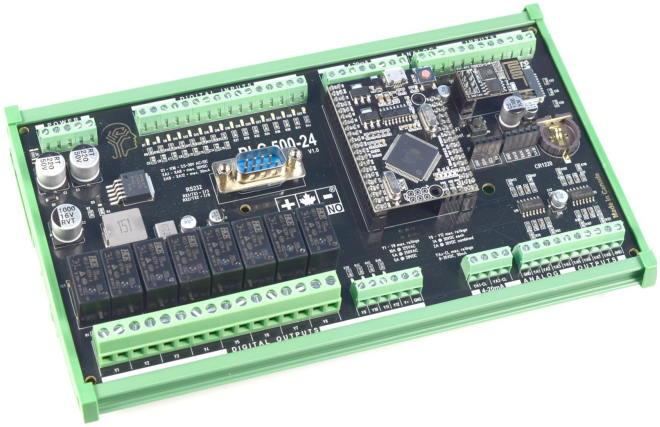
CANADUINO® PLC 500-24 and 500-AC V1.0



CANADUINO® PLC 500 is a loaded, industrial grade, programmable logic controller module.

CANADUINO® PLC 500 is available in versions for 11-35V DC and 100-240V AC supply.

CANADUINO® PLC 500 features analog and digital inputs and outputs, 0-10V analog capabilities, 4-20mA current loop capabilities, a memory card slot, battery backed real-time-clock, RS232 and Wi-Fi connection.

CANADUINO® PLC 500 includes a Wi-Fi module ESP-01S from AI-Thinker and a fully Arduino compatible MCU module with Atmega2560. It can be programmed with the same tools as an Arduino MEGA2560.

CANADUINO® PLC 500 is fully supported by the programming software "Visuino" from Mitov Software which offers a graphical interface without the need of writing any code. A limited license is included with every PLC 500. *

CANADUINO® PLC 500 features: **

- ✓ 8 digital inputs 3.5-30V AC or DC
- ✓ 8 digital inputs 3.5-30V DC only
- ✓ 8 analog 0-10V inputs (10 bit)
- ✓ 4 current loop inputs 4-20mA
- ✓ 4 GPIO 0-5V analog or 5V digital
- ✓ 8 relay outputs up to 10A
- ✓ 4 digital open-collector outputs
- ✓ 8 analog 0-10V outputs (8 bit)
- ✓ 2 current loop outputs 4-20mA
- ✓ I2C bus (5V) for sensors etc.
- ✓ Real-Time-Clock with battery backup
- ✓ Micro-SD card slot max. 32GB
- ✓ ESP-8266 Wi-Fi module (2.4GHz)
- ✓ 2 RS232 interfaces for HMI etc.
- ✓ Optional 35mm DIN-Rail mount

* Will become available for download later.

** Applies to the MEGA2560 MCU module. Alternative modules can have different specifications.

Order information:			
	CANADUINO® PLC 500-AC	EAN 4260474038800	SKU 26880
	CANADUINO® PLC 500-24	EAN 4260474037827	SKU 26782
	DIN Rail Mount for PLC 500	EAN 4260474037889	SKU 26788
	AI-Thinker ESP-01S module	EAN 4260474035809	SKU 26580
	MEGA2560 Pro Mini module	EAN 4260474034208	SKU 26420

OVERVIEW

CANADUINO® PLC 500 is an All-In-One Programmable Logic Controller (PLC) module for home, hobby and light industrial applications. The module with dimensions of 107 x 200 mm is 2-sided SMD assembled and can be attached to a surface using M3 hardware (3.2mm mounting holes).

A mounting tray kit for 35mm standard DIN rail is available as option. It supports the installation in electrical cabinets, provides additional protection against accidental contact and electrical shock and helps avoiding damage to the PCB by improper use of fastener hardware. We highly recommend the tray for installations where a voltage of 40V or higher is present.

General Overview
This product was designed to offer a maximum on features in just one device and for the best possible value-for-money ratio. Therefore, it uses an Arduino IDE programmable, Arduino MEGA2560 compatible controller module in its standard configuration. The design of the circuitry allows for future upgrades of the processing module and the Wi-Fi module with custom designs or STM32 and ESP32 based modules that are currently in development.

Everyone who knows how to program an Arduino for reading and writing of ports, using libraries for RTC, memory card and ESP8266 module, and sending and receiving data with a serial connection, will be able to program the CANADUINO® PLC 500!

And for everyone who doesn't know how to program an Arduino, Visuino from Mitov Software provides an easy start to program the included MEGA2560 controller module using function blocks and connect them with a mouse click. But for more advanced programming, it is highly recommended to learn the Arduino programming language.

The Power Supply
We offer CANADUINO® PLC 500 with two different power supply versions. The model 500-24 is designed to work on any 10W (or bigger) DC power supply between 11 and 35 Volt. Therefore, it can be used in 12V and 24V environments. The model 500-AC comes with an enclosed, 10W AC/DC power supply on board that complies with UL1012, EN60950 and UL60950 safety standards. It will operate on 50/60Hz AC within 100 and 240V.

The Input Section
The module comes with 16 opto-isolated digital inputs, recognizing any AC or DC level of 3.5V or higher as HIGH signal, with a maximum input voltage of 30V AC or DC. Inputs 1 to 8 are equipped with low-pass filters and optimized for DC and 50/60Hz AC input voltage. Inputs 9 to 16 are AC and DC capable as well, but without low-pass filters. It is recommended to ad a software de-bounce to the latter if used with AC input signals. Otherwise, these inputs are the better choice for fast changing DC input signals.

Four current-loop inputs 4-20mA are mapped to the MEGA2560 analog inputs A8 to A11 and can operate on a maximum loop current of 22mA (equals about 6V across input terminals). The eight 0-10V analog inputs have a 30V over-voltage protection and are mapped to the MEGA2560 analog inputs A0 to A7. The remaining four analog input pins of the MCU are directly accessible on a 5-pin header (A12 to A15). **Caution:** These pins have no protection!

The Output Section

Eight relay outputs with normally-open contacts can switch loads of up to 10A @ 125V AC or up to 5A @ 250V AC or 28V DC. We selected relays with high current capability and short switching times (10/5ms on/off) for precisely timing and therefore, a greater range of possible applications.

To give you even more options, we added four open-collector digital outputs, capable of switching up to 1A @ 30V DC per single output (limit 2A combined). These outputs are equipped with suppression diodes on a common voltage input pin to drive inductive loads like solenoids or bigger relays (DC contactors).

The eight analog outputs provide 0-10V level for example for lighting dimmers or motor drivers.

The Real-Time-Clock and micro-SD Card Section

A must-have for timer-controlled processing or data-logging is a precisely RTC. We are using a DS3231 RTC chip with backup-battery to keep the time and to provide a calendar and alarm feature. The DS3231 is supported by several available libraries and code examples.

The RTC, together with the memory card capability (micro-SD card up to 32GB), is the perfect base for on-board event logging with time stamps.

The Wi-Fi module ESP-01S

It is probably the cheapest and most used Wi-Fi module in the world, featuring Espressif's ESP8266 SoC. The module is pre-programmed with a firmware that can receive and execute AT-commands through a serial connection. The Wi-Fi module can send any kind of data like port statuses or analog port readings to a client in a local network or over the internet.

Other Options

We integrated two COM ports for the communication with computers, printers, scales, telephone modems, HMI displays or any other equipment with RS232 serial connection.

The internal I2C bus that connects the RTC chip to the MCU is accessible on a 4-pin connector and can be used to connect other I2C hardware like, for example, an OLED or LCD. Four unused analog input ports, directly connected to the MCU chip, can also be accessed (5-pin connector). These analog inputs and the I2C bus have no protection at all!
Be extremely careful and make sure you know exactly what you are doing when using them.

COMMISSIONING

The PLC mainboard is completely assembled and doesn't need any further preparation. The MEGA2560 MCU module comes with its pin headers not factory assembled and requires soldering.

For safety reasons, the module should only be operated when mounted to the (optional) DIN rail mounting tray. This applies especially to the AC version connected to line voltage and when higher voltage is connected to the relay outputs. We highly recommend using the low-voltage DC version together with the mounting tray as well. It helps avoiding accidental shorts or other damages to the module.

Before mounting the PLC module to its desired location, remove the MCU module and the Wi-Fi module, and make sure nothing is connected to input and output terminals. After mounting, connect a matching power supply to the PLC module and check the output voltage on 9V and 10V screw terminals. If this test is successful, disconnect power and install the MCU module, the Wi-Fi module, a memory card (if needed for your application) and the backup battery.

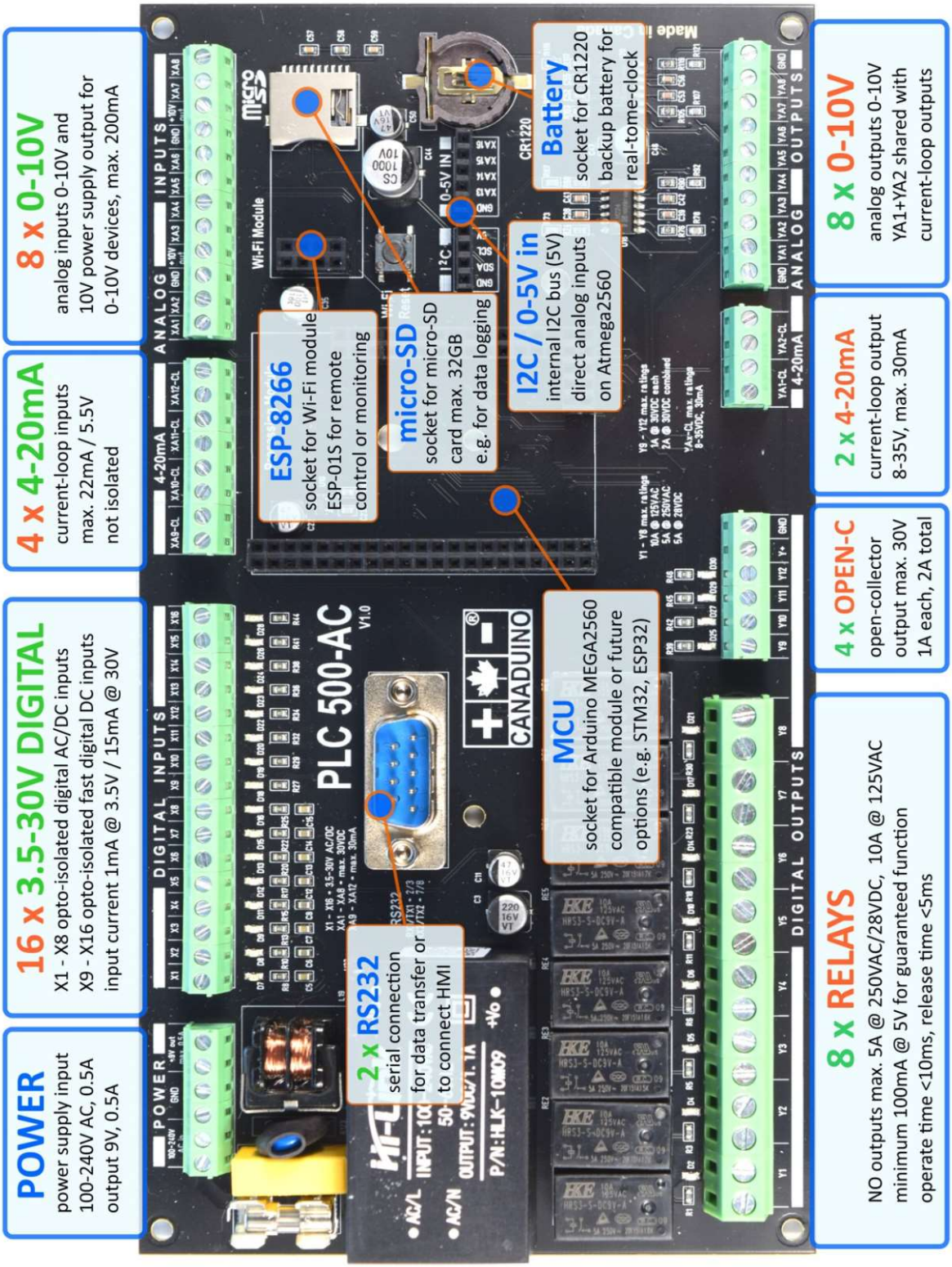
Power it on again and perform the same test as before, still with nothing connected to the module. After the test, disconnect the power supply again.

Now it is time to connect inputs and outputs and load your program to the MCU module. The MCU module can be programmed using the 5V USB power supply from the host computer even when it is attached to the PLC module.

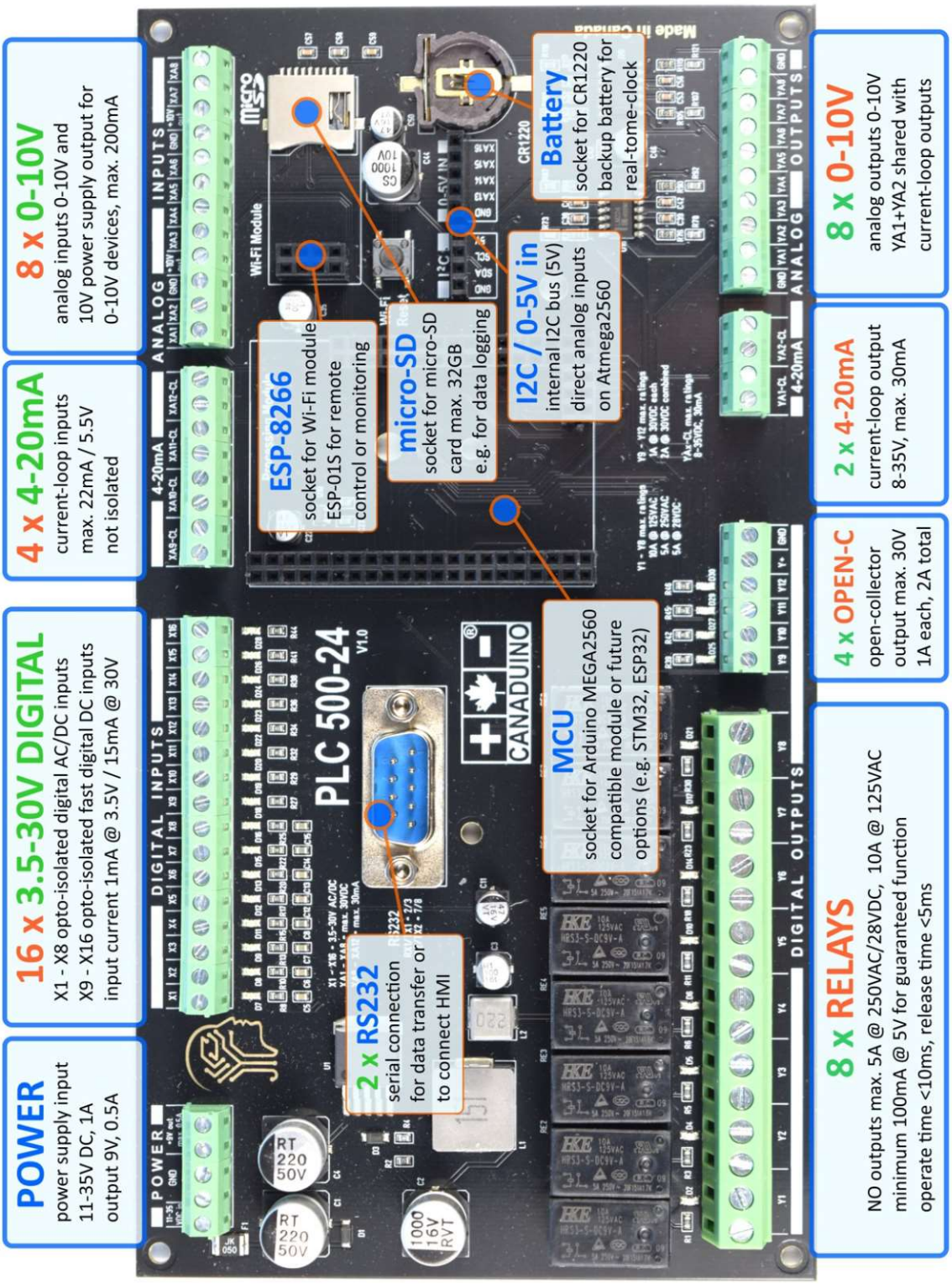
IMPORTANT: Make sure you have sufficient protection (e.g., fuse, current limiter) for the digital outputs (relays and open-collector) in place. Missing or wrong protection can cause damage to the PLC module in the event of an overload or short on one of the outputs.

DISCLAIMER: This product is a module to be integrated into electrical installations by professionals with the necessary knowledge and experience about the safe installation of electrical equipment. The one installing and operating this product must possess the necessary understanding, training, and skills about electronics, schematics, soldering, programming and troubleshooting. We can't be held responsible if a project that incorporates our products does not work as expected. We also can't be held responsible for damages, malfunction, injuries, fire, burns, or other results that may occur with the incorrect or correct use of our products.

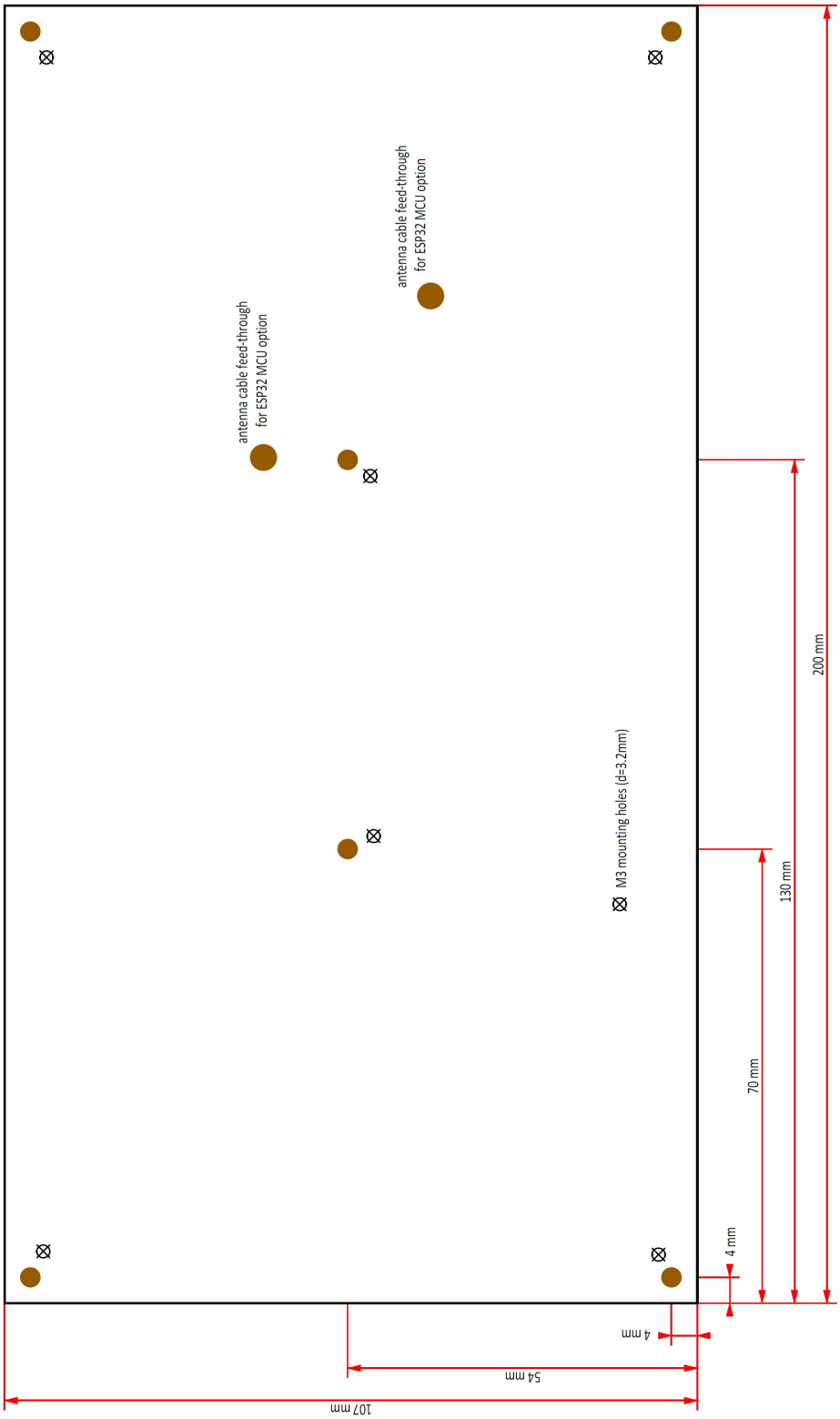
Note:
This document covers basic aspects and only contains information available on the day of its first creation. Please check UNIVERSAL-SOLDER website for updated and additional information or downloads. This document might not be updated with every new information.



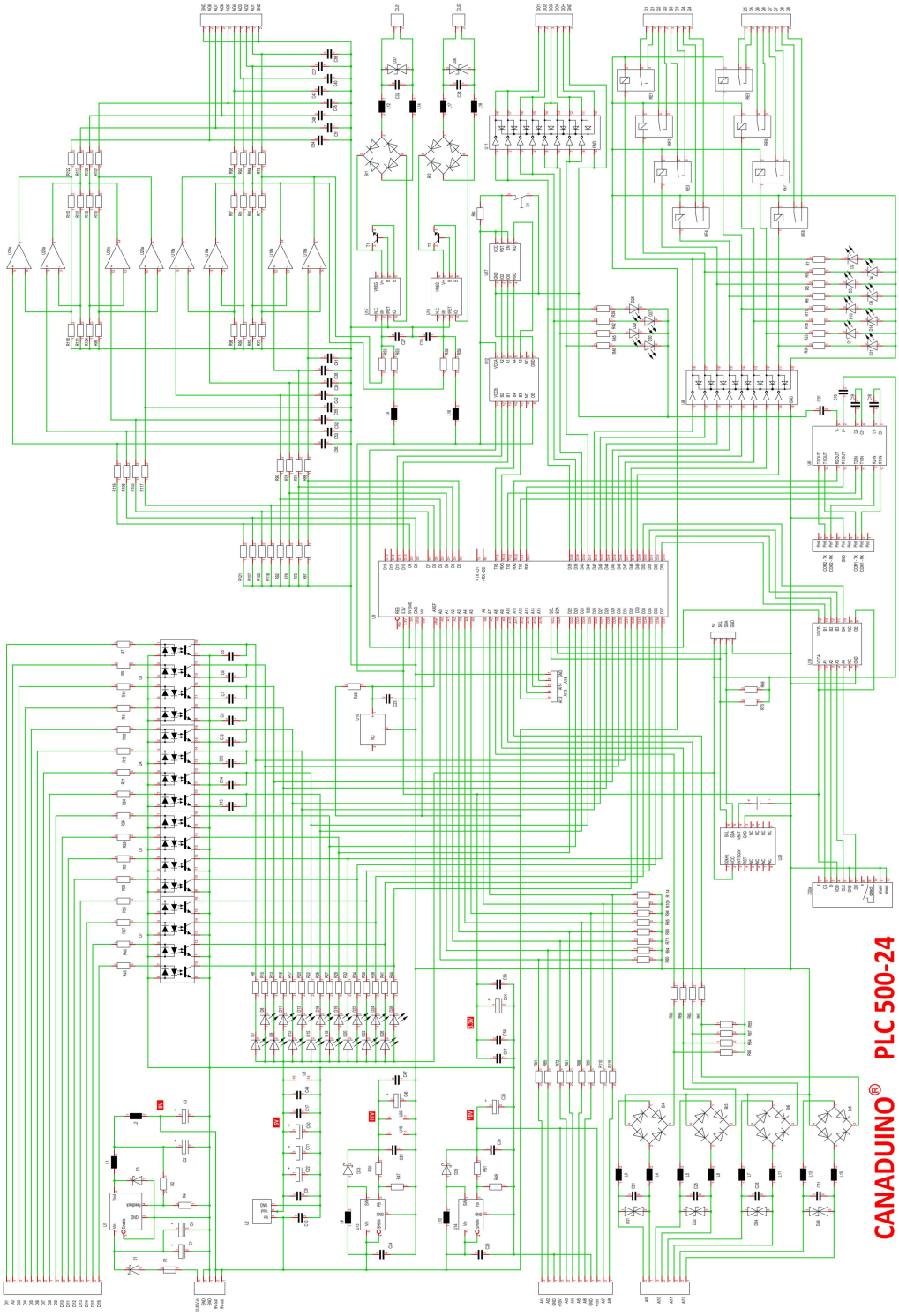
CANADUINO® PLC 500-AC Features and Connections



CANADUINO® PLC 500-24 Features and Connections



CANADUINO® PLC 500 Series Dimensions



CANADUINO® PLC 500-24 Schematic