

Connected Spa Kit 2

Product description, operation and troubleshooting guide

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Subject to change based on Beta testing and Pilot production feedback

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Revision history

Date	Author	Remarks
04/26/2024	Srujan Sriram	First draft, intended for beta app development
09/12/2024	Srujan Sriram	Integrated changes to Light indicators and Programming mode.
09/12/2024	Mansi Pauskar	Updated LED states for a couple cases. Notes added
10/31/2024	Srujan Sriram	Added Product description, updated Guide name
11/1/2024	Prajas John	Update range, Operating condition, Power adaptor recommendation.
11/1/2024	Jeremy Osborn	Update programing mode options
11/5/2024	Srujan Sriram	Antenna image update and FCC statement
11/22/2024	Srujan Sriram	Updated IC statement and moved Revision history around

What's in the box:

Part.No	Visual	Description
1		IoT modules x2 (antenna included) - Gateway module - Spa module
2		USB A to Type C Cable Used to power the Gateway module.
3.1		RS-422 Communication cable.
3.2		RS-485 Communication cable.

Product description

The Connected Spa Kit 2 solution is a two module system that provides Mobile app based control for hot tubs manufactured by Watkins Wellness. The modules are interchangeable in their roles. One of the modules, termed the Home Network Adapter (HNA) is placed in close proximity to the user's WiFi access point. The other module is a Spa Network Adapter (SNA) and is connected to the Hot tub's Control box, accessible by a trained professional.

Communication/Power

The HNA communicates with the WiFi access point/Internet over WiFi and is powered using a USB-C cable (provided by manufacturer) and a wall outlet adapter (not provided by manufacturer). Recommended to use a 5V USB Type-A power adapter that exceeds 2.5W, includes short circuit, overload, and over-temperature protection, and meets regional safety standards. No other cables are needed.

The SNA communicates with the spa and is also powered using the RS-422/RS-485 cable (provided by manufacturer).

Datasheet

Key features

- Two module system:
 - Home Network Adapter communicates with Home WiFi network.
 - Spa Network Adapter communicates with Spa over the wire.
- Dimensions: 4"(W) X 4-1/8"(L) X 1-1/8"(D)
- Operating conditions: 0C to 60C
- Range: 150' between the modules, with as much direct line-of-sight as possible.

Technical specifications

- Internet requirements:
- Connectivity
 - 802.11 b/g/n wifi connection @ 2.4GHz
 - LoRa with Operating frequencies:
 - 903-927MHz (NA)
 - 915-927 MHz (?) – Covers for Aus/NZ
 - 866.5 MHz – Covers for EU
 - 867 MHz – Covers for EU
 - 869.5 MHz – Covers for EU
 - BLE: Disabled

- Antenna: Sunnyway SWE030 (PN: SW20023EB56)
- LED: One Multi color LED
- Buttons: 2 buttons for operations such as
 - Pairing
 - Accessing Programming modes.
- Power:
 - 5V USB
 - 12V RS-485/RS-422
- Power back up: None
- Audio/Video: None
- Warranty: TBD

FCC 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 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.

IC Compliance CAN ICES-3 (B)/NMB-3(B)

This device complies with Industry Canada's licence-exempt RSSs. 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."

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) l'appareil ne doit pas produire de brouillage;
- 2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure Guidance

In order to comply with FCC / ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 20 cm de séparation du corps humain en tout temps.

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

Purpose

This document goes over the details of how the Watkins IoT solution is to be used. This includes operations such as Pairing, Installation and App control.

This document is for Watkins engineering internal use only. This can be used as a basis for creating customer/technician instructions.

The procedures here are subject to change, based on Beta and field feedback.

Operations

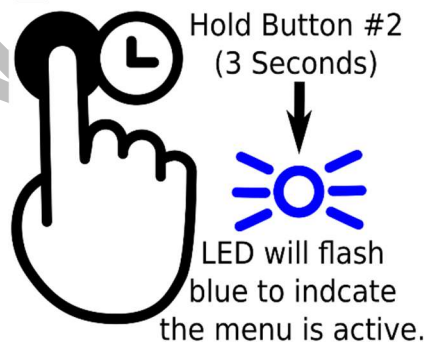
Pairing This sub-section is intended factory only, and not for customers or field technicians.

Programming mode

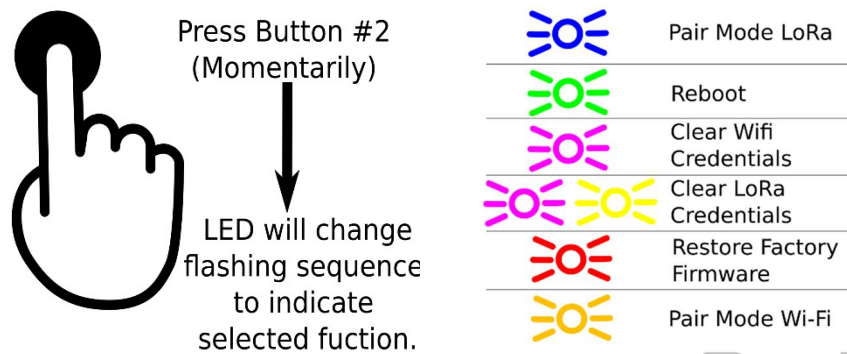
This mode presents a “menu” to perform several operations. This menu uses the limited user feedback of the LED to indicate which operation is selected and if an operation is active.

Programming mode usage

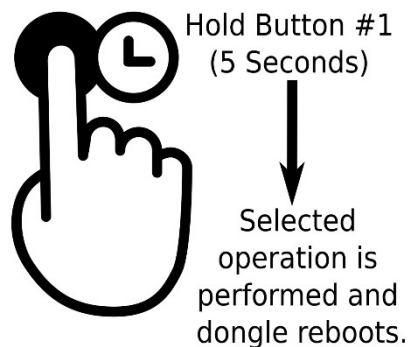
- 1) To enter the Programming mode: hold button#2 down for 3 seconds. The status LED shall turn blue and flash at 1 Hz indicating that the “Pairing Mode” operation is selected.



- 2) To select a different operation, button#2 may be pressed for a moment. The LED will change to the corresponding selection color and flash rate.



- 3) To activate the currently selected operation, button#1 may be pressed for 5 seconds.



The operations are listed below along with their corresponding LED indication.

Operation	Operation Description	LED Selection Color (This color indicates current selection within programming menu. Once selected, Dongle will transition to chose state and LED will update accordingly to Light Indicators table below)
Pairing Mode via 915 MHz LoRa Radio	This process will search for a second dongle in pairing mode and log its ID, designating it as the paired device using the LoRa radio. Press and hold button #1 for 5 seconds to begin the pairing sequence. During this sequence, the LED will flash yellow and blue to indicate active pairing. Upon successful	Menu Selection: Flashing Blue (1 Hz) Active Operation: Flashing Yellow/Blue (1Hz)

	completion, both modules will automatically reboot.	
Reboot	This operation will reboot the dongle's firmware. Press and hold button #1 for 5 seconds to begin the reboot sequence.	Flashing Green (1 Hz)
Clear Wi-Fi Credentials	This operation will clear the dongle's Wi-Fi credentials including the network name, SSID, and password. To start the sequence, press and hold button #1 for 5 seconds to initiate the clearing sequence. The dongle will automatically reboot once the credentials have been removed.	Flashing Magenta (1 Hz)
Clear Custom LoRa parameters.	This operation will be removed in production. It is used to clear custom configurations pertaining to LoRa configurations. It is a development operation and not intended to be used by a technician. To start the sequence, press and hold button #1 for 5 seconds to initiate the clearing sequence. The dongle will automatically reboot once the LoRa parameters have been removed.	Flashing Magenta/Yellow (1 Hz)
Reset to Factory Firmware	This operation will remove all OTA updates and revert to the factory firmware. It does not erase pair data or Wi-Fi information. To start the sequence, press and hold button #1 for 5 seconds to initiate the clearing sequence. The dongle will automatically reboot once the firmware has been reverted.	Flashing Red(10 Hz)
Pair via 2.4 GHz Wi-Fi Radio	This process will search for a second dongle in pairing mode and log its ID, designating it as the paired device using the Wi-Fi radio. Press and hold button #1 for 5 seconds to begin the pairing sequence. During this sequence, the LED will flash yellow and blue to indicate active pairing. Upon successful	Flashing Orange (1 Hz) Active Operation: Flashing Yellow/Blue (1Hz)

	completion, both modules will automatically reboot.	
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Modules never paired before

When powered up, modules that have never been paired will be *fast blinking yellow*.

1. On both the modules you wish to pair, press button#1 for 3 seconds. This will put the modules into Programming mode.
2. Press button#2 on both the modules for 5 seconds.
3. Allow a few seconds for pairing to complete and lights to *slow blink yellow*.

Modules already paired before

1. Pick a module, press button#1 for 3 seconds. This will put the module into Programming mode.
2. Press button#2 for 5 seconds. At this point, this module will begin searching for a pair and will *fast blink Yellow*
3. The second module discovers that it has lost its pair and will *slow blink Red*.
4. On second module, perform same operation. That is:
 - a. Press button#1 for 3 seconds to kick it into Programing mode
 - b. Press button#2 for 5 seconds.
5. At this point, both modules are unpaired and *fast blinking yellow*.
6. Now follow the previous procedure to pair modules that have never been paired before.

Installation

1. Download Hotspring/Caldera app on your mobile phone from your Apple app store or Android Marketplace. Register yourself as a user.
2. Determine the Watkins spa control box variant you have, either by Watkins part number OR visual inspection as below:
 - a. If there is an IoT port, then this is a new IoT optimized Control box
 - b. Otherwise, this is a legacy Control box
3. Gateway module setup:
 - a. Choose any IoT module, connect USB cable (#2) to its USB Type C port, to power it up. You should see the Light come up *Cyan*, followed by *fast blinking Yellow* (refer LED Color table below). At this time, it is waiting to find its pair.
4. Spa module setup:
 - a. On the other IoT module, based on the Watkins spa control box variant, use a paper clip pin to manually set the DIP switch at the back of the IoT module

- b. Power down the spa
 - c. Connect module to the suitable port (Bus extension board OR IoT port) on the control box.
 - d. Power up the spa. You should see either module come up *Cyan*, followed soon by *slow blinking Yellow*. This means the two devices are paired.
5. At this point, your Gateway module is publishing a WiFi network, with a name that follows the pattern – **Watkins_<some hexadecimal code>**
6. On the mobile app, if you have registered as a user, you can Add spa and your app will guide you through the rest of the process. Below is a brief summary of this process:
 - a. On your phone's WiFi settings, connect to the above WiFi network published by the spa (i.e., Watkins_<some hexadecimal code>)
 - b. Go back to the app.
 - c. Your app will now ask you to specify your WiFi credentials.
 - d. Once specified and you click Connect:
 - i. Your IoT modules' light indicator will turn Solid green
 - ii. Your app will progress along to show your spa information.

Your spa is now ready for control over the internet!

Troubleshooting

Power up both the modules by connecting to a Wall outlet through a USB cable (#2, only one provided). You should see the light indicators come up *Cyan*, followed by *slow blinking Yellow* (once per second). This means the two devices are paired.

Other Specifications / Notes

The Watkins IoT solution is a 2 module system designed to enable you to control your spa remotely. Both modules are pre-paired at factory.

The first module is to be placed near your home WiFi router, so it can communicate using WiFi protocol. It is powered through USB cable (provided) connectable to a standard wall outlet through a USB wall charger (not provided). Once onboarded, this module is best left alone until you need to reorganize or change your home WiFi settings. The second module is identical in build to the first one and is designed to be hardwired to a Watkins control box using either an *RS-485 cable(PN?)* or an *RS-422 cable(PN?)*, depending on if your control box is a legacy build or an IoT optimized build respectively. Both cables are provided in the box. The first module is intended to be a hop-off point between the home WiFi router and the second module.

Below are some key *specifications* and *features*, pertinent to the user:

Range

150 feet between both the modules. Ideally, with as much direct line of sight as possible. Connectivity can be expected to be degraded when the modules are separated by dense materials such as concrete and metal.

Power loss

Not handled

Light indicators

When placed in normal position, a Smart LED glows in different colors and patterns to indicate the following information. Both HNA and SNA will show the same status if paired and communicating.

LED Color	Meaning
Off (No Color)	No Power
Slow Flashing White	Startup sequence, determining if and how
Solid Blue	Powered ON. Unpaired and not connected to spa
Fast Flashing Yellow	Searching for a pair or if pair communication is lost. (3 Hz)
Fast Yellow/Blue	Paring mode, searching for a new pair. (3 Hz)
Fast Flashing Yellow/Orange	Paired but not connected to a spa and no internet connection. Waiting to be connected to spa. (3Hz).
Solid Yellow	Paired and not connected to a spa. WiFi not configured yet.
Flashing Green	Paired and connected to a spa. WiFi not configured yet
Solid Green	ALL CLEAR! Paired and connected to a spa and the Internet (MQTT broker)
Fast Flashing Red	Error, lost connection with spa, or both dongles connected to a spa. (3 Hz)
Solid Red	Lost connection with the Internet (MQTT broker). WiFi credentials provided, but unable to connect.
Solid Cyan	Connected to spa without being paired. The dongle should be able to be configured into solo spa mode. This mode shall not be documented in the user manual as connected to the spa without pairing and the dongle should be paired.
Slow Flashing Blue	Programming mode (1 Hz)

Solid Orange	This mode indicates that neither module is connected to a spa, however they are paired and connected to the internet. This mode is for testing purposes only. (HNA-HNA configuration) - (Not currently implemented – may not need this)
Slow Flashing Orange	This mode indicates that both modules are connected to a spa, and they are paired and connected to the internet. This is an invalid configuration and is not supported. May be used for engineering purposes. Not to be included in user documentation. (Not currently implemented – may not need this)

Table: LED Colors and meanings

Note: 1 Hz Flashing means that the light blinks once per second.

OTA updates

The software on the modules can be updated over the air. The Spa control software is not updatable over the air.

Software update can be expected to take several minutes, and the below sequence can be expected:

1. Acknowledgement on the mobile app to perform firmware update.
2. Software update occurs during spa downtime (example: midnight)
3. Once completed, user is notified of a successful software update and this version is available on the app as well as the Spa control panel for review later.

Troubleshooting