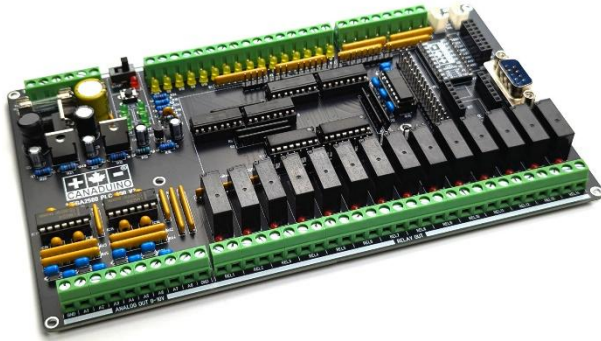


CANADUINO MEGA2560 PLC-300 V2 DIY Soldering Kit



This Kit offers a very affordable opportunity to add a programmable logic controller to many kinds of projects and machines like lighting, HVAC, greenhouses, water treatment or smoke houses. It can help you control your Halloween decoration or your manufacturing equipment.

CANADUINO MEGA2560 PLC-300 V2 is built around an Arduino MEGA2560 compatible module and can be programmed using Arduino IDE. We highly recommend Mitov's "Visuino" visual programming tool.

CANADUINO MEGA2560 PLC-300 V2 fits a small budget but delivers power and versatility equal to 10x more expensive professional process control devices.

MEGA2560 PLC-300 V2 features:

- ✓ 8 analog 0-10V inputs (10-bit res.)
- ✓ 8 analog inputs or GPIO (0-5V)
- ✓ 8 analog 0-10V outputs (8-bit res.)
- ✓ Dual I2C "Grove" interface 3.3V & 5V
- ✓ 16 digital 3.3V to 24V DC inputs
- ✓ 14 digital 250V/5A relay outputs
- ✓ Dual RS232 ports
- ✓ SPI interface 3.3V (4-wire)

INTRODUCTION

The CANADUINO MEGA2560 PLC-300 V2 is a Do-It-Yourself soldering kit comprising only through-hole components that can be assembled using basic electronic tools (electronics soldering iron, lead cutter, and multimeter).

The kit features 16 opto-isolated digital inputs, which will recognize any DC voltage >3V as HIGH level. The maximum continuous input voltage on these pins must not exceed 26V. The input current varies, depending on the input voltage, between 1.5 and 15mA. The digital inputs can withstand over voltage of max. +40V for no longer than 1s, or continuous negative voltage of max. -5V.

Digital output control is handled by 14 fast-acting OMRON G5NB-1A-E relays, featuring approximately 10ms operate and release times, along with high-capacity contacts. These relays can handle loads up to 5A at either 250V AC or 30V DC.



The analog inputs and outputs are accessible via screw terminals and are designed for standard 0-10V operation, making them ideal for controlling light dimmers, motor drivers, and similar devices.

To facilitate analog control, the board provides a dedicated 10V output terminal, perfect for powering potentiometers or light dimmers to generate analog input signals. This output is protected by a self-resetting 100mA fuse. A separate, 5V terminal is available to power auxiliary devices such as sensors or displays with up to 1A. This 5V rail also supplies other parts of the PLC and higher loads than 1A will cause malfunction of the entire system. We recommend using an external, fast-acting 500mA fuse (or <350mA poly-fuse) on this pin.

While the analog inputs and outputs are not electrically isolated, the main analog inputs are protected against voltages up to 30V DC (positive or negative). The board also features 8 additional analog inputs available on the AUX connector (2x8 pin female header), which connect directly to the ATmega2560's analog inputs A8 through A15. These additional inputs, while lacking protective circuitry, can alternatively be configured as standard 5V-level digital I/O ports.

The ATmega2560's native 2-wire serial interface (I2C) is available on two Grove-type connectors, providing options for both 3.3V and 5V devices. The microcontroller's SPI port (Arduino pins D50 to D53) is level-converted to 3.3V and accessible via the AUX header, enabling connections to external devices such as graphic displays, real-time clock modules, or memory cards.

Communication capabilities include dual RS232 ports supporting transmission speeds up to 115.2kbps. Both ports share a single D-Sub 9-pin male connector, allowing the PLC to interface with various devices including industrial machinery, frequency motor drives, computers, and HMI terminals.

Power requirements for the PLC module are 12-24V DC (maximum 26V), with current consumption not exceeding 400mA during normal operation (all relays activated, no external devices connected). A slow-blow fuse rated at 800mA protects the entire device from overcurrent conditions.

The kit comes equipped with robust screw terminals featuring rising cage clamp contacts, ensuring reliable connections with both solid and flexible wires from AWG 26 to AWG 14 (0.13-1.6mm²). For mounting flexibility, the board includes 3.2mm diameter mounting holes in all four corners plus two additional holes in the middle, compatible with M3 standoffs or spacers.

For industrial installations, an optional DIN rail mounting tray measuring 212 x 128mm is available, designed to securely attach to standard 35mm DIN rails.

ASSEMBLING

Assembling this kit requires electronic experience and fundamental skills. Before starting, ensure you are comfortable with reading schematics, identifying component values (through measurement or reading resistor color codes and component markings), and performing basic troubleshooting. You will need standard electronic tools: a temperature-controlled soldering iron, solder, side cutters (flush cutters), and a multimeter.

Component locations and values are clearly marked on the PCB and detailed in the provided schematic and parts list. Pay careful attention to component polarity and orientation:

- Integrated Circuits (and sockets, if used): Align the notch (marking pin 1) with the corresponding notch printed on the PCB
- Voltage Regulators (TO220 and TO92): Match the outline printed on the PCB
- LEDs: Match 'A' (longer lead, anode) and 'K' (shorter lead, cathode) markings. Note that in LED groups sharing the same orientation, polarity is marked only once
- Electrolytic Capacitors: The component has a marking on its negative side (shorter lead) whereas the PCB print indicates the positive side with a "+" (there goes the longer lead).
- Rectifier Diode D1: Align the cathode ring marking with the corresponding PCB marking

Assembling sequence and notes:

- Begin with the lowest-profile components: Resistors R7, 10, 12, 13, 15, 16, 20, 21, 23, 24, and 34.
- Proceed with the next taller parts, which are the IC sockets or ICs, LEDs, the reset button, and the resistor networks, followed by the 100nF and 2.2 μ F MLCC (capacitors) and the big diode D1. The tallest components - the relays and TO220 voltage regulators - should be assembled last.
- For proper alignment, first solder just one pin of each component (two opposite corner pins for ICs or sockets). Check alignment while components can still be adjusted, then complete all remaining connections.
- When installing resistor networks, locate pin 1 (marked with a square on the PCB) - this should be the leftmost pin when the text on the component is readable.
- For easiest assembly, insert a fuse into the fuse clips before soldering them to the board.
- Remember: Double-check all polarized components (electrolytic capacitors, diodes, ICs) before soldering to prevent damage during power-up.

Do not already install your Arduino and/or Xiao module!



COMMISSIONING

After performing visual testing for shorts or bad solder joints, apply a voltage of 12-24V DC to GND and the DC terminal. Check if all 4 power LEDs are shining bright and measure the 5V and 10V on the screw terminals. Measure the 3.3V and 5V on the AUX header. If everything looks good and the module does not draw more than 50mA, please turn the power supply off and push your Arduino MEGA 2560 board and, if available, your XIAO module into their sockets.

After powering it on again, the idle current should now be 50-100mA higher than it was before.

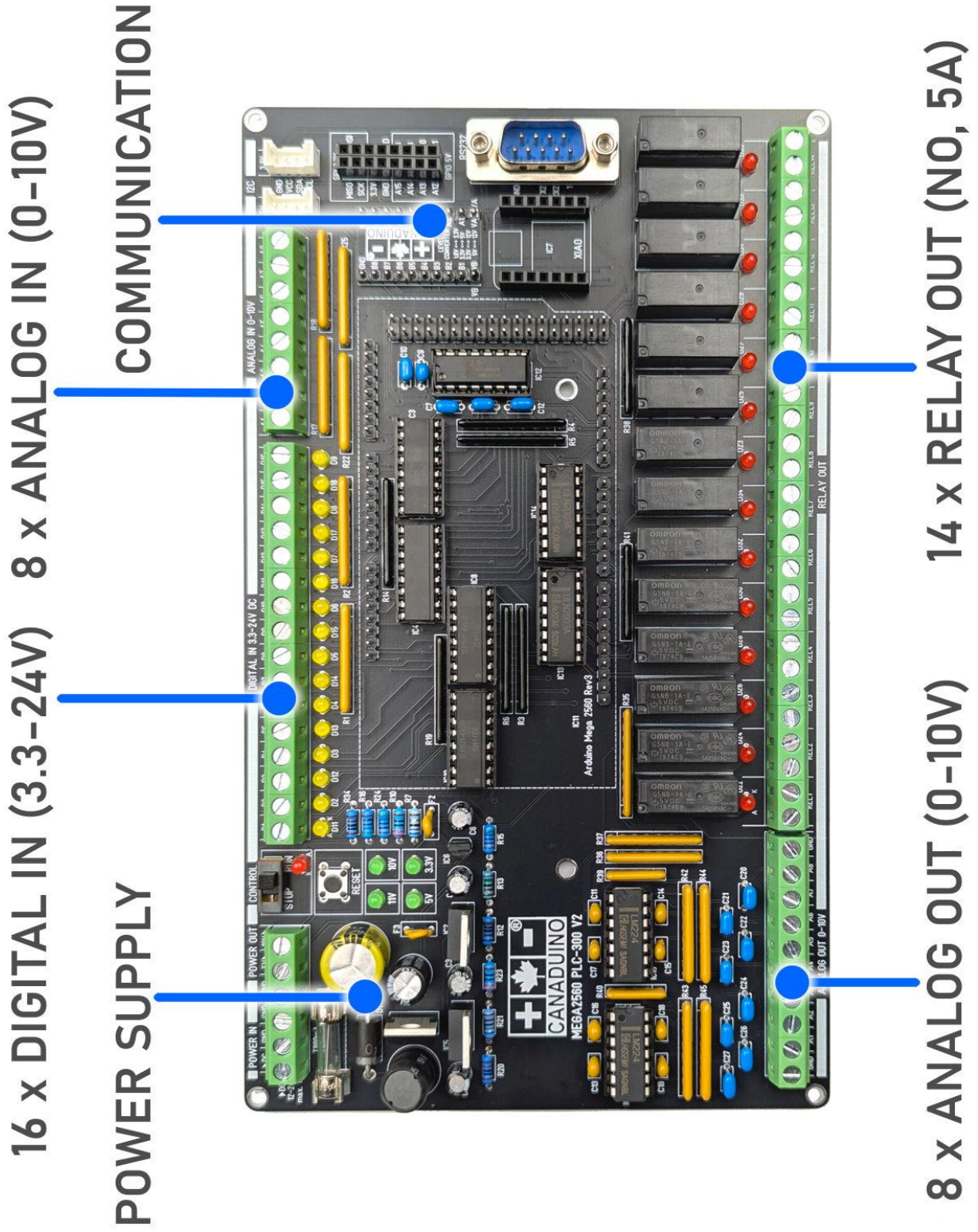
We recommend you check every input and the analog outputs with a voltmeter, to confirm the expected voltage levels. Connect every input D1 - D16 with a jumper wire to either the 5V or 10V supply output and see if the corresponding input LED will light up.

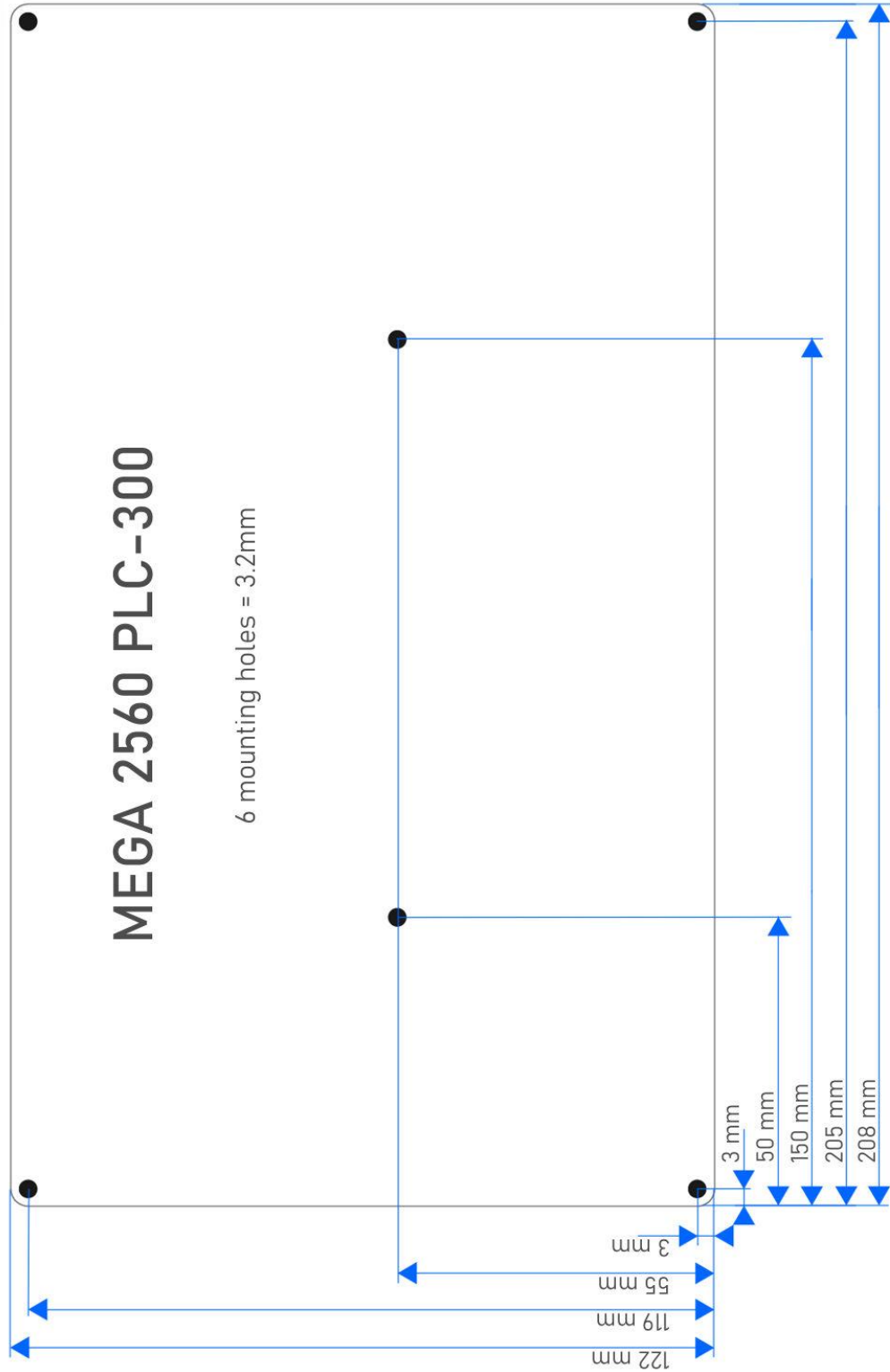
Arduino demo sketches, available on our website, can help you with the testing of all inputs and outputs, the RS232 ports, recognizing connected I2C devices, addressing input and output ports and sending serial communication.

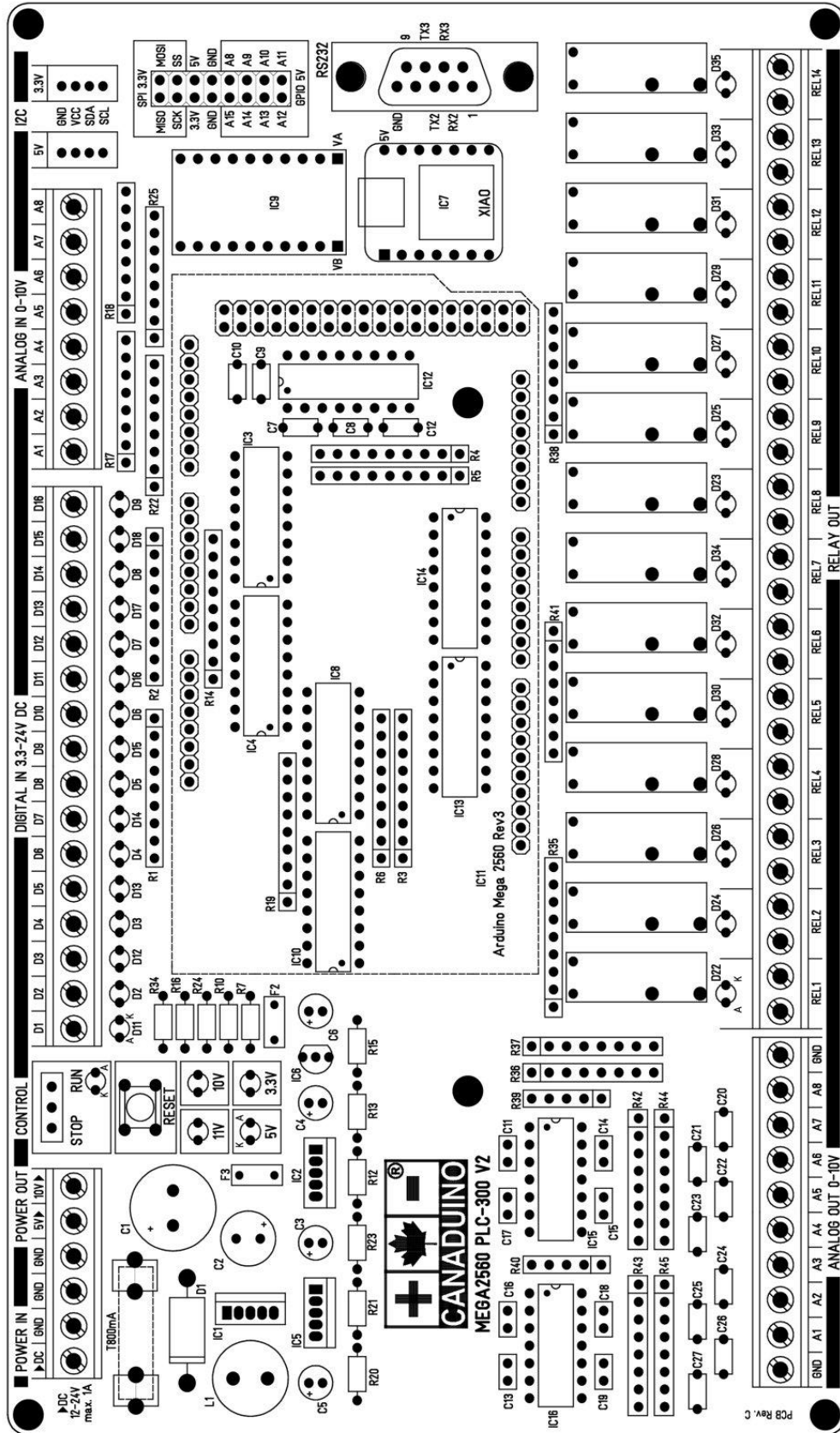
The schematic explains the functions thoroughly, and the port mapping, which is part of the schematic, gives you all information required to develop your program.

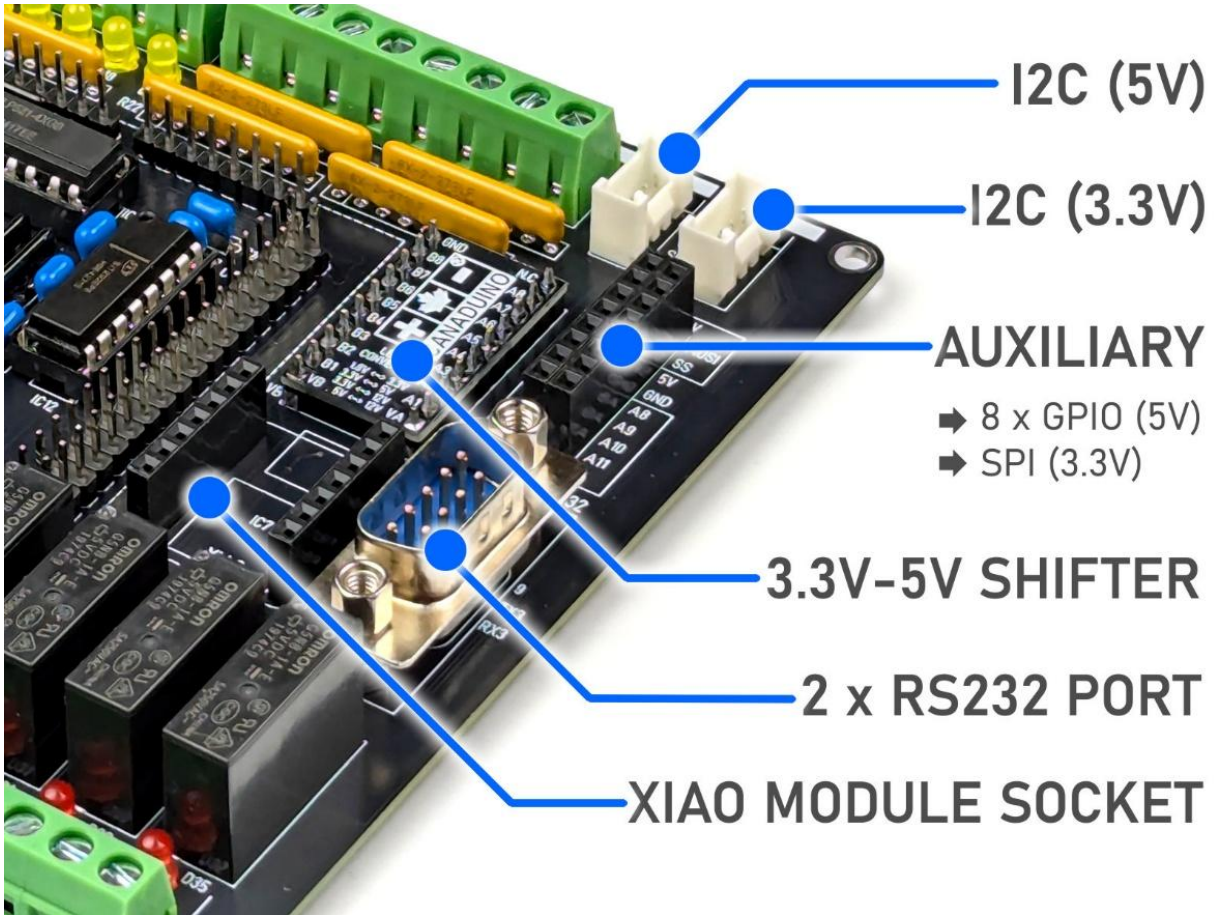
ORDER INFORMATION

PLC-300 DIY kit:	EAN 4260474039951
DIN rail mount:	EAN 4260474033997
MEGA2560:	EAN 4260474030736 and 4260474030439
XIAO modules:	see https://www.seeedstudio.com/xiao-series-page









QTY	Name	Value
1	C1	470 μ F >40V
8	C11,C13,C14,C15,C16,C17,C18,C19	100nF, 2.54mm
1	C2	470 μ F >10V
2	C3,C5	47 μ F >16V
2	C4,C6	10 μ F >10V
13	C7,C8,C9,C10,C12,C20,C21,C22,C23,C24,C25,C26,C27	2.2 μ F, 5.08mm
1	D1	SR360
4	D10,D19,D20,D36	LED 3mm green
16	D2,D3,D4,D5,D6,D7,D8,D9,D11,D12,D13,D14,D15,D16,D17,D18,	LED 3mm yellow
15	D21,D22,D23,D24,D25,D26,D27,D28,D29,D30,D31,D32,D33,D34,D35	LED 3mm red
2	F1	fuse holders
1	F1	5x20mm cartridge T800mA
1	F2	poly-fuse 200mA
1	F3	poly-fuse 100mA
1	IC1	LM2596T-5.0(XBLW)



1	IC12	SIT232EPE
2	IC13,IC14	ULN2003AP
2	IC15,IC16	LM224N
2	IC2,IC5	LM2941T
4	IC3,IC4,IC8,IC10	K847PH
1	IC6	H7333
1	IC9	CANADUINO level shifter
7	IC socket (not required)	DIP16
2	IC socket (not required)	DIP14
1	L1	33 μ H
2	R1,R2	8 x 1k (bussed, 9P)
2	R10,R23	220
3	R12,R20,R34	1k
1	R13	7.5k
2	R14,R19	8 x 47k (bussed, 9P)
3	R15,R16,R24	560
4	R17,R18,R22,R25	4 x 27k (isolated, 8P)
1	R21	6.8k
4	R3,R4,R5,R6	8 x 3.3k (bussed, 9P)
1	R35	8 x 22k (bussed, 9P)
2	R36,R37	4 x 10k (isolated, 8P)
2	R38,R41	7 x 1k (bussed, 8P)
2	R39,R40	4 x 22k (bussed, 5P)
2	R42,R43	4 x 22k (isolated, 8P)
2	R44,R45	4 x 330 (isolated, 8P)
1	R7	68
14	REL1,REL2,REL3,REL4,REL5,REL6,REL7,REL8,REL9,REL10,REL11,REL12,REL13,REL14	G5NB-1A-E-DC5V
1	S1	RUN switch
1	S2	RESET button
18	Terminal Block	5mm, 3P
7	Terminal Block	5mm, 2P
2	I2C connector	2mm, 4P
1	RS232 connector	D-Sub9M
2	Male pin strips (for MEGA 2560)	1x40P
1	Male pin strip (for MEGA 2560)	2x40P
1	Female header (AUX connector)	2x8P
2	Female header (for level shifter; use not recommended)	1x10P
2	Female header (for XIAO module)	1x7P