

Productivity® Open Overview

ProductivityOpen leverages the modern processing power of Arduino and the proven industrial value of the Productivity1000 input and output modules while making use of the wide variety of Arduino MKR form factor shields.

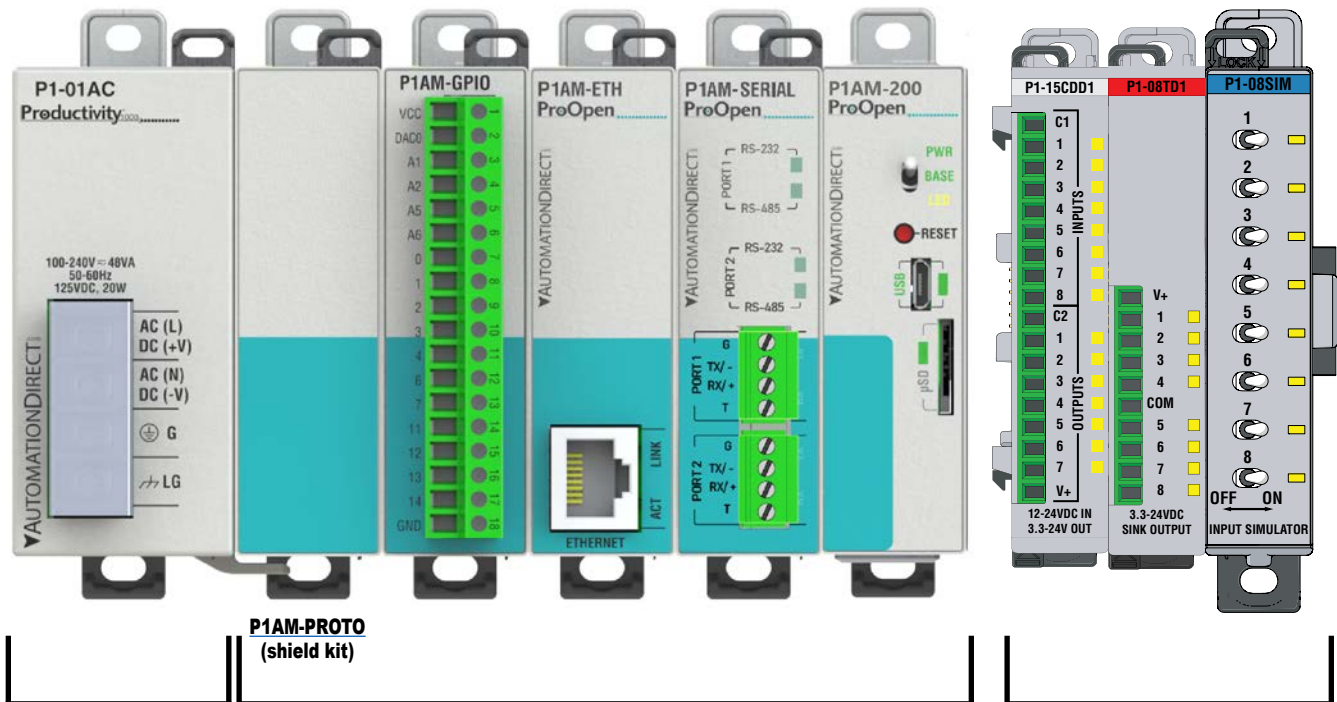
The P1AM-100 module is programmed with the Arduino IDE or ProductivityBlocks, an optional proprietary block programming environment. The P1AM-200 CPU is programmed with either the Arduino IDE or CircuitPython, using any IDE or text editor.

Features

- Supports Productivity1000 input and output modules
- Supports Arduino MKR form factor shields
- UL-listed CPU
- UL-listed ProductivityOpen branded shields



Productivity® Open Modules		
Part Number	Price	Description
P1AM-100	\$69.00	Arduino compatible CPU
P1AM-200	\$109.00	Arduino compatible CPU
P1AM-ETH	\$55.00	Ethernet shield
P1AM-SERIAL	\$55.00	Serial shield, RS-232 & RS-485
P1AM-GPIO	\$61.00	Extended I/O shield
P1AM-PROTO	\$44.50	Custom housing kit
P1AM-START1	\$288.00	Maker community start kit
P1AM-START2	\$223.00	Industrial community start kit



**Productivity1000
Power Supply**

**The power of Arduino in
ProductivityOpen.**

**Productivity1000
Industrial grade,
I/O Modules**

Productivity[®] Open Overview

Productivity1000 I/O Modules

A variety of discrete and analog I/O modules from our Productivity1000 line is available for use with the P1AM-100 and P1AM-200 CPUs.

Productivity1000 Discrete Modules

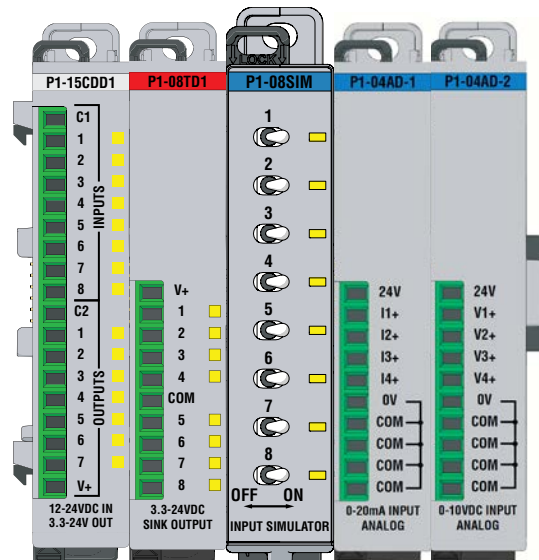
Part Number	Number of Inputs	Description
Input Modules		
<u>P1-08SIM</u>	8	Input Simulator Module
<u>P1-08ND3</u>	8	Sinking/Sourcing 12–24 VDC Input
<u>P1-08ND-TTL</u>	8	Sinking/Sourcing 3.3 - 5 VDC Input
<u>P1-16ND3</u>	16	Sinking/Sourcing 12–24 VDC Input
<u>P1-08NE3</u>	8	Sinking/Sourcing 24V AC/DC
<u>P1-16NE3</u>	16	Sinking/Sourcing 24V AC/DC
<u>P1-08NA</u>	8	AC Isolated 100–240 VAC
Output Modules		
	Number of Outputs	
<u>P1-08TD1</u>	8	Sinking DC Output
<u>P1-08TD2</u>	8	Sourcing DC Output
<u>P1-08TD-TTL</u>	8	Sourcing DC Output
<u>P1-15TD1</u>	15	Sinking DC Output
<u>P1-15TD2</u>	15	Sourcing DC Output
<u>P1-08TA</u>	8	AC Output
<u>P1-08TRS</u>	8	Isolated Relay Output
<u>P1-16TR</u>	16	Relay Output
Input/Output Modules		
	Inputs	Outputs
<u>P1-15CDD1</u>	8	7
<u>P1-15CDD2</u>	8	7
<u>P1-16CDR</u>	8	8

Productivity1000 Specialty Modules

Part Number	Description
Input Modules	
P1-04PWM	4 channels of sinking/sourcing 0–20 kHz, 0–100% duty cycle outputs
P1-02HSC	2 independent single-ended 5–24 VDC inputs that accept up to 100kHz of pulse/direction and quadrature signals and 2 5–24 VDC general-purpose high-speed inputs.

Productivity1000 Analog Modules

Part Number	Number of Inputs	Description	
Input Modules			
<u>P1-04AD</u>	4	Analog Input (Current/Voltage)	
<u>P1-04AD-1</u>	4	Analog Input (Current)	
<u>P1-04AD-2</u>	4	Analog Input (Voltage)	
<u>P1-04ADL-1</u>	4	Analog Input (Current)	
<u>P1-04ADL-2</u>	4	Analog Input (Voltage)	
<u>P1-08ADL-1</u>	8	Analog Input (Current)	
<u>P1-08ADL-2</u>	8	Analog Input (Voltage)	
<u>P1-04RTD</u>	4	RTD Input	
<u>P1-04THM</u>	4	Thermocouple Input	
<u>P1-04NTC</u>	4	Thermistor Input	
Output Modules			
	Number of Outputs		
<u>P1-04DAL-1</u>	4	Analog Output (Current)	
<u>P1-04DAL-2</u>	4	Analog Output (Voltage)	
<u>P1-08DAL-1</u>	8	Analog Output (Current)	
<u>P1-08DAL-2</u>	8	Analog Output (Voltage)	
Input/Output Modules			
	Inputs	Outputs	
<u>P1-4ADL2DAL-1</u>	4	2	Analog Input/Analog Output (Current)
<u>P1-4ADL2DAL-2</u>	4	2	Analog Input/Analog Output (Voltage)



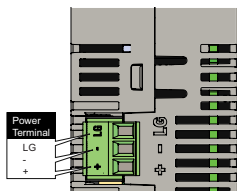
P1AM-200 Arduino Compatible CPU

P1AM-200 \$109.00

The P1AM-200 is an Arduino-compatible CPU. It uses the Atmel SAMD51P20 and can be programmed in C++ using the Arduino IDE or in CircuitPython using any text editor. It interfaces with all P1000 Series I/O modules connected to the right side and most Arduino MKR form factor shields connected to the left side.



P1AM-200



WARNING: Use only a P1000 power supply **OR** an external 24V power supply, not both simultaneously.



CPU Status Indicators	
PWR	Green LED is illuminated when power is ON
BASE	Green LED is illuminated when BASE controller is powered and has been initialized
LED	Yellow LED is illuminated when commanded by user program. LED can be referred to as LED_BUILTIN or Pin 32.

User Specifications

User Memory	1MB Internal flash with 16Kb used for bootloader. 16MB External QSPI Flash; 2Kb EEPROM
Memory Type	Flash: 1MB; SRAM: 256Kb; QSPI Flash: 16MB; EEPROM: 2Kb
Base Controller and I/O Power Requirement ¹	24VDC $\pm 2\%$ Plan 1.25 W per P1000 I/O module @ 0.5 W for the SAMD chip and base controller @ 9W for max. header power draw
Recommended Fuse (External)	Edison S5061-R, Time Delay, 1A fuse For 9-15 modules: Edison S506-R, Time Delay, 2A fuse
Peripherals	MicroB USB, Arduino MKR-compatible, microSD card slot for data logging (32GB max), User controlled neopixel LED
Hardware Limits of System ²	15 Productivity1000 I/O Modules; Arduino MKR shields
Programming	Programmed in C/C++ with the Arduino IDE or CircuitPython with a text editor.

¹ If you do not use a Productivity1000 power supply (P1-01AC, P1-02AC, or P1-01DC), then use a power supply that has transformer isolation. Use independent 24VDC supplies for the CPU and inductive loads to keep the CPU power clean and free of voltage spikes caused by switching solenoids, motors and relay coils.

² See "MKR Expansion Bus Pins" table and notes for shield power budget restrictions.

³ See Header Power Limitations in P1AM User Manual.

General Specifications

Operating Temperature	0° to 60°C (32° to 140°F)
Storage Temperature	-20° to 70°C (-4° to 158°F)
Humidity	5 to 95% (non-condensing)
Altitude	2,000 meters, max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Heat Dissipation	4W
Overvoltage Category	II
Enclosure Type	Open Equipment
Module Location	Productivity1000 I/O modules connect on the right side of module. Productivity1000 power supply, P1AM Shields and MKR Shields connect on the left side on the module.
Weight	82g (2.89 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada & USA; CE

* See CE Declaration of Conformance for details.

Toggle Switch Specifications

- Switch can be read using the "digitalRead" function.
- Switch can be referred to as "SWITCH_BUILTIN" or Pin 31.

P1AM-200 Arduino Compatible CPU



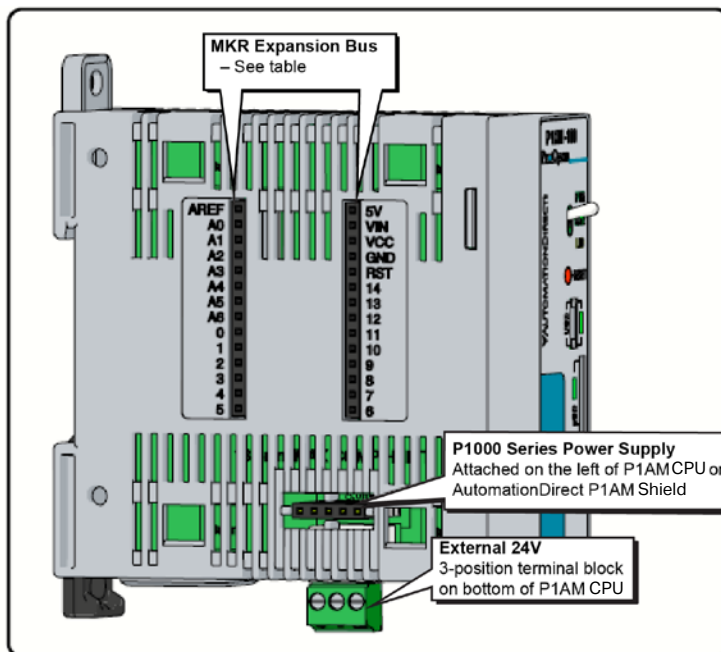
P1AM-200

Reset Switch Specifications

- Press once to manually reset code execution, the Base Controller, and all P1000 Series modules.
- Press twice quickly to put the P1AM CPU into bootloader mode.

Neopixel Specifications

- Neopixel compatible single-wire LED.
- NEOPIXEL_PIN or Digital pin 49 (Arduino), board.NEOPIXEL (CircuitPython)



P1AM-200 Connector Bus View

MKR Expansion Bus Pins

GPIO	A0–A6, 0–14
Analog Input Pins	A0–A6
Analog Output Pins	A0
PWM Pins	0–8, 10, A3, A4
Interrupt Pins	0, 1, 4–8, A1, A2
5V	5V supply output
Vin	5V regulated supply
VCC	3.3 V supply output
GND	Ground
RST	Reset
AREF	Analog Input Reference

Critical Notes:

Pins A3, A4, and 8–10 are used for the base controller.
Do not exceed 46mA combined from pins 0, 1, and 4–10.
Do not exceed 3.3 V on any I/O pin.
Do not exceed 7mA on any I/O pin.
Do not apply power to 5V or VCC



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