Programmable Logic Controller (PLC) Guide

World Leader in Technical Training
Lab-Volt is the proud recipient of more International Worlddidac Awards for product excellence than any other manufacturer of scientific and technological training apparatus for student and classroom use. Lab-Volt serves thousands of trade schools, colleges and universities, educational ministries, military training centers, and industrial plants throughout most countries in Africa, Asia, Europe, the Middle East, Pacific Rim, and the Americas.

To meet the needs of its global customers, Lab-Volt has sales offices and manufacturing plants in the United States, Canada, Malaysia, and Colombia, along with a network of factory-trained staff strategically placed around the world.

Lab-Volt is proud to continue the tradition of excellence that has become its international trademark.

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- Instrumentation Process Control Systems
- Web-Based Training Systems
- Early Technology Science Education

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- Power Transmission, Distribution, and Protection
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- Microwave Technology
- Antenna
- Telephony
- Fiber Optic Communications

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- Electric Power and Controls
- PLCs and Drives
- Manufacturing Technologies
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- Construction
- Manufacturing
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- Circuit Simulations
- Digital and Microprocessor
- Telecommunications
- Industrial Electronics

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PLC Training Systems

**Model 3240-A0**

**PLC: Allen-Bradley MicroLogix 1100**
- Used by DeVry University for their PLC course
- Built-in 10/100 Mbps Ethernet/IP port for peer-to-peer messaging
- Embedded Web server and LCD screen
- Online editing functionality
- Digital and Analog I/Os; Digital (24 VDC): 10 inputs (one 40kHz high-speed), six outputs (two 40kHz high-speed); Analog (0 - 10 VDC): two inputs
- PID Capability
- Five push-button and five toggle switches
- 24 VDC built-in power supply
- Easy expansion using rackless I/O modules
- Onboard traffic light simulator
- Compatibility with MicroLogix and SLC instruction set
- Requires the RSLogix 500 programming software (Model 3245-A) and programming cable (3246-40)

**Model 3240-B0**

**PLC: Siemens ET200S**
- 24 V built-in Power Supply
- 8x inputs (24 VDC only) and 12x outputs (24 VDC relay outputs)
- Eight fault switches
- PID Capability
- Easy expansion using rackless I/O modules (analog expansion module 3244-B0; two current/voltage inputs and two current/voltage outputs)
- Four push-buttons and four toggle switches
- Based on SIEMENS S7-300 technology
- Requires the STEP 7 programming software and an Ethernet crossover cable for programming.
- Includes Siemens Resource Curriculum CD-ROM.

**Model 3240-20**

**PLC: Allen-Bradley MicroLogix 1200**
- Digital I/Os; 14 inputs (24 VDC), 10 Outputs (Relay – 24 VDC or line voltage, selectable)
- 24 VDC built-in power supply
- Twelve fault switches
- PID Capability
- Easy expansion using rackless I/O modules (Analog expansion module 3244-20)
- Three push-button and four toggle switches
- Direct connectivity with the Mechanical Process Simulator (Model 3290)
- Compatibility with MicroLogix and SLC instruction set
- Requires the RSLogix 500 programming software (Model 3245-A) and programming cable (3246-40)
- Includes curriculum
PLC Training Systems

**Model 3240-30**

PLC: Allen-Bradley MicroLogix 1500

- Compact design
- Digital I/Os: 10 inputs (24 VDC), six outputs (Relay – 24 VDC)
- No possible expansion
- No PID Control
- Form-factor compatible with the Hydraulic/Pneumatic perforated work surfaces and the 8036 Industrial Controls workstations
- Requires the RSLogix 500 programming software (Model 3245-A) and programming cable (3246-40)
- Includes curriculum

**Model 3270-40**

PLC: Allen-Bradley MicroLogix 1000

- Compact design
- Digital I/Os: 24 V built-in power supply
- 12x inputs (24 VDC only) and 12x outputs (24 VDC relay outputs)
- Eight fault switches
- PID Capability
- Easy expansion using rackless I/O modules (Expansion module 3244-30; four current/voltage inputs and four current/voltage outputs)
- Six push-buttons and six toggle switches
- Compatibility with MicroLogix and SLC instructions set
- Requires the RSLogix 500 programming software (Model 3245-A) and programming cable (3246-40)
- Includes curriculum

**Model 3270-50**

PLC: Omron CPM1A

- Compact design
- Digital I/Os: 12 inputs (24 VDC), eight outputs (Relay - 24 VDC)
- No possible expansion
- Requires a 24 VDC power supply (Model 6360)
- Requires CX Programmer programming software (Model 3245-20) and programming cable (Model 3246-20)
- Form-factor compatible with the Hydraulic/Pneumatic perforated work surfaces and the 8036 Industrial Controls workstations
- Used with Hydraulic and Pneumatic Systems, Models 6080 and 6081; includes curriculum
PLC Training Systems

Model 3270-60

PLC: Siemens SIMATIC S7-222

- Compact design
- Digital I/Os: eight inputs (24 VDC), six outputs (Transistor - 24 VDC)
- Requires a 24 VDC power supply (Model 6360)
- Fully configurable, integrated PID controller
- Form-factor compatible with the Hydraulic/Pneumatic perforated work surfaces and the 8036 Industrial Controls workstations
- Requires STEP7 Micro/Win programming software (Model 3245-30) and programming cable (Model 3246-30)
- Used with Hydraulic and Pneumatic Systems, Models 6080 and 6081; includes curriculum

Model 5930-00

PLC: Allen-Bradley CompactLogix L32E

- Digital I/Os: 16 inputs (24 VDC), 16 outputs (Relay - 24 VDC)
- Built-in 24 VDC power supply
- Eight fault switches
- PID Capability
- Easy expansion using rackless I/O modules
- Can be programmed using four languages: Relay ladder, structured text, sequential function chart, and function block diagram
- Supports three types of network communications: DF1 Full Duplex Serial Link (RS-232-C), Ethernet/IP, and DeviceNet
- Requires RSLogix 5000 Lite Edition programming software (Model 5935) and a standard RJ45 cable
- Used with 5901 Flexible Manufacturing System; includes curriculum

Model 3128-00

PLC: Moeller EASY512

- Compact design
- Digital I/Os: eight inputs (24 VDC), four outputs (Relay - 24 VDC)
- LCD Display
- Two of the eight digital inputs can be configured as 0-10 VDC analog inputs
- Requires a 24 VDC power supply (Model 3139)
- Form-factor compatible with the 8036 Industrial Controls workstations
- Includes EASY-SOFT Basic programming software and programming cable
- Used with 8036 Industrial Controls System; includes curriculum
The Lab-Volt Flexible Manufacturing System (FMS) allows students to familiarize themselves with manufacturing applications commonly encountered in modern facilities. The modular construction of the FMS permits a wide variety of setups allowing students to reproduce the operation of an industrial production line. Students will be introduced to programmable logic controller (PLC) programming, sensors, DeviceNet network configuration, quality control issues, and troubleshooting of FMS through a series of carefully designed exercises. The Flexible Manufacturing System (Advanced Applications), Model 5901-2, is an add-on to the Model 5901-1 and provides the latest manufacturing technology equipment to create more sophisticated applications.

- Compatible PLCs: Refer to chart on page 10/11
- Simulates the operation of a production line in a classroom laboratory using the latest manufacturing technology equipment
- Very complete, modular application
- Powerful PLC with Ethernet and DeviceNet Networks
- Variety of sensors
- Power electronics
- Pneumatic devices
- Servo Control (advanced)
- Operator Panel (advanced)
- Artificial Vision (advanced)
- Complete software solution
- Fault Insertion
- Wiring skills
- Includes job sheets
**PLC Applications**

**Model 8075-10 — Traffic Light System**

- Compatible PLCs: Refer to chart on page 10/11
- A well-known classic training system
- N-S/E-W traffic control with pedestrian crossing
- Another unit can be added to create a full, four-directions traffic light
- Flow management with proximity detectors (optional)
- Traffic light synchronization
- Fault insertion
- LEDs (long life)
- 10 24 VDC control inputs
- Includes job sheets

**Model 8075-20 — Electro-Pneumatic System**

- Compatible PLCs: Refer to chart on page 10/11
- Two double-acting cylinders
- Two reed switches and mechanical limit switch for PLC feedback
- Perforated work surface
- Control valve station featuring single- and double-solenoid valves
- Applications: Stamping, hold and punch, filling process, etc.
- Fault insertion
- Accepts three 24 VDC control signals from PLC
- Includes job sheets
**PLC Applications**

**Model 8075-30 – Electro-Mechanical System (DC Motor)**

- Compatible PLCs: Refer to chart on page 10/11
- Explores drives and lead screw positioning systems used in motion processes
- Industrial 1800 RPM, 90 VDC motor
- Two magnetic limit switches for PLC feedback
- Bi-directional, regenerative DC drive
- Perforated base to accommodate optional sensors
- Fault insertion
- Optional 100 ppr Optical Encoder
- Accepts three 24 VDC control signals from PLC
- Includes job sheets

**Model 8075-40 – Electro-Mechanical System (Stepper Motor)**

- Compatible PLCs: Refer to chart on page 10/11
- High-torque stepper motor
- Stepper motor drive programmed by computer using manufacturer software
- Programmable stepper motor drive
- Motion sequences triggered by the PLC I/Os
- Lead screw mechanism
- Two magnetic limit switches for PLC feedback
- DC power supply
- Perforated base to accommodate optional sensors
- Fault insertion
- Optional 100 ppr Optical Encoder
- Accepts eight 24 VDC control signals from PLC
- Includes job sheets
PLC Applications

Model 8075-50 — Wind Turbine System

- Compatible PLCs: Refer to chart on page 10/11
- System comprised of a Lab-Volt Nacelle Simulator – Model 3297 and a Wind Generator – Model 3213
- Small blower for generating air flow
- Nacelle equipped with DC motor and Mechanical clutch
- Two limit switches with NO and NC contacts
- Analog position sensor measures wind direction (0 - 10 V)
- Frequency variable pulse train signal measures wind speed (24 VDC)
- Requires external 24 V Power Supply
- Accepts two 24 VDC control signals from PLC for motor operation
- Includes job sheets

Model 8075-60 — Level Process Control System

- Compatible PLCs: Refer to chart on page 10/11
- Submersible variable speed pump
- Level process column
- Electronic level process Interface
- Float switch
- Capacitive level switch
- Magnetic level switch
- Solenoid valve
- Manual valve
- Optional analog level sensor
- Self-regulating process allows a variety of PLC control schemes
- Explore batch and PID control (dependent on PLC specifications)
- Includes job sheets
PLC Applications

Model 8075-70 – Bottling Process System

- Compatible PLCs: Refer to chart on page 10/11
- Film canister capping process
- Compact application combines pneumatics, motion control, and PLC sequencing
- Two high-torque stepper motors
- Dual stepper motor drive
- Inductive proximity switch
- Mechanical switch
- Single solenoid directional valve
- Double-acting cylinder
- DC power supply
- Perforated work surface
- Dual stepper motor drive can be used as a Step/Dir or Jog/Dir drive
- Optional accessories allow containers to be filled with liquid during process
- Includes job sheets
## Optional Equipment

### Model Image Description

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3139, 6360</td>
<td><strong>DC Power Supply:</strong> Some Lab-Volt PLCs do not feature built-in DC power supplies. However, these two PLCs are generally components of systems that already include the required 24 VDC supplies. Model 3139 is part of the 8036 Industrial Controls system. Model 6360 is part of the Hydraulic and Pneumatic Systems, Models 6080 and 6081.</td>
</tr>
</tbody>
</table>
| 3201-3204 | **3201: Push-Buttons/Lights** - Features two NO and one NC momentary push-button, and three LED indicator lights. Can simulate a Start/Pause/Stop station with indicator lights.  
            **3202: Toggle Switches/Lights** - Features three toggle switches and three LED Indicator Lights.  
            **3203: Rotary Switch** - Features two rotary switches with NO and NC contacts.  
            **3204: Emergency Switch** - Features one emergency switch with two NO contacts (one for low voltage and the other for line voltage) |
| 3205      | **Wiring Module** - This multi-purpose module allows easy interface between customers’ existing PLCs and 2 mm leads and jacks used with the Lab-Volt PLC Applications. This model can also be used to practice wiring skills using the terminal blocks. |
| 3210      | **Optical Encoder** - This model is an optional add-on to the Electro-Mechanical applications. It provides position feedback (100 PPR) with signal levels compatible with the PLC 24 VDC inputs. |
| 3214      | **Level Sensor** - This model is an optional add-on to the Process Control system (8075-60). It provides water level feedback (0-5 VDC or 4-20 mA) through the Level Process Interface. |
| 5924      | **Signal Tower:** The Signal Tower consists of three lights providing visual feedback of the state of a process. It can be used to indicate if an application is running, paused, or stopped. Lights are stacked one upon another, up to five modules (standard unit contains three modules). Each module is easily programmable without any special wiring or tools. An Acoustic Alarm, Model 39303, is available as an option. |
| 6085      | **Sensors Training System** - This system contains a selection of photoelectric, inductive, and capacitive sensors representative of what can be found in industry. These sensors can be used with a variety of PLC applications. |
| 6410-A0   | **Portable Compressor** - The Air Compressor consists of a quiet 7.6-liter (two-gallon) air compressor. Its quiet pump and motor make it ideal for classroom and school laboratories. The Air Compressor can be used to provide compressed air to the Conditioning Unit, Model 6411-A. |
| 6411-A0   | **Conditioning Unit** - The Conditioning Unit consists of a main shutoff valve, a filter, a pressure regulator, a pressure gauge, a sleeve valve, and a muffler. It conditions and limits the pressure of the air supplied to the pneumatic circuits. The Conditioning Unit must get its compressed air from a central air supply or a portable unit such as the optional Air Compressor, Model 6410-A. |
# Easy Reference Guide - PLC Compatibility

<table>
<thead>
<tr>
<th>Model</th>
<th>System</th>
<th>Compatible Lab-Volt Models/ PLCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>3290</td>
<td>Mechanical Process Simulator</td>
<td><strong>Model 3240-20</strong>: Allen-Bradley MicroLogix 1200</td>
</tr>
<tr>
<td>5901</td>
<td>Flexible Manufacturing System</td>
<td><strong>Model 5930-00</strong>: Allen-Bradley CompactLogix L32E</td>
</tr>
<tr>
<td>6082-50</td>
<td>Hydraulics and Pneumatics Applications - Allen-Bradley PLC</td>
<td><strong>Model 3270-40</strong>: Allen-Bradley MicroLogix 1000</td>
</tr>
<tr>
<td>6082-60</td>
<td>Hydraulics and Pneumatics Applications - Omron PLC</td>
<td><strong>Model 3270-50</strong>: Omron CPM1</td>
</tr>
<tr>
<td>6082-70</td>
<td>Hydraulics and Pneumatics Applications - Siemens PLC</td>
<td><strong>Model 3270-60</strong>: Siemens SIMATIC S7-222</td>
</tr>
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<td>8075-10</td>
<td>Traffic Lights System</td>
<td><strong>Model 3240-B0</strong>: Siemens ET200S</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td><strong>Model 3240-30</strong>: Allen-Bradley MicroLogix 1500</td>
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<td></td>
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**Model 3240-20**: Allen-Bradley MicroLogix 1200  
**Model 3240-30**: Allen-Bradley MicroLogix 1500  
**Model 3270-40**: Allen-Bradley MicroLogix 1000  
**Model 3270-50**: Omron CPM1  
**Model 3270-60**: Siemens SIMATIC S7-222 |
| 8075-50 | Wind Turbine Application System | **Model 3240-A0**: Allen-Bradley MicroLogix 1100  
**Model 3240-B0 & 3244-B0**: Siemens ET200S and Analog Expansion Kit  
**Model 3240-20 & 3244-20**: Allen-Bradley MicroLogix 1200 and Analog Expansion Kit  
**Model 3240-30 & 3244-30**: Allen-Bradley MicroLogix 1500 and Analog Expansion Kit |
| 8075-60 | Level Process Control System    | **Model 3240-B0 & 3244-B0**: Siemens ET200S and Analog Expansion Kit  
**Model 3240-20**: Allen-Bradley MicroLogix 1200  
Other PLCs offer partial curriculum coverage.  
**Model 3240-30 & 3244-30**: Allen-Bradley MicroLogix 1500 and Analog Expansion Kit  
**Model 3240-A0**: Allen-Bradley MicroLogix 1100 |
| 8075-70 | Bottling Application System     | **Model 3240-A0**: Allen-Bradley MicroLogix 1100  
Other PLCs offer partial curriculum coverage. |
### Mechanical Process Simulator

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<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
<th>3290</th>
<th>8075-10</th>
<th>8075-20</th>
<th>8075-30</th>
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<th>8075-60</th>
<th>8075-70</th>
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<tbody>
<tr>
<td>3201</td>
<td>Push-Buttons/Lights</td>
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<td>Rotary Switch</td>
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<td>Stepper Motor Drive Dual</td>
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<td>Optical Encoder</td>
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<td>Wind Generator</td>
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<td>Level Sensor</td>
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<td>Level Process Interface</td>
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<td>Station Control Valves</td>
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<td>Traffic Lights</td>
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<td>Electro-Mechanical – Stepper Motor</td>
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<td>Nacelle Simulator</td>
<td></td>
<td></td>
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### PLC Compatibility

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Opt = Optional equipment for advanced experimentation. (6410-A0 required if no alternate air source is available.)

P = Partial curriculum coverage only.

* = Requires corresponding Analog Expansion Kit (Model 3244-XX) to perform all exercises.
<table>
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<tr>
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