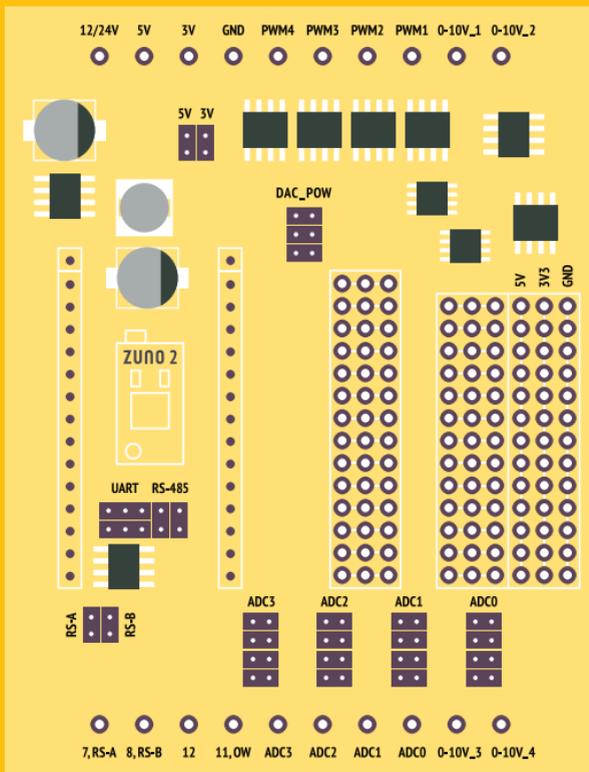




Z-UNO 2 SHIELD

UNIVERSAL Z-WAVE DEVICE



ZME_ZUNO2-SHIELD-DIN
ZME_ZUNO2-SHIELD-SEALED

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SAFETY INFORMATION AND PRECAUTIONS

Make sure to follow safety rules and regulations while working with 110/230 Volts. In many countries a license is required to alter 110/230 Volts cables.

To ensure your safety, please read this manual carefully before installing Z-Uno Shield. Follow wiring instructions exactly.

Z-Wave.Me is not responsible for any equipment damage or personal injury caused by incorrect installation or operation that differ from the one mentioned in this manual.

AVAILABLE FREQUENCIES AND ENCLOSURES

Z-Uno Shield is available in all Z-Wave frequencies. The frequency is changed in Arduino IDE from the menu Tools > Frequency. The included Z-Uno 2 can work on all frequencies or only for some regions. Refer to the table below:

SKU	Frequency	Z-Wave regions
ZMEEZUNO2-SHIELD-*	865-869 MHz	EU, RU, IN, CN
ZMEUZUNO2-SHIELD-*	908-928 MHz	US, IL, ANZ, JP, TW, HK
ZME_ZUNO2-SHIELD-*	865-928 MHz	All regions
ZMENZUNO2-SHIELD-*	No Z-Uno included	

Do not use frequencies outside of your SKU code. Doing so will result in a very short operation range.

Z-Uno Shield comes in several enclosures:

ZME*ZUNO2-SHIELD-DIN	Enclosure for DIN-rail mounting, 4 units width
ZME*ZUNO2-SHIELD-SEALED	Sealed IP65 enclosure with cable gland

WHERE TO BUY

Z-Uno Shield is available from many different resellers.

Please consult <https://z-uno.z-wave.me/buy> to find the nearest shop.

OVERVIEW

Z-Uno Shield is a configurable multipurpose Z-Wave device. It can act as a sensor, as an actor or as a gate to popular buses like UART / RS-485 / 1-Wire and others.

Z-Uno Shield inherits the flexibility of Z-Uno <https://z-uno.z-wave.me> and at the same time is very easy to use. It was designed to simplify Z-Uno usage in many typical installations.

Being included in a Z-Wave controller Z-Uno Shield will be detected as several sensors/actors depending on the configuration (each in its own endpoint, also called channel).

The following types of end points are supported:

- dimmers and blinds
- RGBW color control
- switches (as well as sirens, valve controls and door locks)
- sensors and meters
- thermostats

Z-Uno Shield have 8 output connectors and 8 input/output connectors. Depending on the configuration you have:

- Four 0-10 V analog outputs – control industrial dimmers
- Up to four PWM or switch outputs (up to 5 A per channel, open collector) – control contactors, switches, halogen bulbs or LED strips
- Up to eight digital 0/3 V inputs or outputs – connect various low voltage digital sensors and actors
- Up to four 0/3, 0/5 or 0/12 V digital or analog inputs – connect industrial 10 V sensors or any Arduino-compatible sensor
- RS-485 or UART – for industrial meters
- 1-Wire – for DS18B20 or other sensors

Consult page 8 for detailed connectors description.

Each input / output connector can be configured and associated to a Z-Wave end point.

Z-Uno Shield can be programmed like Z-Uno. There is also a special easy to use configuration tool.

This tool is available online on <https://z-uno.z-wave.me/shield/configurator>.

ABOUT Z-UNO

Z-Uno is the first and only easy to use device that allows you to create your own Z-Wave device without deep knowledge of the Z-Wave protocol or programming. Z-Uno is a mix of the power of the Z-Wave home automation radio protocol and the Arduino simplicity. Being inspired by the Arduino project Z-Uno inherits all concepts of easy-to-use hardware and software solutions, keeping maximum flexibility.

Z-Uno programming is done by writing sketches in a simplified C language and loaded into Z-Uno using Arduino IDE. More info on <https://z-uno.z-wave.me>. Using Z-Uno Shield Configurator <https://z-uno.z-wave.me/shield/configurator> you can build your sketch without programming.

Z-Uno Shield is a "shield" for Z-Uno that extends Z-Uno standard pins functionality.

COMPATIBILITY WITH Z-UNO 1 AND Z-UNO 2

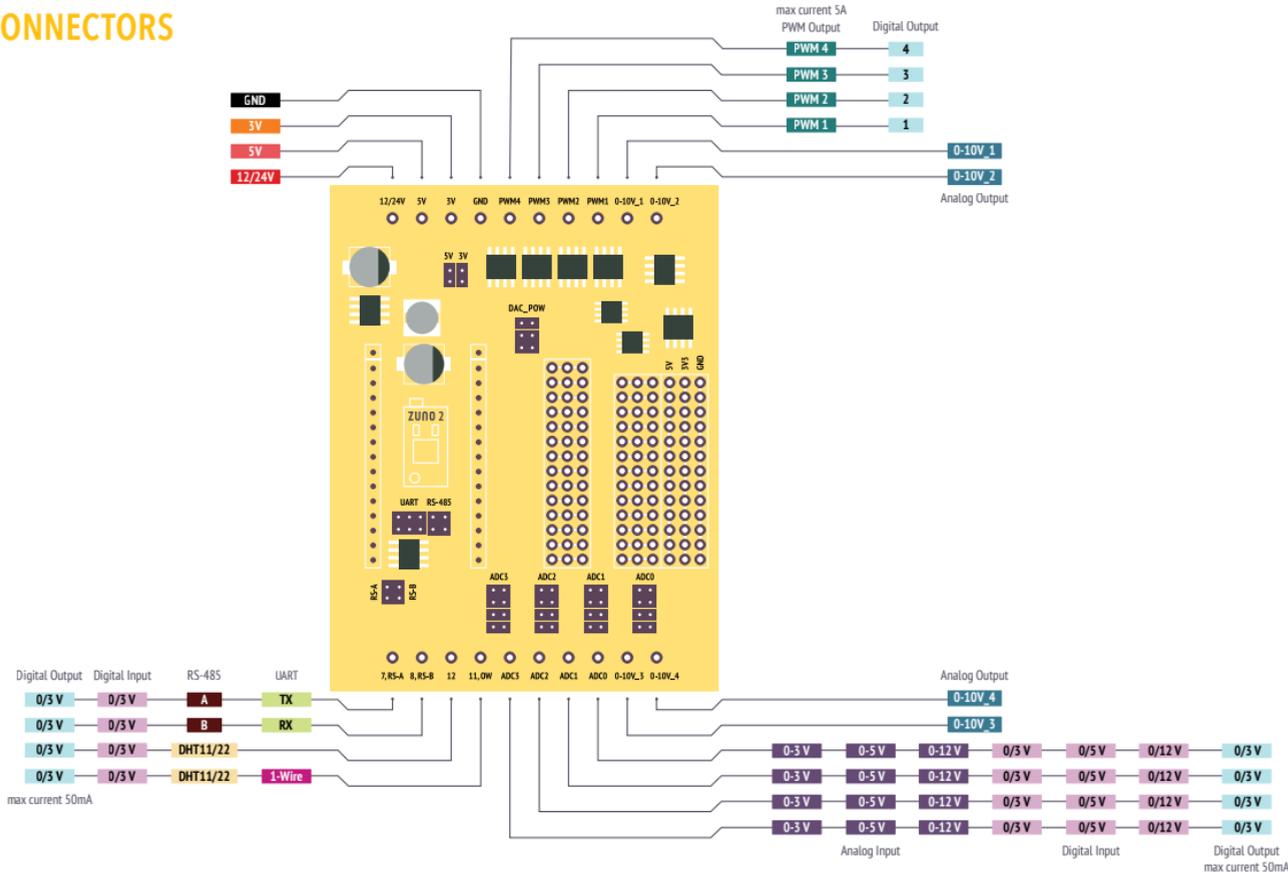
Z-Uno 2 Shield is fully compatible with Z-Uno 2.

Z-Uno 2 Shield is also partially compatible with Z-Uno 1:



Attention! 0-10V_1-4 pins will not work and RS-485 will not be available on pins 7 and 8. Hereafter in this manual "Z-Uno" will refer to Z-Uno 2.

CONNECTORS



12/24V – 8-25 Volts power supply of the Z-Uno Shield

5V – 5 Volts output if 12/24V connector is used (max current 500 mA). Otherwise 5 Volts input

3V – 3.3 Volts output if 12/24V or 5V connectors are supplying the power (max current 120 mA). Otherwise 3.3 Volts input

GND – Ground connector

0-10V_1-4 – Analog output 0-10 Volts (max current 20 mA)

PWM1-4 – Digital or PWM output, open collector (max current 5 A per channel and max 15 A per all four channels, max voltage 30 V)

ADC0-3 – Analog or digital input with 0-3 V, 0-5 V or 0-12 V range, 0/3 V digital output (max current 50 mA)

11, OW – Digital input or output (max current 50 mA) or 1-Wire bus or DHT22/DHT11 sensor pin. Pulled up with 4.7 kΩ resistor

12 – Digital input or output (max current 50 mA) or DHT22/DHT11 sensor pin

7, 8 – Digital input or output (max current 50 mA) or UART TX/RX or RS-485 A/B

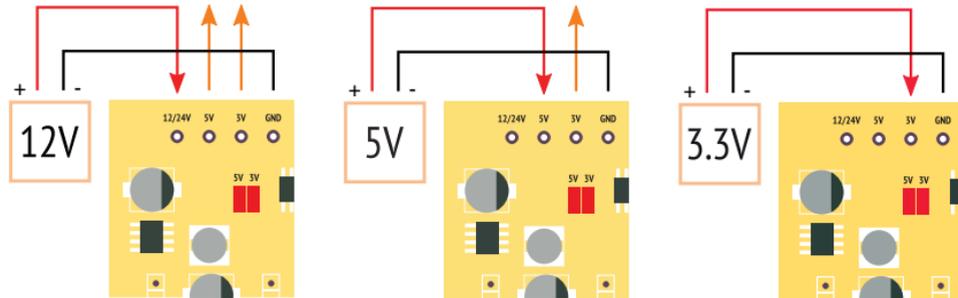
Pic. 1. Z-Uno Shield connectors

USE CASES

Powering Z-Uno Shield

There are three options to power your Z-Uno Shield:

- connect 8-25 Volts to the 12/24V connector. 5V connector can supply 5 Volts power, 3V connector can supply 3.3 Volts power.
- connect 5 Volts to 5V connector. Do not use 12/24V connector in this case. 3V connector can supply 3.3 Volts power.
- connect 3.3 Volts to 3V connector. Do not use 12/24V and 5V connectors in this case.



Pic. 2. Power modes: 12/24 V, 5 V and 3 V

Connecting 0-10 Volts dimmers

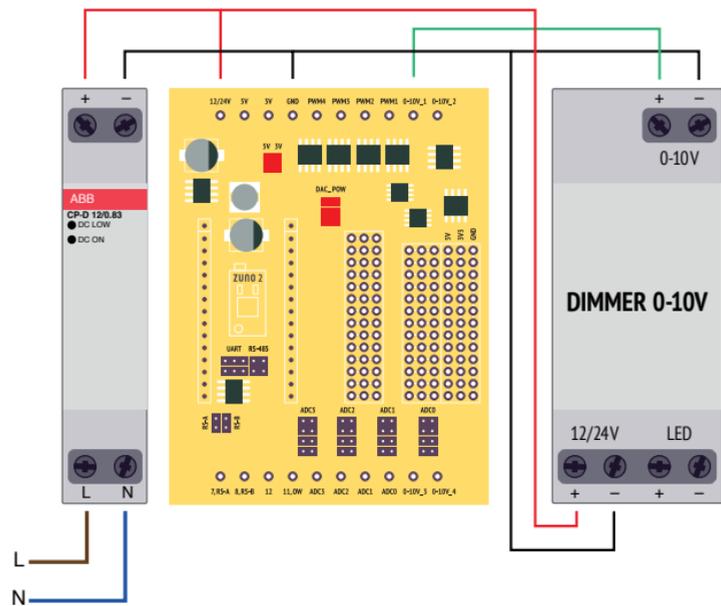
0-10V_1-4 connectors can drive dimmable LED controllers and industrial dimmers. Z-Uno Shield 0-10V_1-4 outputs can be controlled by buttons or via Z-Wave from another device or controller.

Connecting LED strips or halogen lamps

PWM outputs allow to smoothly dim the brightness of a single color LED strips or control color or a RGBW strip. Maximal current per channel is 5 A, total per all four channels not more than 15 A.

All four PWM outputs can drive:

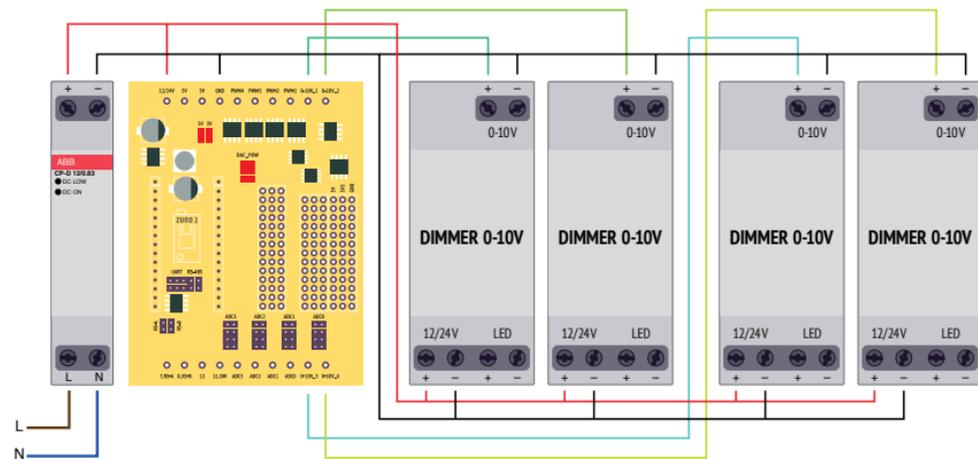
- Single color LED strip – up to 4
- RGBW LED strip – only 1
- Halogen bulbs – up to 4
- LED-amplifier for single color LED strip – up to 4
- LED-amplifier for RGBW LED strip – only 1



< **0-10V_1**
Analog output 0-10V

Dimmer ▾

Pic. 3a. Connecting one 0-10 V dimmer



< **0-10V_1**
Analog output 0-10V

Dimmer ▾

< **0-10V_2**
Analog output 0-10V

Dimmer ▾

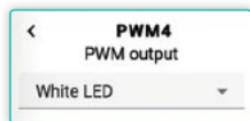
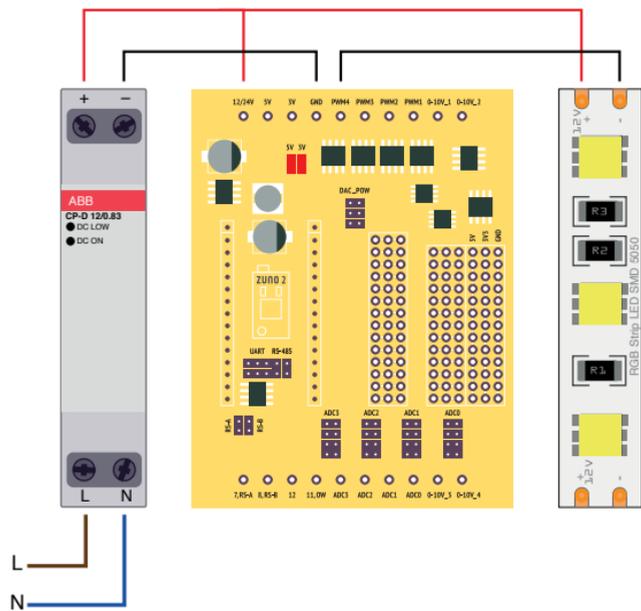
< **0-10V_3**
Analog output 0-10V

Dimmer ▾

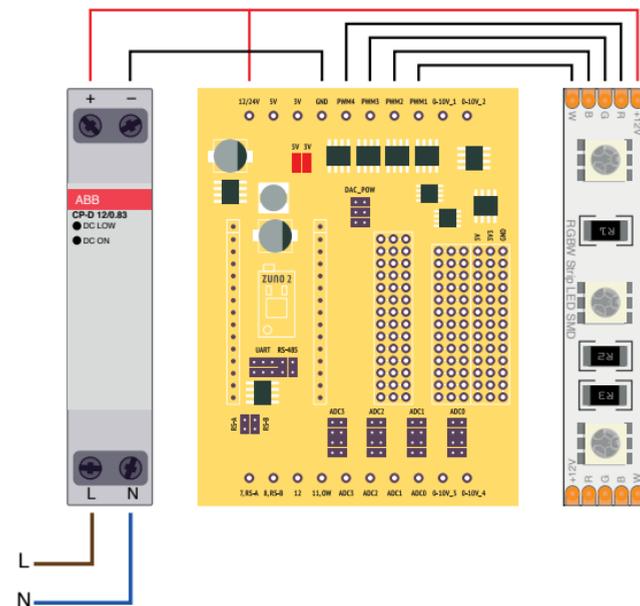
< **0-10V_4**
Analog output 0-10V

Dimmer ▾

Pic. 3b. Connecting four 0-10 V dimmers



Pic. 4. Connecting LED strip



Pic. 5. Connecting RGBW strip

Controlling relays and contactors

With Z-Uno Shield it is possible to use electromagnetic relays, solid state relays and contactors.

Connectors PWM1-4 are open collector schematics and are switched to the Ground. It can be used to control electromagnetic relays, contactors and solid state relays with reference voltage 3-30 Volts DC.

Connectors "7, RS-A", "8, RS-B", 12, 11, ADC0-3 can be used to control contactors and solid state relays with reference voltage 3 Volts.

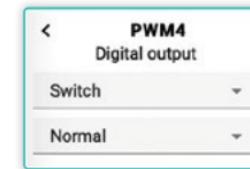
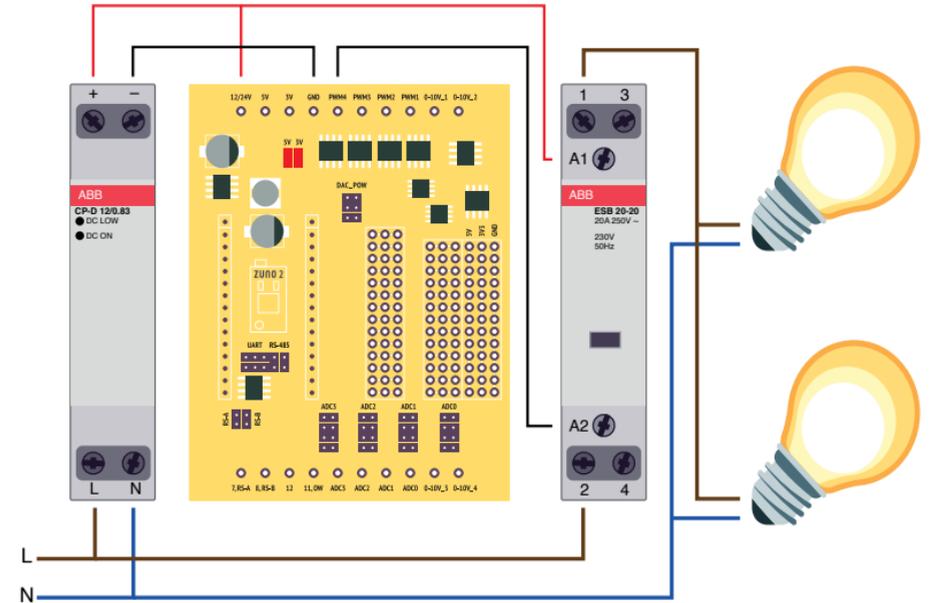
Connecting binary sensors and buttons

Connectors 7, 8, 12, 11 can be used as binary input with 3 V inputs.

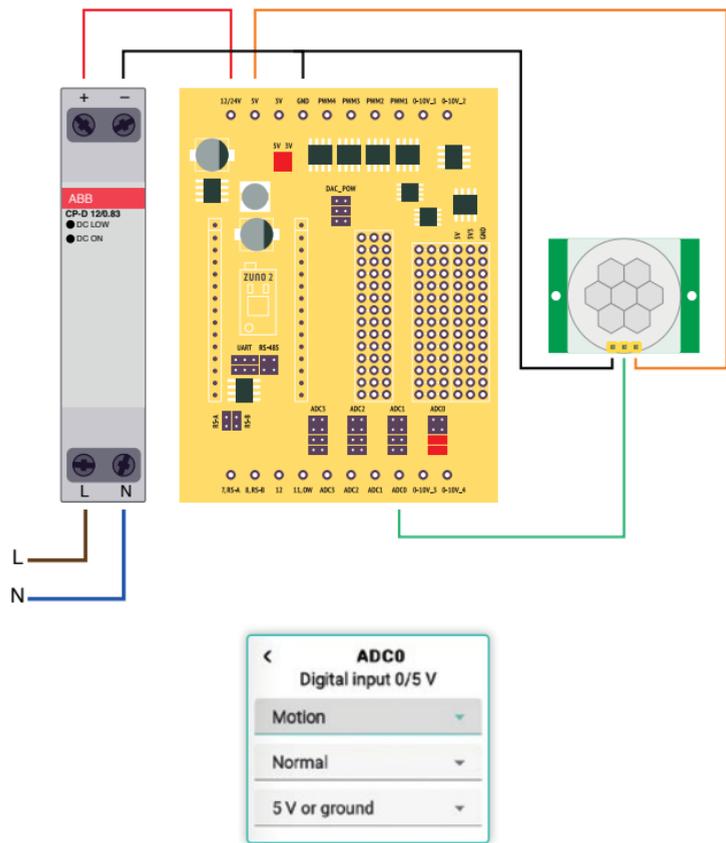
Connectors ADC0-3 can in addition make use of voltage dividers to connect 0-5 Volts or even 0-12 Volts sensors. Use jumpers to select the correct divider. See page 35.

Connect buttons or wall paddles or a reed switch to dry contact inputs of Z-Uno Shield.

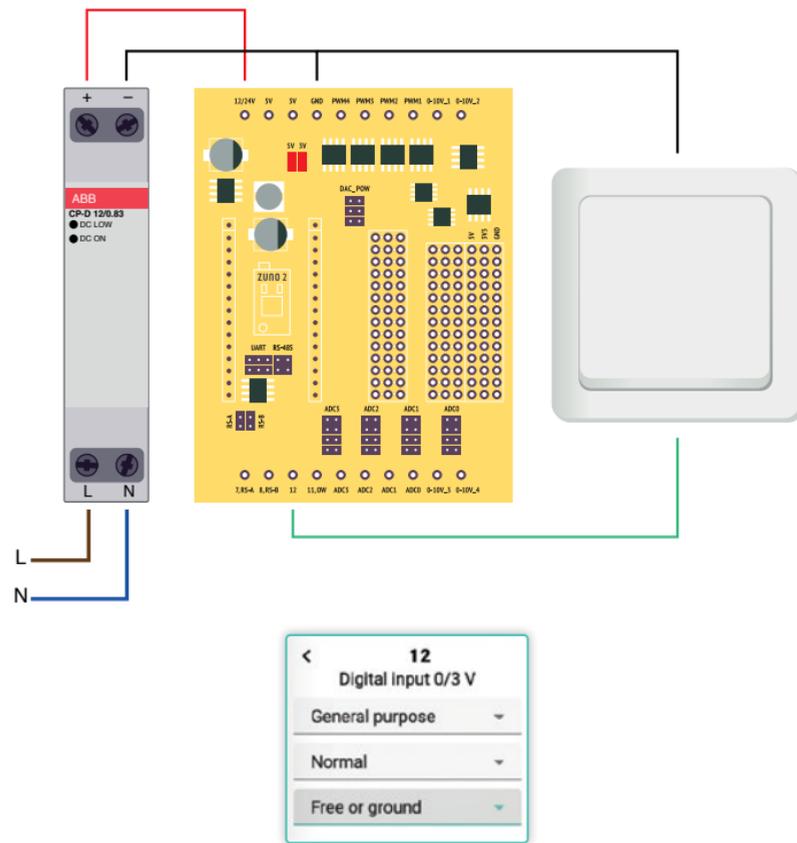
Note that long wires to sensor might result in accident false alarms due to noise from 230 Volts or other cables located nearby.



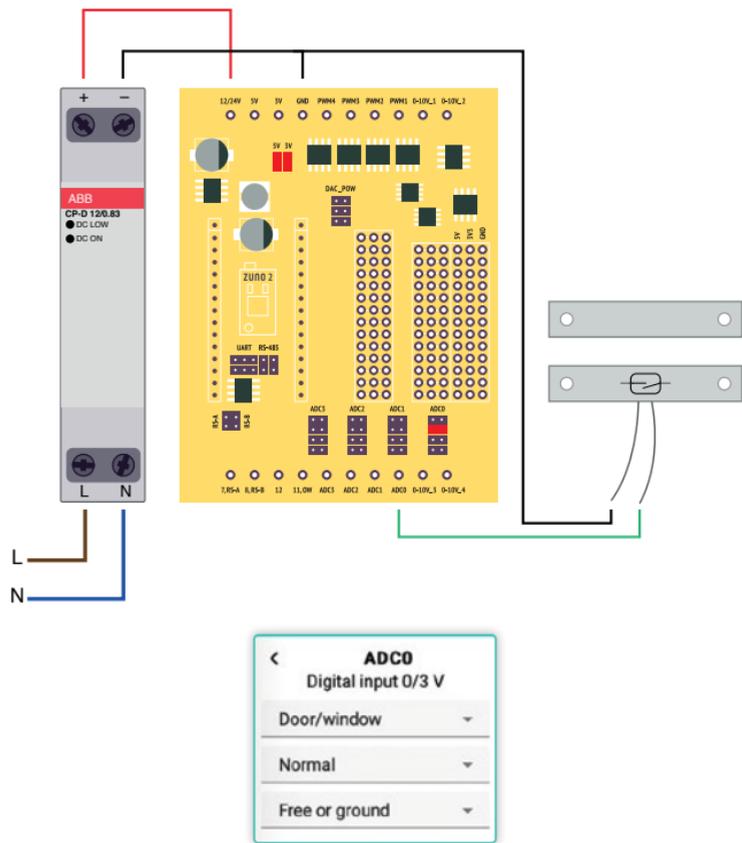
Pic. 6. Connecting contactors



Pic. 7. Connecting an Arduino-compatible 5 V binary sensor



Pic. 8. Connecting a wall switch



Pic. 9. Connecting a reed switch

Connecting analog sensors

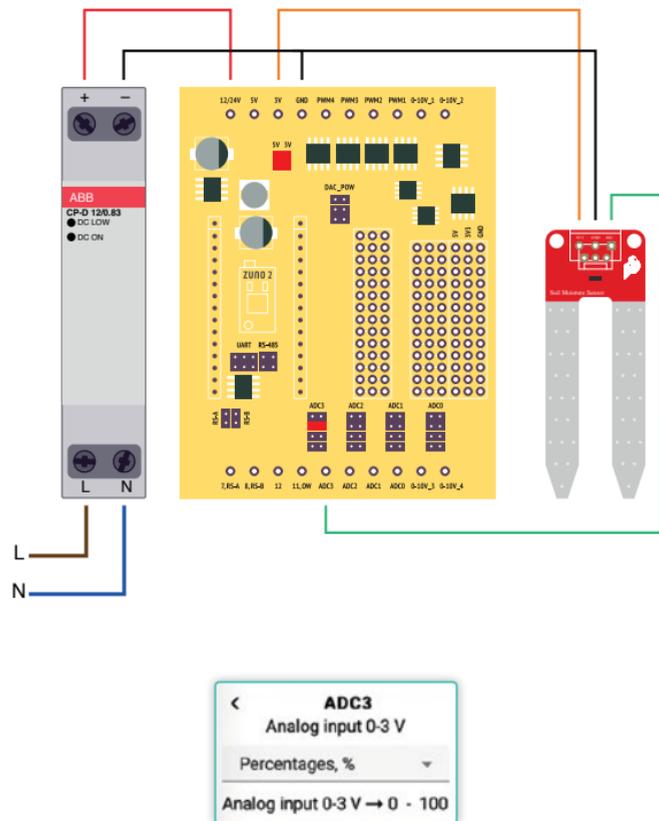
Connectors ADC0-3 can be used to connect various 0-12 Volts sensors. Corresponding jumpers should be installed to select the voltage range between 0-3, 0-5 or 0-12 Volts.

See page 35 for more information about ADC jumpers.

To use analog sensors select in the Configurator the sensor type/scale and the range to map the sensor value to.

Currently the following types are supported (you can add your own right in the generated sketch source code):

- %
- Temperature, °C
- Luminance, lux
- Humidity, %
- Voltage, V
- Current, A
- Distance, m



Pic. 10. Connecting a soil moisture sensor

Connecting DHT-11, DHT-22, AMS23xx

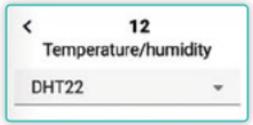
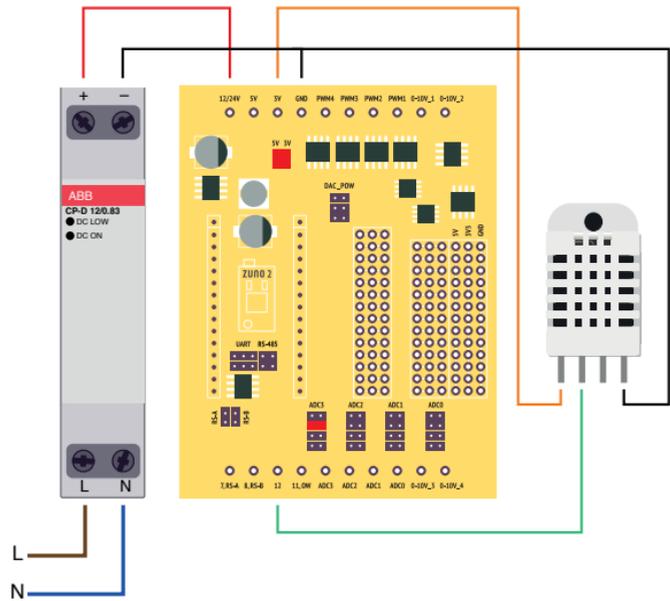
Pins 11 and 12 can directly drive humidity and temperature sensors DHT11, DHT22 or AMS23xx. Those sensors will generate two widgets for temperature and humidity.

Connecting 1-Wire sensors

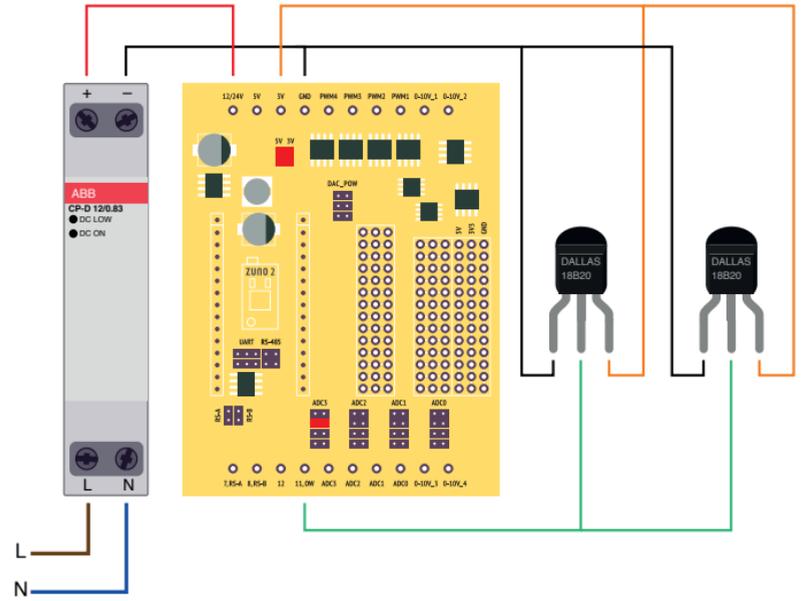
Pin 11 OW can be used to communicate using 1-Wire bus. You can connect many DS18B20 temperature sensors to this connector. Each sensor will generate its own widget.

RS-485

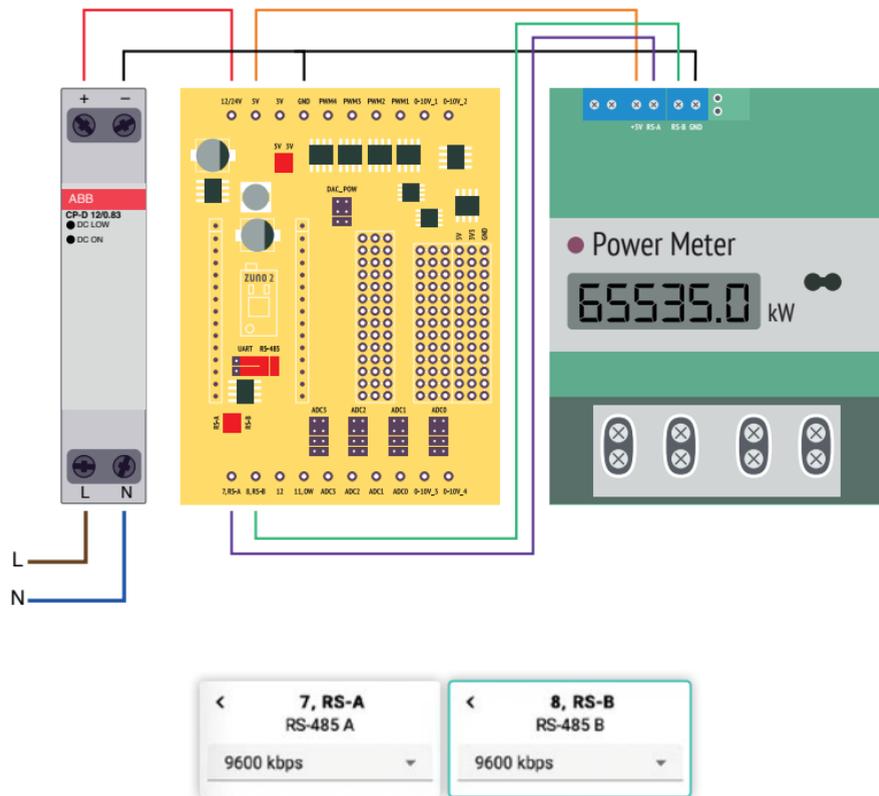
Connectors RS-A and RS-B can be used to connect to RS-485 bus. RS-485 is used in various meters and relay switches as well as in security systems. RS-485 is also a base for a widely used in industry MODBUS RTU. Please note that the protocol on top of the RS-485 is application specific – request the protocol description from the manufacturer of the connected device.



Pic. 11. Connecting DHT22



Pic. 12. Connecting many DS18B20 temperature sensors



Pic. 13. Connecting to a RS-485 power meter

COMPATIBILITY WITH Z-WAVE CONTROLLERS

Z-Uno Shield is compatible with same controllers as Z-Uno is. Being a Z-Wave Plus V2 certified device, Z-Uno is compatible with most modern Z-Wave controllers. Among others are Z-Wave.Me RaZberry and Z-Way, Fibaro Home Center 3 and Lite, Zipato.

Z-Uno Shield is a multiple channels device – each Z-Wave end point will create its own control in the controller user interface .

CONFIGURATION

Z-Uno Shield can be configured by changing the sketch used. Please consult Z-Uno documentation and Z-Uno Quick Start Guide <https://z-uno.z-wave.me/QSG> to get more information on Z-Uno programming. It is suggested to use a special configuration tool to set up your Z-Uno Shield <https://z-uno.z-wave.me/shield/configurator>. The configurator will guide you how to set up jumpers on the Z-Uno Shield as well as how to wire peripherals. It is always possible to modify the sketch generated by the configurator. Basic programming skills are required to modify the code.

Z-Uno Shield can also accept Configuration parameters from the Z-Wave controller. More details are available on <https://z-uno.z-wave.me/z-wave/configuration-parameters/>

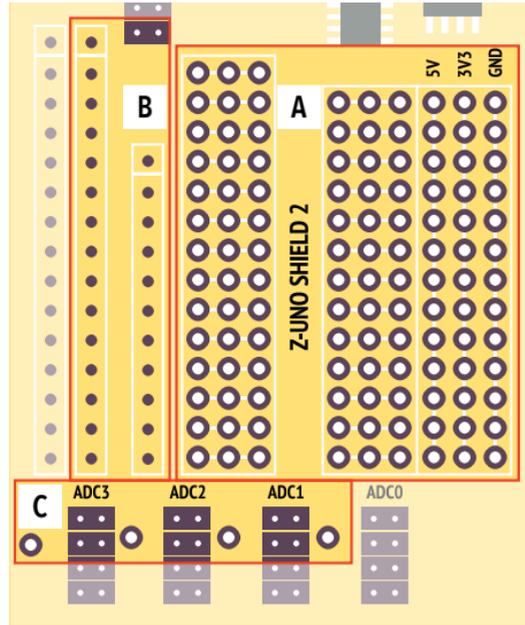
CUSTOMIZING Z-UNO SHIELD

A. Z-Uno Shield includes a breadboard for easier customization to your needs.

B. All Z-Uno pins are available on this breadboard. See labels between Z-Uno placeholder and the breadboard.

C. ADC0-3 and 7, 8 connectors can be decoupled from Z-Uno and connected to the breadboard using a wire.

Check Z-Uno pinout for more info.



ADDING TO A Z-WAVE NETWORK

To add Z-Uno Shield in a Z-Wave network press three times on the Service Button (BTN) on the Z-Uno.

REMOVING FROM A NETWORK AND RESET

To remove Z-Uno Shield from a Z-Wave network press three times on the Service Button (BTN) on the Z-Uno. If it do not help, reset Z-Uno by holding the Service Button for 10 seconds and then press three times.

If your code hangs Z-Uno and prevents Z-Uno from being added/removed, Rescue Mode can help to bring it back to life. Hold the Service Button while clicking on the Reset button (RST).

SENDING NODE INFORMATION FRAME

To emit Node Information Frame (NIF) press three times on the Service Button (BTN) on the Z-Uno.

Z-WAVE SECURITY

Z-Wave protocol allows secure commands transmission to bring more privacy to your smart home network. To enable Security in Z-Uno use Arduino IDE menu item. Once Security is turned on Z-Uno will follow the rules below:

- All control commands to Z-Uno must be secure.
- All commands sent by Z-Uno (based on Association groups) follow rules:
 - First time Z-Uno tries to speak securely.
 - If success, Z-Uno will memorize that this device must always be spoken securely.
 - If fails, Z-Uno will remember this and send unsecure commands to that device.
- This allows to mix secure and unsecure devices in the same Association group.

Note that Z-Uno supports Z-Wave Security S2 or Security S0. The PIN code for Security S2 is written in Arduino IDE right after uploading the sketch.

Z-WAVE COMMAND CLASSES

Z-Uno supports the following Command Classes:

- Association V2
- Association Group Information V3
- Battery (for sleeping and FLiRS modes) V1
- Basic V2
- Configuration V4
- Device Reset Locally V1
- Indicator V3
- Firmware Update V5
- Manufacturer Specific V2
- MultiChannel V4
- MultiChannel Association V3
- MultiCommand V1
- Notification V8
- Power Level V1
- Security V1
- Security S2 V1
- Supervision V2
- Transport Service V2
- Version V3
- Wakeup (for sleeping mode) V2
- Z-Wave Plus Info V2

Depending on channels types Z-Uno will also support some of these Command Classes:

- Sensor Binary V2 and Notification V5
- Sensor Multilevel V8
- Meter V5
- Switch Binary V2
- Switch Multilevel V4
- Switch Color V3
- Door Lock V4
- Thermostat Mode V3 and Thermostat Setpoint V3

Depending on Association Groups set up Z-Uno can control:

- Basic V2
- Door Lock V5
- Switch Multilevel V4
- Scene Activation V1

DEVICE CLASSES

Z-Wave defines so called Device Classes to allow better interoperability. Z-Uno Shield will automatically set corresponding Device Class to each channel depending on channel type. Z-Uno Shield Device Class will be same as Device Class of channel #1.

Channel type	Generic class	Specific class
Sensor Binary	Sensor Notification	Notification Sensor
Sensor Multilevel	Sensor Multilevel	Routing Sensor Multilevel
Meter	Meter	Simple Meter
Switch Binary	Switch Binary	Power Switch Binary
Siren	Switch Binary	Siren
Flow Stop	Switch Binary	Valve Open Close
Switch Multilevel	Switch Multilevel	Power Switch Multilevel
Switch Color	Switch Multilevel	Color Tunable Multilevel
Blinds	Switch Multilevel	Motor multiposition
Thermostat	Thermostat	General Thermostat
Door Lock	Entry Control	Door Lock

FIRMWARE UPGRADE

Z-Uno allows upgrade of the bootloader and user sketch via USB as well as Over-The-Air (OTA). Follow the manual of the Firmware Upgrade feature of your Z-Wave Controller. Firmware upgrade is confirmed by three times press of the Service Button or via configuration parameter. Note that your sketch will be deleted during bootloader upgrade process – you will need to upload it again. For more info see Z-Uno OTA process description on <https://z-uno.z-wave.me/z-wave/ota>.

DEVICE RESET

Z-Uno can be excluded from network by following Removing process initiated by a Z-Wave controller or by resetting the device via Service button: hold the Service button for 5 seconds and then press three times. Use this procedure only if your controller is missing or inoperable. Note that the sketch is not erased during exclusion or reset process.

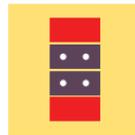
CHANGING Z-WAVE SETTINGS

Z-Uno Shield sketch defines number of channels, their types, number of association groups and power mode. Arduino IDE also allows to turn on/off security. But Z-Wave do not allow to change those parameters «on the fly». To remain compatible with Z-Wave Plus, Z-Uno will not adopt those changes until device is removed from the network or resetted. You can also force Z-Uno Shield to adopt these parameters «on the fly» by changing configuration parameter #1.

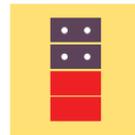
JUMPERS

Jumpers allow to configure Z-Uno Shiled hardware. The Configurator will guide you which jumpers to install.

ADC JUMPERS



Z-Uno ADC pin to connector via divider (0-12 V measurement)



Z-Uno ADC pin to connector via divider (0-5 V measurement)

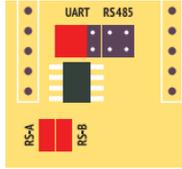


Z-Uno ADC pin directly to connector (0-3 V measurement)

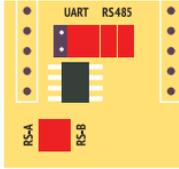


Disconnect Z-Uno ADC pin from connector

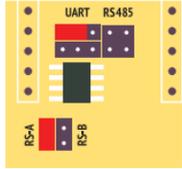
RS-485 / UART JUMPERS



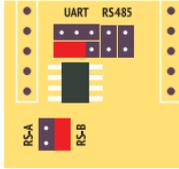
Z-Uno 7 and 8 pins to connectors 7, RS-A and 8, RS-B.
For UART or digital input/output.



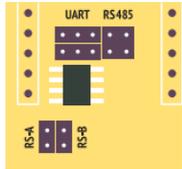
Z-Uno 7 and 8 pins to connectors RS-A and RS-B via RS-485 converter (pin 17 controls direction).



Z-Uno 7 pin to connector 7, RS-A.
For UART TX or digital input/output on connector 7, RS-A.
8, RS-B not connected.

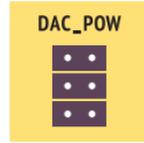


Z-Uno 8 pin to connector 8, RS-B.
For UART RX or digital input/output on connector 8, RS-B.
7, RS-A not connected.



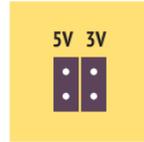
Disconnect Z-Uno 7 and 8 pins from connectors 7, RS-A and 8, RS-B.

DAC POWER



Remove jumpers to reduce consumption. 0-10V pins will be off.

Z-UNO POWER



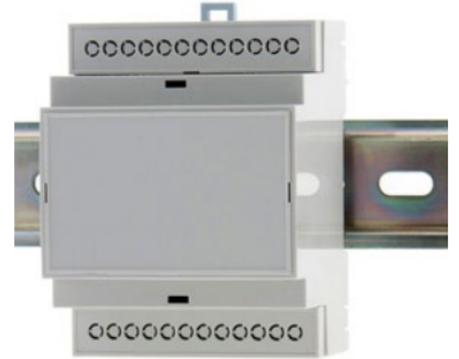
Disconnect power pins between Z-Uno and Z-Uno Shield. May be used when Z-Uno is powered from USB.

TYPES OF ENCLOSURES



SEALED ENCLOSURE

Gainta G2104C



DIN-RAIL ENCLOSURE

Gainta D4MG

PACKAGE CONTENT

- Z-Uno (Z-Uno board, carton box, manual)
- Z-Uno Shield board
- Jumpers (22 pieces)
- DIN-rail enclosure D4MG or sealed enclosure G2104C with PG-11G cable gland
- This manual

MOUNTING CABLE GLAND

PG-11G cable gland mounting thread is 18.6 mm. It is suggested to use crown drill bit for easier mounting.

YOUR NOTES

Manufactured by
Smart Systems Distribution Sàrl
15B, av. Edmond Vaucher
1219 Châtelaine, Switzerland

Z-WAVEME
BUILDS THE SMART HOME



Z-Uno2 Shield DIN



Z-Uno2 Shield Sealed



[Z-UNO.Z-WAVE.ME/SHIELD](https://www.z-wave.me/shield)