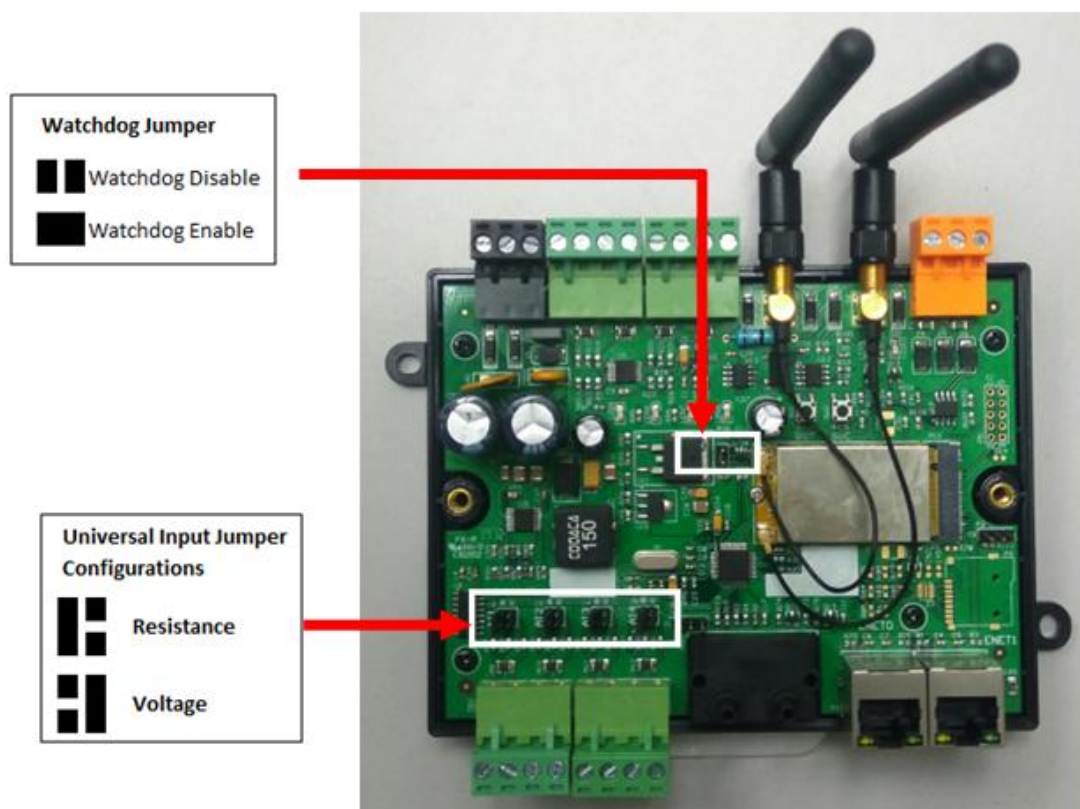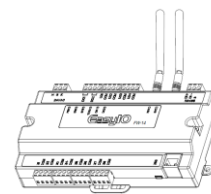Below image shows the jumper setting for Universal Input and Watchdog Jumper

FW-08

Below image shows the jumper setting for Universal Input and Watchdog Jumper
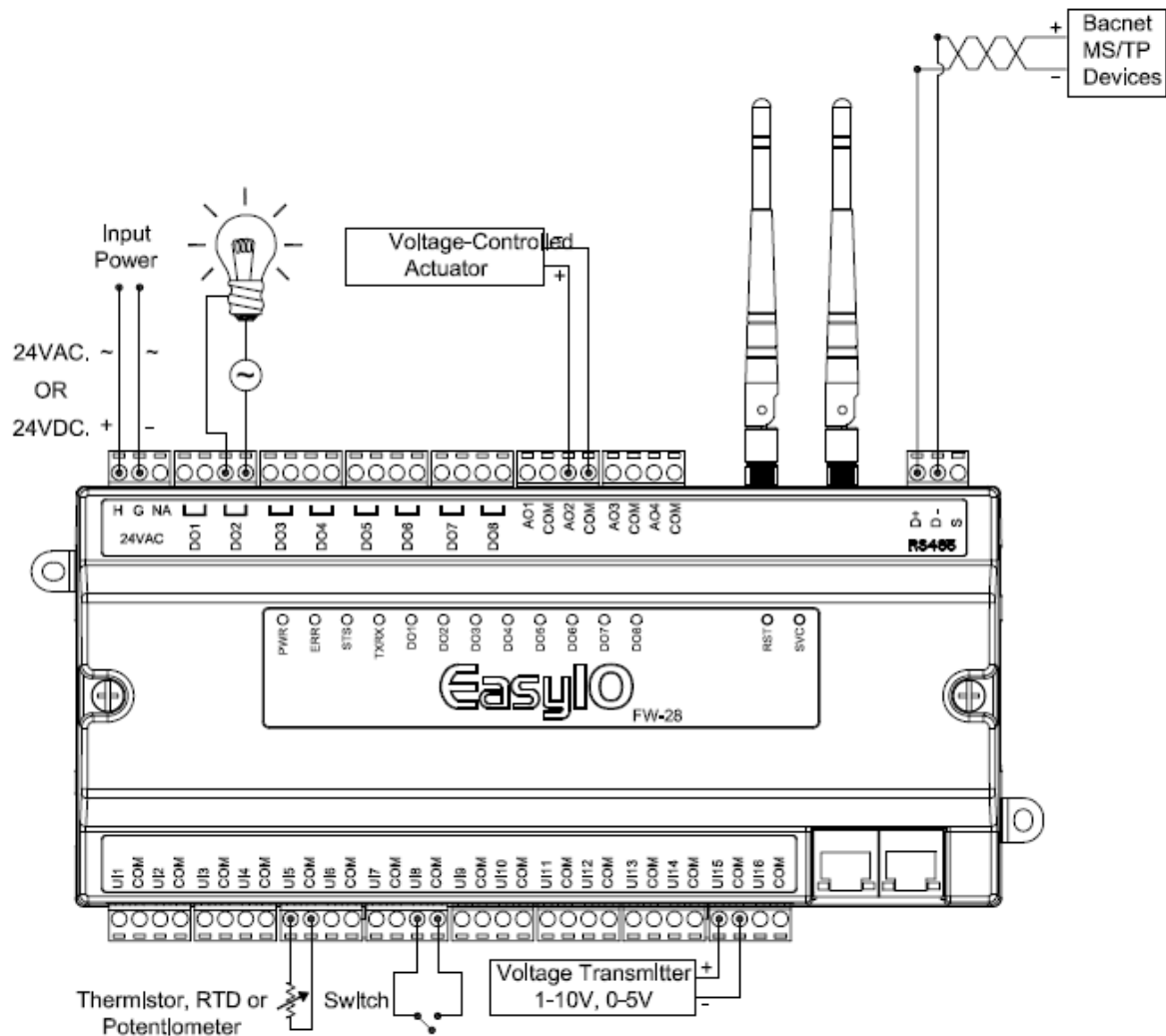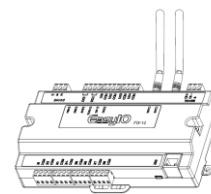

FW-08V

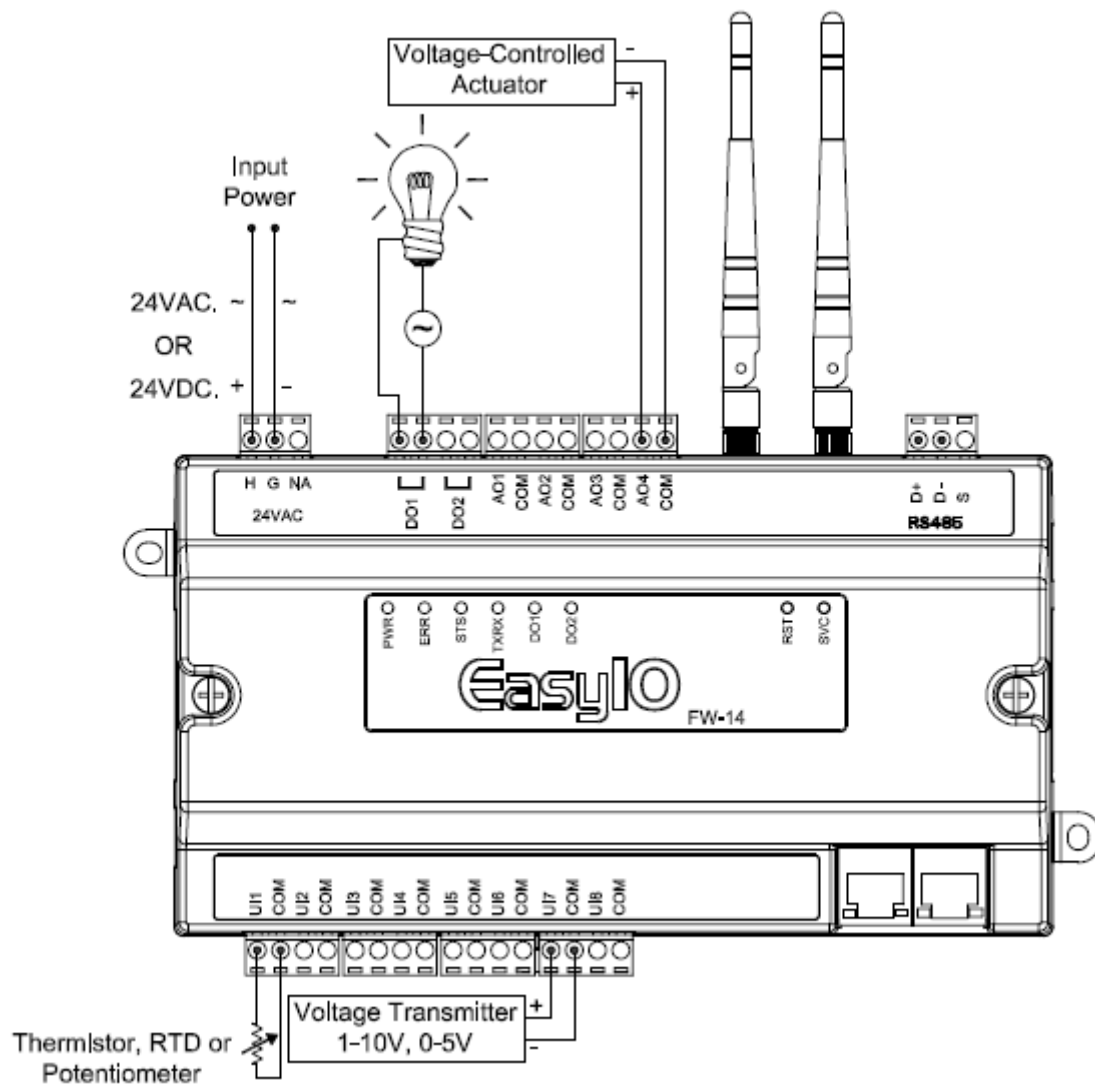Below image shows the jumper setting for Universal Input and Watchdog Jumper

Wiring diagram

Below diagram shows the general wiring diagram for FW series according to its model.

FW-28

FW-14

FW-08
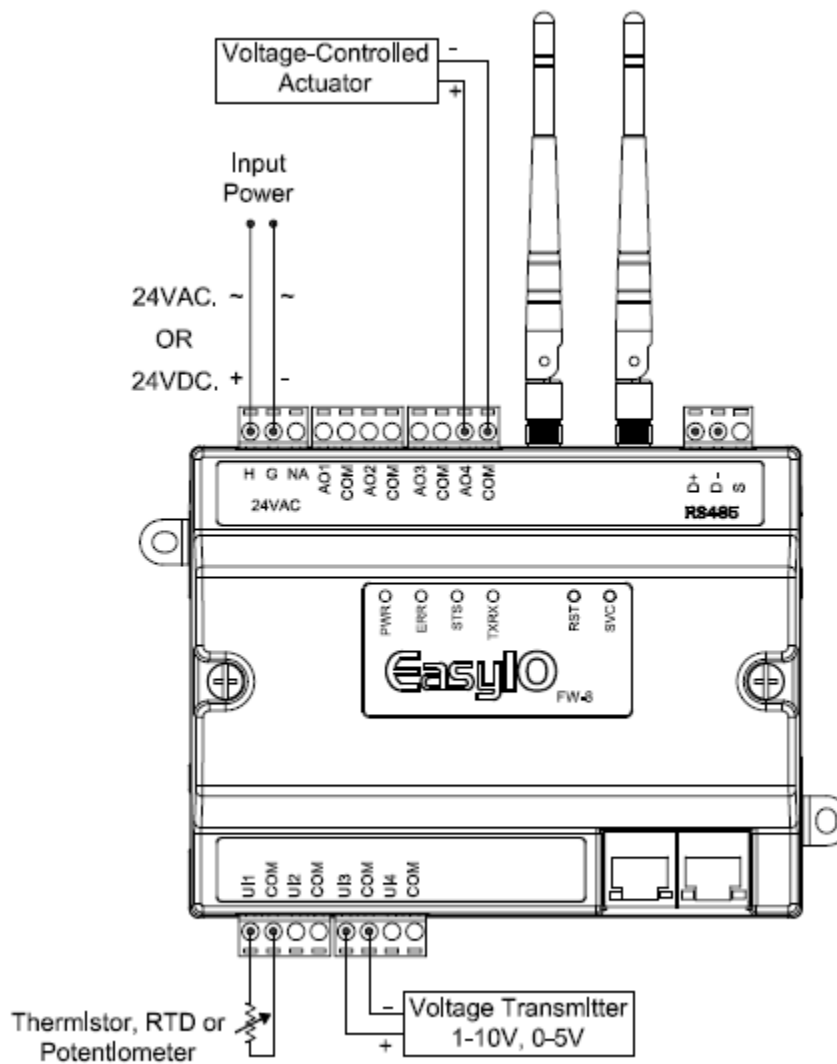
FW-08V
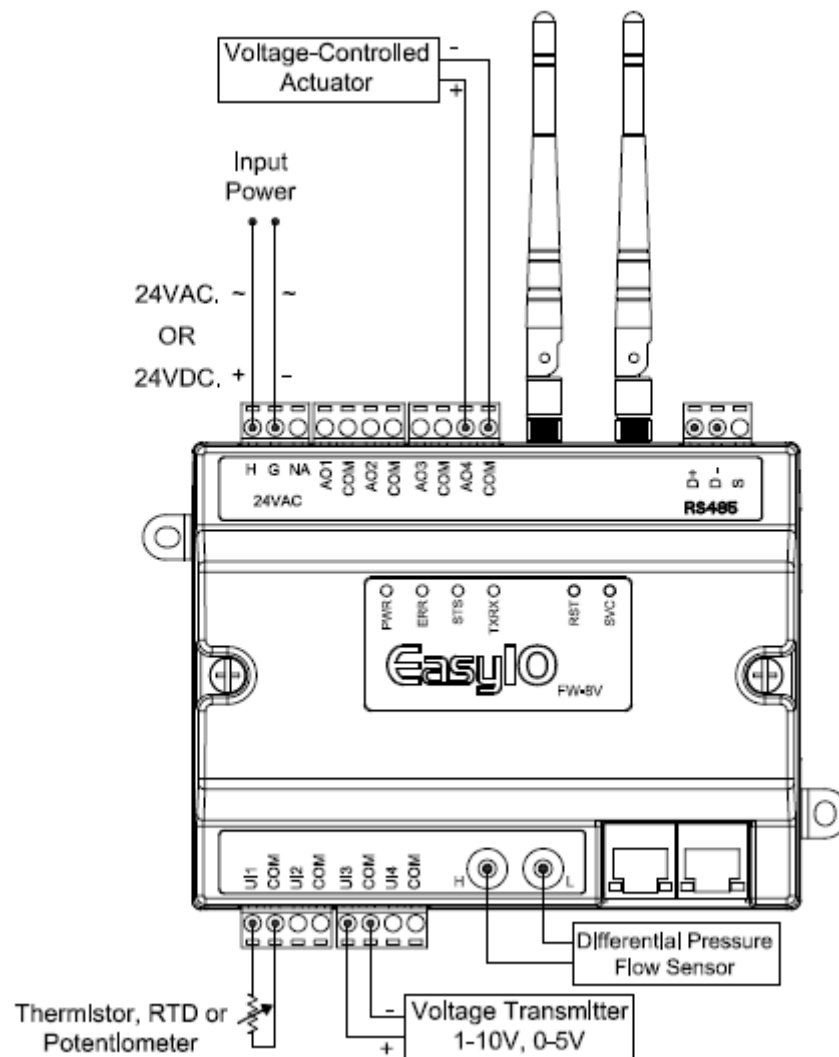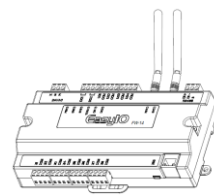
Digital Output Wiring Connection

EasyIO FW Series digital output is for general purpose isolated digital output connections (relay output).
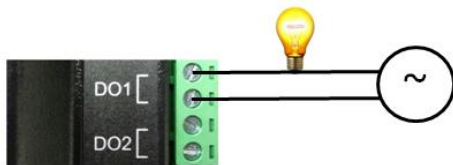
Pilot Duty rating is as below (Pilot Duty);
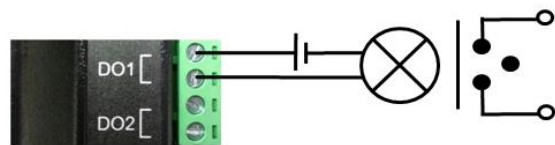- 24 VAC , 2.0A
- 24 VDC , 2.0A

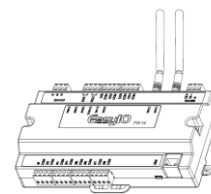| Digital Output	2 Channels – FW-14 only
Type	Relay Contacts, SPST NO, 48VA at 24VAC,

It does not output voltage or current. It is a dry relay contact.


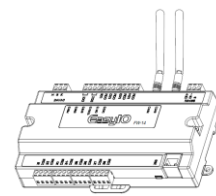*Digital Output Connection*

Analog Output Connection

EasyIO FW series has Analog Output connections. Each Analog Output can only drive voltage.

The operating range for voltage mode is 0 – 10V.

**We DO NOT recommend you to drive a relay directly from UO 0-10V mode as it is not design for it and will damaged the UO. **

| Universal Output	4 Channels
Type	Voltage: 0 – 10VDC , **Min Impedance 2,000 Ohm.**
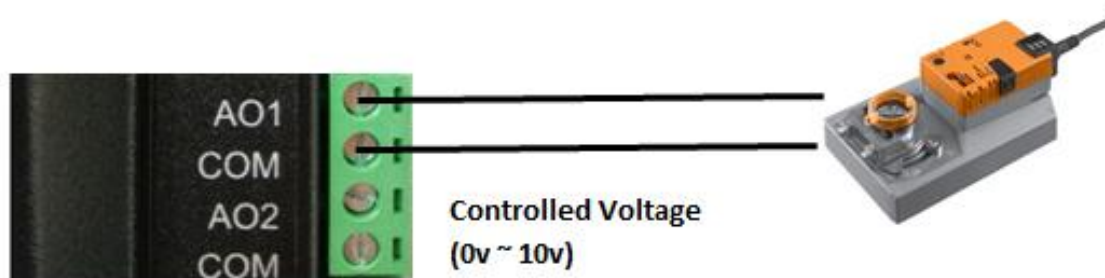
Universal Input Connection

EasyIO FW series has non-isolated universal inputs. The universal input supports three type of analog signal i.e. resistance and voltage via hardware jumper and internal register settings:

Universal Input	8 Channels
Voltage	0 - 10V DC (+/-0.05V)
Resistance	500 - 500K (+/-10 Ohm)
Thermistor	10K, 20K, 1K Balco, 1K Platinum : All (+/-0.1 Deg-C)
UI as Digital Input	Voltage Free Contact

   a)   Resistance – The working range of resistance is 500 Ohm – 500k Ohm.
       The commonly used Thermistor such as 10K, 20K, 1K Balco and 1K Platinum are all supported.

   b)   Voltage – Supports 0 – 10V and 0 – 5V (scaling required).
   The minimum input impedance of voltage mode input is **1 Mega Ohm.**
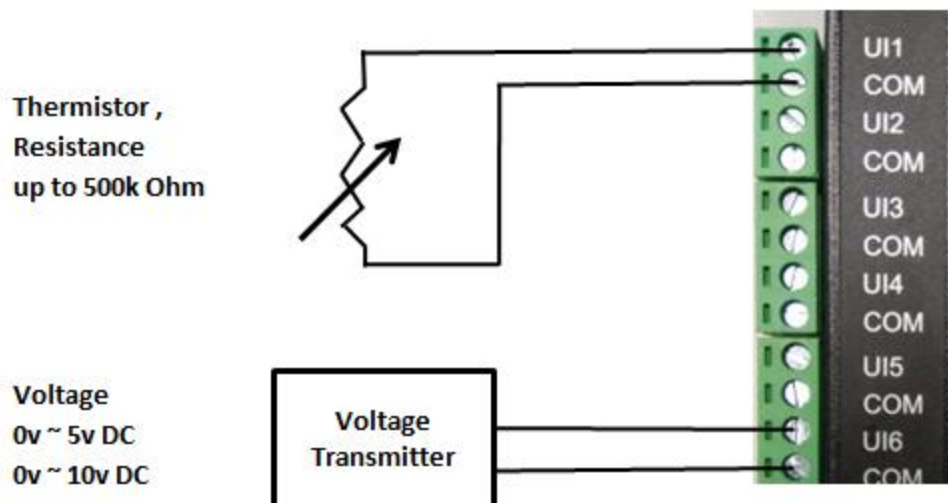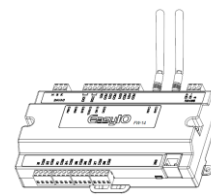
Differential Pressure Sensor (FW-08V)

Applicable to FW-08V only

EasyIO FW-8V has an on board differential pressure sensor or some called it Air Flow sensor.
The sensor is pre-calibrated by manufacturer and it gives digital signal instead of analog signal.
The sensor calibration is calibrated with temperature compensation which gives excellent accuracy.

The specifications of the sensor is as below.

Differential Pressure Sensor	1 Channel
Operating Range	0 ~ 500 Pa / 0.0 ~ 2.0 inches of water
Key Feature	CMOS Techonology
Pressure Value	Digital Output via I^2C
Data Update Rate	50ms
Temperature Compensation	Yes
Warm Up Time before first measument	No warm up required
Span Accuracy	4.5% of reading
Zero Point accuracy	0.2 Pa at 25 ^oC / 0.008 inches of water
Barbed Connection	6.3mm FR tubing (0.25 inch)
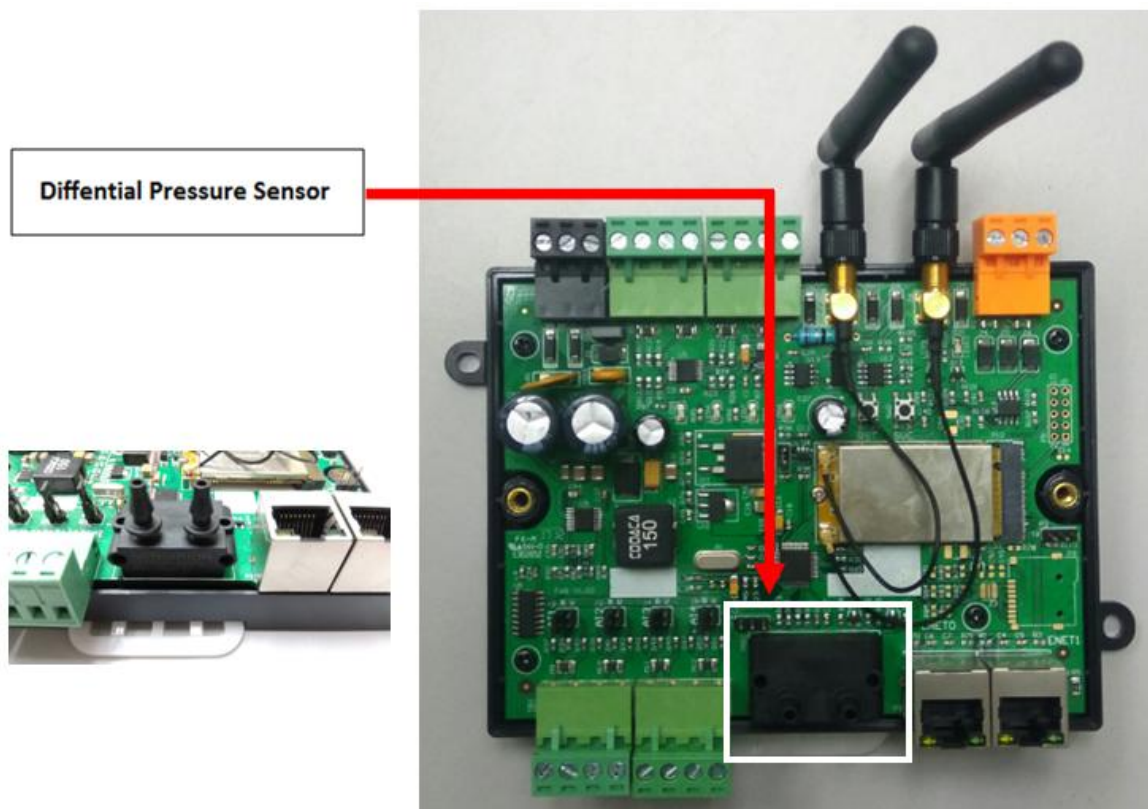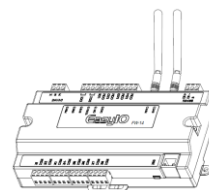
Network and Wireless

EasyIO FW series comes with on board wireless connection and 2 ethernet ports.
The wireless network comply to IEEE 802.11 standards.
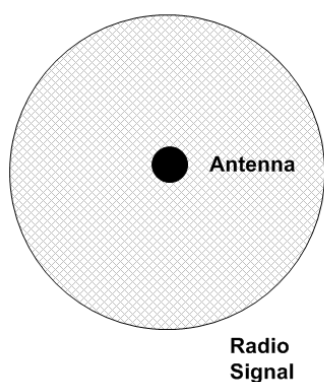It supports IEEE 802.11 B/G/N standard.

Each unit is supplied with two (2) 2dBi RP-SMA female jack antenna.
Antenna supplied are Omni Direction antenna where it emits its radio signal equally in all direction in a single plane.
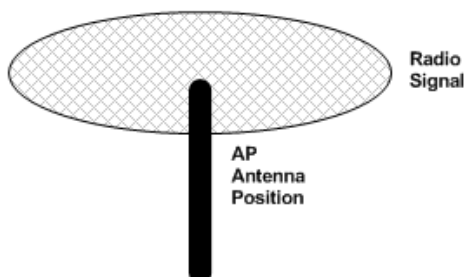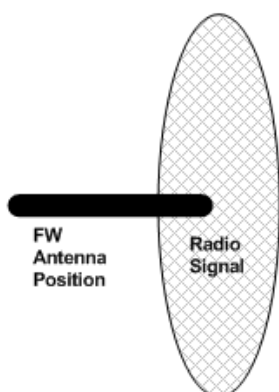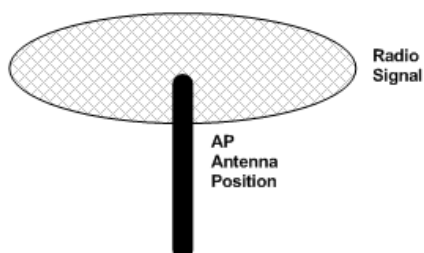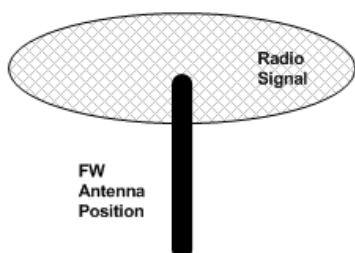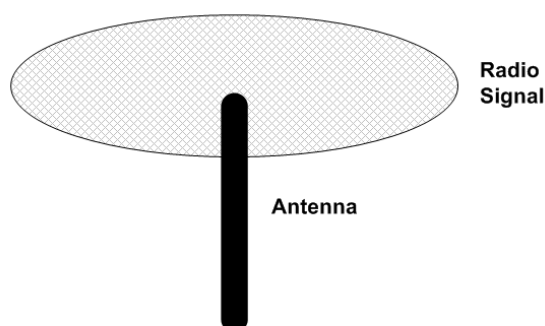Make sure both antennas are used for best performance.
Position the antenna where it in parallel to access point antenna.

FW Series Wi-Fi Access Point name is preset at factory.
Each unit has 2 Wi-Fi Access Point as below.

SSID 1 : FW-xxxx , where xxxx is the last 4 digit of the MAC address 01.
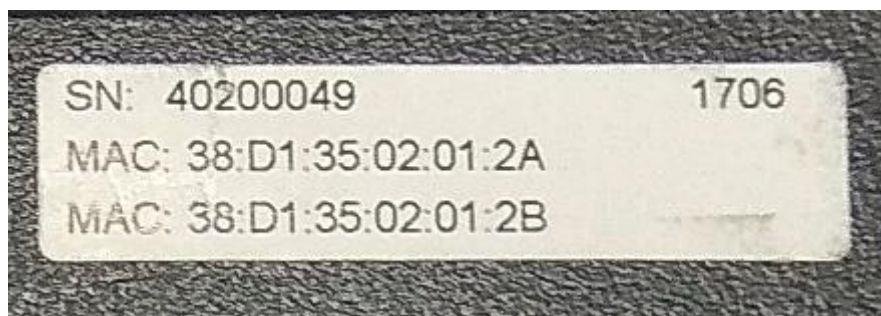SSID 2 : Conf-xxxx , where xxx is the last 4 digit of the MAC address 01 (Hidden by default)

Mac Address label located at the bottom casing top right hand corner of each FW series controller.
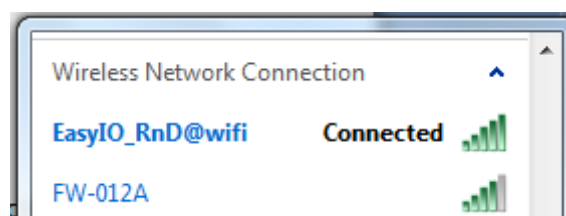The MAC address label is available on the circuit board as well , above the ethernet ports.
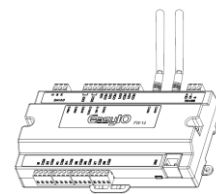Password for both SSID is _12345678._
** Please change the password to secure the connection**

In the example above, the MAC address 1 is *38:D1:35:02:01:2A,* you should to scan the SSID as FW-012A from any Wi-Fi Scanner.

Image below shows a Wi-Fi scanner from a Windows Operating system.

Both SSID *(SSID 1 and SSID 2)* and ethernet ports has a DHCP server built in. If you are connected to the FW series controller via Wi-Fi or Ethernet you will obtain an IP address assign by the DHCP server.

The 2 ethernet ports on board function as a normal unmanaged network switch.
It supports 10/100 Mbps Half Duplex and Full Duplex.
For details explanation and configurations, please refer to EasyIO FW Network Configuration Guide.

Important Note
Supplied antennas are Wi-Fi 2.4Ghz, 2dBi antennas.
DO NOT use any other antenna which are not compatible with 2.4GHz Wi-Fi
In some installation where obstructions exist such as dry wall, concrete wall, air conditioning duct works higher gain antenna is required to maintain its signal reception.
If required higher gain antenna can be purchase from any local computer store.

Antenna extension cable with magnetic base mount can also be used.
Do take note that using or extending the antenna with an antenna extension cable reduce its gain.
Generally for every 5 feet of antenna extension wire run it losses 2dBi.
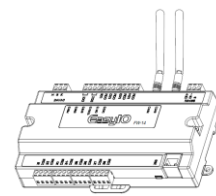**Each dBi lost is equivalent to 20% of transmission power.**

Maintain signal strength 65% and above for Wi-Fi best performance.
Image below shows signal strength of 67%.
This information is available in the "Network Configuration Page" access via the "Utility" menu at the side bar.

Repeater Network :			
Wireless AP :	SSID	▼ Scan Add	
	Password	👁	
	Saved SSID	EasyIO_RnD@wifi (67)	
	Status	Connected	
Clear			

Login Details

EasyIO FW Series default IP address and login details are as below.

Primary Network (Main Wi-Fi SSID and Ethernet)
Default IP address   : 192.168.10.30
Default Subnet   : 255.255.255.0
Default Gateway   : 192.168.10.1

Secondary Network (Conf Wi-Fi SSID)
By this SSID is hidden. This SSID is mainly use for configuration purpose.
Default IP address   : 192.168.14.1
Default Subnet   : 255.255.255.0

Sedona Login via CPT
Username   : admin
Password   : <no password>

Web Browser login (Dashboard)
Username   : admin
Password   : hellocpt

Utility Menu

To access the FW Series Utility menu, connect to the FW series controller using any web browser.

Step 1
In the web browser address bar type in the FW series controller IP address (default is 192.168.10.30).
The IP address of the FW controller solely depend to your connection type.
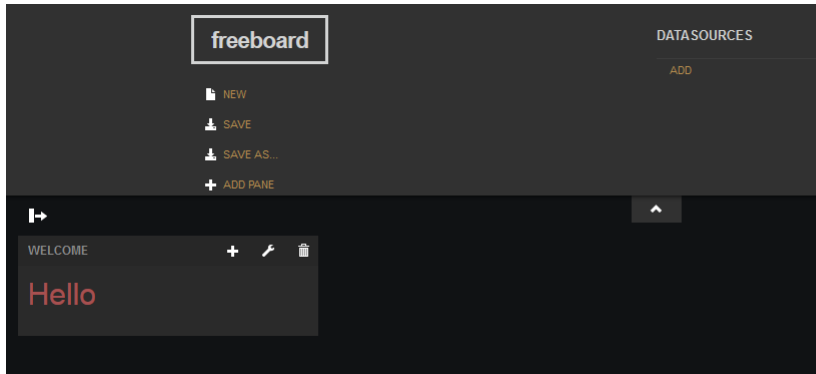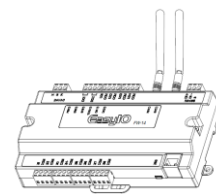In the example below SSID FW-xxxx is used.

Step 2
At the login page, input the username and password.
By default username and password is as below.

Username   : admin
Password   : hellocpt

Step 5
Once login successfully the browser will display the dashboard page.

Step 6

At the dashboard screen, click expand icon, at the bottom left to view the sidebar.
Then select Utility menu, .

Utility menu consist of several configuration for the FW series controller.
The menu are as below.

1. Network Configuration
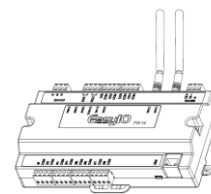2. Date Time Configuration
3. Logo Configuration
4. Network Manager
5. Service Manager
6. Firmware upgrade

In this document we will not discuss "**Network Configuration**", "**Network Manager**" and "**Firmware Upgrade**" as these 3 elements are detail in its own user guide.

Date Time Configuration

This menu is used to perform date and time configuration for the FW controller.
The FW Series controller supports Network Time Protocol (NTP) synchronization.

To change the Date and Time of the controller, go to the DateTime tab.

Click at calendar icon, [📅] and change the date or time or both.
Click save once is complete.

DateTime	NTP

DateTime:	2019-01-07 16:23:23 [📅]
TimeZone:	Asia/Singapore ▼
UTC Offset:	8 hours
UTC Offset Mode:	◯ OS ⦿ Configuration

To enable NTP time sync, go to the NTP tab.
Check the "*enable Network Time Sync*". Change the "*Time Server*" if require.
Modify the "*Update Interval*" if necessary.

Click Sync to perform a force sync and save.

DateTime	NTP

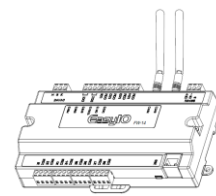|	
	☐ Enable Network Time Sync
Time Server:	time.windows.com
Update Interval:	1 ⬍ Hour
	Sync Save

25

Logo Config

This menu is used to modified the FW Series login screen logo.
The default logo is CPT Tools logo. You can modified the logo to used own custom logo to represent your own organization.

Click into the Logo Config Option.
Upload a logo to the controller by drag and drop into the doted box or simply click within the doted box.
For best performance custom image criteria for custom login logo is that the image resolution ***DO NOT exceed 200kb*** and ***NO larger than 641px * 315px***.

Format supported are *.jpeg, *.png and *.gif as well.

Drop logo image file here
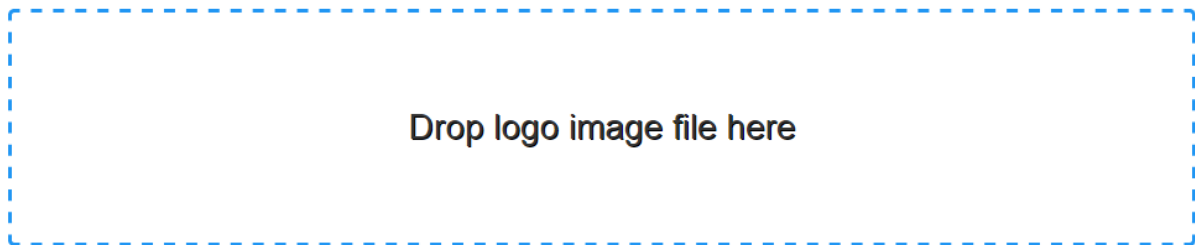
Service Config

This menu is used to create a auth_key to be used with built in FW Series Data exporter.
Refer to FW Series SQL User guide for further details.

EasyIO   DataAPI

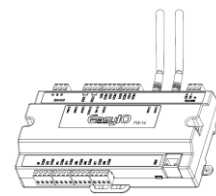**Authentication Key**

Expiry Date   2020-01-07

Note   Note for this AuthKey
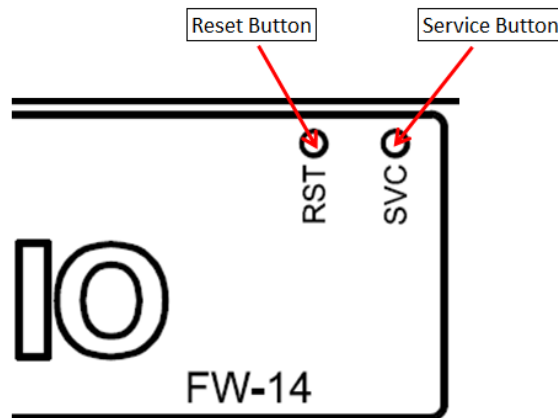
Create

Key   Expiry Date   Note

Buttons and Indications

The controller will do a hardware reset when the Reset Button is pressed whenever manual restart is required.

The Service button is used to activate the built-in boot loader program for software upgrade.
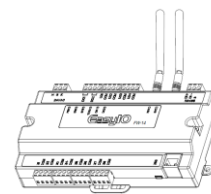
Each digital output has a correspondence LED to indicate its current state.

Image shows the Reset button, Service button and also TXRX indicators.
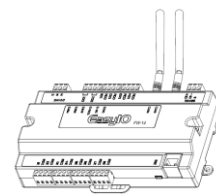*Image shown is an EasyIO FW-14 unit.*

Image shows the Status indicator, Error indicator and individual Digital Output indicator

Button and LED indications. Image shown is an EasyIO FW-14.

		LED Conditions	Description
1	🔴	ERR	Pattern: continuously blinking. ERR is to indicate whenever there is Communication errors between FM-02 module and base board. Pattern: constantly light up. The controller is undergoing firmware upgrading. This is normal during firmware upgrade process.
2	🟢	STS	STS is used to indicate the heartbeat of the Microcontroller. The STS LED will blink at 1-second interval in normal operation Condition.
3	🟡	TX/RX	TXRX is used to indicate when there are Communication activities in Port 1. (Transmitting or Receiving) on the Communication port. If BACnet MS/TP is enable both TX and RX led blinking shows communication is established successfully.

Restore factory settings

This function is done with just the by pressing the "Service" button while the controller is booting up.

A restore to factory settings will do the following;

1. Restore the IP address to the default which is *192.168.10.30*
2. Clear the Sedona application in the Sedona VM back to default (default app is an empty app)
3. A default Sedona apps default login is admin, <no password>.
4. Dashboard files

Follow the steps below to restore to factory settings.

Step 1
Make sure you backup the Sedona apps if you have connection to the EasyIO FW-14.

Step 2
Power down the controller then power up
Within 5 seconds HOLD down the service button (right button) until the Error LED starts to flash fast.
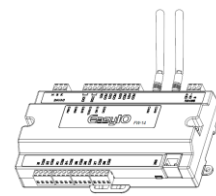This process will take approximately 45 seconds before the error Led start to blink.
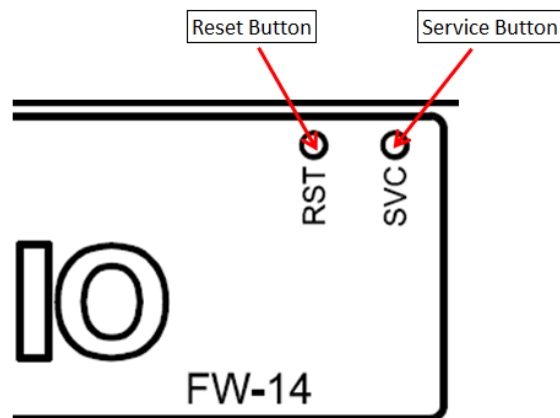
Step 3
Once the Red LED flashes, release the service button.
Now press the service button momentary.
It will restore the FG Series controller to factory default state.

Technical Support

For technical issue, please contact respective region support channel.

Worldwide and Asia Pacific Support   : support@easyio.com
Americas Support   : support@easyio.pro
Europe Support   : support@easyio.eu