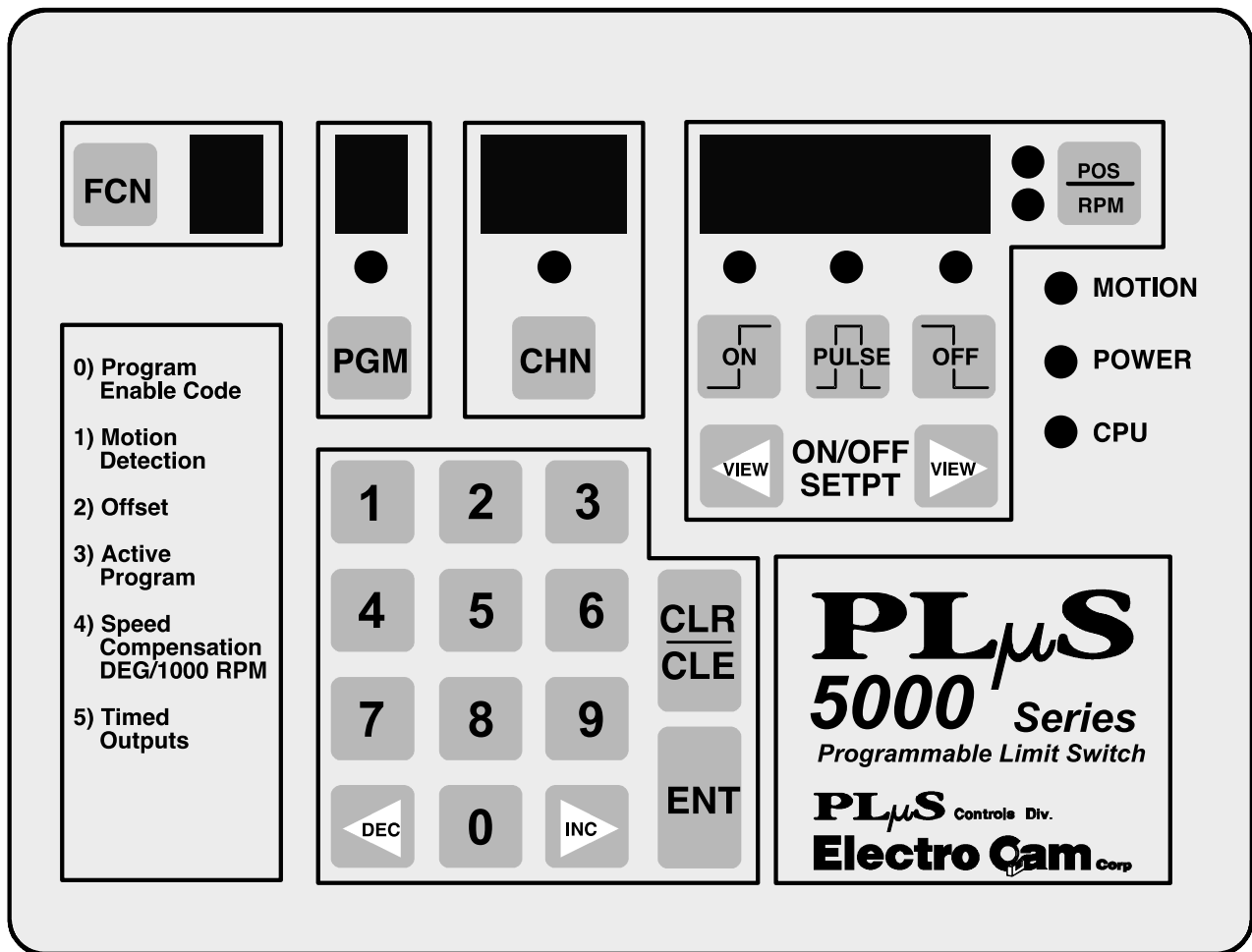


PL μ S[®] PS-5000 Series Programmable Limit Switch



Programming & Installation Manual

October 2001

Electro Cam Corp.

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WARRANTY

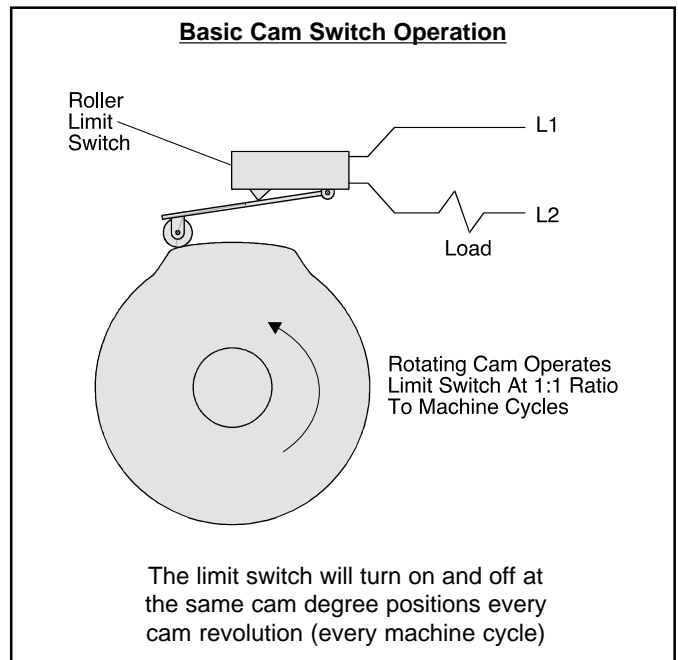
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Introduction

Basic Cam Switch Operation

A PL μ S control's main purpose is to operate outputs in a manner that simulates cam switches. The drawing to the right illustrates the operation of a cam switch. Its function is to switch the load on and off at the same rotary positions of the cam shaft during each revolution of that cam shaft. The rotating cam shaft is driven by a machine at a 1:1 ratio, so that the on / off positions of the cam cycle always match specific positions in the machine cycle. However, cam limit switches have the following disadvantages: unreliable (wear), hard to adjust (machine must be stopped during adjustment), and they cannot run at high speeds because of contact bounce and excessive mechanical wear.

PL μ S controls overcome these basic cam switch problems. They have no moving wear parts, they are easy to adjust from the keyboard with the machine running or stopped, and they can operate at speeds up to 3000 RPM. They also add many capabilities far beyond simple cam switch logic.



Standard Product Features

Keyboard/Controller

The keyboard controller is the main component of the PL μ S system. The front keypad and displays provide a complete user interface from which every aspect of the control's operation can be monitored and programmed. When properly mounted with the gasket provided, the keyboard meets NEMA 4 standards. A clear silicon rubber boot assembly is available to provide NEMA 4X protection for installations where harsh washdown chemicals are used.

Ease of Setup

All output position setpoint values are simply entered through the numeric keypad. These setpoints can be adjusted while the machine is running or stopped by using the increment, decrement, or numeric keys. The keyboard is also used to synchronize the control's position to the machine, eliminating the need to mechanically adjust the resolver's shaft position.

Multiple Programs

Depending on the model ordered, up to 64 different programs, or "job recipes" can be stored in the control's memory. This minimizes down time for job change over because simply changing program numbers makes all of the output setting changes required. Program numbers can be changed by mechanical switches; PLC's (using the hardware program select inputs); the keypad; or serial communication messages.

Output Speed Compensation

Speed compensation allows outputs to compensate for the response time of the controlled devices by turning on earlier as machine speeds increase. This eliminates the need to adjust output settings whenever machine speeds are changed. Using speed compensation often allows higher production speeds and eliminates the need for output adjustments.

Motion ANDing

A speed range can be programmed into the controller, and outputs can then be ANDed with the speed range so that they will be disabled unless the machine speed is within the range. This can be used to turn off outputs if the machine stops; disable outputs until the machine reaches a minimum speed; or disable outputs if the machine goes above a specified maximum speed. A common use for this feature is disabling outputs to glue valves so the flow of glue turns off if the machine stops.

Timed Outputs

Outputs can be programmed to turn on at the programmed "on" position and turn off when the specified time elapses, rather than staying on until an "off" position is reached. The result is a constant output duration, regardless of machine speed. The output will turn off when the "off" position is reached if it hasn't already timed out. Timed outputs are used to drive devices which require a fixed time to perform a task, regardless of machine speed.

Standard Product Features (continued)

Selectable Scale Factor (resolvers only)

The number of increments per revolution (Scale Factor) is programmed by the user. Standard controls have a maximum of 1024 increments per revolution and "-H" option (high resolution) controls have a maximum of 4096 increments per revolution. To make the control operate and program in degrees, a Scale Factor of 360 is used. In some applications it is desirable to use a Scale Factor that defines each increment as a specific distance in engineering units (ex: 1 inc = .1" of travel).

Output Grouping and Modes of Operation

Outputs can be subdivided into groups and each group can be associated with an input device. There are five different modes of operation that can be selected for each group. For example, some modes allow the group to activate only when the corresponding input has signaled that product is present. Glue control is a typical place where outputs are disabled until product is sensed as being present. For details, see page A-1.

Serial Communication

Serial communication provides an RS-232 and an RS-485 communication port. Using PL μ SNET software for IBM compatible computers, available from Electro Cam Corp., the control's entire program can be saved from the control to a disk file or loaded from a disk file to the control. The program can be printed or edited using the computer. It is also possible to send individual communication commands to the control, while running, to change settings in the program. The user must write appropriate software to communicate at the individual command level.

Expanded Operator Access

This feature gives the operator access to motion detection settings, offset, active program number, and speed compensation.

NOTE: Serial Communication and Expanded Operator Access were "-C" and "-E" options prior to date code 9740.

Optional Product Features

Analog Output, "-A"

Units with this option can output an analog signal that is linearly proportional to RPM. The analog signal level at zero RPM can be programmed through the keyboard, 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 are control of glue pressure as machine speed changes, and speed matching of other equipment to the machine being controlled.

Outputs Based On Rotation Direction, "-D"

In standard PL μ S controllers, outputs will turn ON/OFF based on resolver position, regardless of which way the resolver is turning. With the "-D" option, outputs can be based on resolver rotation direction.

Large Program Memory, "-F"

Depending on the number of outputs ordered, standard controls can store up to 64 programs consisting of not more than 1258 output pulses total. Controls with the "-F" option increase this capacity by storing up to 256 programs consisting of not more than 4589 output pulses total.

Gray Code Position Output, "-G"

The "-G" option provides eight bits of position information on the last eight outputs. This "gray code" output can be connected to a PLC or other electronic control device, eliminating the need for expensive accessory cards. The PLC can then make control decisions that do not demand a fast response, while other PL μ S outputs directly control devices that must operate quickly and consistently.

High Resolution, "-H" (resolvers only)

Controls with this option can divide the resolver shaft

rotation into as many as 4096 increments. Standard controls have a maximum of 1024 increments.

Leading/Trailing Edge Speed Comp, "-L"

This option allows the "on" and "off" edges of output pulses to be speed compensated by different amounts. High speed gluing is a common application where the "on" and "off" edges of the output signal have to be compensated by different amounts.

Phase Mark Registration, "-P"

Phase mark registration allows the PL μ S control to determine if a product appears before or after a programmed timing window. If mis-registration occurs, the product's timing can be adjusted manually, or by a PLC or similar controller interfaced to the PL μ S control.

Caustic Washdown Boot, "-W"

The face of the keyboard is rated NEMA 4X (meets NEMA 1, 4, 4X, and 12). For additional protection against caustic washdown, grease, oil, dirt, and normal wear, a clear silicone rubber boot is available that fits over and around the keyboard. The back of the boot provides a good seal between the back of the keyboard and the control panel. The boot is transparent and pliable, allowing the keyboard to be viewed and operated through it. Controls ordered with the "-W" option are shipped with the boot fitted over the keyboard. Boots may also be ordered separately and installed in the field (#PS-4904-99-001).

Remote Display

A remote display which connects to the RS-485 port is available for units ordered with both the "-C" and "-E" options. This allows position and RPM information to be displayed up to 1000 feet away from the controller.

PS-5000 Series Model Summary



PS-5001
PS-5101
PS-5004
PS-5104
PS-5034
PS-5134

These Models Use External I/O Module Racks



PS-5011
PS-5111

These Models Use Built-In I/O Transistor Chips



PS-5021
PS-5121
PS-5024
PS-5124

These Models Have I/O Modules On Controller Back

Key To Option Selection

20-240 VAC: Change "-10-" to "-20-".
24-24 VDC: Change "-10-" to "-24-".

- A** Analog output proportional to speed
- F** Additional setpoint/program storage
- G** Gray code position output
- H** High resolution, resolver only
- L** Individual leading/trailing edge speed compensation
- P** Register mark phasing
- U** CE mark - requires 24VDC input
- V** Vibration protective coating
- W** Washdown Boot

Model	Output Type	Transducer	# of Outputs	# of Programs	Output Modes?	Options
PS-5001-10-016	Module Rack	Encoder	16	64	no	A, F, G, L, P, V, W, 20, 24
PS-5101-10-016	Module Rack	Resolver	16	64	no	A, F, G, H, L, P, V, W, 20, 24
PS-5001-10-024	Module Rack	Encoder	24	48	no	F, G, L, V, W, 20, 24
PS-5101-10-024	Module Rack	Resolver	24	48	no	F, G, H, L, V, W, 20, 24
PS-5001-10-048	Module Rack	Encoder	48	24	no	F, G, L, V, W, 20, 24
PS-5101-10-048	Module Rack	Resolver	48	24	no	F, G, H, L, V, W, 20, 24
PS-5004-10-016	Module Rack	Encoder	16	64	yes	A, F, G, L, P, V, W, 20, 24
PS-5104-10-016	Module Rack	Resolver	16	64	yes	A, F, G, H, L, P, V, W, 20, 24
PS-5004-10-024	Module Rack	Encoder	24	48	yes	F, G, L, V, W, 20, 24
PS-5104-10-024	Module Rack	Resolver	24	48	yes	F, G, H, L, V, W, 20, 24
PS-5004-10-048	Module Rack	Encoder	48	24	yes	F, G, L, V, W, 20, 24
PS-5104-10-048	Module Rack	Resolver	48	24	yes	F, G, H, L, V, W, 20, 24
PS-5011-10-N08	Transistor, Sinking	Encoder	8	64	no	F, L, V, W, 20, 24
PS-5111-10-N08	Transistor, Sinking	Resolver	8	64	no	F, H, L, V, W, 20, 24
PS-5011-10-N16	Transistor, Sinking	Encoder	16	64	no	F, G, L, P, V, W, 20, 24
PS-5111-10-N16	Transistor, Sinking	Resolver	16	64	no	F, G, H, L, P, V, W, 20, 24
PS-5011-10-P08	Transistor, Sourcing	Encoder	8	64	no	F, L, V, W, 20, 24
PS-5111-10-P08	Transistor, Sourcing	Resolver	8	64	no	F, H, L, V, W, 20, 24
PS-5011-10-P16	Transistor, Sourcing	Encoder	16	64	no	F, G, L, P, V, W, 20, 24
PS-5111-10-P16	Transistor, Sourcing	Resolver	16	64	no	F, G, H, L, P, V, W, 20, 24
PS-5034-10-032	Transistor, Ext. Rack	Encoder	32	32	yes	F, G, L, V, W, 20, 24
PS-5134-10-032	Transistor, Ext. Rack	Resolver	32	32	yes	F, G, H, L, U, V, W, 24
PS-5034-10-064	Transistor, Ext. Rack	Encoder	64	16	yes	F, G, L, V, W, 20, 24
PS-5134-10-064	Transistor, Ext. Rack	Resolver	64	16	yes	F, G, H, L, U, V, W, 24
PS-5021-10-M09	Modules on Back	Encoder	9	64	no	A, F, L, V, W, 20, 24
PS-5121-10-M09	Modules on Back	Resolver	9	64	no	A, F, H, L, P, U, V, W, 20, 24
PS-5024-10-M09	Modules on Back	Encoder	9	64	yes	A, F, L, V, W, 20, 24
PS-5124-10-M09	Modules on Back	Resolver	9	64	yes	A, F, H, L, P, U, V, W, 20, 24