

## Remote controlled lay-z-spas



photo cred: davidmardanielsson



photo cred: jarisiv

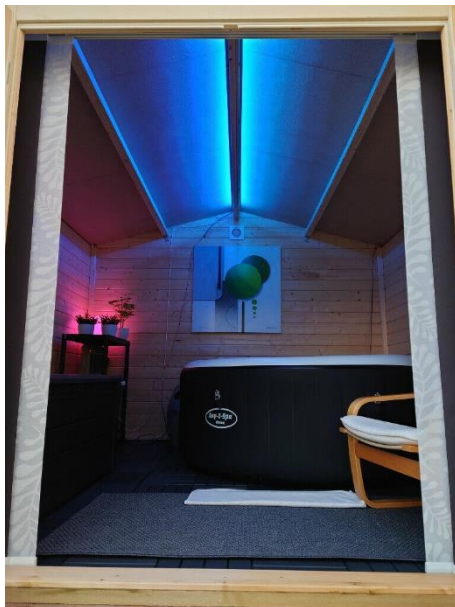


photo cred: torei

## How to build the Wi-Fi remote for Bestway Lay-Z-Spa

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## 1) Checking compatibility

Table of models (not exhaustive)

<i>Alias examples These names can be sold with other pump models than listed here!</i>	Model Number	Pump specs	Wires	Supported or #define model most likely to work
<i>Riviera</i>	12220	Eggshape	?	?
<i>Monaco</i>	54113	Eggshape	?	?
<i>Vegas</i>	54122	Eggshape	6	?
<i>Miami</i>	54123	Eggshape	6/4	Yes/Yes
<i>Palm Springs</i>	54129	Eggshape	4	NO54154
<i>Hawaii/Hydrojet</i>	54138	Square	4	NO54138*
<i>Palm Springs/Hydrojet</i>	54144	Square	?	Probably
<i>Paris</i>	54148	Eggshape	?	?
<i>Hawaii</i>	54154	Eggshape	6	Yes
<i>Siena</i>	54156	Eggshape	4	?
<i>2019 Maldives/Hydrojets</i>	54173	Square	4	Yes*
<i>Honolulu</i>	54174	Eggshape	6	?
<i>St. Moritz</i>	54175	Eggshape	6	Yes
<i>Bali</i>	54183	Eggshape	6	Yes
<i>Milan</i>	54184	Eggshape	?	?
<i>Tahiti</i>	54186	Eggshape	6	Yes
<i>Helsinki</i>	54189	Eggshape	6	PRE2021
<i>Cancun</i>	54286	Eggshape	?	?
<i>Ibiza</i>	54291	Eggshape	?	?
<i>Havana</i>	54298	Eggshape	?	?
	54327		6	Yes
<i>2021 Miami</i>	S100102	Square 2021	6	MIAMI2021**
<i>2021 Bali</i>		Square 2021	6	Yes**
<i>2021 Maldives/Hydrojets</i>		Square 2021	6	MALDIVES2021**
<i>Vegas</i>	54112	?	4	
<i>Coleman SaluSpa</i>	13804 ?	Eggshape	6	PRE2021
<i>St. Lucia</i>	S100101	Square 2021	6	Yes
<i>Helsinki</i>	S100103		6	Yes
<i>SaluSpa Honolulu</i>	S100104	Square 2021	6	Yes
<i>Coleman SaluSpa Cali</i>	90437E	Eggshape	6	Yes
<i>Bestway Paris</i>	54149E		6	NO54149E***

\*Some 4-wire models are reported to get communication error messages. Some due to poor power supply, some suspected to be caused by something else (no conclusions yet)

\*\* Might need 560 Ohms resistors between LLC and display (CLK, DATA, CS), as reported by cyberfly79.

\*\*\* May show sporadic button presses. Need to uncomment the define statement in config.h

### Open the pump to verify number of wires

Unscrew the 6 screws as the picture shows, and carefully lift the display. It is attached with a cable with a connector on it. Check if there are 6 or 4 wires/pins. Other models can be disassembled in a similar manner. On the older Hydrojets you must remove the whole cover, not the display. That pump is heavy and fiddlier to disassemble on your own.




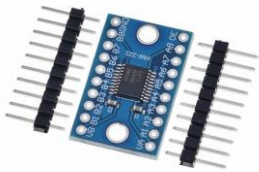

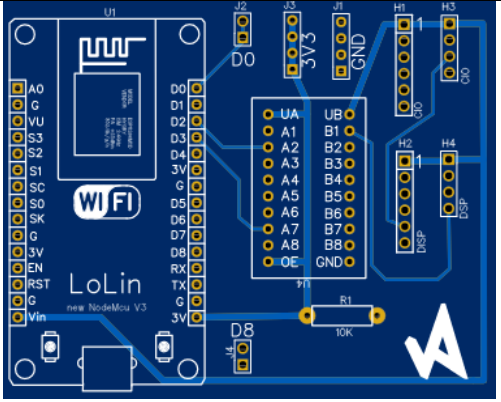
Example – eggshaped 6-wire pump



2021 square model

## 2) Hardware

### BOM

<p>ESP8266 NodeMCU 1.0 (12E) V3 (V3 is wider than V2) (NOT ESP32)</p>	
<p>8 channel bidirectional level converter TXS0108E (NOT TXB...)</p>	
<p>6 or 4 pin male/female pair cable 0.1" spacing: JST SM Housing Connector <a href="http://www.wish.com">www.wish.com</a></p>	<p>6 Pin</p> 
<p>PCB <a href="https://oshwlab.com/Visualapproach/bestway-wifi-controller">https://oshwlab.com/Visualapproach/bestway-wifi-controller</a> <a href="https://easyeda.com/Visualapproach/bestway-wifi-controller">https://easyeda.com/Visualapproach/bestway-wifi-controller</a> To order, scroll down to the PCB layout, click open in editor. Then go to Fabrication/download gerber files. <i>(I don't get % on your order. You pay same \$ as I did)</i> <i>Don't expect assembled unit by using the auto-BOM. Source parts yourself.</i></p>	
<p>Resistor, 10K Ohms, through hole</p>	<p>Optional For power-on stability. I run without it and it works fine.</p>
<p>Female header pins (0.1")</p>	<p>Optional but highly recommended! Make sockets for the ESP and LLC. Removing a broken part is very time consuming if soldered directly to the PCB.</p>

## Build

Solder the 6-wire cables to the PCB (H1, H2):



For the 4-wire version, use the 4-wire cables and solder to the two 4-holes section (H3, H4).

4-wire pinout on my test pump NO54138 (Colors and pinout on your pump may differ!):

- |                              |          |
|------------------------------|----------|
| 1 (Uppermost. Black on pump) | = 5V     |
| 2 (Red on pump)              | = GND    |
| 3 (Yellow on pump)           | = DSP TX |
| 4 (Green on pump)            | = CIO TX |

Solder the 10 K resistor.

You can go on and solder the LLC and ESP8266 directly to the PCB, but I recommend using female headers. In case you want to switch or reuse them.

D0, D8, 3V3 and GND is left empty. They are there for the possibility to connect auxiliary equipment.

Put the PCB in a box, plastic bag or something to protect against water if you want.

Don't connect the connectors to the pump yet.



### 3) Software

6-wire and 4-wire versions

DL and install Visual studio code: <https://code.visualstudio.com/download>

From within VSC, click on Extensions icon (ctrl+shift+X). Select PlatformIO IDE and install.

From the new platformio icon, open folder “6-wire-version” or “4-wire-version”.

Choose your model in the file “**model.h**”. Only one model may be defined. Double slashes ‘//’ means the line is commented out. To change model, comment out PRE2021 by putting // in front of that line. Remove the ‘//’ from your model.

```
//uncomment your model and comment out the rest
//#define MODEL54149E //Paris airjet 54149E
#define PRE2021 //the older one, no hydrojets
//#define MIAMI2021 //no hydrojets
//#define MALDIVES2021 //hydrojets
```

Upload sketch via USB\*. (Right arrow at bottom of screen)

Upload LittleFS Data or you will get a 404! Click platformio icon, go to PROJECT TASKS > nodemcu2 > Platform and build filesystem image, then upload filesystem image.

An Access Point is created called "Auto portal".

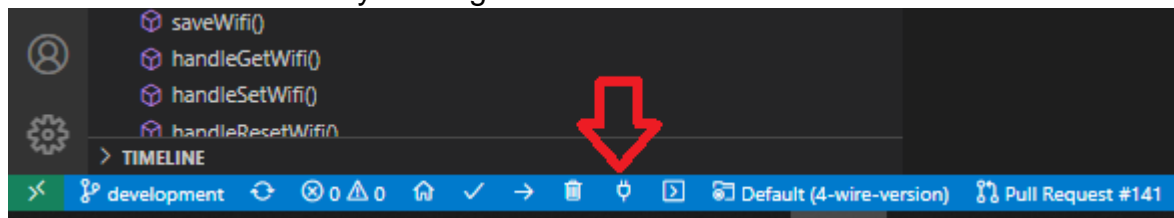
Log in and enter your wifi credentials.

Visit IP/ and click on the hamburger menu in the top right corner.

Select “SPA config”. Enter your settings, click SAVE.

The device’s IP is shown in the serial monitor window and the pump display (only 6-wire).

Start the serial monitor by clicking here:



From now on you can update the device over the air (OTA) by editing platformio.ini file.

<https://github.com/visualapproach/WiFi-remote-for-Bestway-Lay-Z-SPA>

Last edited 2022-04-25 20:20

Default setting is to upload via USB cable:

```
upload_protocol = esptool  
; upload_protocol = espota  
; upload_port = 192.168.4.121  
; upload_flags =  
; --auth=esp8266
```

Edit like this to upload Over The Air. You need to enter your own IP address to the device.

```
; upload_protocol = esptool  
upload_protocol = espota  
upload_port = 192.168.4.121  
upload_flags =  
  --auth=esp8266
```



Old Arduino instructions.

You can still use Arduino IDE if you like, but you have to rename “main.cpp” to the parent folder’s name.ino and move the lib/BWC files to the same folder.

Arduino IDE <https://www.arduino.cc/>

[LittleFS upload tool](#)

From Arduino library manager, install

ArduinoJSON (Benoit Blanchon)

ESPDateTime <https://github.com/mcxiaoke/ESPDateTime>

WebSockets <https://github.com/Links2004/arduinoWebSockets>

WiFiManager <https://github.com/tzapu/WiFiManager>

LittleFS <https://arduino-esp8266.readthedocs.io/en/latest/filesystem.html#uploading-files-to-file-system>

PubSubClient <https://github.com/knolleary/pubsubclient>

Select the right board (NodeMCU12E), and set "FS 2MB/OTA 1MB", speed 80 MHz. select correct COM port.

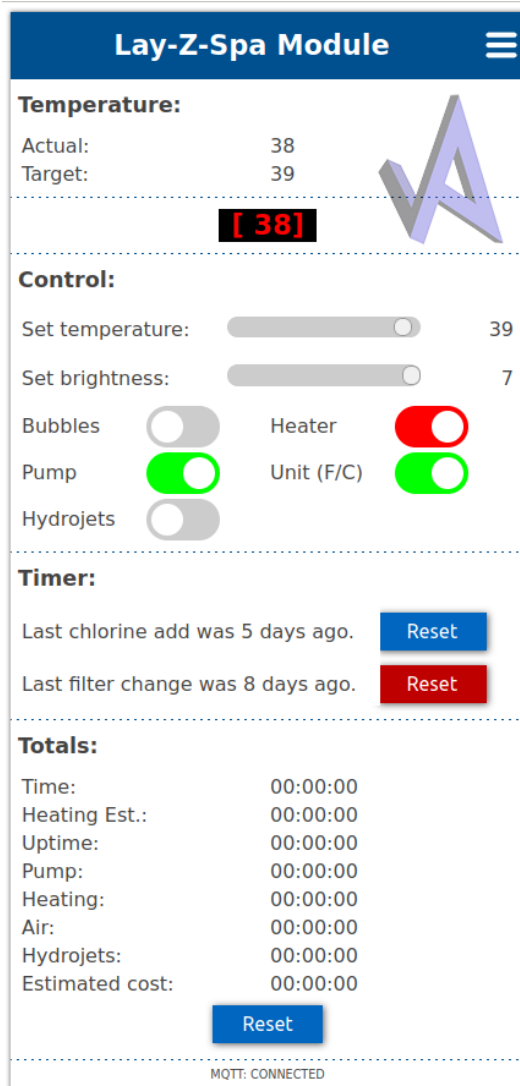
OTA:

Password “esp8266”

selecting the new IP instead of the COM port. You need to restart Arduino IDE for this to show up.

If it does not work – use platformio and/or google

## 4) Web interface



**Lay-Z-Spa Module**

**Temperature:**  
 Actual: 38  
 Target: 39  
 [ 38 ]

**Control:**  
 Set temperature: 39  
 Set brightness: 7  
 Bubbles: ☐ Heater: ☒  
 Pump: ☒ Unit (F/C): ☒  
 Hydrojets: ☐

**Timer:**  
 Last chlorine add was 5 days ago. **Reset**  
 Last filter change was 8 days ago. **Reset**

**Totals:**  
 Time: 00:00:00  
 Heating Est.: 00:00:00  
 Uptime: 00:00:00  
 Pump: 00:00:00  
 Heating: 00:00:00  
 Air: 00:00:00  
 Hydrojets: 00:00:00  
 Estimated cost: 00:00:00  
**Reset**

MQTT: CONNECTED

Main page (/index.html)

Main page shows information about the spa, like temperature, and elapsed time since last filter change, chlorine added and how long the pump has been running etc.

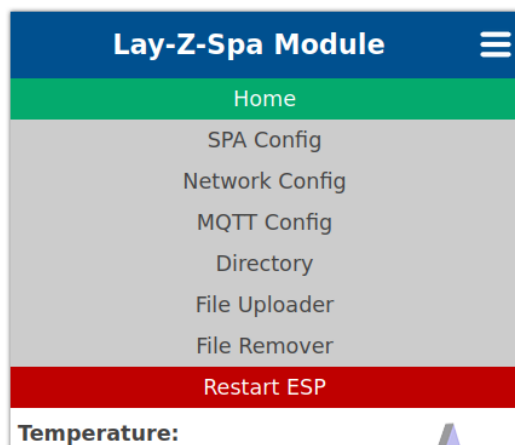
There is a slider to adjust the display brightness on the pump.

Press [Reset] restart the timer. These buttons will turn red when overdue.

Pressing the [Reset] button will reset the Totals times.

*There is also a TTTT field in the latest version, that shows estimated time to target temperature. Negative values means time since diverting from target temperature.*

MQTT status



**Lay-Z-Spa Module**

- Home
- SPA Config
- Network Config
- MQTT Config
- Directory
- File Uploader
- File Remover
- Restart ESP

**Temperature:**

Clicking the menu button reveals other actions and pages.

Author: @torei

[Restart ESP] restarts the ESP 8266. Just in case you want to hear that lovely melody and read the greeting on the display again.

### SPA Config

Price per kWh:

Chlorine add (Interval):

Filter change (Interval):

Audio: ☐

Startup behaviour:

**save**

---

Command:

Value:

Execute time:

Repeat interval:  seconds  
(0=once, 1h=3600, 1d=86400, 1w=604800)

**add command**

---

**Command queue**

**clear queue**

Last boot: 1.1.2022, 00:00:00 External System

Schedule up to 10 actions. E.g. set target temp to 38, and turn on heater every Thursday and turn off pump every Sunday.

### Network Config

**Access Point:**

Enable specific AP: ☒

SSID:

Password:

---

**Static IP:**

Enable static IP: ☐

IP Address:  .  .  .

Gateway IP Address:  .  .  .

Subnet Mask:  .  .  .

DNS Server (primary):  .  .  .

DNS Server (secondary):  .  .  .

**save**

---

**Reset WiFi Config:**

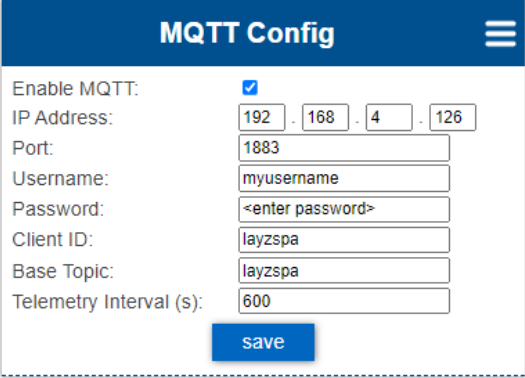
This button resets the access point settings. The ESP will restart and start the "WiFi Configuration Manager". Connect to it's access point and configure your WiFi (just like the first configuration).

**Reset WiFi**

If you want to connect to another AP than you selected in the autoportal.

Advanced network settings.

Forget saved WiFi credentials.

The image shows a web-based configuration interface titled "MQTT Config". It has a blue header bar with the title and a hamburger menu icon. Below the header, there are several configuration fields: "Enable MQTT:" with a checked checkbox, "IP Address:" with four input boxes containing "192", "168", "4", and "126", "Port:" with an input box containing "1883", "Username:" with an input box containing "myusername", "Password:" with an input box containing "<enter password>", "Client ID:" with an input box containing "layzspa", "Base Topic:" with an input box containing "layzspa", and "Telemetry Interval (s):" with an input box containing "600". At the bottom of the form is a blue "save" button.

**MQTT Config**

Enable MQTT: ☒

IP Address:  .  .  .

Port:

Username:

Password:

Client ID:

Base Topic:

Telemetry Interval (s):

**save**

Enter your MQTT broker IP and credentials.

Telemetry interval is how often messages are sent if no changes occur.

## 5) Connect

Unplug pump from mains!  
Connect device to pump.  
Close the display with the screws.  
Turn on pump and enjoy.

## 6) Passwords and credentials

Take a look in the file config.h

## 7) MQTT

This chapter is for advanced users. If you know what MQTT is, and have an MQTT broker, this is what you need to know:

There is two ways to enter your credentials. You can edit the “config.h” file before compiling and then you are done with it. Or you can go to the web interface and click on the MQTT link. If you save from the MQTT web page it will override config.h.

Device is publishing following topics:

**layzspa/Status**

**layzspa/MAC\_Address**

**layzspa/MQTT\_Connect\_Count**

**layzspa/message**

**layzspa/button**

**layzspa/times**

Device is subscribing to topic **layzspa/command**

Payload in **message** is a JSON string with these key/value pairs:

KEY	VALUE
CONTENT	STATES (only used in websockets)
LCK	LOCKEDSTATE
PWR	POWERSTATE
UNT	UNITSTATE (0=F, 1=C)
AIR	BUBBLESSTATE
GRN	HEATGRNSTATE
RED	HEATREDSTATE
FLT	PUMPSTATE
TGT	TARGET TEMP
TMP	TEMPERATURE
CH1	CHAR1 DISPLAY'S FIRST CHARACTER ASCII code
CH2	CHAR2
CH3	CHAR3
JET	JETSSTATE
ERR	ERROR (Only 4 wire)
GOD	GODMODE (ESP have control) (Only 4 wire)

Payload in **command** must be a JSON string with these key/value pairs:

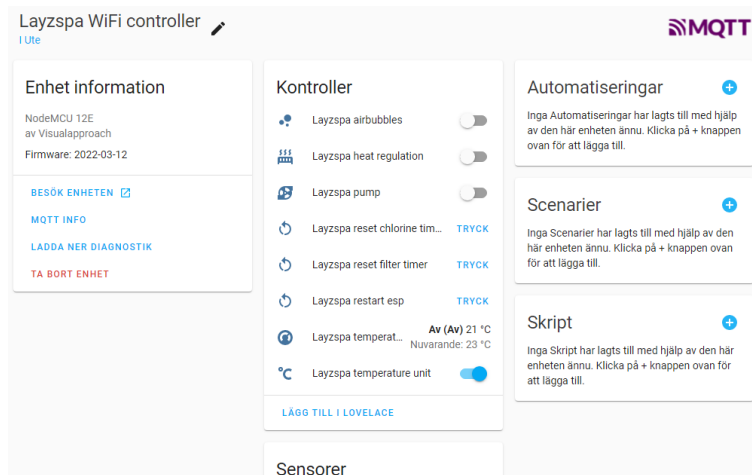
KEY	VALUE
CMD	INTEGER, see next table
VALUE	MIXED
XTIME	INTEGER, Execution time in UNIX TIMESTAMP or 0 for immediate action
INTERVAL	INTEGER, Repeat every Nth second INTEGER or 0 for NO REPEAT

Available commands (CMD) are

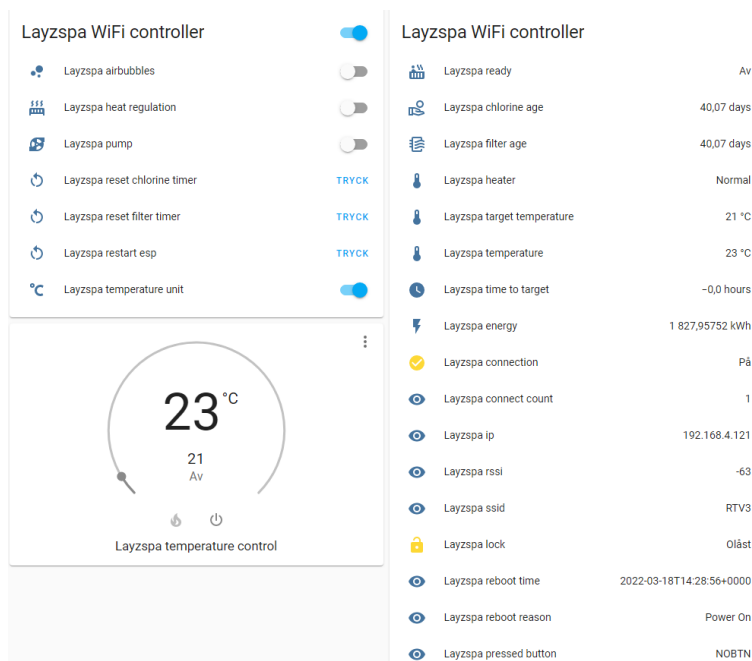
0	SETTARGET
1	SETUNIT
2	SETBUBBLES
3	SETHEATER
4	SETPUMP
5	RESETQ (clear command queue)
6	REBOOTESP
7	<i>GETTARGET (internal use)</i>
8	RESETTIMES
9	RESETCLTIMER
10	RESETFTIMER
11	SETJETS (only some models)
12	TAKECONTROL (only 4-wire)  SETBRIGHTNESS (only 6-wire, set display brightness 0-7)

## 8) Homeassistant

From firmware version 2022-03-13 this device will register in HA by auto discovery when you connect to your MQTT broker. Go to configuration – devices – Layzspa WiFi controller and click on “add to lovelace”.



Lovelace panels:



The climate control and temperature sensors has its own unit conversion according to your general settings in HA. Switching unit only changes the pump display and the actual numbers sent over MQTT, but the lovelace translates to your preferred unit. After changing HA general unit you have to restart HA.

If you update firmware and get double entities, remove the device from HA interface and restart HA.

## 9) FAQ

<https://github.com/visualapproach/WiFi-remote-for-Bestway-Lay-Z-SPA/discussions>

<https://github.com/visualapproach/WiFi-remote-for-Bestway-Lay-Z-SPA>

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**10) If you like this project, please consider a donation:**

[PayPal.me/TLandahl](https://www.paypal.me/TLandahl)