GET MORE THAN YOU PAY FOR... from AUTOMATIONDIRECT.com

Product Focus: Programmable Logic Controllers
What can a PLC do for you?

Programmable Logic Controllers (PLCs) have been around for over 50 years and have become the go-to control choice for automation projects worldwide. Used in a multitude of applications including assembly line control, food processing and packaging, luxury yacht automation, and even amusement park rides, PLCs are everywhere. The benefits provided by today’s low-cost PLCs (CLICK PLCs start at $69) easily outweigh their expense, making them a must-have for modern-day production processes.

**PLC Benefits**

1. **Utmost flexibility:** PLCs have high processing speeds and can carry out complex functions including arithmetic, pulse tracking, condition monitoring, etc. They can also manage many inputs and outputs simultaneously, allowing one PLC to control and monitor many processes at once. Many changes needed to the process can be handled via the software, requiring no rewiring of components.

2. **Longer life and reliability:** PLCs are designed to handle the harsh industrial world and are constructed with solid state components, so there are no moving parts that can wear out over time and fail.

3. **Easier troubleshooting:** PLCs provide many diagnostic tools to help isolate malfunctions quickly, and replacing parts is much less time consuming than systems with hard wired control.

4. **Less real estate required:** PLCs have become more compact with many micro versions available today. The smaller form factors free up a lot of panel space compared to older control systems.

5. **Energy savings:** Modern-day PLCs consume a fraction of the energy required by their electromechanical relay control counterparts.
**DISCRETE SENSING**
- Proximity
- Photoelectric
- Laser
- High speed
- Encoders
- Limit switches

**PROCESS SENSING**
- Temperature
- Pressure
- Level
- Flow

**MOTION CONTROL**
- Stepper systems
- Servo systems
- Linear motion

**OPERATOR INTERFACE**
- HMI
- SCADA
- Marquees/message displays

**MOTORS/DRIVES**
- AC motors
- DC motors
- Drives
- Soft starters

**PNEUMATICS**
- Cylinders
- Valves
- Rotary actuators
- Grippers

**PILOT DEVICES/INDICATORS**
- Pushbuttons/E-stops
- Indicators/stacklights
- Selector switches
- Audio signal devices

www.AutomationDirect.com 1-800-633-0405
As with any engineering decision, it’s always best to put it on paper first to see the “big picture.” The same holds true when choosing the most effective controller for your application. This choice depends on a number of factors and the following steps serve as a checklist of things to consider when determining programmable logic controller requirements. Listed are the most important areas to consider when choosing a control system and can help determine your system needs.

**Step 1. Proposed System**
Determine whether your system is new or existing. Will your system be installed from scratch or are there existing products already installed? The rest of your system will need to be compatible with new components.

*Why this is important:*
Certain controller products may not be compatible with others. Making sure your existing products are compatible with any new products you are researching will save you time and money.

**Step 2. Environmental Issues**
Consider any environmental issues that will affect your application (temperature, dust, vibration, codes specific to your facility, etc.).

*Why this is important:*
Certain environments may affect the operation of a controller. For example, typical controllers have an operating temperature of 0-55 degrees Celsius (32-130 degrees F). If your application will include any extreme environmental conditions, or you have specific codes at your facility that must be met, you will need to either research products that meet those specifications or design the installation to meet requirements.

**Step 3. Discrete Devices**
Determine how many discrete devices your system will have and which types (AC, DC, etc.) are needed.

*Why this is important:*
The number and type of devices your system will include is directly linked to the amount of I/O that will be necessary for your system. You will need to choose a controller that supports your I/O count requirements and has modules that support your signal types.

**Step 4. Analog Devices**
Determine how many analog devices your system will have and which types (voltage, current, temperature, etc.) are needed.

*Why this is important:*
The number and type of devices your system will include is directly linked to the amount of I/O that will be necessary for your system. You will need to choose a controller that supports your I/O count requirements and has modules that support your signal types.

**Step 5. Specialty Modules or Features**
Determine whether your system will require any specialty features. Will your application require high-speed counting or positioning? What about data logging, a real-time clock, or other specialty feature?

*Why this is important:*
Specialty functions are not necessarily available in all controller CPUs or in standard I/O modules. Understanding the special functions your system may perform will help you determine which CPU to choose and whether or not you will need to purchase additional specialty modules.
Step 6. CPU Requirements
Determine the type of CPU you will need. How much memory will your system require? How many devices will your system have (determines data memory)? How large is your program estimated to be, and what types of instructions will your program include (determines program memory)? How fast a scan time do you need?

Why this is important:
Data memory refers to the amount of memory needed for dynamic data manipulation and storage in the system. For example, counter and timer instructions typically use data memory to store setpoints, current values, and other internal flags. If the application requires historical data retention, such as measured device values over a long period of time, the size of the data tables required may determine the CPU model you choose.

Program memory is the amount of memory needed to store the sequence of program instructions that have been selected to perform the application. Each type of instruction requires a specific amount of program memory. Applications that are basically sequential in nature can rely on the I/O device rule of thumb to estimate program memory (5 words of program memory for each discrete device and 25 words for each analog device); complex applications will be more difficult to judge.

If scan time is important in your application, consider the CPU processor speed as well as instruction execution speed. Some CPUs are faster at Boolean logic but slower with data handling instructions. If special functions such as PID are required, the CPU you select may make those functions easier to perform.

Step 7. I/O Locations
Determine where your I/O will be located. Will your system require only local I/O, or both local and remote I/O locations?

Why this is important:
If subsystems will be needed at long distances from the CPU, you will need a controller that supports remote I/O. You will also have to determine if the remote distances and speeds supported will be adequate for your application. Ethernet-connected I/O hardware is becoming one of the more popular communication standards. This I/O may also be referred to as distributed I/O, and may require a particular protocol, such as Modbus.

Step 8. Communications
Determine your communication requirements. Will your system be communicating to other networks, systems or field devices?

Why this is important:
Communication ports (other than the programming port) are not always included with a controller. Knowing your system communication requirements will help you choose a CPU that supports your communication requirements, or additional communication modules if necessary.

Step 9. Programming
Determine your programming requirements: Does your application require only traditional programming instructions, or are special instructions necessary? Do you prefer fixed memory addressing or tag name based control? Which programming language are you accustomed to?

Why this is important:
Certain controllers may not support every type of instruction. You will need to choose a model that supports all instructions that you may need for a specific application. For example, built-in PID functions are much easier to use than writing your own code to perform closed-loop process control. Typical instructions such as timers, counters, etc., are available in most controllers. Also, many variations exist when it comes to the programming language (ladder logic, structured text, etc.) and memory addressing (fixed or tag name based). Choose the programming package that you are most comfortable with and that will offer the most ease-of-use when developing, troubleshooting and maintaining.

Something to Consider: Open-source Control
With the growing popularity of low-cost single-board controllers and the “Maker” communities that support them, it was only natural for them to find their way into the industrial realm. Off-the-shelf single-board controllers are intended for hobbyists and students but the automation industry needs an open-source controller that can handle extreme conditions. The ProductivityOpen controller (P1AM-100) is an industrial open-source controller designed for harsh environments that is programmed using C++ code for utmost controller customization.
Choosing the Right PLC for the Job

Once you have your control system specifications, it’s time to decide which PLC is right for the job. PLC suppliers are abundant in today’s industrial automation market. With so many choices, it can often get confusing as to which PLC will work best for your particular application. At AutomationDirect, we try to serve the controller needs of as many industrial automation professionals as possible. Therefore, we offer many PLC choices, each intended to fulfill a particular need or purpose.

FREE software and FREE Tech support!

The CLICK PLC family is ideal for everyday applications. The compact size and simplified programming make CLICK great for small systems and beginner projects.

CLICK PLCs
Basic PLC Unit starting at $85

#1 Value in Automation!
Do-more PLCs starting at $197

The Do-more PLC family has one of the most advanced instruction sets in the market and many other tools/features to help you tackle complex applications.

Productivity Series CPU starting at $180

The Productivity PLC family offers the utmost versatility in both hardware and software. This scalable PLC line will easily conform to large systems with tons of I/O or smaller/segmented systems using limited I/O. With tag name programming, device integration that includes GS drives, Protos X field I/O and others, and a few WOW factors, like onboard analog module data displays, Productivity PLCs are a perfect fit for almost any application.
SIMPLE CONTROL

The CLICK micro-brick PLC (starting at just $69.00, with FREE easy-to-use programming software) is by far the most practical PLC for the smallest of applications and the perfect tool for beginners.

CLICK PLCs are perfect for...
Beginner projects
Easy relay replacement
Small applications including:
  • Conveyor VFD speed control
  • Tank level control with pump switching
  • Sorting line diverter control
  • Simple pneumatic control
  • Lighting control
  • Home automation applications
Analog signal splitter applications
Process monitoring/remote visibility (remote I/O)
Streamlined PID control
Modbus RTU to TCP conversion
PLC unit starting at $69

CLICK PLCs STRONG POINTS:
  • Extreme value
  • Small size
  • Simplicity with low learning curve
  • Straightforward programming with 21 available instructions
  • Easily paired with C-more micro HMI

www.clickplcs.com
Simple instruction set

For over 30 years Vacuum Technology Incorporated has focused on developing practical, affordable, and custom-tailored solutions for industrial vacuum/leak testing applications worldwide.

“\textit{We found the CLICK PLC from AutomationDirect to be a reliable, easy-to-use, I/O interface for our machines. We replaced our bulky, aging, relay circuit boards and ribbon cable PC connections with smaller, more affordable, Ethernet-capable CLICK PLCs. Besides their PLCs, AutomationDirect’s fast, same-day shipping and easy ordering are an added plus for us.}”

- Jesus Chavez

www.vacuumtechnology.com

www.AutomationDirect.com 1-800-633-0405
ADVANCED CONTROL
(fixed memory addressing)

The Do-more! PLC control technology was developed to efficiently tackle complex applications. This PLC series, with its numerous hardware and software features, provides an extensive toolbox to help you master the most demanding projects.

Do more with advanced applications including:
- Waste water treatment
- Stepper/servo control systems
- Simple to mid-range motion control
- Electrical switchgear applications
- HVAC/chiller tower control
- Precision valve control
- Object positioning
- Building automation
- Bar code systems
IIoT/Big Data applications
Data logging
Protocol conversion
Modbus RTU to TCP conversion

Do-more BRX PLCs STRONG POINTS:
- Motion control
- Built-in high speed I/O
- PWM outputs
- Email with attachments
- Robust Instruction set
- Data file management
- MQTT(S)/HTTP(S)/FTP protocols
- Rest API
- Embedded webserver
- PLC simulator
- Security
- User-defined structures
- Embedded video help

www.do-more.com
James Catlett  
Plant Manager  
Chemence

"AutomationDirect's low prices and free support keep us coming back. Their automation products are exactly what we need to get the job done and the new BRX PLC, with its motion capabilities and built-in analog, is perfect for our packaging lines." - James Catlett

“AutomationDirect's low prices and free support keep us coming back. Their automation products are exactly what we need to get the job done and the new BRX PLC, with its motion capabilities and built-in analog, is perfect for our packaging lines.” - James Catlett

Chemence is the only industrial, consumer, and medical cyanoacrylate manufacturer in the US.
**Productivity Series**

**ADVANCED CONTROL**

*(tag name memory addressing)*

The Productivity family of PLCs is our most versatile family. Each series offers different I/O capacities but all use the same programming software, allowing you to easily scale your control hardware up or down depending on the application. The ProductivitySuite software provides versatile programming with tag name addressing that has no predefined memory structure.

Great for any application including:

- Waste water treatment
- Stepper/servo control systems
- Precision package tracking and sorting
- Bottling applications
- Electrical switchgear applications
- HVAC /chiller tower control
- Car wash systems
- Industrial oven control
- Communication-heavy or diverse applications

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**Productivity 1000**

- CPU only $204
  - 4 built-in comm ports: micro USB, Serial RS-485, Serial RS-232, Ethernet 10/100Mbps
  - Data logging up to 32GB on a microSD card (sold separately)
  - Slim, stackable, super compact design
  - Add up to 8 I/O modules for a total of 128 discrete I/O points or 32 analog I/O channels
  - Choose from spring clamp, screw terminal or the popular ZipLink wiring solution for your I/O wiring needs

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**Productivity 2000**

- CPU only $276
  - 5 built-in comm ports: (1) plug-and-play USB programming port, (1) general purpose Ethernet 10/100Mbps port, (1) remote I/O Ethernet 10/100Mbps port and (2) serial ports
  - Data logging up to 32GB on a microSD card (sold separately)
  - Programmable 4-line OLED message display on CPU for system status and tag data readouts
  - OLED displays on select analog modules for real-time, no meter required measurements
  - Up to 480 local I/O points and 4,320 total I/O through remote expansion
  - 29 discrete, analog and specialty I/O modules including high-speed

---

**Productivity 3000**

- CPU starting at only $589
  - Up to 7 built-in comm ports: USB programming port, micro USB, Serial RS-485, Serial RS-232, general purpose Ethernet 10/100Mbps port, remote I/O Ethernet 10/100Mbps
  - Programmable 4-line LCD message display on CPU for system status and tag data readouts
  - LCD displays on all analog modules
  - Support for local expansion and remote I/O bases, up to 59,840 I/O points
  - 39 discrete, analog and specialty I/O modules including high-speed
  - ABS certified

---

**Productivity PLCs STRONG POINTS:**

- Tag name memory
- Large I/O count
- Hot-swappable I/O modules
- Multiple built-in communication options
- ABS certified modules
- High level of integration
- Web server/mobile access
- Database sharing (great for SCADA/HMIs)
- Two-dimensional data arrays (sorting/tracking)
- Data displays
- Scalable hardware options

www.productivityplc.com

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www.AutomationDirect.com 1-800-633-0405
CTC Crushing, an IMPACT family company, supplies quality sand, gravel and specialty rock products to the Las Vegas and Boulder City, NV areas. They've been responsibly mining and crushing native rock for 20 years and are experts in aggregate production.

“We recently upgraded our entire plant from a hardwired, manually-controlled operation to a PLC-controlled one using the Productivity2000 and C-more HMI’s from AutomationDirect. These products have performed remarkably well in the quarry’s harsh environment and have provided the simplicity, reliability and efficiency we were looking for.” - Todd Timpa

www.impactsandandgravel.com

www.AutomationDirect.com 1-800-633-0405
Still unsure which PLC is for you? Let us help.

When it comes to deciding which one of our PLCs is the one for your application, we want to help. Our online interactive PLC selector tool can help get you on the right path to the right PLC. Simply choose the type and amount of I/O, the type of communication, and any hardware or software requirements. The tool will then display the suitable PLC families for your selections, along with overview videos, cost comparisons, and feature listings.

FREE online PLC selector: http://go2adc.com/select-plc

<table>
<thead>
<tr>
<th>Feature</th>
<th>Do-more BRX</th>
<th>Productivity2000</th>
<th>CLICK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion Control</td>
<td>✔ (250kHz pulse in/out with axis/coordinate control)</td>
<td>✔ (1MHz pulse in/out)</td>
<td>---</td>
</tr>
<tr>
<td>PID</td>
<td>✔ (with trend and auto-tuning)</td>
<td>✔ (with trend and auto-tuning)</td>
<td>✔ (with trend and auto-tuning)</td>
</tr>
<tr>
<td>Max PID Loops</td>
<td>Only limited by memory</td>
<td>Only limited by memory</td>
<td>8 loops</td>
</tr>
</tbody>
</table>

**Built-in Communications Ports**
- Up to 3 built-in (including PDM, interchanging port)
- RS232/485 serial port
- Optional Ethernet port, POM slot port options: USB, RS232, RS232 with flow control, RS422, RS485 or Ethernet

- 5 built-in: USB, RS-232, RS-485, Ethernet, Remote I/O
- With integrated GS drives, remote slaves and Prox X field I/O systems

- Up to 3 built-in: RS-232, RS-485 and/or Ethernet

**Built-in Port Speeds**
- Ethernet: 10/100 Mbps Serial: up to 115.2k baud
- Ethernet: 10/100 Mbps Serial: up to 115.2k baud
- Ethernet: 10/100 Mbps Serial: up to 115.2k baud

**Communications Protocols**
- Modbus RTU, Master/Slave, Modbus TCP, TCP/IP, EtherNet/IP, MQTT/AMQP, HTTP/HTTPS, FTP, SMTP, SNMP, DHCP, Ethernet remote I/O, K-sequence Slave
- Modbus RTU Master/Slave, Modbus TCP, ASCII In/Out, TCP/IP, UDP/IP, EtherNet/IP, Ethernet remote I/O, ProNET, Custom
- Modbus RTU Master/Slave, Modbus TCP, EtherNet/IP, ASCII In/Out

**Email**
- (allows data file attachments)
- (allows data file attachments)
- ---

**Data Displays**
- ---
- (CPU module status and patented Analog module data displays)
- ---

**Data Logging**
- (1MB Internal RAM + 32GB MicroSD option)
- (32GB MicroSD option)
- ---

**Data File Management**
- (12 specific instructions for file handling)
- ---
- ---

**Built-in Web Server/Mobile**
- ---
- ---
<table>
<thead>
<tr>
<th>Feature</th>
<th>Do-more BRX</th>
<th>Productivity2000</th>
<th>CLICK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built-in Web Server/Mobile Access</td>
<td>✓ (Web server)</td>
<td>✓ (Web server and mobile app)</td>
<td>---</td>
</tr>
<tr>
<td>Max Local Discrete/Analog I/O</td>
<td>292 discrete I/O points and 134 analog channels</td>
<td>480 discrete I/O points 240 analog channels</td>
<td>142 discrete I/O points or 54 analog channels</td>
</tr>
<tr>
<td>Max Local High-speed I/O</td>
<td>146 high-speed I/O channels at up to 250kHz using built-in DC I/O and I/O/O modules or 64 channels at up to 20kHz with the HS-04</td>
<td>30 high-speed I/O channels at up to 1MHz using additional modules</td>
<td>8 inputs / 6 counters at up to 100kHz using built-in DC inputs</td>
</tr>
<tr>
<td>Remote Expansion</td>
<td>Up to 24/remote I/O bases (using M3IO controller) and up to 16 Scanner/Client Explicit EtherNet/IP connections</td>
<td>Up to eight remote I/O base groups and up to 32 scanner/client Ethernet connections</td>
<td>---</td>
</tr>
<tr>
<td>Auto-configured I/O</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Integrated VFD, VPN &amp; field I/O support</td>
<td>---</td>
<td>✓</td>
<td>---</td>
</tr>
<tr>
<td>Max User Memory</td>
<td>1.89 MB</td>
<td>50 MB</td>
<td>16 KB</td>
</tr>
<tr>
<td>Programming Environment</td>
<td>Fixed memory addressing; ladder logic with fill-in-the-blank function blocks, stage sequencing</td>
<td>Tag name addressing; ladder logic with fill-in-the-blank function blocks</td>
<td>Fixed memory addressing; ladder logic with fill-in-the-blank function blocks</td>
</tr>
<tr>
<td>Instruction Set</td>
<td>200+ instructions</td>
<td>80+ instructions</td>
<td>21 instructions</td>
</tr>
<tr>
<td>Structure Data Types</td>
<td>✓ (user defined)</td>
<td>✓ (user defined)</td>
<td>---</td>
</tr>
<tr>
<td>Data Arrays</td>
<td>1D</td>
<td>10/20</td>
<td>13</td>
</tr>
<tr>
<td>Code Blocks</td>
<td>Programs/Subroutines/Tasks/interrupts</td>
<td>Tasks</td>
<td>Subroutines/Interrupts</td>
</tr>
<tr>
<td>Project Simulator</td>
<td>✓</td>
<td>✓</td>
<td>---</td>
</tr>
<tr>
<td>Rest API</td>
<td>✓</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Pulse Width Modulated Outputs</td>
<td>✓</td>
<td>✓</td>
<td>---</td>
</tr>
<tr>
<td>Security</td>
<td>CS/Project/Communication</td>
<td>Project</td>
<td>Project</td>
</tr>
<tr>
<td>Onboard Help</td>
<td>Extensive help file with embedded videos and video library</td>
<td>Extensive help file</td>
<td>Help file with video links</td>
</tr>
</tbody>
</table>

**FREE software and FREE technical support all our PLCS!**

![FREE software and FREE technical support all our PLCS!](image)

- [Help Inventory for Fast Shipping](#)
- [2-day Shipping - Order by 4pm](#)
- [FREE Shipping - Order by 4pm](#)
- [30-day Money-Back Guarantee](#)
- [FREE Technical Support](#)
- [Located in USA](#)

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INDUSTRIAL OPEN-SOURCE CONTROL

With the growing popularity of single-board controllers and the risks involved with implementing them in industrial applications, it was apparent that our industry needed an open-source controller that would hold up in the most extreme conditions.

Produced in conjunction with FACTS Engineering, the ProductivityOpen controller (P1AM-100) is just that, as it combines the best of both worlds - Maker ingenuity coupled with our Productivity controller family’s proven reliability.

The P1AM-100 CPU is a blank canvas and with the right know-how, you can make it do almost anything:
- Simple data logging
- IIoT functions
- Pick and place
- Greenhouse automation
- HVAC control
- Water treatment processes
- Package/material handling
- Generator switchgear
- Lighting control
- The possibilities are ENDLESS!

The Productivity®Open UL/CE-certified open-source CPU mimics the Arduino® MKRZero microcontroller, seamlessly supporting both standard 3rd-party MKR shields and industrial PLC I/O.
Program the ProductivityOpen CPU using the Arduino IDE (C++) or the ProductivityBlocks graphical programming interface to quickly code the P1AM-100 controller for your application. Based on the ArduBlock concept, ProductivityBlocks is a graphical programming interface and add-on to the Arduino IDE. ProductivityBlocks helps you build your sketch program by dragging and dropping interlocking blocks; the associated C++ is generated for you!

www.automationdirect.com/P1AM
The gap between plant-floor systems and front-office operations is closing at a rapid pace. Data sharing between logistics, accounting, maintenance, production, and other departments provides “big-picture” oversight, which results in better planning, reduced waste, and higher efficiency.

Modern-day PLCs, like the Do-more! BRX, have adapted to the demand for higher-level data exchange. BRX has advanced data logging and communication features, including an embedded Rest API and native MQTT(S) protocols, that allow it to easily take on the role of an edge device - gathering, refining and delivering control system data to upstream IT collection and BIG DATA analysis programs.
**Rest API**

The integrated Rest API and secure HTTPS protocol allow BRX to work with flow control tools like Node-RED® in order to supply high-level IT systems with the plant-floor data they need.

---

**Embedded Web Server**

With BRX’s embedded Web server, you can instantly access system status, diagnostic information, and monitor memory usage from any Internet-ready device.

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**Must-have IIoT Protocols**

With the growing number of IIoT platforms and cloud computing services, BRX controllers utilize the industry-standard MQTT(S) and FTP protocols to seamlessly integrate with asset management/IIoT platforms including Microsoft Azure® and IBM Watson®.
AutomationDirect.com has been a leader in providing affordable, quality industrial control products to the U.S. and Canada for more than two and a half decades.

As a privately-held efficiently run company, we take pride in serving our customers the way they want to be served - honestly and fairly. We do everything we can to accomplish this day in and day out.

- Honest up-front pricing (no gimmicks)
- Quick delivery - order today, it ships fast!
- FREE tech support - top-rated by customers in surveys and reviews
- FREE shipping on orders over $49