Remote controlled lay-z-spas

photo cred: davidmardanielsson

photo cred: jarisiv
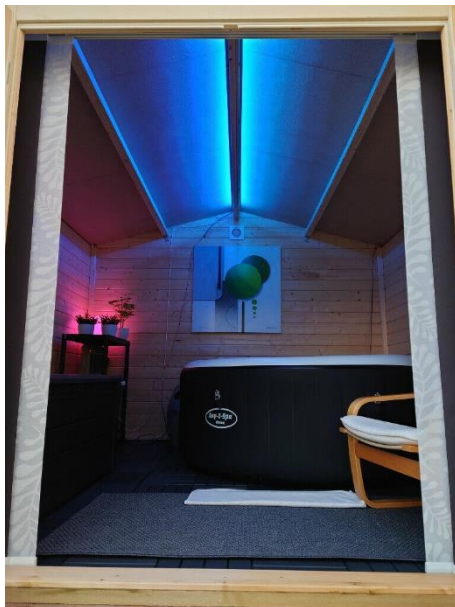

photo cred: torei
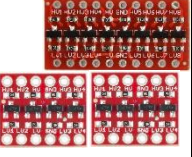
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How to build the Wi-Fi remote for Bestway Lay-Z-Spa

TOC

1) Checking compatibility

Table of models (not exhaustive)

Alias examples These names can be sold with other pump models than listed here!	Model Number	Pump shape	Wires	Model.h MALDIVES2021=hydrojets MIAMI2021=no jets	Confirmed working with 1 2
2021 Bali	?	Square 2021	6	MIAMI2021	
2021 Maldives/Hydrojets	?	Square 2021	6	MALDIVES2021	
Riviera	12220	Eggshape	?	?	
Coleman SaluSpa	13804 ?	Eggshape	6	PRE2021	
Vegas	54112	?	4	NO54123	
Monaco	54113	Eggshape	?	?	
Vegas	54122	Eggshape	6	?	
Miami	54123	Eggshape	6/4	PRE2021/NO54123	
Palm Springs	54129	Eggshape	4	NO54154	
Hawaii/Hydrojet	54138	Square	4	NO54138[1]	
Palm Springs/Hydrojet	54144	Square	?	Probably	
Paris	54148	Eggshape	?	?	
Bestway Paris	54149E	?	6	NO54149E	
Hawaii	54154	Eggshape	6	Yes	2
Siena	54156	Eggshape	4	?	
2019 Maldives/Hydrojets	54173	Square	4	NO54173[1]	
Honolulu	54174	Eggshape	6	?	
St. Moritz	54175	Eggshape	6	PRE2021	
Bali	54183	Eggshape	6	PRE2021	
Milan	54184	Eggshape	?	?	
Tahiti	54186	Eggshape	6	PRE2021	
Helsinki	54189	Eggshape	6	PRE2021	1+2
Cancun	54286	Eggshape	?	?	
Ibiza	54291	Eggshape	?	?	
Havana	54298	Eggshape	?	?	
	54327		6	PRE2021	
Coleman SaluSpa Cali	90437E	Eggshape	6	PRE2021	
St. Lucia/Rio	S100101	Square 2021	6	MIAMI2021	1+2
2021 Miami	S100102	Square 2021	6	MIAMI2021	
Helsinki	S100103		6	MIAMI2021	
SaluSpa Honolulu	S100104	Square 2021	6	MIAMI2021	
Santorini whirlpool	S200102	?	6	MIAMI2021	

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General info on pump models

- If you find errors in the table above, or want to add information, please post a discussion on github.
- 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)
- 2021 and later 6-wire models may need 560-680 Ohms resistors between LLC and display (CLK, DATA, CS), as reported by cyberfly79. Use short wires. I can't say what models since the reports is differing on the same models. If the display flashes you need them.
- NO54149E may show sporadic button presses.

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.
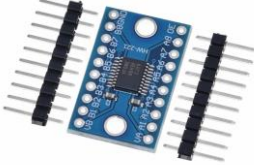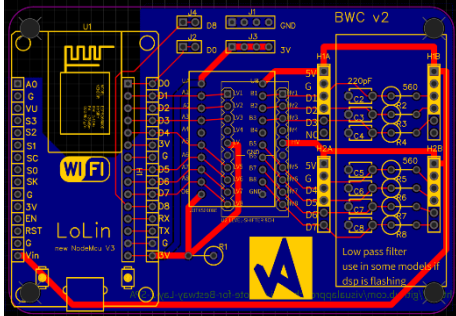

Example – eggshaped 6-wire pump

2021 square model

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2) Hardware

BOM

ESP8266 NodeMCU 1.0 (12E) V3 (V3 is wider than V2) (NOT ESP32)	
8 channel bidirectional level converter TXS0108E (NOT TXB…)	
6 or 4 pin male/female pair cable 0.1" spacing: JST SM Housing Connector www.wish.com	
PCB version 2 (better option) https://oshwlab.com/visualapproach/bestway-wireless-controller-2 https://easyeda.com/visualapproach/bestway-wireless-controller-2 PCB v1 https://oshwlab.com/Visualapproach/bestway-wifi-controller https://easyeda.com/Visualapproach/bestway-wifi-controller To order, scroll down to the PCB layout, click open in editor. Then go to Fabrication/download gerber files. *(I don't get % on your order. You pay same $ as I did)*	

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Resistor, 10K Ohms, through hole	Optional For power-on stability. I run without it and it works fine.
Female header pins (0.1")	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.

Build

PCB version 1: Solder the 6-wire cables to the PCB (H1, H2):

PCB version 2: Solder the 6-wire cables to the PCB (H1A, H2A):
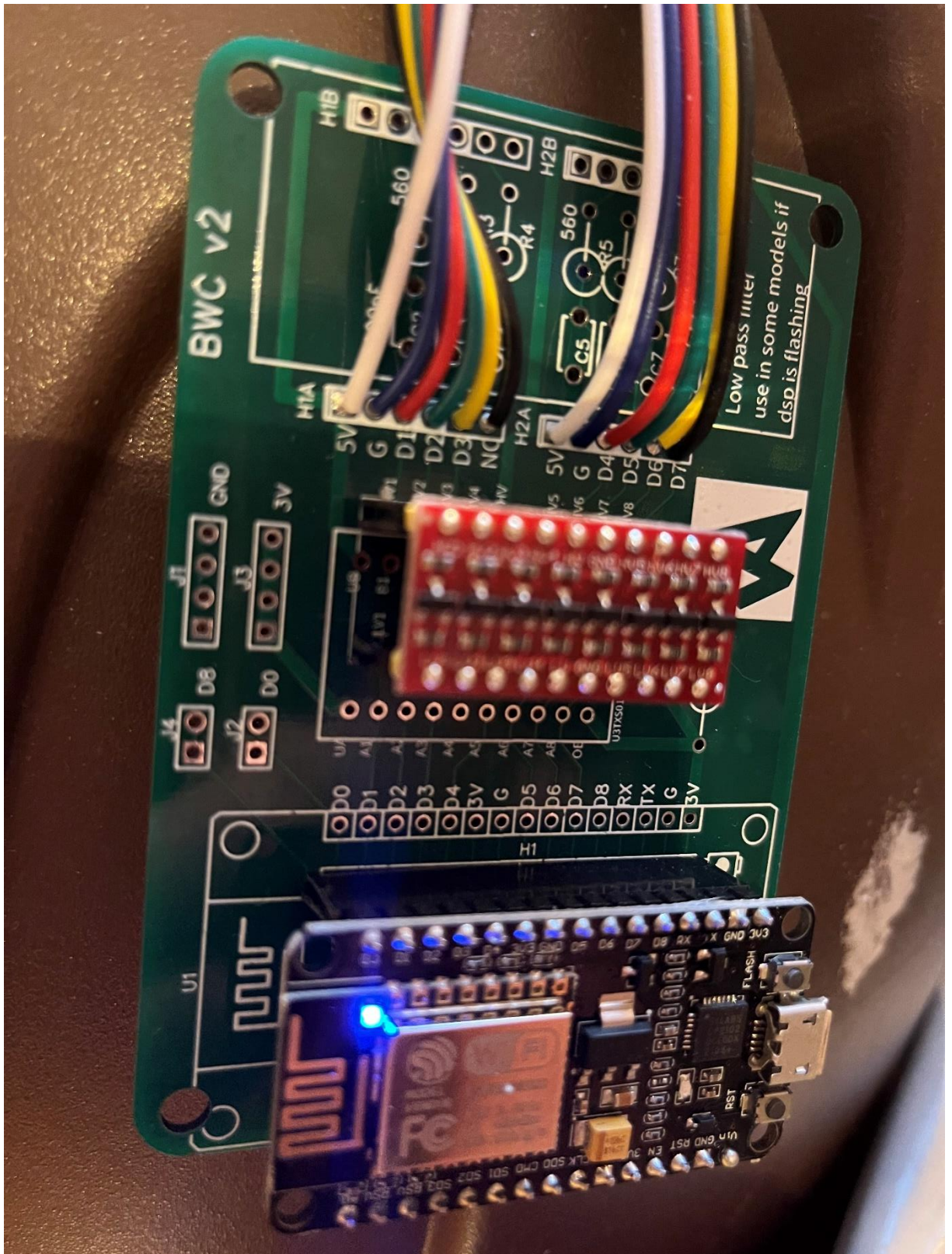
On some 2021 models the display will flash. In that case resolder the DSP cable to H2B and populate the resistors R5-R7(8) and optionally the capacitors C5-C7(8). Use either the shown LLC or the TXS0108E in the appropriate slot.

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For the 4-wire versions:

PCB v1: use the 4-wire cables and solder to the two 4-holes section (H3, H4).

PCB v2: solder to the first (upper) 4 slots in H1A, H2A. If E13 occurs you can try using the low pass filter as described above, but only for R2-3 and R5-6 and respective capacitor slots. No guarantee it will work anyways but maybe…

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

```
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 if applicable (TXS0108E).

Build continued

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. You will regret if not using headers…

D0, D8, 3V3 and GND is left empty. They are there for the possibility to connect auxiliary equipment. Special considerations needed. See ESP8266 datasheet.

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. Also choose the PCB version in the same manner. You must use the #defines already existing in this file.

```
//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 > nodemcuv2 > Platform and build filesystem image, then upload filesystem image.

An Access Point is created called "Lay-Z-Spa Module". Pswd "layzspam0dule".

Log in and enter your wifi credentials.
Visit http://layzspa.local 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:
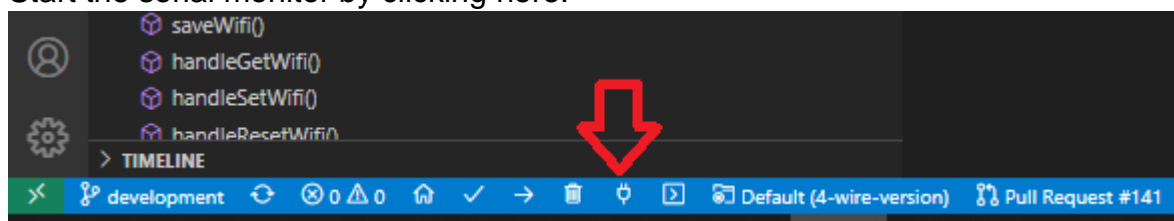
From now on you can update the device over the air (OTA) by editing platformio.ini file.

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Default setting is to upload via USB cable:

```
upload_protocol = esptool
; upload_protocol = espota
; upload_port = layzspa.local
; upload_flags =
;     --auth=esp8266
```

Edit like this to upload Over The Air. If you have several devices you would want to use different hostnames.

```
; upload_protocol = esptool
upload_protocol = espota
upload_port = layzspa.local
upload_flags =
  --auth=esp8266
```

4) Extra features (only 6-wire)

You can disable the buttons on the display by editing this line in BWC_8266_globals.h

```
//set to zero to disable display buttons. Order as above.
//Example: to disable UNIT and TIMER set 1,1,0,1,0,1,1,1,1,1,1
const uint8_t EnabledButtons[] = {1,1,1,1,1,1,1,1,1,1,1};
```

Button presses will not be sent to the pump (CIO) but will be sent over WS/MQTT to be handled elsewhere.

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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.
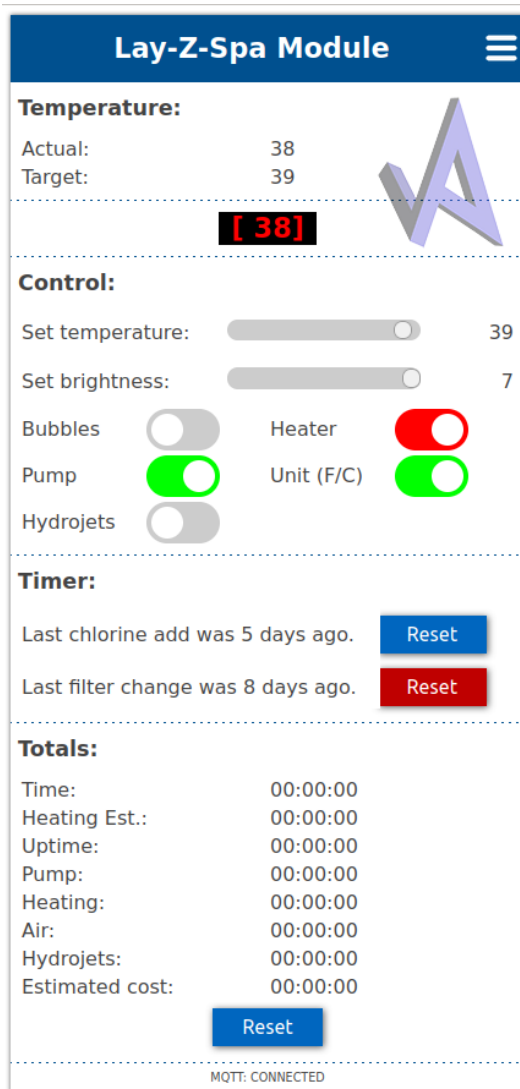
OTA:

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

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5) Web interface

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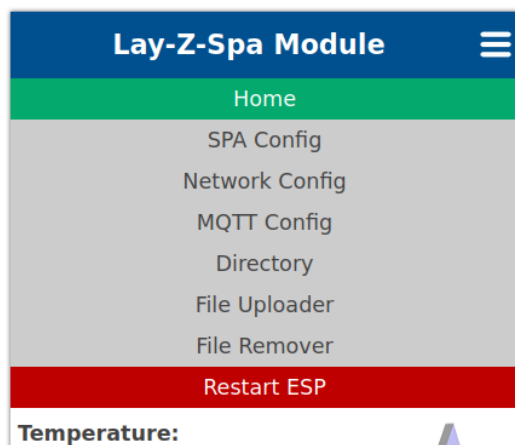
There is a slider to adjust the display brightness on the pump.

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

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.

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SPA Config

Price per kWh: `0`
Chlorine add (Interval): `7`
Filter change (Interval): `7`
Audio: ☐
Startup behaviour: `Last saved states ▾`

save

Command: `Set target temp ▾`
Value: `1`
Execute time: `01 . 01 . 2022 , 00 : 00 : 00` ⊗
Repeat interval `0` 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: `yourSsid`
Password: `yourPassword`

Static IP:

Enable static IP: ☐
IP Address: `192` . `168` . `0` . `30`
Gateway IP Address: `192` . `168` . `0` . `1`
Subnet Mask: `255` . `255` . `255` . `0`
DNS Server (primary): `8` . `8` . `8` . `8`
DNS Server (secondary): `8` . `8` . `4` . `4`

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.

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MQTT Config ☰

Enable MQTT: ☑
IP Address: 192 . 168 . 4 . 126
Port: 1883
Username: myusername
Password: <enter password>
Client ID: layzspa
Base Topic: layzspa
Telemetry Interval (s): 600

save

Enter your MQTT broker IP and credentials.

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

6) Connect

Unplug pump from mains!

Connect device to pump.

Close the display with the screws.

Turn on pump and enjoy.

7) Passwords and credentials

Take a look in the file config.h

8) Secret key combination

If you press the following buttons on the display, the ESP will reset and forget the Wi-Fi settings:

POWER

LOCK

TIMER

POWER

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9) 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)

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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	*GETTARGET (internal use)*
8	RESETTIMES
9	RESETCLTIMER
10	RESETFTIMER
11	SETJETS (only some models)
12	TAKECONTROL (only 4-wire) SETBRIGHTNESS (only 6-wire, set display brightness 0-8)

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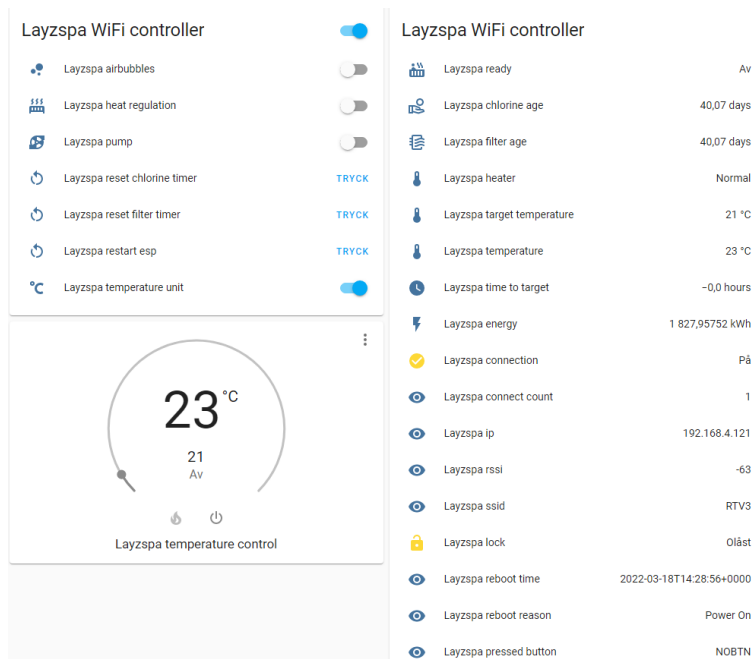Last edited 2022-06-29 22:24

10) 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".
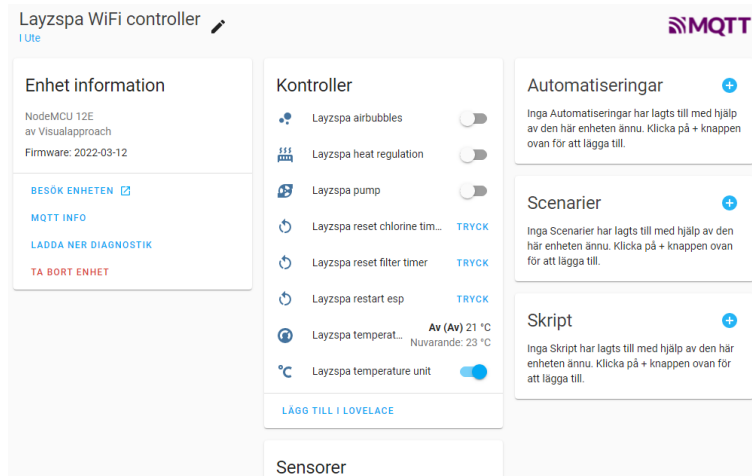
Lovelace panels:

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.

11) FAQ

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

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12) If you like this project, please buy me a coffee:

PayPal.me/TLandahl

Thank you!