Flux Open Home
Irrigation Controller

User Manual

Version 1.3.0

Made for ESPHome

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1. Overview

The Flux Open Home Irrigation Controller is an ESP32-S3 based smart irrigation system that supports up to 32 zones:

- Zones 1-8: Built-in on the main controller board
- Zones 9-16: Optional Expansion Board 1 (I2C address 0x20)
- Zones 17-24: Optional Expansion Board 2 (I2C address 0x21)
- Zones 25-32: Optional Expansion Board 3 (I2C address 0x22)

The controller integrates with Home Assistant and provides features including scheduled watering, auto-advance through zones, repeat cycles, valve overlap for seamless transitions, and intelligent pump/master valve management.

2. Initial Setup

Wi-Fi Provisioning

The controller supports multiple methods to connect to your Wi-Fi network:

Bluetooth Provisioning (Recommended)

- Open the Home Assistant app on your phone or computer
- Go to Settings → Devices & Services
- The device should appear as a discovered device
- Follow the prompts to enter your Wi-Fi credentials

Captive Portal

- If Bluetooth provisioning is unavailable, the controller creates its own Wi-Fi access point
- Connect to the network named irrigation-controller-XXXXXX (where XXXXXX is part of the MAC address)
- There is no password for the Wi-Fi access point
- A captive portal will open where you can enter your Wi-Fi credentials

USB Serial Provisioning

- Connect the controller to your computer via USB
- Use ESPHome or a serial terminal to configure Wi-Fi

Adding to Home Assistant

Once connected to Wi-Fi, the controller will automatically be discovered by Home Assistant. Accept the integration to add all entities.

3. Status LED Indicators

The controller has an RGB status LED that indicates the current state:

LED Color	Pattern	Meaning
Blue	Pulsing	Booting / Not connected to Wi-Fi
Green	Pulsing	Connected to Wi-Fi

4. Zone Configuration

Enabling/Disabling Zones

Each zone has an "Enable" switch in Home Assistant. Only enabled zones will:

- Run during scheduled irrigation
- Be included when using Auto Advance
- Respond to the Start/Stop/Resume control

Zone Names

Default zone names are "Zone 1" through "Zone 32". These can be customized in the ESPHome configuration by modifying the substitutions.

5. Zone 8 Special Modes

Zone 8 can operate in three different modes, configured via the "Zone 8 Mode" selector in Home Assistant:

Zone Mode (Normal irrigation zone)

- Zone 8 operates as a normal irrigation zone
- Can be enabled, scheduled, and run like any other zone
- No pump/master valve functionality

Master Valve Mode

- Zone 8 relay controls a master valve upstream of all zone valves
- The master valve opens when the first zone starts
- The master valve stays open throughout the entire irrigation cycle
- The master valve closes only after the last zone completes
- Zone 8 is automatically disabled as an irrigation zone in this mode

Pump Start Relay Mode

- Zone 8 relay controls a pump start relay
- The pump starts 2 seconds after the first zone valve opens
- The pump stays running throughout the entire irrigation cycle
- The pump stops only after the last zone completes
- Zone 8 is automatically disabled as an irrigation zone in this mode

Important: When Zone 8 is set to Master Valve or Pump Start Relay mode, it cannot be enabled or run as an irrigation zone. The system automatically prevents this.

6. Valve Overlap & Seamless Zone Transitions

How It Works

When running multiple zones in sequence (via Auto Advance or scheduling), the controller uses valve overlap to ensure smooth transitions between zones. This means:

1. The next zone valve opens 3 seconds BEFORE the current zone valve closes
2. Both valves are briefly open simultaneously during the transition
3. The current zone valve then closes while the next zone continues

Benefits

- Pump protection: The pump only starts once and stops once per irrigation cycle
- Reduced water hammer: Overlapping valves prevent sudden pressure spikes
- Smoother operation: No interruption in water flow between zones
- Energy efficiency: Eliminates pump startup current spikes between zones

Timing Summary

Event	Timing
Zone valve opens	Immediate
Pump/Master valve starts	2 seconds after first zone opens
Next zone opens (overlap)	3 seconds before current zone closes
Current zone closes	After overlap period
Pump/Master valve stops	When last zone closes

7. Manual Switches - Important Safety Information

The controller board includes physical manual switches for each zone relay. These allow you to activate zones without using Home Assistant.

⚠️ **CRITICAL WARNING FOR ZONE 8** ⚠️

If Zone 8 is configured as "Pump Start Relay" or "Master Valve": NEVER activate the Zone 8 manual switch unless at least one other zone switch (Zones 1-7 or expansion zones) is already activated.

Why this matters:

- In Pump Start Relay mode, Zone 8 controls your irrigation pump
- Activating a pump without any zone valves open creates a "dead head" condition
- This can cause rapid pump overheating, motor damage, pipe pressure buildup, and potential fitting damage

Safe operation of manual switches:

4. **First**, activate the zone(s) you want to water (Zones 1-7 or expansion zones)
5. **Wait** for the valve(s) to fully open (2-3 seconds)
6. **Then** (and only if needed) activate Zone 8 manually
7. When finished, **first** deactivate Zone 8
8. **Then** deactivate the zone valves

Note: When operating through Home Assistant or the scheduled system, the controller automatically handles all timing, valve overlap, and pump safety logic.

8. Operating Zones from Home Assistant

Starting a Single Zone

9. Find the zone switch (e.g., "Zone 1") in Home Assistant
10. Turn it on - the zone will run for its configured duration
11. If Zone 8 is configured as Pump Start Relay or Master Valve, it will automatically activate
12. The "Status" text sensor shows which zone is active
13. The "Time Remaining" sensor shows countdown

Start/Stop/Resume Control

The "Start/Stop/Resume" switch provides master control:

- Turn ON: Starts the first enabled zone (or resumes if paused)

- Turn OFF: Stops all irrigation

9. Duration Settings

Each zone has a duration setting that determines how long it runs:

- Entity name: "Zone X Duration"
- Unit: Minutes
- Default: 2 minutes
- Icon: Timer icon

10. Auto Advance Feature

The "Auto Advance" switch controls whether the system automatically moves to the next enabled zone after each zone completes.

With Auto Advance ON:

- Start any zone or use Start/Stop/Resume
- After the zone's duration completes, the next enabled zone starts automatically
- Valve overlap ensures smooth transitions - the next zone opens before the current one closes
- The pump/master valve stays on throughout the entire cycle
- Stops after the last enabled zone completes

With Auto Advance OFF:

- Only the selected zone runs
- System stops after that zone completes
- You must manually start each zone

11. Repeat Cycles

The "Repeat" number entity controls how many complete cycles run through all enabled zones:

- Default: 1 (single pass through all zones)
- Setting it to 2: Runs through all enabled zones twice
- Setting it to 3: Runs through all enabled zones three times

This is useful for sandy soils, slopes where water needs time to absorb, and deep watering applications.

Note: The pump/master valve remains on throughout all repeat cycles, only turning off when the final cycle completes.

12. Scheduling

The controller supports automated scheduling with the following controls:

Schedule Enabled

Master switch to enable/disable all scheduled runs.

Schedule Days

Seven switches to select which days the schedule runs: Monday through Sunday.

Schedule Start Times

Up to four start times can be configured. Enter times in HH:MM format (24-hour). Leave blank to disable that time slot.

How Scheduling Works:

14. Enable "Schedule Enabled"
15. Select the days you want irrigation to run
16. Set one or more start times
17. At the scheduled time, all enabled zones will run in sequence with Auto Advance
18. Valve overlap ensures smooth transitions between zones
19. The pump/master valve (if configured) runs continuously throughout the schedule

13. Expansion Boards

The controller automatically detects expansion boards on startup.

Viewing Detected Zones

The "Detected Zones" text sensor shows the total number of available zones and which expansion boards are connected.

Expansion Board Addresses

Board	Address
Board 1 (Zones 9-16)	I2C address 0x20
Board 2 (Zones 17-24)	I2C address 0x21
Board 3 (Zones 25-32)	I2C address 0x22

Automatic Zone Disabling

If an expansion board is not detected, zones on that board are automatically disabled to prevent errors.

14. Firmware Updates

The controller supports over-the-air (OTA) firmware updates directly from Home Assistant.

Checking for Updates

In Home Assistant, find the "Firmware Update" entity. It will show if an update is available.

Installing Updates

20. Click on the Firmware Update entity
21. Click "Install"
22. Wait for the download and installation to complete
23. The device will automatically reboot with the new firmware

15. Troubleshooting

Device not connecting to Wi-Fi

- Check that the LED is pulsing blue (looking for connection)
- Try the captive portal method - connect to the device's AP
- Verify your Wi-Fi credentials are correct
- Ensure your router supports 2.4GHz (5GHz is not supported)

Zones not running

- Verify the zone is enabled (Enable Zone X switch is ON)
- Check the zone duration is greater than 0
- Verify Zone 8 Mode if zones 1-7 aren't triggering the pump

Pump not starting (Zone 8 as Pump Start Relay)

- Verify Zone 8 Mode is set to "Pump Start Relay"
- Remember there's a 2-second delay before the pump starts
- Check that at least one zone valve is active
- The pump won't start if Zone 8 Mode is set to "Zone"

Pump cycling on/off between zones

This should NOT happen with firmware v1.3.0+. If you experience this:

- Verify you have the latest firmware installed
- Check that Zone 8 Mode is set correctly
- Ensure Auto Advance is enabled for multi-zone runs

Schedule not running

- Verify "Schedule Enabled" is ON
- Check that at least one day is selected
- Verify at least one start time is configured
- Ensure the time in Home Assistant is correct
- Confirm zones are enabled

Expansion board zones not working

- Check the "Detected Zones" sensor
- Verify I2C connections to expansion boards
- Ensure correct I2C addresses (0x20, 0x21, 0x22)

16. Version History

v1.3.0

- NEW: Valve overlap (3 seconds) for seamless zone transitions
- NEW: Integrated pump management via sprinkler component
- IMPROVED: Pump/master valve no longer cycles between zones
- IMPROVED: Simplified internal code for better reliability

v1.2.x

- Initial Made for ESPHome compliant release
- OTA updates via GitHub
- Auto-advance preference memory
- Zone 8 mode selection

Support: https://github.com/FluxOpenHome/IrrigationController

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