

ArduPLC MICRO

MANUAL



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1. General Description

ArduPLC MICRO is a microcontroller device that allows us to connect and control electrical and electronic devices directly without the need for additional components such as relays, optocouplers, etc. Basically it is an Arduino with real possibility of control.

Features:

- Compact Size - DIN rail Mount
- 24V DC Power Supply (6.5-30V DC)
- USB MINI port for programme upload.
- 6 Analogue Inputs with 0-5V, 0-10V and 0-20mA Ranges
- 4 Relays
- 6 opto-isolated digital inputs
- Auxiliary RJ12 connector for I2C expansion bus.
- RTC optional.

Its compact size makes it very versatile for simple applications and where space plays an important role.

We offer two versions according to your type of feed:

- AC version: admissible voltage between 90VAC and 260VAC and mains frequency between 50Hz and 60Hz
- DC version: permissible voltage between 6.5VDC and 30VDC

Thanks to its USB port, it can be programmed directly from the environment or Arduino IDE.

It is recommended for distributed applications like home automation, connection with industrial PLCs, control, etc.

All inputs and outputs are accessible through robust screw terminals.

ArduPLC MICRO is delivered in a standard DIN rail enclosure. This makes it easier for us to mount it inside electrical panels for automation, home automation, etc.

2. Characteristics

- Microcontroller: Atmel ATmega32U4.
- 6 10-bit Analogue Inputs with 0-5V, 0-10V and 0-20mA Ranges
- 4 Output Relays.
- 6 Opto-isolated Digital Inputs 5...30VDC
- Programmed via Mini USB port.
- Optional RTC Module
- Version with keypad and 1.3" OLED display
- I2C Expansion bus via RJ12 connector.
- Power Supply: 6.5VDC a 30VDC
- Compatible with Arduino IDE.
- DIN Rail Mount

3. Microcontroller

ArduPLC MiCRO is based on Arduino and therefore we can use any of the Arduino development environments to program our device. The equivalence between the ArduPLC NANO and Arduino I / Os are as follows:

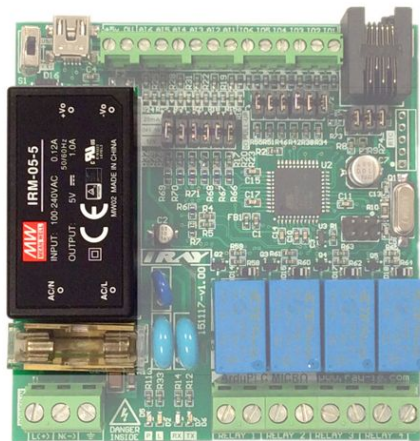
Function	Arduino Pin
RELAY 1	4
RELAY 2	5
RELAY 3	6
RELAY 4	7
DIGITAL INPUT DIN1	0
DIGITAL INPUT DIN2	1
DIGITAL INPUT DIN3 (PWM)	9
DIGITAL INPUT DIN4 (PWM)	10
DIGITAL INPUT DIN5 (PWM)	11
DIGITAL INPUT DIN6 (PWM)	13
ANALOGUE INPUT AIN1	A0
ANALOGUE INPUT AIN2	A1
ANALOGUE INPUT AIN3	A2
EANALOGUE INPUT AIN4	A5
ANALOGUE INPUT AIN5	A4
ANALOGUE INPUT AIN6	A3
LED L	12
INT RTC, DREADY	8

4. Power Supply.

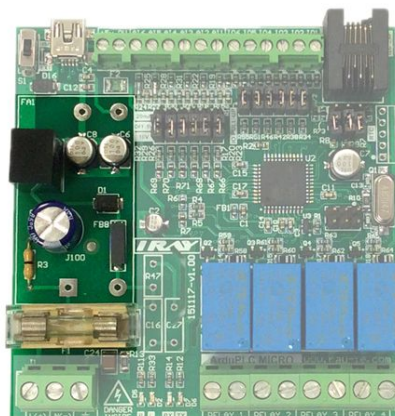
There are two versions of ArduPLC MICRO according to their type of feed:

- AC version: admissible voltage between 90VAC and 260VAC and mains frequency between 50Hz and 60Hz
- DC version: admissible voltage between 6.5VDC and 30VDC

The AC version internally incorporates a switched source of 5W

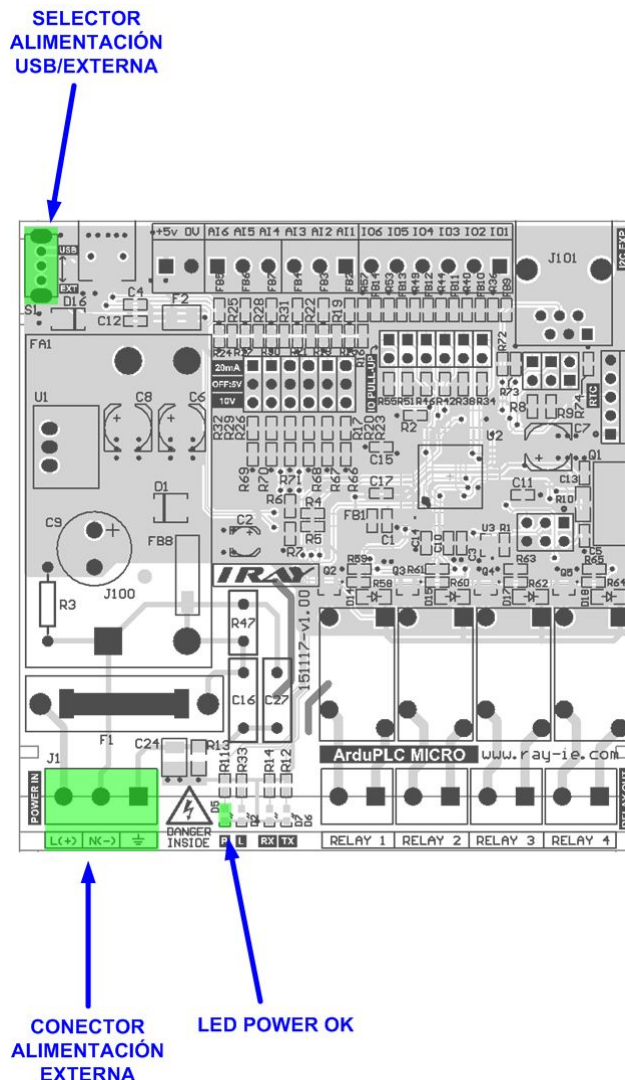


The DC version internally incorporates a voltage regulator:



In both cases, this design, provides us with a high feeding efficiency which means low consumption and low heating. We can also supply ArduPLC MICRO from the USB port itself. In this case make sure that the USB port where you will connect ArduPLC MICRO has a current of 500mA.

To select between USB or EXTERNAL power, set switch S1 to the desired position:

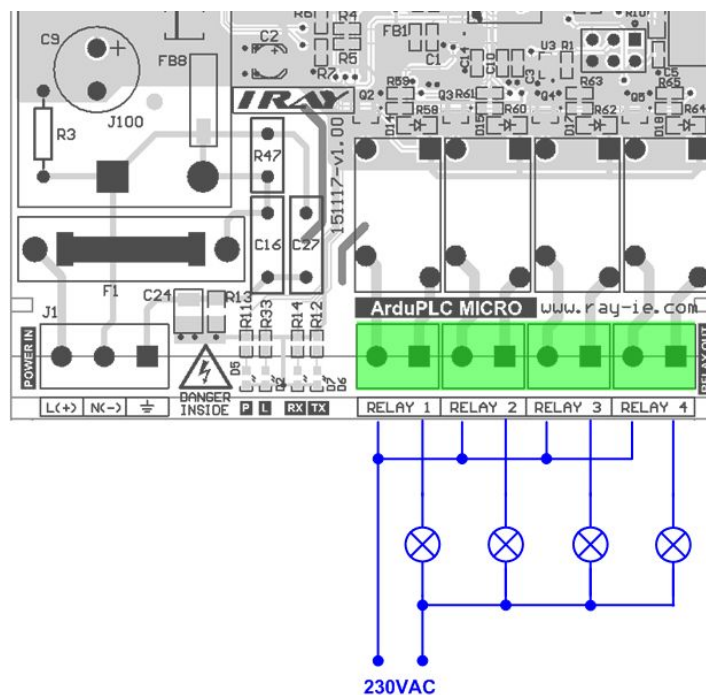


For external power supply there is a protection fuse. To replace it, remove the cover using a screwdriver and replace the fuse with an equivalent one: 1A - 5x20mm.

5. Output Relays.

The output relays are of the normally open type. All outputs have totally independent commons.

Example of connection to control 4 lamps:

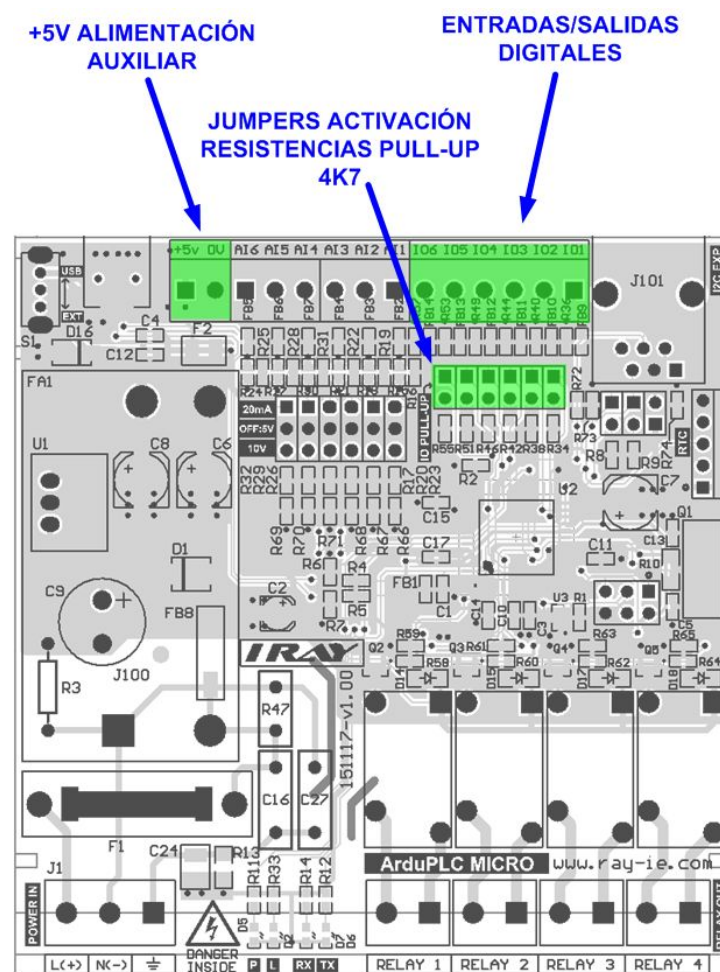


Relay Technical Characteristics:

- Maximum Current 5A
- Maximum Voltage: 250VAC o 30VDC
- Maximum Power: 1250VA, 500W
- Electrical Life: 100,000 operations at 5A , 250VAC
- Mechanical Life: 10,000,000 operations

6. Digital Inputs.

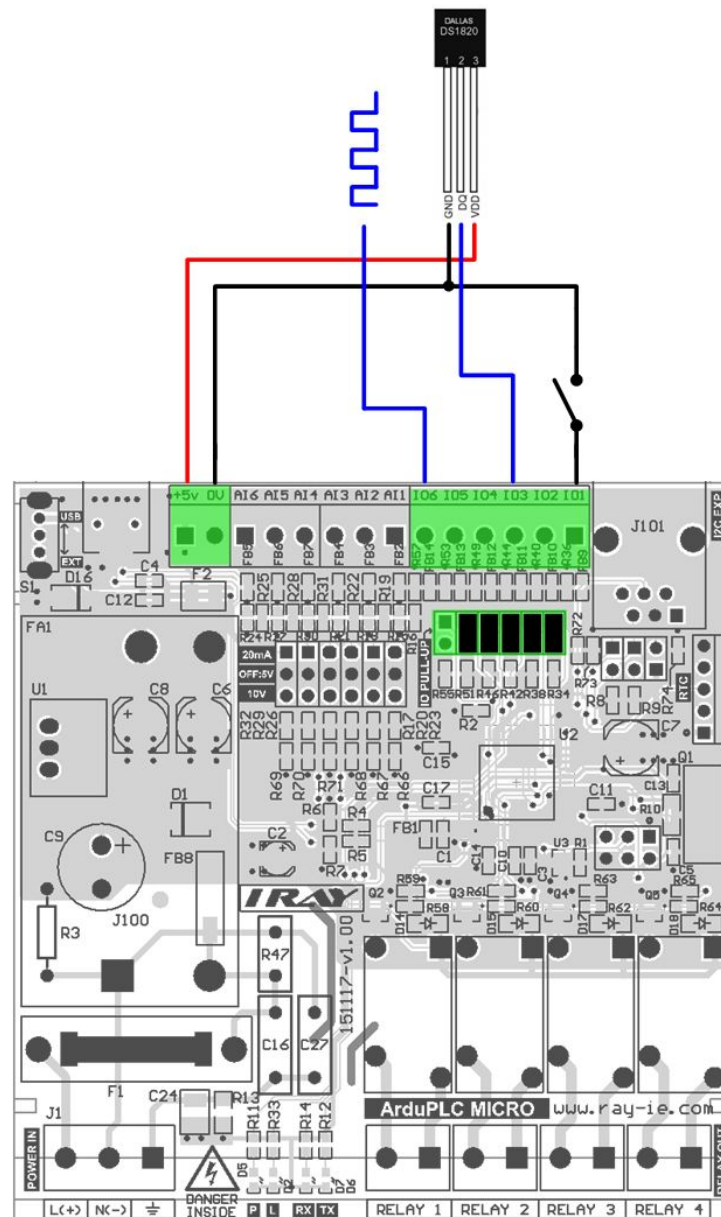
The digital inputs / outputs are direct pins to the microcontroller so the logic levels are 5V. Like an Arduino board, these pins can be configured as inputs or as outputs. The internal pull-up resistors of the microcontroller can also be activated.



There are cases where we need pull-up resistors of a lower resistive value, for example, to create a 1-WIRE bus we need a pull-up resistor of 4K7. The internal pull-up resistance of the microcontroller is not enough. We can activate a pull-up resistor of

4K7 by activating the corresponding jumper on the board.
Channels 3, 4, 5 and 6 have PWM output.

The following is an example of a connection for a temperature sensor 1-WIRE, input switch and output PWM:

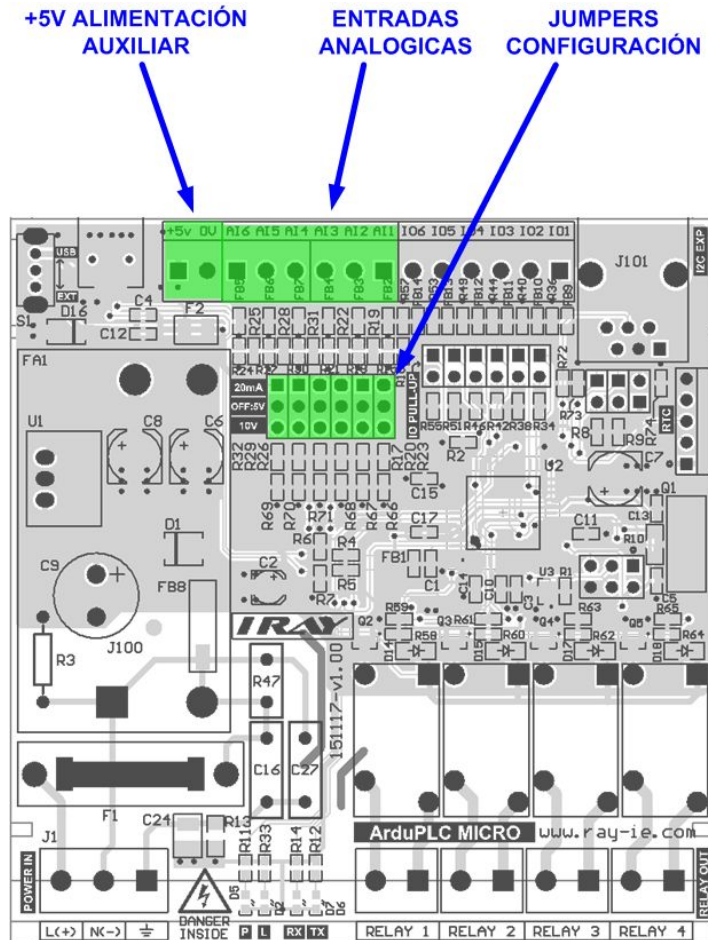


The switch, connected to channel 1, has the 4K7 terminal resistance activated. In this way, when the switch is turned off, the logic status of the input becomes high level or 5V. When the switch is closed, the logic state becomes low or 0V. Also the internal pull-up resistance of the microcontroller can be activated instead of the external resistance of 4K7 to create the same effect.

The DS28B20 digital temperature sensor uses the 1-WIRE bus, which requires a 4K7 pull-up resistor on the data bus. The data bus is connected to channel 3 and has its corresponding 4K7 terminal resistance activated. To power the sensor we can use the 5V auxiliary output.

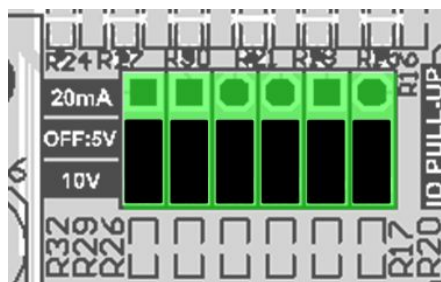
The PWM output is connected to channel 6. To use this channel as output, we disconnect the 4K7 terminal resistor.

7. Analogue Inputs

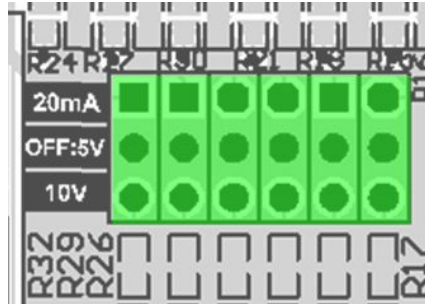


ArduPLC MICRO has 6 analog inputs that can be configured, independently, for one of the following ranges:

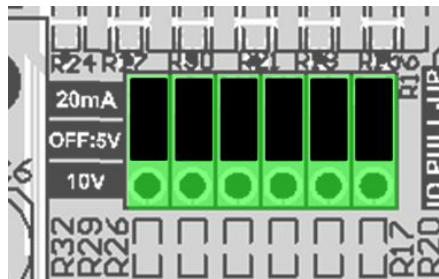
0-10V: jumper jumper as shown:



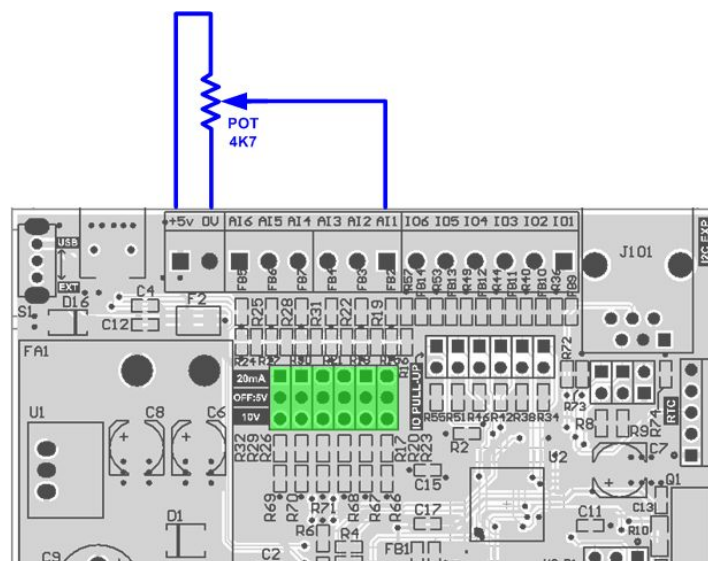
- 0-5V jumper jumper as shown:



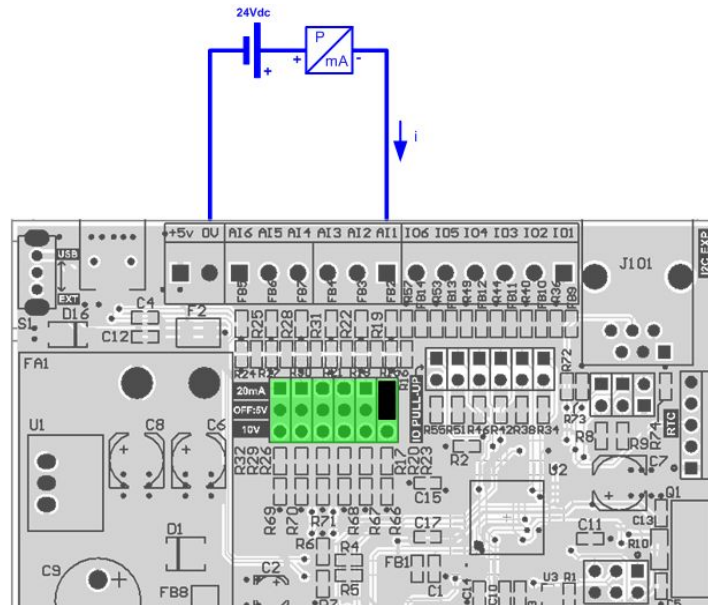
- 0-20mA: jumper jumper as shown:



The following is an example of a connection for an external potentiometer connected to 5V:



Connection example for a two-wire 4 / 20mA pressure transducer:

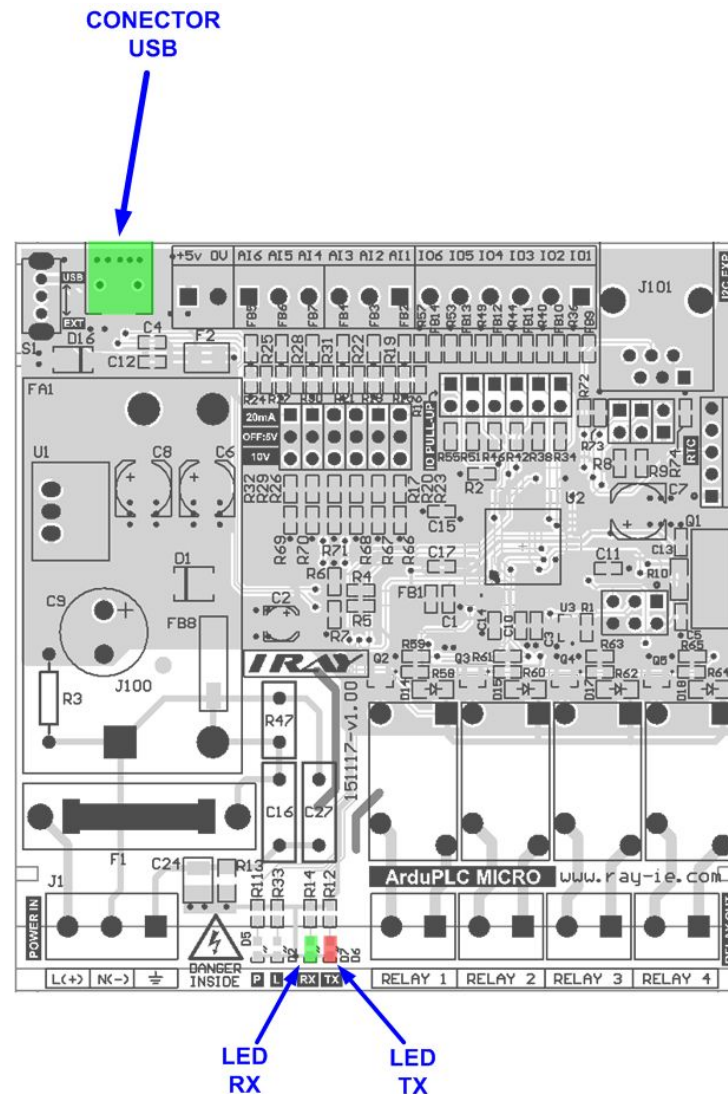


For the range 0 / 20mA, the digital conversion values are as follows:

Current	Converted Value
0 mA	0
4 mA	204
20 mA	1023

8. USB Port.

ArduPLC NANO has a Mini USB connected directly to the ATmega32U4 for programming purposes.

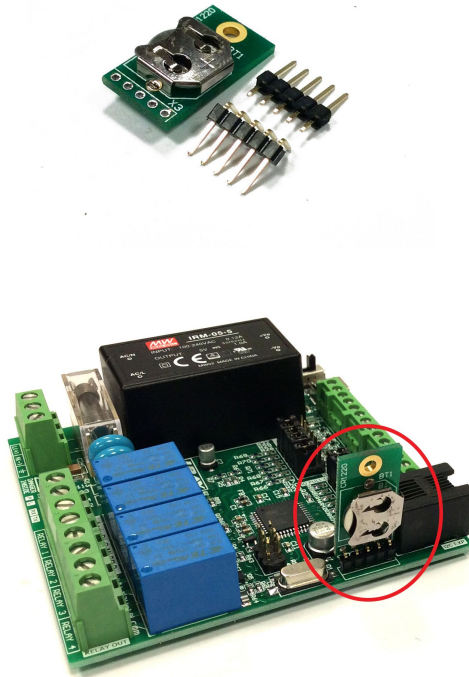


The RX and TX LED's show us the activity on the USB port.

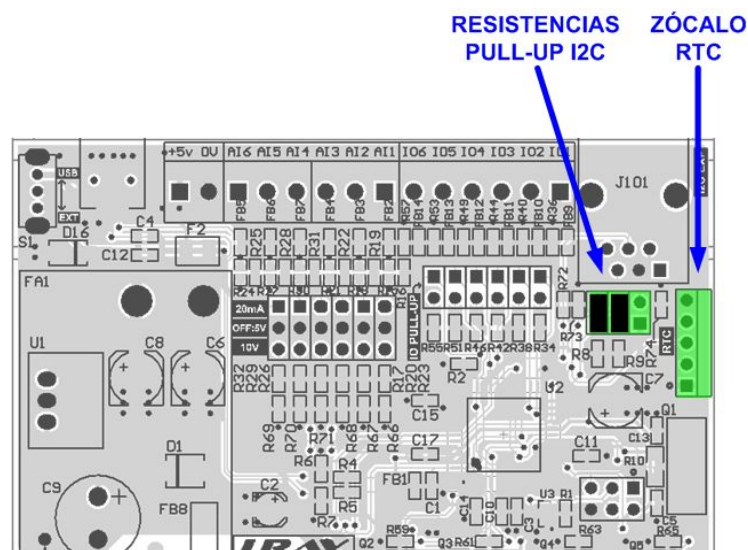
ArduPLC MICRO is delivered, by default, with bootloader loaded to program from the environment or Arduino IDE. (**NOTE:** Select "Arduino MICRO" board in the Arduino IDE environment.)

9. Socket for a RTC.

You can fit an RTC module to the ArduPLC NANO. To do this, solder the RTC module as shown below:

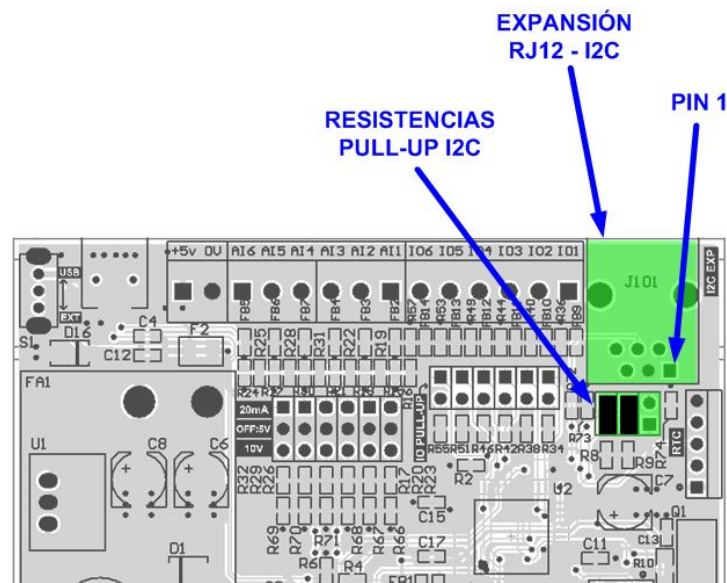


You must activate the pull-up resistors on the I2C bus for the correct operation of the RTC.



10. I2C Expansion Bus via RJ12.

ArduPLC MICRO facilitates the interconnection of other devices through the RJ12 expansion bus based on the I2C protocol.



In this connector we find:

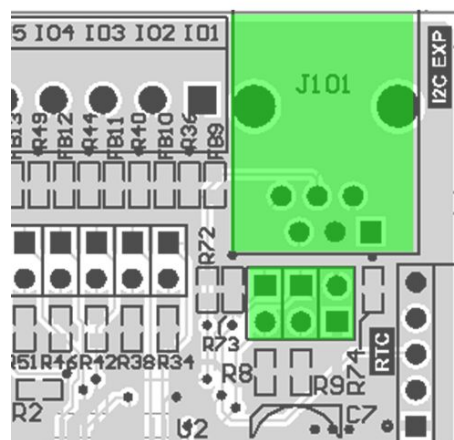
- I2C bus signals.
- 5VDC and 24VDC (the later is not available in the ArduPLC NANO AC version).
- DREADY interrupt signal.

Depending on the case, you may be interested in deactivating any of these lines such as power lines so they do not have conflicts with other devices that use the I2C bus. For example, if you interconnect two modules together, one of them must have the bus power disconnected. You also have to keep in mind that there can only be one PULL-UP resistor on the entire bus, deactivating the remaining ones.

RJ12 I2C Bus Pinouts:

PIN RJ12	Function
1	+24VDC (not available on AC model)
2	+5VDC
3	GND
4	DREADY
5	SCL
6	SDA

The connector configuration jumpers are listed below, from left to right:



- SDA PULL-UP: on/off pull-up resistor
- SCL PULL-UP: on/off pull-up resistor
- +5ON: 5VDC power on/off.
- +24ON: 24VDC power on/off (not available on AC model)

11. Technical Specifications..

DC Model Power Supply Range: 6.5 a 30 VDC

AC Model Power Supply Range: 90 a 260 VAC, 50-60Hz

Reverse polarity Protection (DC Model)

Surge Protection on digital inputs and USB port

Current Consumption @ 24VDC (typical): 15mA (0.4W)

Current Consumption @ 24VDC (max): 100mA (2.4W)

Current Consumption @ 230VAC (typical): 10mA (2.3W)

Current Consumption @ 230VAC (Max): 30mA (6.9W)

5V Aux Maximum current supply: 100mA

Relay Contact Current (Max): 5A

Relay Contact Voltage: 250VAC / 30VDC

Relay Maximum Power: 1250VA, 500W

Operating Temperature Range: -10 a 60 °C

Width: 88 mm

length: 90 mm

Height: 58 mm

Weight: 200 g.