PLµS

PS-5000 SERIES

PROGRAMMABLE LIMIT SWITCH

RESOLVER OR ENCODER INPUT

STANDARD FEATURES:

- INDIVIDUAL CHANNEL SPEED COMPENSATION
- 64 PROGRAMS (options to 512)
- 3 LEVELS OF PROGRAMMING ACCESS
- TIMED OUTPUTS
- MOTION DETECTION AND-ing
- SELECTABLE (2-1024) SCALE FACTOR (Resolver-based units)
- 12 VDC ACCESSORY POWER
- DUAL 3/4" BEARINGS IN ALL ENCODERS & RESOLVERS

OPTIONAL FEATURES:

- OUTPUT ENABLE MODES
- INDIVIDUAL LEADING AND TRAILING EDGE SPEED COMPENSATION
- SERIAL COMMUNICATION
- ANALOG OUTPUT
- GRAY CODE POSITION OUTPUT
- HIGH RESOLUTION (12-bit - 4096)
- 220 VAC INPUT

Electro Cam Corp.

13647 Metric Rd • Roscoe, IL 61073 USA • 815-389-2620 • FAX 815-389-3304 • 800-228-5487 (USA & Canada)

OUTPUT GROUPING AND ENABLE MODES

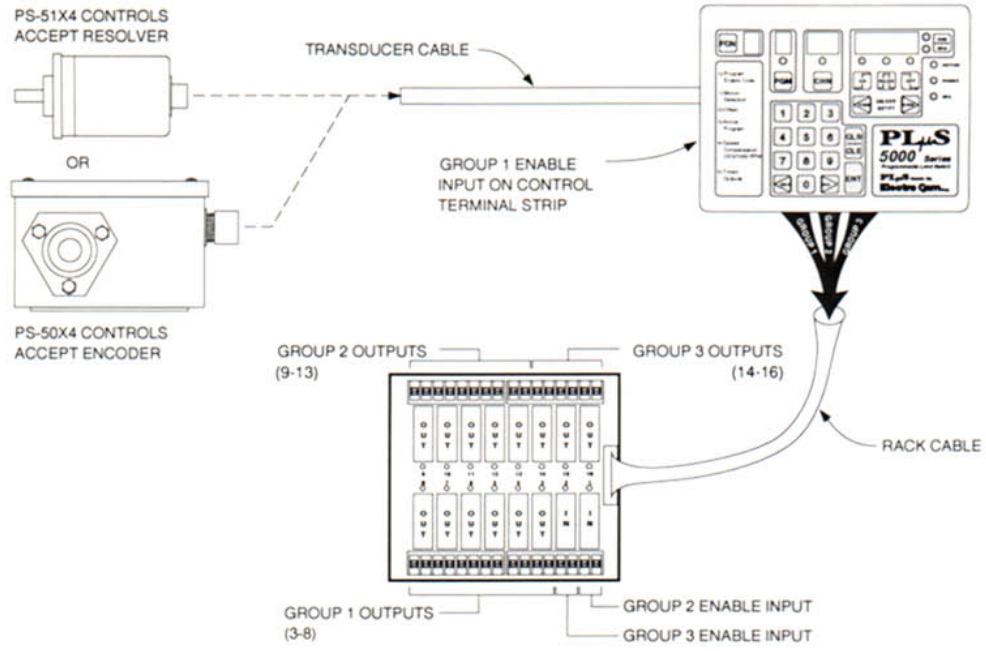
The PLµS 5XX4 controls have two features not found in other 5000 Series controls.

1. SUBDIVIDE OUTPUTS INTO GROUPS

The total I/O available on the I/O rack can be subdivided into groups. Each group can have a dedicated "Enable Input" as needed. The number of groups, number of outputs in each group and the number of "Enable Inputs" are established through simple keyboard programming.

2. OPERATE OUTPUT GROUPS IN DIFFERENT MODES

There are 4 modes of operation that each group can operate in. Incorporating these modes can reduce or eliminate the need for "hard wired" logic or interaction with PLCs.



The example illustration above shows a 16 I/O control with its outputs subdivided into 3 groups: group 1 = 6 outputs, Group 2 = 5 outputs, and Group 3 = 3 outputs. Each Group has a dedicated "Enable Input" and can be operated in one of the 4 modes described in the following illustrations. ***The ability to have different modes of operation running simultaneously, within the same control, greatly increases application versatility, and reduces external hardware.***

MODE 1

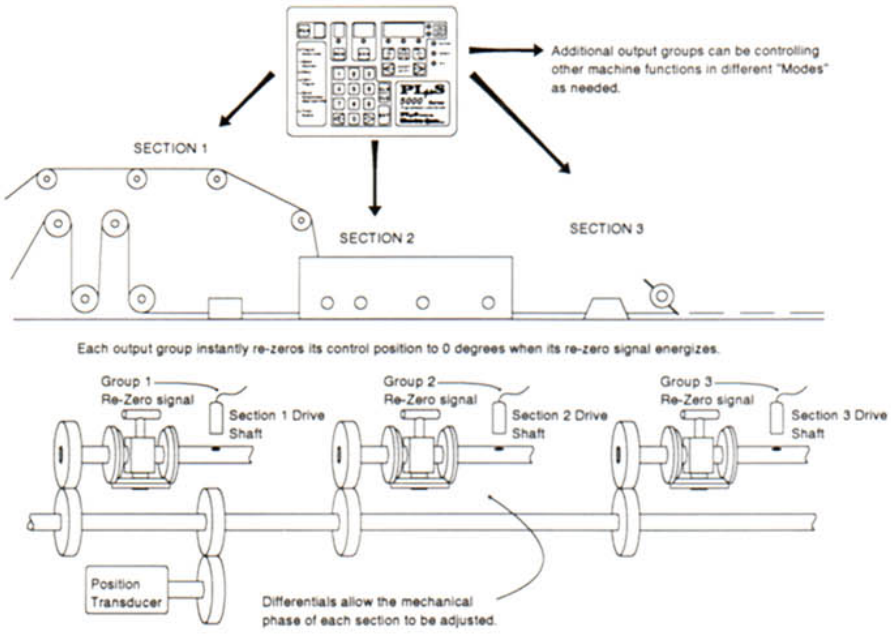
Control different sections of a machine that vary in mechanical phase relationship

This illustration shows a single PLµS control and position transducer controlling 3 "Adjustable Phase" sections of a converting machine.

The rotary position of the electrical output signals can be manually set/adjusted from PLµS keyboard or automatically adjusted by sensors. This keeps the electrical control signals properly synchronized to the mechanical devices in each section when phase adjustments are made.

1 position transducer provides position information for all sections of machine, regardless of their phase relationship.

NOTE: All gear drives are 1:1 ratio.



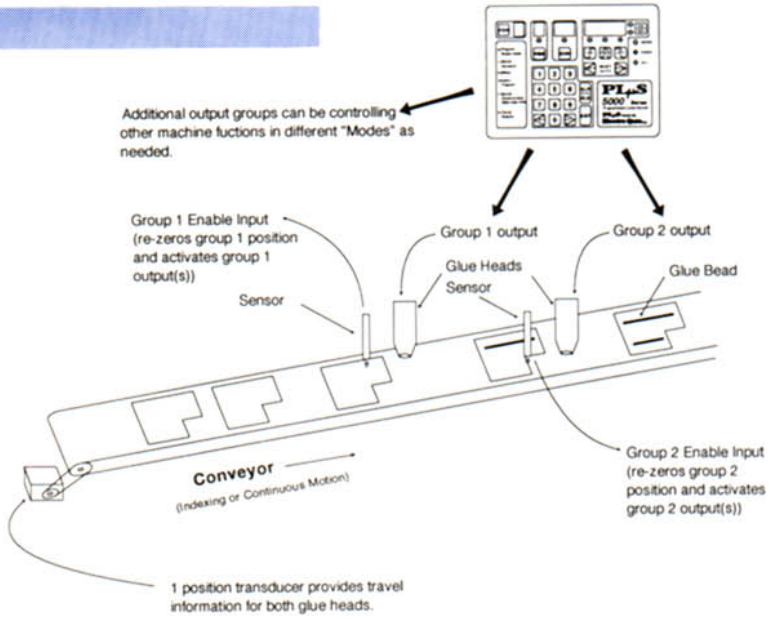
MODE 2

Control different machine functions asynchronously, on demand

This illustration shows a PLµS control and a single position transducer "independently" controlling 2 glue heads at different locations on a conveyor. The spacing between parts being glued is random.

Each output group instantly re-zeros its control position to 0 degrees when its enable input is energized. The outputs in the group then become active for up to 359 degrees.

Random spacing between parts is automatically handled because each enable sensor causes the position of its output group to re-zero. This references the output signals to the leading edge of the part being glued. When parts are not present the outputs will be inactive.

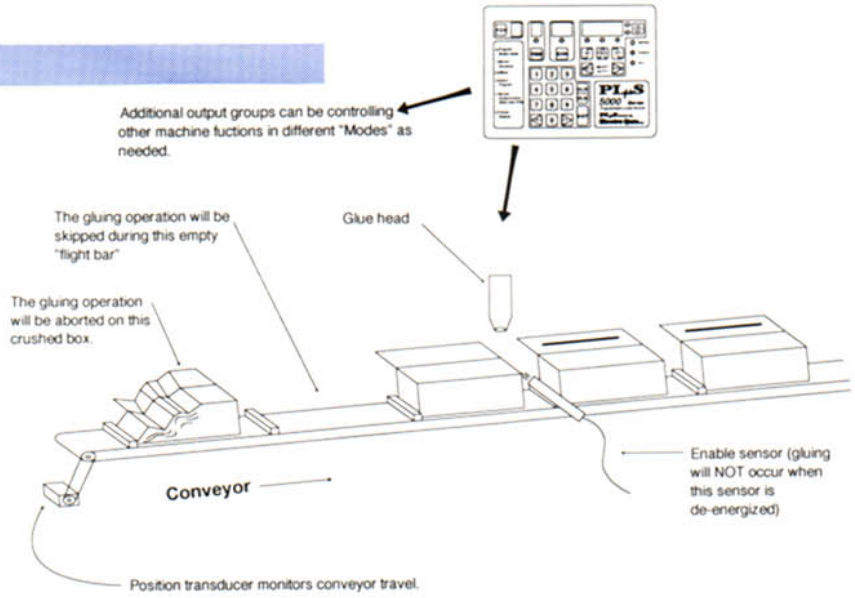


MODE 3

Operate a machine function only while a related input signal is maintained

In this illustration the glue head will only be allowed to operate while the photo eye sees the top edge of a box. Boxes that are not properly erected or crushed will cause the glue function to be aborted when the eye loses sight of the top edge.

Mode 3 operation eliminates the need to hardwire photo eyes and other sensors in series with the corresponding PLµS control outputs. Instead, the sensor input is "ANDed" with the selected output(s) through simple programming.



MODE 4

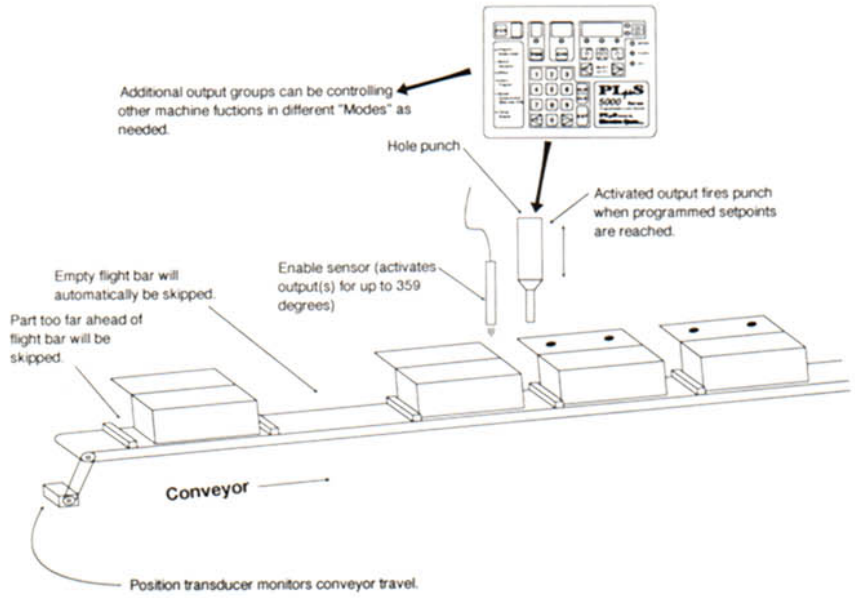
Operate machine function only if sensor detects part in correct position

In this illustration the punch will operate if the enable sensor detects the leading edge of the part at the correct position in the machine cycle.

The presence and correct position of parts is verified by the enable sensor before the output(s) are activated. The control position remains in sync with the machine position.

The output(s) in the group become active for up to 359 degrees IF the enable sensor signal occurs within a specified position in the machine cycle. Sensor signals that occur outside of the programmable "Enable Input Window" will be ignored.

This mode of operation is appropriate for flight bar conveyors, rotary index tables and similar types of machinery.



OUTPUT CONFIGURATIONS

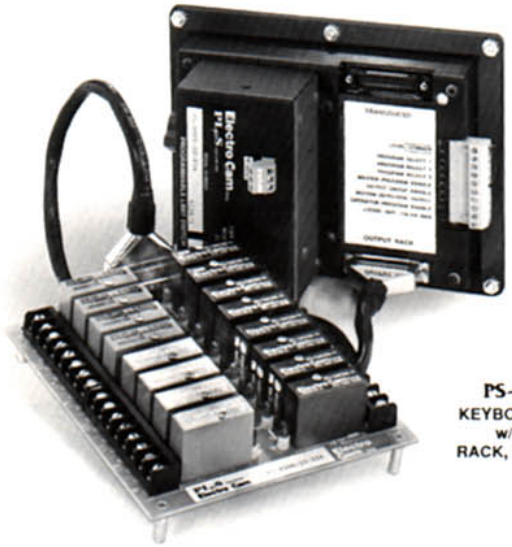
PLμS Programmable Limit Switches are used in a wide variety of rotating shaft control applications:

- Switching machine devices ON and OFF directly (solenoid valves, clutch/brakes, etc.)
- Interfacing to other microprocessor-based control systems (such as Programmable Logic Controllers-PLC's)
- A combination of both of these configurations for direct output to "real time" critical functions (PLC scan delays can deteriorate high speed accuracy needed for some machine functions-gluing, registration control, etc.)

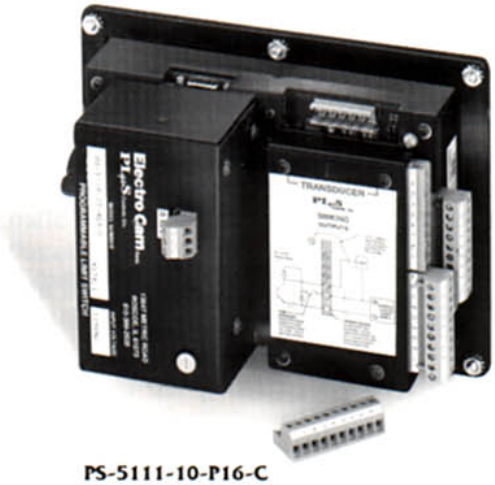
Each of these system configurations require specific components, and the PS-5000 Series is ideally suited because of the hardware options available. As shown below, the Keyboard/Controller is available in 3 basic output formats, each with distinct advantages. In addition, these Keyboard/Controllers are available in a NEMA 12 enclosure.

PS-5001, PS-5101, PS-5004, PS-5104
with separate Output Rack & Modules

These models use AC and/or DC Output Modules-suitable for directly switching machine devices, as well as PLC input. A system also includes an Output/Input Rack, Output Rack Cable and Output Modules (Input Modules on PS-5X04 Models, if used). Available in 16-, 24-, & 48-output models.



PS-5001-10-016
KEYBOARD/CONTROLLER
w/PS-4100-11-016
RACK, CABLE & MODULES



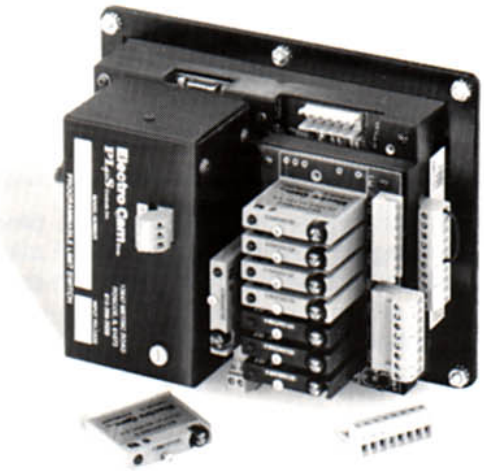
PS-5111-10-P16-C
KEYBOARD/CONTROLLER

PS-5011, PS-5111
with built-in transistor outputs

These models provide 8 or 16 optically isolated DC sinking or sourcing outputs, each with 50 mA rating at 5-30 VDC. Output Rack, Cable, and Output Modules are not needed, signal wiring is direct to PLC or similar control logic circuitry. Uses pluggable terminal blocks on back of Keyboard/Controller.

PS-5021, PS-5121, PS-5024, PS-5124
with on-board AC and/or DC Output Modules

These models control up to 9 AC and/or DC Output Modules, mounted on back of Keyboard/Controller. The SLIMLINE Modules feature integral fuses and LED's. No separate output Rack or Cable is used; output wiring uses pluggable connectors on back of Keyboard/Controller. Fuse Tester circuit is provided on back of unit.



PS-5124-10-M09-C
KEYBOARD/CONTROLLER

PROGRAMMING FEATURES

3 LEVELS OF PROGRAMMING ENABLE

The 3 program enable levels allow individuals to access control functions they need to adjust, while restricting access to other functions that go beyond that individual's responsibility.

"Master" enable level allows access to all functions and is used by engineering to initially configure the controller.

"Setup" enable level accesses all functions that could routinely need adjustment, but restricts access to functions that would normally be set once and not changed (Ex: Scale Factor, direction of forward rotation, etc).

"Operator" enable level allows only the setpoints and time values of specified output channels to be adjusted (these output channels are specified at "Master" level).

MOTION DETECTION AND-ing

Whenever the machine speed falls within the programmed High and Low RPM setpoints, the motion logic is in the ON state. Outputs can selectively by AND-ed with the motion logic so they will only be active when the machine speed is within RPM setpoints.

OFFSET

Full scale offset simplifies transducer installation.

24, 48 & 64 PROGRAMS

A program consists of all of the output setpoints and input enable setpoints needed to run a specific job. The control can store 64 of these programs (job setups) in permanent memory. 48 programs available in 24-output units; 24 programs available in 48-output units. Simply changing program numbers sets the control to run a different job.

INDIVIDUAL CHANNEL SPEED COMPENSATION

Speed compensation automatically advances the On/Off setpoints of an output channel proportional to machine speed to compensate for the response of the device being controlled. Each output channel can be speed compensated by a unique amount, regardless of how much speed compensation is needed for other outputs. Compensation is a linear function programmed in Degrees/1000RPM. Compensated output setpoints track machine speed changes. Optional **LEADING & TRAILING EDGE SPEED COMPENSATION** enables compensation of output devices which have different TURN ON/TURN OFF delays.

TIMED OUTPUTS

Output channels can selectively be programmed to turn ON at degree positions and turn OFF after a specified amount of time elapses. Timing resolution can be adjusted down to .2mSec increments. Also, a maximum OFF degree position can be programmed to turn OFF the output if that position is reached before the specified time has elapsed.

ACCESSORY POWER SUPPLY

Regulated 12VDC (150 mA max) power available for external devices.

SELECTABLE SCALE FACTOR (Resolver Models)

The resolver shaft position is decoded to 10 bit (1024 increments) resolution (Optional 12-bit resolution for 4096 increments), but the controller logic and display can operate at fewer increments per revolution if desired. For example, to display and program in degrees, a scale factor of 360 would be used (360 increments per revolution).

4 OUTPUT ENABLE MODES (PS-5XX4 Models)

Outputs can be subdivided into groups with dedicated enable signals. Each group can be assigned to operate in 1 of the following modes: (use of these modes can often eliminate the need for external logic)

MODE 1 - Outputs always active, switching ON and Off whenever programmed setpoints are reached. Enable signal causes degree position to reset to 0.

MODE 2 - Outputs are inactive until group enable signal occurs. Degree position then resets to 0 and outputs become active for up to 1 revolution.

MODE 3 - Outputs are only active while enable signal is ON. When enable signal is OFF, outputs will be inactive.

MODE 4 - Outputs are only active if enable signal occurs during specified window. The degree position for that group will not be changed and the outputs will become active for up to 1 revolution.

SERIAL COMMUNICATION (Optional) RS-232 & RS-422/485 PORTS

External communication devices can SEND and RECEIVE all program information within the PLµS control, either as individual setpoints and functions or as a complete memory upload or download. An Electro Cam software package is available for IBM compatible computers.

SYSTEM COMPONENTS

ENCODER-BASED
(separate output rack)
PS-5001/5004 Keyboard/Controller
Encoder
Encoder Cable
Output Rack
Output Rack Cable
Output Modules
Input Modules (PS-5004 Model)

RESOLVER-BASED (separate output rack)
PS-5101/5104 Keyboard/Controller
Resolver
Resolver Cable
Output Rack
Output Rack Cable
Output Modules
Intput Modules (PS-5104 Model)

RESOLVER-BASED (Integral output rack)
PS-5111/5121*/5124* Keyboard/Controller
Resolver
Resolver Cable
SLIMLINE Modules (PS-5121*/5124* Models)

ENCODER-BASED (Integral output rack)
PS-5011/5021*/5124* Keyboard/Controller
Encoder
Encoder Cable
SLIMLINE Modules (PS-5021*/5024* Models)

ORDERING INFORMATION

PS-5XXX-XX-XXX-X

TRANSDUCER SELECTION
0 - Encoder input
1 - Resolver input

OUTPUT CONFIGURATION
0 - Separate Output Rack & Modules
1 - DC transistor outputs
2 - SLIMLINE modules* on Keyboard/Controller back

FUNCTIONS
1 - Standard Features
4 - Output enable modes & standard features

INPUT VOLTAGE
10 - 115VAC input
20 - 230VAC input

TYPE OF OUTPUT
O - Separate Rack & Output Modules
M - SLIMLINE Modules (PS-5X2X Models)*
N - DC Sinking output (PS-5X11 Models)
P - DC Sourcing output (PS-5X11 Models)

NUMBER OF OUTPUTS
08 - 8 DC outputs (PS-5X11 Models)
09 - 9 SLIMLINE Modules (PS-5X2X Models)*
16 - 16 AC/DC Outputs
24 - 24 AC and/or DC Outputs
48 - 48 AC and/or DC Outputs

OPTIONS
A - Analog output proportioned to RPM
C - Serial communication
G - Gray Code output
H - High resolution (12 bit-4096)
L - Leading & trailing edge speed compensation

STANDARD OUTPUT MODULES

SLIMLINE OUTPUT MODULES*

PLµS Models, requiring output and input modules, use one of the following types of plug-in modules. An input or output module is required for each input or output being used. Module signals are isolated from one another, allowing AC and/or DC modules to be mixed on the same control, directly driving machine devices or interfacing to PLC's for logic functions. Slimline modules, used on PS-5X2X Models only, contain integral fuses and LED's for ease of monitoring and troubleshooting.

OUTPUT MODULES

DC Output:	**EC-ODC5** (Standard) **EC-ODC060-3** (Slimline)
Output Voltage:	0 to 60 VDC
Output Current:	3 A @/below 35°C (95°F) Derate 35.7 mA/°C (19.8 mA/°F)
Input Voltage:	5 VDC nominal to 8 VDC maximum
DC Output:	**EC-ODC5A** (Standard) **EC-ODC200-1** (Slimline)
Output Voltage:	0 to 200 VDC
Output Current:	1 A @/below 45°C (113°F) Derate 18 mA/°C (10 mA/°F)
Input Voltage:	5 VDC nominal to 8 VDC maximum
AC Output:	**EC-OAC5A-11** (Standard) **EC-OAC240-3** (Slimline)
Load Voltage:	24 to 280 VAC rms
Load Current:	30 mA rms to 3 A rms @/below 35°C (95°F) Derate 50 mA/°C (27.8 mA/°F)
Input Voltage:	5 VDC nominal to 8 VDC maximum

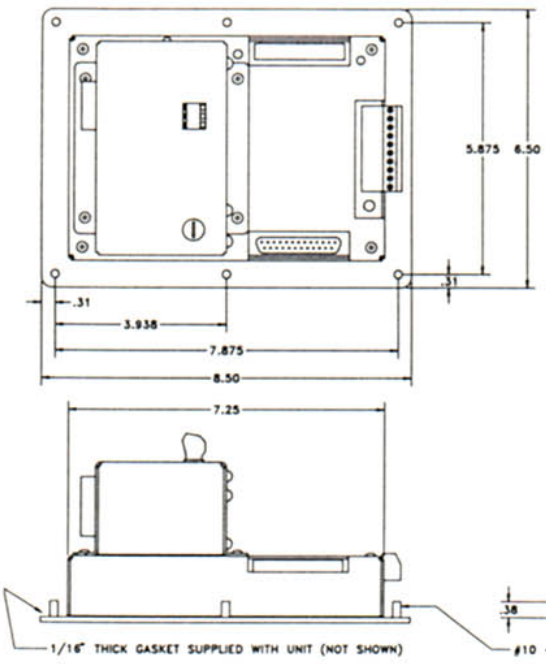
Reed Relay:	**EC-ORR5** (Standard) **EC-ORR000-0** (Slimline)
Output Type:	N/O Reed Relay Contacts
Contact Rating:	10 VA maximum (DC resistive load)
Output Voltage:	0 to 24 VDC/0 to 120 VAC rms
Output Current:	100 mA DC maximum 30 mA AC maximum (resistive loads only)
Analog Output:	**EC-ANLG-010V** (Standard) **EC-SANL-010V** (Slimline)
Resolution:	12 Bits (4096 Increments)
Output Voltage:	0 to 10 VDC
Output Current:	10 mA DC maximum
Load Resistance:	1 K Ohm minimum
Analog Output:	**EC-ANLG-420M** (Standard) **EC-SANL-420M** (Slimline)
Resolution:	12 Bits (4096 Increments)
Output Current:	4 to 20 mA DC
Load Resistance:	450 Ohms maximum

INPUT MODULES

DC Input:	**EC-IDC5** (Standard) **EC-IDC032** (Slimline)
Input Voltage:	10 to 32 VDC
Input Current:	25 mA maximum @ 32 VDC input
Turn On Time:	5 ms maximum
Turn Off Time:	5 ms maximum

AC Input:	**EC-IAC5** (Standard) **EC-IAC120** (Slimline)
Input Voltage:	90 to 140 VAC rms
Input Current:	11 mA AC rms maximum @ 140 VAC rms input
Turn On Time:	20 ms typical
Turn Off Time:	20 ms typical

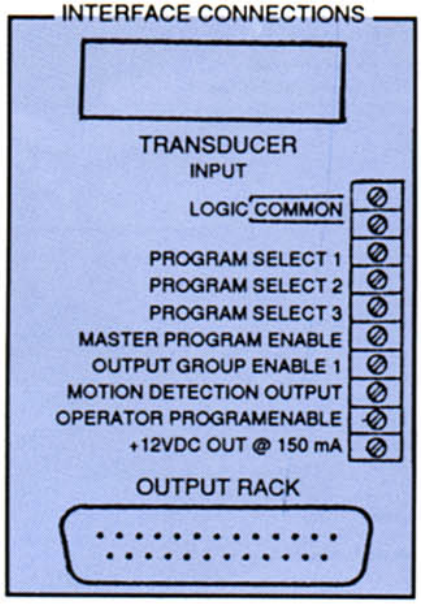
AC Input:	**EC-IAC5A** (Standard) **EC-IAC240** (Slimline)
InputVoltage:	180 to 280 VAC
Input Current:	5 mA AC rms maximum @ 280 VDC rms input
Turn On Time:	20 ms typical
Turn Off Time:	20 ms typical



KEYBOARD/CONTROLLERS

NOTE: PS-5X0X mounting dimensions shown.

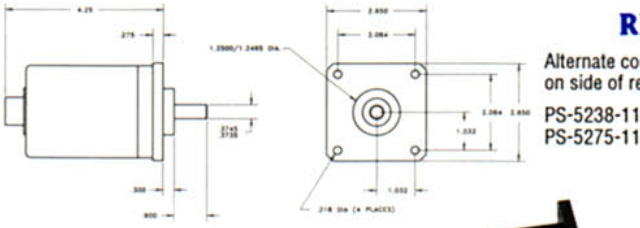
PS-5X1X/5X2X Keyboard/Controller dimensions not shown. Output rack on these units is integral to unit (connection is internal). Mounting dimensions for all Keyboard Controllers are identical. See chart on p.2 for specific model numbers.

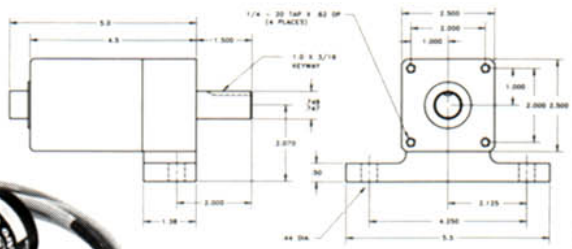


RESOLVERS

Alternate connector position available on side of resolver housing, specify:

PS-5238-11-ADS (flange-mount)
PS-5275-11-ADS (foot-mount)





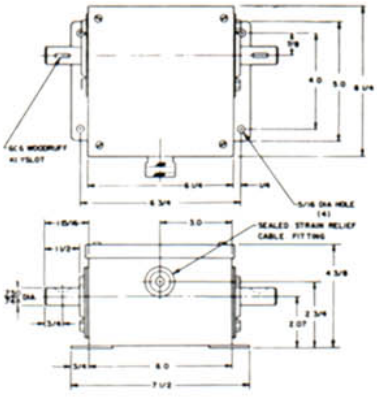
FLANGE MOUNT
PS-5238-11-ADR

FOOT MOUNT
PS-5275-11-ADR

RESOLVER CABLE
PS-5300-01- XXX

Keykboard/Controller to Resolver, 10' length standard (-010). Other lengths specify "-XXX" in 5' increments up to 30', 10' increments to 50', and 50' increments up to 1000'.

ENCODERS



NEMA 12 Housing
PS-4256-11-DDR-(0 TO 1000 RPM)
PS-4257-11-DDR-(0 TO 2000 RPM)

NEMA 4X Housing
PS-4456-11-DDR-(0 TO 1000 RPM)
PS-4457-11-DDR-(0 TO 2000 RPM)

Note: NEMA 4x (stainless steel) not shown. Mounting dimensions are identical to NEMA 12 as shown.

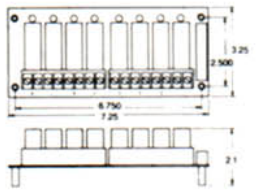
ENCODER CABLE
PS-4300-01- XXX

Keyboard/Controller to Encoder, 10' length standard (010). Other lengths specify "XXX" in 5' increments up to 30' and 10' increments to 30'-200'.

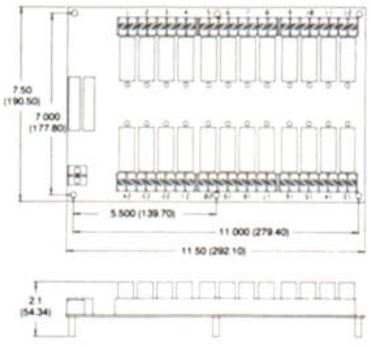
OUTPUT RACKS For use with PS-5X0X Controllers

Order modules separately (p. 7), one module required per output. Output racks mounted with (4) #6 screws. Output Rack and Cable not used in PS-5X1X/5X2X systems (output rack integral to unit).

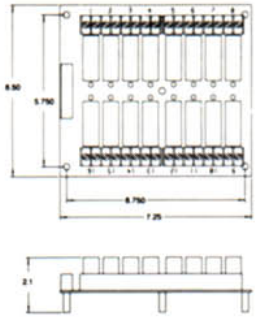
PS-4100-11-208 (8 Point)



PS-4100-12-124 (24 Point)



PS-4100-11-216 (16 Point)



OUTPUT RACK CABLE
PS-4300-02- XXX

Keyboard/Controller to Output Rack, 5' length standard (005). Other lengths specify "XXX" in 5' increments up to 30' if longer cables required consult factory.