spruce

Spruce Controller Gen 2
Instruction Manual

support.spruceirrigation.com

Spruce™ WiFi Smart Irrigation Controller 16
Model Number: PS-SPRWIFI16-01
Contains FCC IDs:
XFF-Z357PA20
COFWMNVM11

PS-SPRWIFI16-01
Designed and assembled in USA.

App guidance is for instructional purposes only and may differ from actual product. Subject to change without notice.

spruceirrigation.com/terms

FCC Compliance Statement
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.
Note: 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 to an outlet on a circuit different from that to which the receiver is connected.
- Consult an experienced radio/TV technician for help.

Changes or modifications to this product not authorized by Plaid Systems could void the electromagnetic compatibility and wireless compliance and negate your authority to operate the product.
Canada Statement
This Class B digital apparatus complies with Canadian ICES-003. This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.


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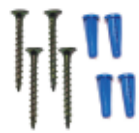
Inside the Box

Spruce Controller

AC Adaptor



Mounting Hardware
4x screws, 4x drywall anchors

Tools Needed

Phillips (+) Screwdriver
Drill & 3/16” drill bit
(if mounting to drywall)

Smartphone, Tablet, or Desktop Computer

2.4GHz Wi-Fi Network and password

Connect Spruce to the Wi-Fi Network

Create a Spruce Account

1. Download the Spruce App (or navigate to the Spruce Web App)

Search for "Spruce Irrigation" in the app marketplace

Navigate to app.spruceirrigation.com in your browser

2. Register for an account and log in

Connect Spruce

3. Remove the cover from the Spruce Controller and plug in the power using the included AC adapter

4. Navigate to the controller connection wizard
    - If this is a new account, the app will automatically direct you to the connection menu. Tap on the Spruce Controller image to continue.
    - If you are adding a second controller, navigate to the Add Devices screen and tap on the Spruce Controller image to continue.

5. Follow the on-screen instructions to complete the connection process.

Physical Installation

Remove the existing controller

1. Before disconnecting any zone wires, test your existing system by toggling all zones and observing proper water flow. This ensures that all valves and wiring are currently operational.

2. Take a picture of the existing wiring. Take note of which zone wires correspond to which zones. Use the table below to record wire color and description, for future reference.

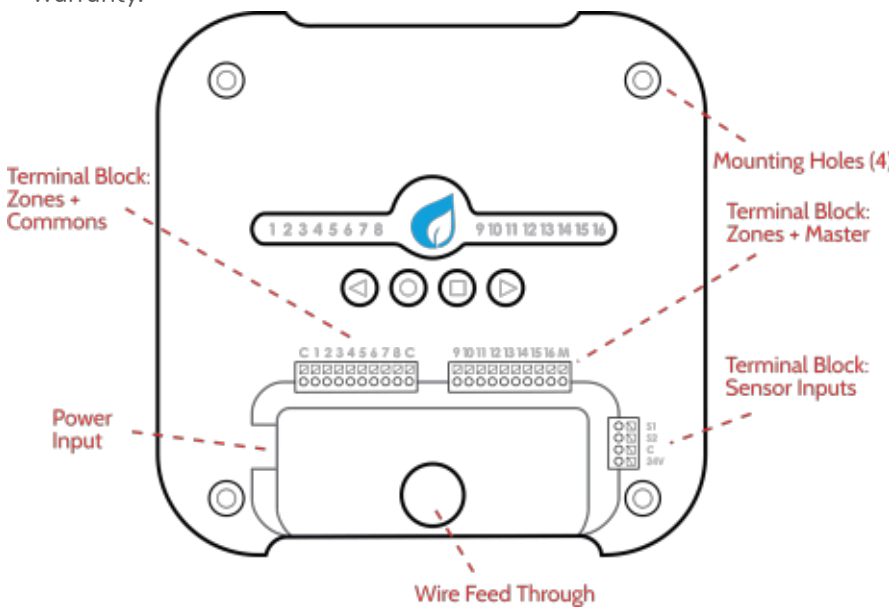
3. Remove all wires from the existing controller.

1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	
8		16	

Physical Installation

Mount Spruce

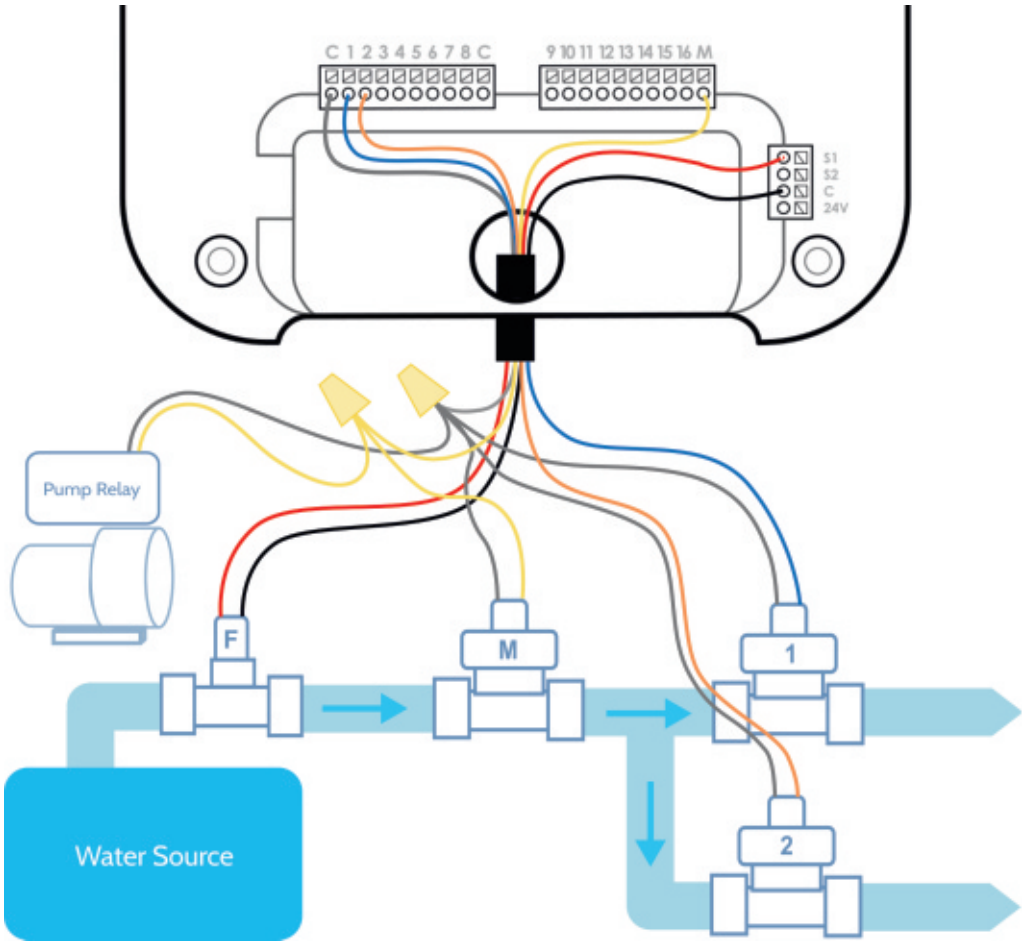
! **Spruce is not weatherproof**. If installing Spruce outdoors, you must mount Spruce in a weatherproof enclosure. Failure to do so will void the warranty.



1. Remove the faceplate from the Controller. If necessary, install drywall anchors: drill holes in alignment with the mounting holes, and insert the provided drywall anchors.

2. Using the screws provided, screw the Spruce Controller Base into the drywall anchors, or directly into bare wood.

Wiring


C 1 2 3 4 5 6 7 8 C
9 10 11 12 13 14 15 16 M
S1
S2
C
24V
Pump Relay
F
M
1
2
Water Source

Wiring

! Power must be supplied to the barrel plug jack using the provided AC adaptor. Power **cannot** be supplied to the 24V terminal on the right terminal block.

Zone Valves (required)

Up to 16 valves can be independently wired and controlled. Each valve will control the water to a specific irrigation zone. The valves must be 24VAC and below 750 milliamps each. Connect each zone wire to the numbered port of your choice. In the sample diagram shown, 2 zone valves exist, and are wired to ports 1 and 2.

Common Wire (required)

The common is a shared wire between all the valves in its wire bundle. Your system may utilize more than one common wire; it is not required to populate all of the common ports. Connect the common wire(s) to either "C" port on the left terminal block. The C ports on the left terminal block must only be used for zone valves, and the C port on the right terminal block must only be used for the S1 and S2 (external sensor) inputs.

Master Valve (optional)

The master valve is installed on the main line, close to the water source. It provides additional insurance that no water is flowing when the valves are off. The master valve opens any time another valve is opened. Connect the master wire to the port labeled "M".

Pump Relay (optional)

Some irrigation systems have the option of drawing water directly from a well, tank, creek or pond, rather than using a municipal source. In these situations, the water must be pumped through the system using a pump relay each time the control box turns on a valve. Pumps require a 24VAC pump relay to switch on the 120/240VAC pump. Connect the pump relay wire to the port labeled "M".

Wiring Other Devices

Flow Meter (optional)

Flow meters or flow sensors are installed on the main line close to the water source. They measure GPM (gallons per minute) to monitor water use and detect leaks. A sample wiring plan is shown in the diagram, but may vary by flow meter manufacturer. Refer to the online support page for more information.

Rain Sensor (optional) (not shown)

Rain sensors are modules that are mounted outdoors, typically on a roof or gutter. Feedback from the rain sensor can be used in schedules to prevent watering if rain is detected. Wired and wireless (which are still wired to the controller, but do not require wire out to the sensor) rain sensors are supported by Spruce. Wiring instructions for rain sensors can vary greatly by manufacturer - refer to the online support page for more information.

Test That Installation Was Successful

Return back to the app to complete the setup wizard for the Spruce Controller. As part of this wizard, the app will step you through each zone and toggle the zones on and off.

While this is happening, check that each zone is watering as expected. If there are any problems, reference the troubleshooting section of this booklet.

Setup is complete!

Connecting Other Devices

Wireless Zigbee devices such as **Spruce Sensors** or **Zigbee Outlets** can be connected to Spruce's Zigbee network. Navigate to the "Add Device" section of the app, select the device you wish to connect, and follow the instructions in the connection wizard.

Wired devices like **flow meters** and **rain sensors** can also be added and configured via connection wizards from the "Add Device" section of the app.

For other third party integrations, such as **SmartThings**, **Amazon Alexa**, **Google Assistant**, and more, refer to the online support page for more information.

Troubleshooting

No Power

- Remove all wires from the right terminal block (S1, S2, C, and 24V terminals). If this resolves the issue, check the support page for additional instruction on wiring for external sensors.

- Remove the common wires from all C terminals. If this resolves the issue, verify that the common and zone wire colors match between the controller and the valves.

Issues Connecting to Wi-Fi

1. Hold down both arrow keys until the indicator flashes rapid blue.

2. Power off the controller by unplugging the power supply, then power back on.

3. Turn off Wi-Fi on your device, wait a few seconds, then turn Wi-Fi back on.

4. Attempt to connect Spruce to Wi-Fi again.
    - After entering the connection wizard, put your smartphone to airplane mode. You may exit airplane mode after credentials are sent to the controller.
    - Verify your Wi-Fi password is correct. The password must be the 2.4GHz password - this may be different than your 5GHz password.

Troubleshooting

Controller is Offline

The Spruce Controller is offline when the LED indicator breathes blue and red. In the event that the controller goes offline:

- Check your Wi-Fi network - see if other devices are properly connected to Wi-Fi.
- Restart your controller by unplugging it and plugging it back in. It should return online immediately after boot up.
- Check the Wi-Fi strength indicator is between 0dB & -65dB

No Zones Turn On

- Check the common wire is installed correctly. Try moving the common wire to a new terminal; normally the issue is the common wire is not fully inserted in the terminal.
- If you have a master valve or pump, check that it is wired correctly, and turning on as expected.
- Ensure that the water main is turned on.

Individual Zone Doesn't Turn On

- Check that the zone wire matches the specific zone; try swapping zone wires and see if the issue moves or changes.
- Check the Spruce App event log for overcurrent message. This would indicate a short or valve drawing too much current. This can also be a result of manually turning on too many valves at once.

App Basics

Manual Zone Control

Zones can be turned on or off instantly via the Spruce App. In the Control section of the app, tap on the zone of interest to toggle a zone on or off.

Alternatively, if a schedule is currently running, the remainder of the schedule can be discontinued from the Control section of the app.

Zones can also be toggled via third party integrations, like Amazon Alexa or Google Assistant. Refer to the Spruce Support online documentation for more details.

Zone Settings

Spruce will ask you to enter various zone settings during controller setup. These settings determine the recommended watering duration, frequency, and cycles. Therefore, it is highly recommended that you enter these settings to the best of your knowledge.

App Basics

Schedules

A schedule is a program that will water one or multiple zones at a user-specified time, on user-specified days. Spruce schedules can accommodate variable day intervals, such as even or odd dates, or at a regular interval (for example, every 3 days). When multiple zones are scheduled to run, the zones will run in serial until all zones are completed.

Cycles

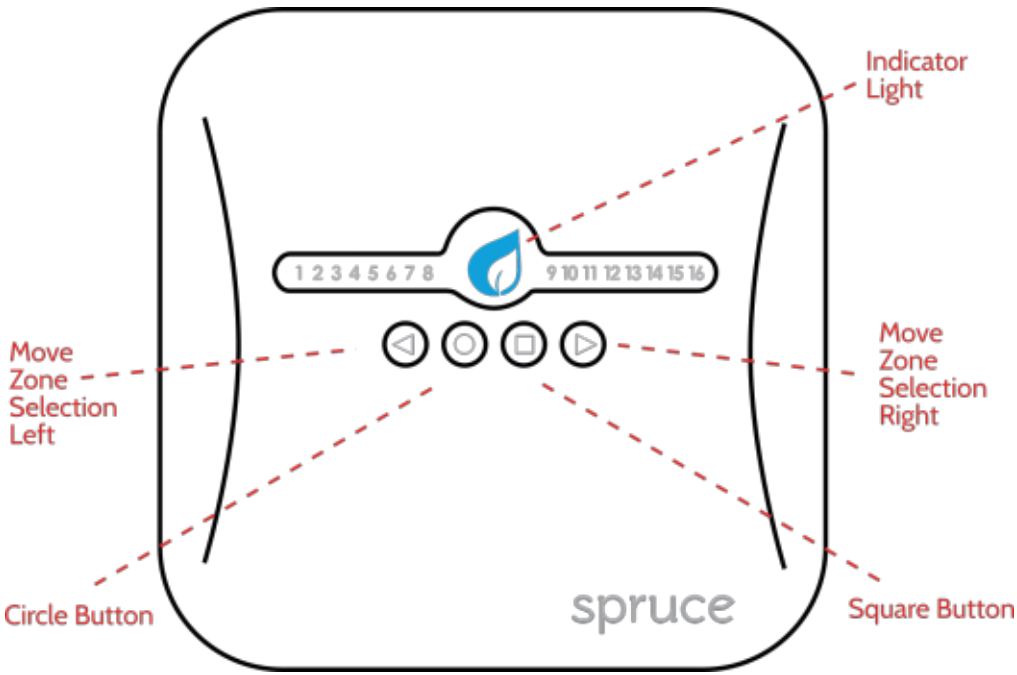
All schedules can set cycles, which break watering for any zone into segments. This gives the soil time to absorb the applied water. In subsequent rounds of watering, the moistened soil allows water to travel even deeper, creating a healthier root system.

Weather Inputs

If set, Spruce can use actual and predicted weather to improve watering efficiency and reduce waste. Various predicted weather metrics (precipitation amount, freezing temperatures, and high wind) can skip watering for the day. As well, Connected Schedules can utilize weather information to calculate daily moisture loss, and schedule watering accordingly.

Interested in more details on various schedule types and options?
Visit
support.spruceirrigation.com
for full documentation.

Buttons Schematic



Manual Control Via Physical Buttons

- Use the left or right arrows to select the desired zone to activate.
- The zone LED will flash blue, indicating that the zone is selected.
- Press the circle button to toggle the zone on or off.
- When the zone is running, its LED indicator will stay solid blue.
- When the zone is flashing blue rapidly, this indicates that the zone is both selected and active

Other Button Functions

Wi-Fi Search Mode

Hold down both arrow buttons for 10 seconds to initiate Wi-Fi search mode. When the LED indicator flashes blue, Spruce is ready to start the connect routine in the App.

Factory Reset

Hold down both arrow buttons for 20 seconds to perform a factory reset. When the factory reset is complete, the LED indicator will rapidly flash blue.

LED Codes

Breathing Light Blue: Normal status. Spruce is connected to the Wi-Fi network, and idle.

Breathing Light Blue with Red Flashes: Controller is disconnected from a WiFi network, but credentials are stored and will reconnect when WiFi is available

Flashing Blue: Spruce is listening for Wi-Fi credentials.

Flashing Red: Controller is looking for devices to join its Zigbee network. When a device is found, the logo will turn blue before going back to the normal status

Breathing Green: Spruce is running a schedule.

Solid Green: A zone is on from a manual toggle; a schedule is not running.

Breathing Purple: Listening for Wi-Fi credentials (flashing blue) has timed out. Unplug and re-plug in the controller to reset this state.

Flashing Purple: The sensor network is being created. This should only happen the first time a sensor is joined and should last for about 10 seconds.

Flashing Yellow: An invalid state. Unplug and re-plug in the controller to reset the controller.

Specifications

Certification	EPA WaterSense®, FCC, IC
Accessibility	Android App, iPhone App, Web App
Valve Terminals	16x Zones, AWG 14-22
Additional Terminals	1x Master / Pump, 2x common
Wired Sensor Ports	2x Rain or Flow Sensor, 24VAC output and common
Connectivity	Wi-Fi 2.GHz 802.11 b/g/n, 802.15.4 (Zigbee HA compatible)
Mesh Specification	802.15.4, 2.4GHz wireless mesh. Connect 16 Spruce Soil Moisture Sensors, also compatible with select Zigbee HA devices.
Valve Detection	Monitors valve current for disconnects or over-current
Installation	Indoors: -5F to 140F; Outdoors: non-condensing enclosure required, not to exceed indoor temperature and humidity specs
Included	1 Amp 120/24VAC 60Hz power adapter, 4x mounting screws & drywall inserts, instruction manual
Dimensions	6.5 x 6.5 x 1.4 in (165 x 165 x 35 mm)
Weight	0.75 lbs (340g)
Warranty	2 Year Limited Warranty