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Find the *Electro Cam PL-1746-C02-R1* at our website: ***Click HERE***

Electro Cam Corp. PLµS Controls Div.

# PL-1746 Series

## PLµS® Plug-In Modules for the Allen-Bradley SLC-500 PLC



PL-1746-C01 PL-1746-C02 PL-1746-C03 PL-1746-C04

**The PLµS PL-1746 Series Plug-In Modules** for Allen-Bradley PLC's, incorporate advanced PLS functions in a 1746 I/O module package.

The PLµS Plug-In Modules provide 12 bit absolute position, and accurate control of functions at high speeds, based on rotary position input. They complement the control capabilities of the PLC by performing tasks that typically must occur much faster than a normal PLC scan cycle.

In addition to providing precise control of events based on rotary position, these modules incorporate high speed control logic and automatic speed compensation, independent of the PLC scan. Output Groups and High Speed Logic Modes move beyond standard PLS functionality to give the user powerful tools that solve control problems accurately and at high speeds.

Programming of the PL-1746 modules may be done through the backplane or through the Electro Cam Corp. model 6400 keypad/display.

## PL-1746 Series Features

| PL-1746 Model | 12 bit Resolution | Leading/ Trailing Speed Compensation | 2 Analog Backplane Outputs | 8 Sinking/ Sourcing DC Inputs | 32 Solid State Relay Output via I/O Rack | 6 Sinking DC Outputs Onboard | 6 Sourcing DC Outputs Onboard | 2 Analog Outputs | Onboard Display | Encoder Based | Resolver Based | Shift Register |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C01-R1 | ❄ | ❄ | ❄ | ❄ | ❄ | | | ❄ | ❄ | | ❄ | |
| †C02-E1-S | ❄ | ❄ | ❄ | ❄ | | | ❄ | | ❄ | ❄ | | ❄ |
| C02-R1 | ❄ | ❄ | ❄ | ❄ | | | ❄ | | ❄ | | ❄ | OPTION -S |
| †C03-E1-S | ❄ | ❄ | ❄ | ❄ | | ❄ | | | ❄ | ❄ | | ❄ |
| C03-R1 | ❄ | ❄ | ❄ | ❄ | | ❄ | | | ❄ | | ❄ | OPTION -S |
| C04-R1 | ❄ | ❄ | ❄ | | | | | | | | ❄ | |

†PL-1746-C02-E1-S AND PL-1746-C03-E1-S are only available with the "S" (Shift Register) Option. The "S" Option is included at no charge – on these two units – only.

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

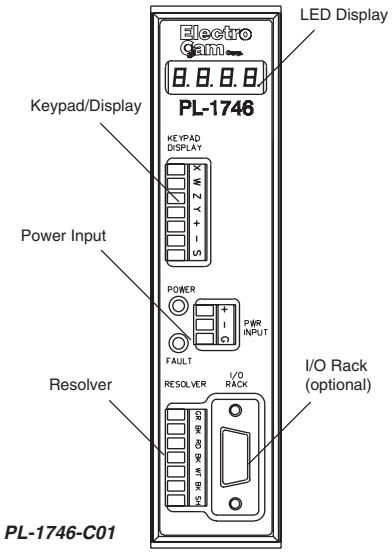
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# Standard PL-1746 Series Features

- Non-Volatile Memory - configurations saved when power is interrupted.
- Absolute position with high resolution (Up to 4096 increments per revolution)
- 48 available programs - active programs selected through the backplane or via the Electro Cam Corp. 6400 series keypad/display.
- Complete module status available through the backplane.
- Automatic leading & trailing edge speed compensation - to advance/retard output channel timing to compensate for ON/OFF delay in valves and other devices.
- 2 levels of motion detection - to enable/disable speed critical machine functions.
- 4 timed outputs for controlling time critical functions initiated by position.
- Output Groups and Operating Modes - allows high speed logic to be done in the PLS, separate from the PLC scan.
- Able to connect up to 2 Electro Cam Corp. Model 6400 keypad/displays for remote adjustment.
- Ability to access user selected parameters while operating in an Allen-Bradley remote I/O chassis
- The Shift Register (C02/C03) allows reduced scan time, simplified programming, and ease of troubleshooting in the event of a sensor failure.

# PL-1746-C01 Plug-In Module

- Up to 32 PLS output channels available through 1746 backplane. All channels are available to use either with the Electro Cam Corp. I/O rack (High Speed/Real World), or any 1746 discrete output module.
- Real world, high speed I/O available via either an 8 input/8 output, or an 8 input/16 output external DIN mount rack.
- Up to 32 digital plus 2 analog outputs available.
  (Requires two racks, 16 I/O per rack)
- SLIMLINE™ module outputs: AC, DC




*PL-1746-C01*

The **PS-4108-13-L08 and PS-4108-13-L16** I/O racks provide inputs, analog outputs, and digital power outputs (requiring SLIMLINE™ solid state relays) for the PL-1746-C01 PLμS plug-in modules.



**PS-4108-13-L08 & PS-4108-13-L16 I/O Racks**

# Resolvers

Electro Cam Corp. Resolvers are designed for rugged industrial applications. They feature dual bearing construction (except the 5212 model), and come in a variety of mounting styles and shaft sizes. Some resolver configurations are shown here.

See Price List (Lit. #202) for complete listing of part numbers and specifications.



### PS-5275-11-ADS
### Foot Mount

- 3/4" Shaft
- Top side, right side, left side or rear connection



### PS-5238-11-ADR
### Flange Mount

- 3/8" or 5/8" Shaft
- Top side, right side, left side or rear connection



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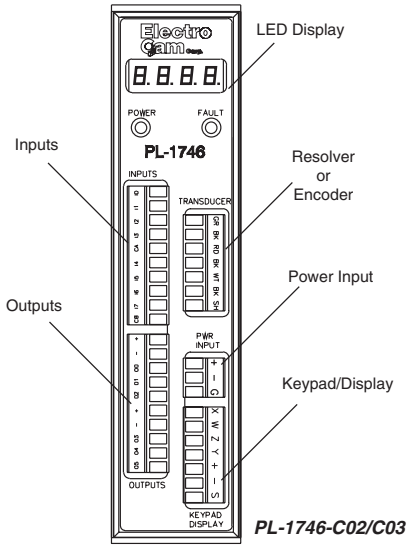
# PL-1746-C02/C03 Plug-In Module

- 6 real world DC outputs, and 8 DC inputs mounted on the front of the PL-1746 module.
  (-C02 = sourcing† outputs, -C03 = sinking† outputs)
- Up to 32 PLS output channels available through the 1746 backplane.
- 2 analog values based on speed, available through the backplane. These are "tunable" to a specific machine speed range.

### Optional Features

- Incremental Encoder input.
- Shift register with 256 shifts (standard on encoder models).
- Output assignment allowing the user to choose which six (6) channels are the real world power outputs.

All other features of the PL-1746-C02/C03 models are the same as those for standard PL-1746 series modules.

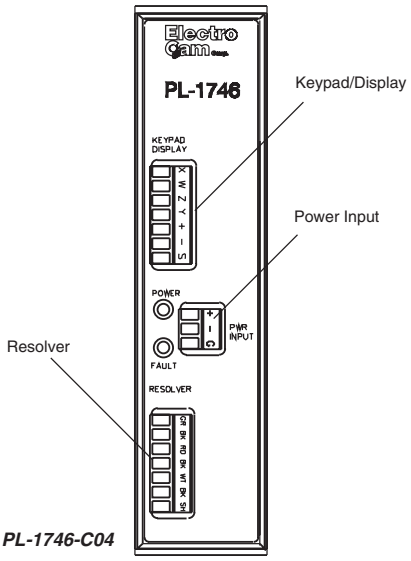


*PL-1746-C02/C03*

# PL-1746-C04 Plug-In Module

- Up to 32 PLS output channels available through the 1746 backplane.
- 2 analog outputs available through the backplane.
- Real-Time Position information is available via the Input File over the SLC 500 backplane. This position can be scaled and zeroed to match actual machine position.
- A register provides detailed hardware error diagnostics. This allows customized handling of faults if they occur.

All other features of the PL-1746-C04 model are the same as those for standard PL-1746 series modules.



*PL-1746-C04*



### PS-5275-051-ADL Foot Mount Geared

- 3/4" Shaft
- 5:1 Gear Ratio
- Top side, right side or left side connection
- Available in ratios 2:1 thru 36:1 (Consult Factory for availability)



### PS-5262-11-CTG Stainless Steel

- 5/8" Shaft
- Left side or right side connection



### PS-5238-11-SDR Servo Mount

- 3/8" Shaft
- Top side, right side, left side or rear connection



### PS-5212-11-SVW Unhoused Servo Mount

- .120" Shaft
- Standard size 11

†See page 4 for sinking/sourcing definitions.



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# Plug-In Module Part Number Breakdown

**P L - X X X X - X X X - X X - X**

**PL =** Plugs into backplane Utilizes Allen-Bradley technology.

**PLATFORM TYPE**
**1746 =** SLC 500

**SUB-CATEGORY**
**C01** = Display, 32 Real World I/O with External I/O racks

**C02** = Display, Built-in 8 Inputs and 6 Sourcing† DC Outputs, 1.5 A

**C03** = Same as C02, except with Sinking† outputs

**C04** = No Display, No Real World I/O

**TYPE TRANSDUCER**
**R** - Resolver
**E** - Encoder

**NUMBER OF TRANSDUCERS**
**1** = One

**OPTIONS**
**S** = Shift Register & Output assignment feature

# Resolver Part Number Breakdown

**P S - 5 2 X X - X X X - X X X - X**

**PLμS Part Number**

**Resolver**

**SHAFT SIZE**
**12** - 1/8 DIA.
**15** - 15 mm DIA.
**20** - 20 mm DIA.
**38** - 3/8" DIA., 2.06" Bolt Flange
**62** - 5/8" DIA., 2.25" Bolt Flange
**75** - 3/4" DIA.

**RATIO**
**11** - Standard 1:1 (Note: 3rd digit not used on Standard 1:1)
**021** - Geared 2:1 - Ext. shaft to internal resolver shaft
**thru**
**361** - Geared 36:1 - Ext. shaft to internal resolver shaft
Various ratios available, contact Factory.

**HOUSING**
**A** - Can housing w/flange or foot endbells.
**C** - Stainless steel square housing.
**E** - 74 mm bolt spacing, flange mount
**S** - Servo mount (.12 = size 11; .38 = size 25 )

**TYPE OF CABLE CONNECTION**
**D** - Military bayonet style connector
**T** - Terminal strip with NO conduit entrance
**V** - No connector, just stripped & tinned wires
**S** - Sealed connector — screw type

***Note:*** *Part # PS-5903-01-001 conduit entrance for terminal strip models sold separately.*

**LOCATION OF CABLE CONNECTION**
**W** - With stripped & tinned leads
**G** - Right (120° from top on "A" housings)
**R** - Rear (not available on Geared Resolver)
**L** - Left (120° from top on "A" housings)
**S** - Side (Top)

**OPTION**
**V** - Vertical Mount
Note: Only required for vertical mounting of PS-5262-11-CTX Models.

# Plug-In Module Typical Systems

| Component(s) | Qty. | Part Number |
|---|---|---|
| **PL-1746-C01 System** | | |
| C01 Plug-In Module | (1) | PL-1746-C01-R1 |
| Resolver | (1) | PS-5275-11-ADR |
| Resolver Cable | (1) | PS-5300-01-010 |
| Keypad/Display | (1) | PS-6400-24-001 |
| Keypad-to-controller cable(s) | (1) | PS-6300-01-005 |
| I/O Rack | (1) | PS-PS-4108-13-L08 |
| I/O Rack Cable | (1) | PS-4308-10-005 |
| SLIMLINE™ Output Modules | (16) | EC-ODC060-3 |
| SLIMLINE™ Analog Modules | (2) | EC-SANL-010V |
| **PL-1746-C02 System (C03 for †Sinking)** | | |
| C02/C03 Plug-In Module | (1) | PL-1746-C02-R1 |
| Resolver | (1) | PS-5275-11-ADR |
| Resolver Cable | (1) | PS-5300-01-010 |
| Keypad/Display | (1) | PS-6400-24-001 |
| Keypad-to-controller cable(s) | (1) | PS-6300-01-005 |
| **PL-1746-C04 System** | | |
| C04 Plug-In Module | (1) | PL-1746-C04-R1 |
| Resolver | (1) | PS-5275-11-ADR |
| Resolver Cable | (1) | PS-5300-01-010 |
| Keypad/Display | (1) | PS-6400-24-001 |
| Keypad-to-controller cable(s) | (1) | PS-6300-01-005 |

## *†SINKING or SOURCING*
### *( as pertaining to Electro Cam Corp. products )*

***Sinking*** means that when the logic is true and the output (or input device) is ON, the output (or input device) is providing a DC common or ground to the connected device.

***Sourcing*** means that when the logic is true and the output (or input device) is ON, the output (or input device) is providing a +DC voltage to the connected device.

This information is important when interfacing an Electro Cam Corp. product with another electronic device. If you are using an Electro Cam Corp. product input to an Allen-Bradley 1746-IN16 "sinking" input card* or similar A-B device, you have to supply a +DC voltage (Electro Cam Corp. ***Sourcing*** output) to this card, NOT a DC common or ground. In these cases, ***Sinking*** is what the card does with the input voltage; sinks it to common or ground.

* Other manufacturers include, but not limited to: Koyo (formerly GE Series 1, Texas Instruments, or Siemens SIMATIC PLS's) that use descriptions similar to Allen-Bradley.

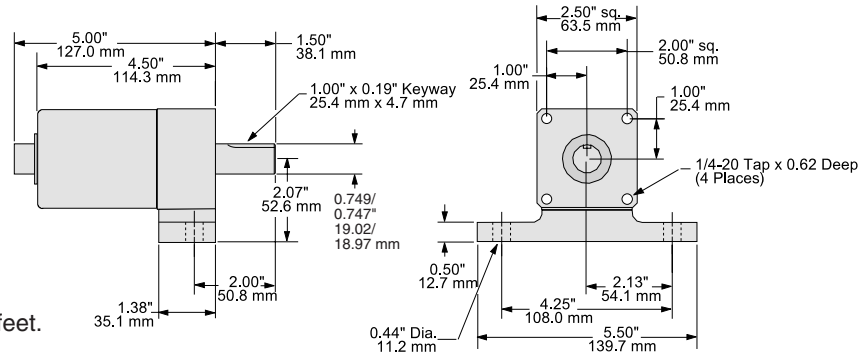


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# Resolver Dimensions

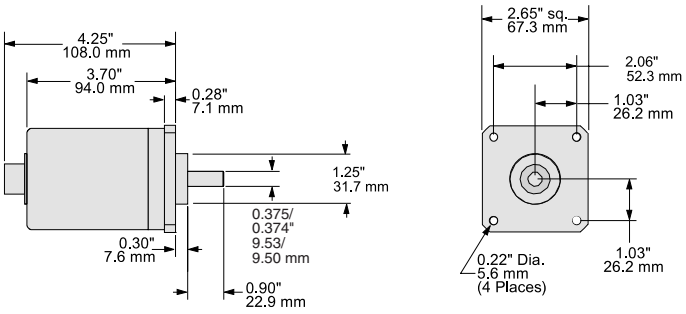
## Foot Mount

**With Rear Connector (shown):**
PS-5275-11-ADR
**With Side Connector:**
PS-5275-11-ADS
**Cable:**
PS-5300-01-XXX where "XXX" is length in feet.




## Flange Mount

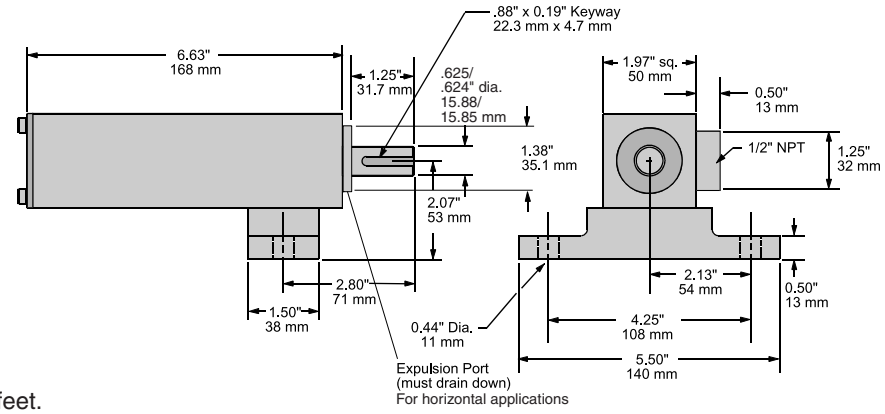
**With Rear Connector (shown):**
PS-5238-11-ADR
**With Side Connector:**
PS-5238-11-ADS
**Cable:**
PS-5300-01-XXX where "XXX" is length in feet.




## Stainless Steel

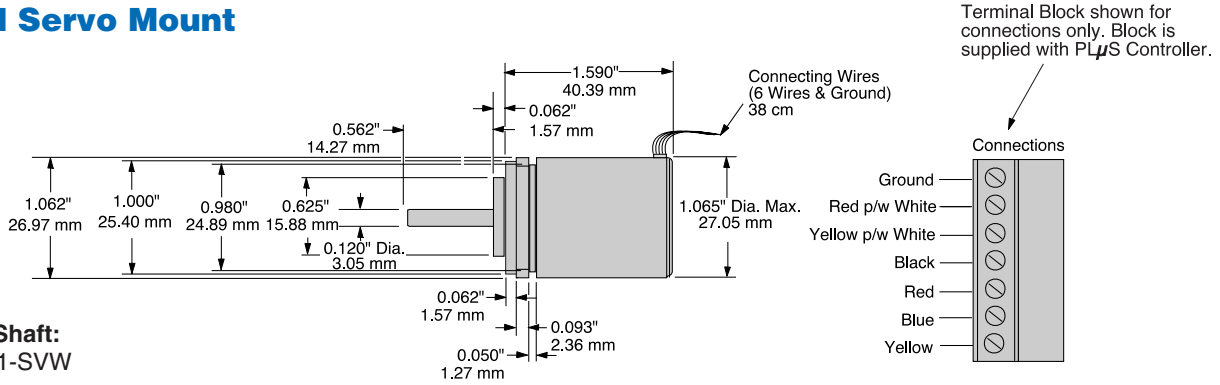
**Horizontal Mount (shown):**
PS-5262-11-CTG (with right connector)
**With Left Connector:**
PS-5262-11-CTL
**Vertical Mount (Shaft up)**
PS-5262-11-CTG-V (with right connector)
PS-5262-11-CTL-V (with left connector)

**Cable:**
PS-5300-02-XXX where "XXX" is length in feet.




## Unhoused Servo Mount

**Size 11, .120" Shaft:**
PS-5212-11-SVW




**Contact the Factory for detailed specifications on other available resolvers.**



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# PL-1746 Specifications

| Plug-In Module Part Numbers | PL-1746-C01-R1 | PL-1746-C02-E1-S<br>PL-1746-C02-R1<br>PL-1746-C03-E1-S<br>PL-1746-C03-R1 | PL-1746-C04-R1 |
|---|---|---|---|
| **Electrical** | | | |
| Input Power | 20-30 VDC. Keypad/display is powered from controller. | 20-30 VDC. Keypad/display is powered from controller. | |
| Backplane Power | 5VDC @ 500 mA max. | 5 VDC @ 500 mA max. | 5VDC @ 500 mA max. |
| I/O Power | 20-30 VDC, 80 mA + 150 mA per keypad + 230 mA per rack.<br>Example: Total = 840 mA with 2 keyboards and 2 racks.<br>Certain types of power supplies employ a self protection feature called current fold back limiting. The inrush currents of the high efficiency switching regulators may cause power supplies to enter current limit mode. Power supplies with current fold back limiting should be sufficient to supply three times the steady state current of the system.<br>Inrush current @ 30v, 40 amps max. for 600 µs (2 keyboards, 2 racks) | 20-30 VDC @ 90 mA max. + 150 mA per PS-6400 keypad<br>Certain types of power supplies employ a self protection feature called current fold back limiting. The inrush currents of the high efficiency switching regulators may cause power supplies to enter current limit mode. Power supplies with current fold back limiting should be sufficient to supply three times the steady state current of the system. | 20-30 VDC @ 80 mA max. + 150 mA per PS-6400 keypad (include power supply warning). |
| Permanent Memory | EEPROM (no battery required) | EEPROM (no battery required) | EEPROM (no battery required) |
| **Environment** | | | |
| Operating Temp. | 0° to 55°C (32° to 131°F) | 0° to 55°C (32° to 131°F) | 0° to 55°C (32° to 131°F) |
| Storage Temp. | -40° to 70°C (-40° to 160°F) | -40° to 70°C (-40° to 160°F) | -40° to 70°C (-40° to 160°F) |
| Humidity | 95% maximum relative non-condensing | 95% maximum relative non-condensing | 95% maximum relative non-condensing |
| NEMA Rating | Keypad/Display: NEMA 4 | Keypad/Display: NEMA 4 | Keypad/Display: NEMA 4 |
| **Physical** | | | |
| Weight | PLµS Module: 0.5 lbs (0.2 kg)<br>Keypad/Display: 0.5 lbs. (0.2 kg) | PLµS Module: 0.5 lbs (0.2 kg)<br>Keypad/Display: 0.5 lbs. (0.2 kg) | PLµS Module: 0.5 lbs (0.2 kg)<br>Keypad/Display: 0.5 lbs. (0.2 kg) |
| **Mounting** | | | |
| Controller | Mounts in SLC-500 chassis. | Mounts in SLC-500 chassis. | Mounts in SLC-500 chassis. |
| Rack | Brackets accept EN-50035 (“G” profile) or EN-50022 (“Top Hat” profile) DIN Rail | | |
| Keypad/Display | Mounts up to 1000’ from controller. 0 0 to 2 keypads may be connected to one controller. | Mounts up to 1000’ from controller. 0 0 to 2 keypads may be connected to one controller. | Mounts up to 1000’ from controller. 0 0 to 2 keypads may be connected to one controller. |
| **Inputs on Rack** | | | |
| DC Inputs | 8 sinking† or sourcing† DC inputs, optically isolated (1st rack only). | | |
| Input ON State Voltage | 10-30 VDC | | |
| Input Current | 11 mA @ 24 VDC | | |
| Response | 2 µs max. | | |
| **Outputs on Rack** | | | |
| Real World Outupts | Up to 16 SLIMLINE™ modules may be mounted on the rack. Modules may be any mix of AC, DC, and reed relay. All modules (except reed relay) optically isolated. | | |
| Analog Output | Up to 2 SLIMLINE™ analog output modules may be mounted on the rack in addition to the 16 digital modules. | | |

*Specifications continued...*

†See page 4 for sinking/sourcing definitions.



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# PL-1746 Specifications (continued)

| Plug-In Module Part Numbers | PL-1746-C01-R1 | PL-1746-C02-E1-S<br>PL-1746-C02-R1<br>PL-1746-C03-E1-S<br>PL-1746-C03-R1 | PL-1746-C04-R |
|---|---|---|---|
| **Outputs On Rack** (cont') | | | |
| Output Types | 4-20 mA or 0-10 VDC, proportional to RPM | | |
| Resolution | 12 bit | | |
| Update Frequency | 10 ms | | |
| Linearity | ±0.3% of full scale @ 25°C (77°F) | | |
| Set-up | Offset & full scale RPM are programmable | | |
| **Inputs on Module** | | | |
| DC Inputs | | 8 DC inputs, optically isolated, sinking† or sourcing† in banks of 4. | |
| Input ON State Voltage | | 20-30 VDC | |
| Input Current | | 11 mA @ 24 VDC | |
| Response | | 2 μs max. | |
| **Outputs on Module** | | | |
| Real World Outputs | | 6 DC outputs @ 1.5A each, 20-30V<br>**Note: -C02 all outputs are SOURCING†**<br>**-C03 all outputs are SINKING†** | |
| Analog Output | | Analog outputs accessible through backplane only; they are proportional to RPM. | |
| Resolution | | 12 bit | |
| Update Frequency | | 10 ms | |
| Set-up | | Offset & full scale RPM are programmable | |
| **Operation** | | | |
| Scan Time | Less than 1000 μs typical (exact time determined by programming) | Less than 1000 μs typical (exact time determined by programming). | Less than 1000 μs typical (exact time determined by programming). |
| Position Resolution | 12 bits (4096 increments) | 12 bits (4096 increments) | 12 bits (4096 increments) |
| Speed Compensation | Programmed in 0.1 msec steps. 16 individually compensated outputs max. Updated 5 times per second. Separate leading/trailing edge compensation standard. | Programmed in 0.1 msec steps. 16 individually compensated outputs max. Separate leading/trailing edge compensation standard. | Programmed in 0.1 msec steps. 16 individually compensated outputs max. Updated 5 times per second. Separate leading/trailing edge compensation standard. |
| Output Timeout | 1.0 ms time base (accuracy: +1,-0 ms) | 1.0 ms time base (accuracy: +1,-0 ms) | 1.0 ms time base (accuracy: +1,-0 ms) |
| Number of Timed Outputs | Four maximum | Four maximum | Four maximum |
| Multiple Programs | 48 programs standard | 48 programs standard | 48 programs standard |
| Total Pulse Memory | 1252 pulses standard | 1252 pulses standard | 1252 pulses standard |
| Pulses per Program | 512 maximum standard | 512 maximum standard | 512 maximum standard |
| Pulses per Output | 512 maximum standard | 512 maximum standard | 512 maximum standard |
| Maximum Speed | 3000 RPM. Note: Pulses generated with Pulse Train command are not included in pulses per program or pulses per output counts. | 3000 RPM. | 3000 RPM. Note: Pulses generated with Pulse Train command are not included in pulses per program or pulses per output counts. |

†See page 4 for sinking/sourcing definitions.



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