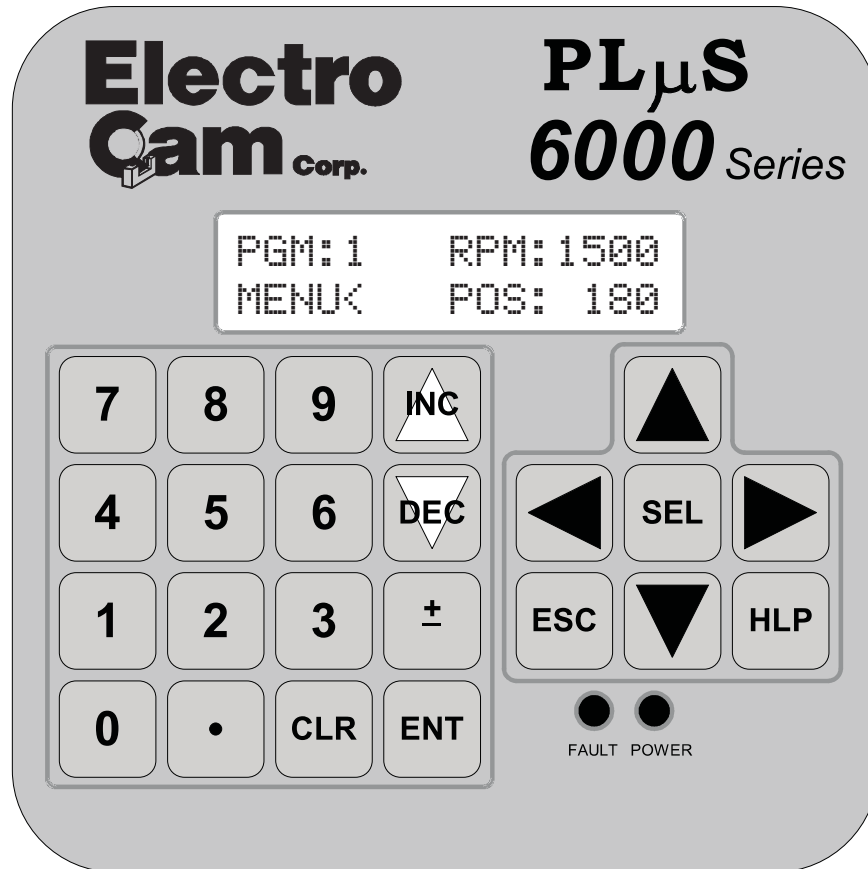


PL μ S™ PS-6244 Series Programmable Limit Switch



Programming & Installation Manual



4/99

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Form to Record Setpoints

WARRANTY

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4. There are no warranties which extend beyond the description on the face hereof. This warranty is in LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED INCLUDING (BUT NOT LIMITED TO) ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. Any legal proceeding arising out of the sale or use of this apparatus must be commenced within (18) months of the date of shipment from the manufacturer.

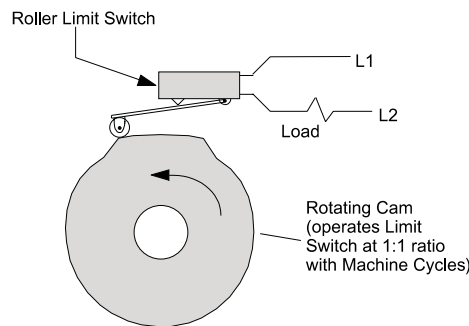
Mechanical Cam Switches

Mechanical Cams

The PS-6244 Programmable Limit Switch electronically simulates mechanical cam switches. A cam switch consists of a roller limit switch whose arm rides on a cam as shown in Figure 1. The cam shaft is driven by a machine at a 1:1 ratio, so that the cam switch turns on and off at specific positions in the machine cycle. Cam limit switches have the following disadvantages:

- The roller, the cam, and the limit switch wear out.
- The machine must be stopped during adjustment.
- On/off patterns are limited, and changing the pattern may require replacement of one cam with another. For example, a cam that switches on and off twice in one revolution would need to be replaced with a different cam if three on/off pulses per revolution were required.
- They cannot run at high speeds because of contact bounce and excessive mechanical wear.

Figure 1—Basic Cam Switch



Programmable Limit Switches

PS-6244's & Encoders

The PS-6244 Programmable Limit Switch uses a quadrature encoder (Figure 2) instead of a cam to indicate machine position. A quadrature encoder uses optical discs to generate streams of pulses that can be processed by the PS-6244. From the encoder signals, the PS-6244 can determine shaft position, direction, and speed. The encoder is usually coupled to a machine shaft at a 1:1 ratio so that one encoder shaft rotation corresponds to one machine cycle. Encoders have no brushes, contacts, or any frictional moving parts to wear out.

Based on the encoder signal, the PS-6244 Programmable Limit Switch turns electrical circuits, or "Outputs," on and off, simulating the mechanical roller limit switch. Because the combination PS-6244/encoder system is completely electronic and has no frictional parts, it offers several advantages over mechanical cam switches:

- Long service life with no parts to wear out.
- "On" and "off" points can be adjusted instantly from the keypad; there are no cams to rotate or replace.
- Adjustment is possible with the machine running or stopped.
- Programmable logic allows complex switching functions that are impossible with mechanical cams.
- Operation at speeds up to 1500 RPM.

Programmable Limit Switches

Figure 2—PS-6244-24-N16M09 Programmable Limit Switch and Quadrature Encoder



PS-6244 Description

Controller & Keypad

PS-6244 Series Programmable Limit Switches consist of two main components: the controller and the keypad/display. The controller houses the microprocessor, associated circuitry, and all of the I/O circuits. This eliminates the need for external I/O racks.

A separate 1/4 DIN keypad/display provides a complete user interface from which every aspect of the controller's operation can be monitored and programmed. Multiple keypads can be connected to a single controller. In addition, when interfaced to a PLC or other computer, the controller can be used without a keypad/display. When properly mounted with the gasket provided, the keypad/display meets NEMA 4X standards. A clear silicon rubber boot assembly is available to provide protection for installations where harsh washdown chemicals are used.

The PS-6244 Series is available in two models: the PS-6244-24-M17 and the PS-6244-24-X16M09 Both are described in Figure 3.

Figure 3—PS-6244 Models

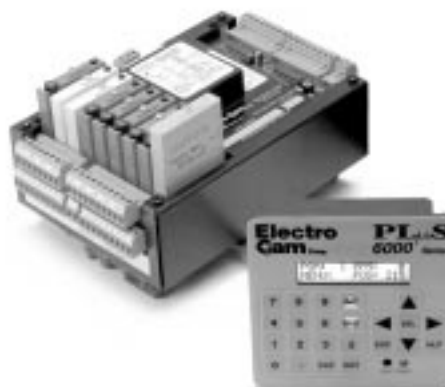
PS-6244-24-M17 Controller—Up to 17 Outputs



The PS-6244-24-M17 has 17 total outputs:

- Outputs 1 through 15 can accept AC or DC output modules for driving “real world” devices such as solenoids, valves, or glue guns.
- Output 16 will accept an AC or DC module, or an analog module that generates a control signal proportional to RPM.
- Output 17 is dedicated to analog output.

PS-6244-24-N16M09 Controller—Up to 25 Outputs



The PS-6244-24-N16M09 has 25 total outputs:

- 16 transistor outputs are built into the controller.
- Outputs 17 through 23 can accept AC or DC output modules for driving “real world” devices such as solenoids, valves, or glue guns.
- Output 24 will accept an AC or DC module, or an analog module that generates a control signal proportional to RPM.
- Output 25 is dedicated to analog output.

Basic Terminology

The following terms will be used throughout this manual to explain PS-6244 installation, programming and operation:

Outputs (channels)

An “output,” or “output channel,” refers to an external circuit that the PS-6244 controls based on encoder position or speed. Outputs can be one of two types:

Switching outputs turn circuits on or off.

Analog outputs generate a control signal that is proportional to RPM.

Setpoints

“Setpoints” are the points within one rotation of the encoder at which an output channel turns on or off. Setpoints can be programmed into an output channel through the keypad/display, or they can be downloaded from a computer or PLC through serial communications. The PS-6244 can turn any given output on and off multiple times within one rotation.

Pulses

A “pulse” is the “on” period between the time an output is turned on and off. The “on” point is the **leading edge** of the pulse, and the “off” point is the **trailing edge**. When multiple “on” and “off” points are programmed into one output channel, the output is said to have multiple pulses.

Programs

Suppose that 15 output channels on a cartoner are programmed with setpoints to fold and glue a certain size carton. These settings could be stored as a “program.” Then, the 15 output channels could be re-programmed with different setpoints for a different size carton. This second set of setpoints could also be stored as a program. To change carton sizes, an operator could simply activate the correct program, and the corresponding setpoints would take effect.

The use of programs can provide tremendous advantages over mechanical cam switches. Standard PS-6244’s can store up to 48 programs. The active program can be selected through the keypad/display, mechanical switches, direct PLC interface, or serial communication messages.

Inputs (hardware inputs)

In addition to accepting a signal from the encoder, the PS-6244 can accept up to 16 input signals from mechanical switches, relay contacts, DC two- or three-wire sensors, solid state DC output modules, or PLC DC outputs. The PS-6244 hardware inputs are dedicated to specific functions involving program selection and controlling output channels based on sensor signals.

PS-6244 Features

Programming Access	Three levels of programming access are provided: Operator, Setup, and Master. Each level can be assigned a password that must be entered to allow programming at that level. In addition, the Operator and Master levels can be activated on an individual keypad through hardware terminals on the back. Careful use of programming access levels can provide key personnel the flexibility they need in programming the controller, while protecting settings against accidental or unauthorized changes.
Speed Compensation	Speed compensation advances the setpoints for an output channel as machine speed increases. This eliminates the need to manually adjust the settings for fixed-response devices whenever machine speeds are changed. Speed compensation provides greater accuracy, higher production speeds, and reduced downtime for machine adjustment.
Motion ANDing	Two speed ranges can be programmed into the controller, and output channels can be ANDed with either speed range so that they will be disabled unless the machine speed is within the specified range. A common use for this feature is disabling outputs to glue valves to turn off the glue flow if the machine stops.
Input ANDing	An output channel may be ANDed with one of eight input signals so that the output is disabled unless the input signal is present.
Shift Register ANDing	The PS-6244 includes a shift register that can turn output channels on or off up to 255 revolutions after a signal is applied to Input Terminal 16, Figure 7. The terminal is usually connected to a product sensor.
Analog Outputs	PS-6244 controllers can drive up to two analog output modules whose output signal will be linearly proportional to RPM. The analog signal level at zero RPM can be programmed, as well as the RPM that corresponds to maximum signal. No measuring equipment is required for initial setup, and calibration is not needed. Typical uses for the analog output are to control glue pressure as machine speeds change, or to match speeds of other equipment to the machine being controlled by the PS-6244.
Serial Communication	Using Electro Cam Corp.'s PLSNET software for IBM-PC compatible computers, the PS-6244's programs can be saved to a disk file or loaded from a disk file to the PS-6244. The programs can be printed or edited using the computer. Individual commands may also be sent to the PS-6244 to change settings while running.
Washdown Boot	A clear silicon rubber boot can be supplied that fits over and around the keypad face. The back of this boot provides sealing between the back of the keypad and the panel. The boot is transparent and pliable, allowing the keypad to be viewed and operated through it. In addition to preventing contamination from harsh chemicals, the boot also protects the keypad from grease, oil, dirt and normal wear that could otherwise shorten its life.