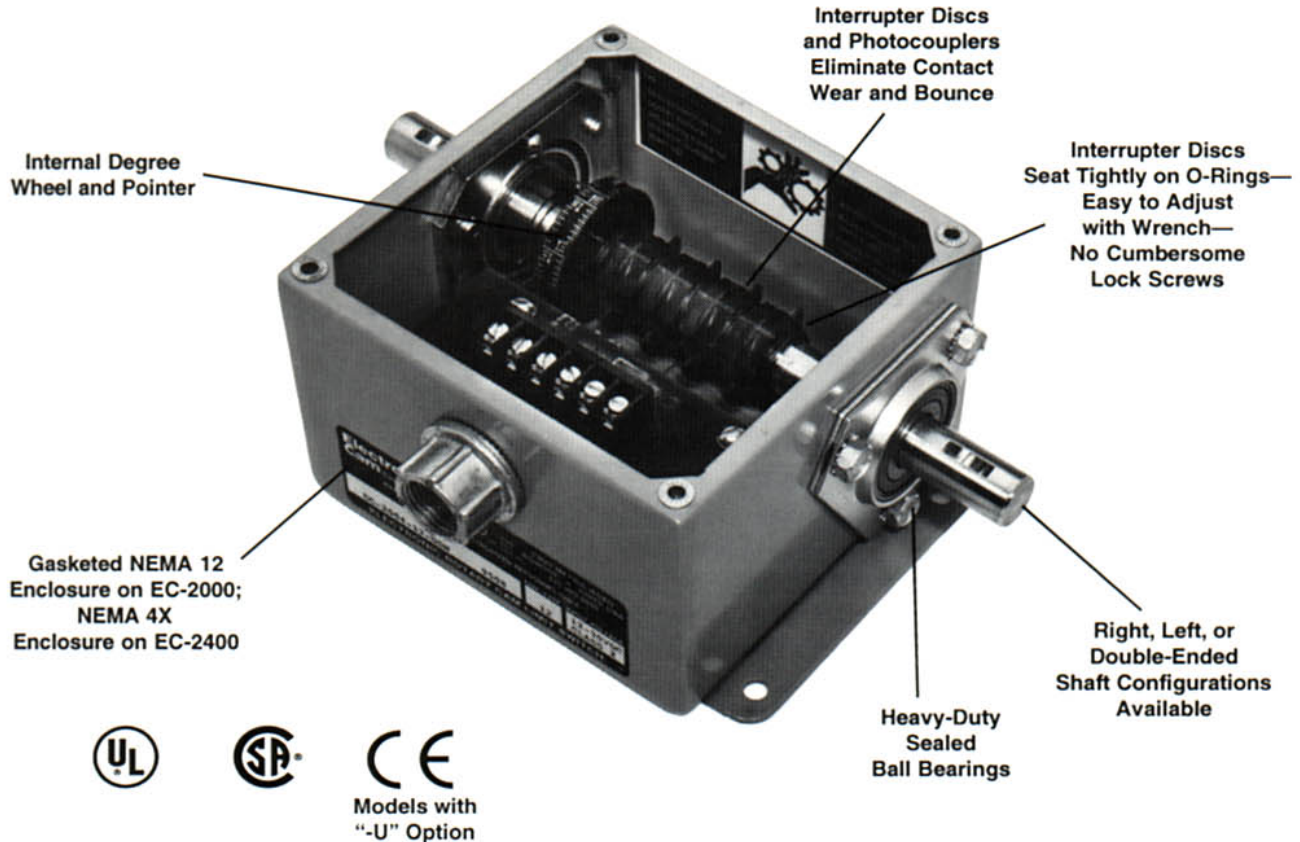


EC-2000/2400

Solid State Rotary Cam Limit Switches



Description

EC-2000 Series and EC-2400 Series Rotary Cam Limit Switches use easy-to-adjust interrupter discs and photocouplers, eliminating contact wear and bounce present with traditional cams and mechanical limit switches.

The low level DC transistor outputs provide "on/off" signals to programmable logic controllers (PLC's) or other logic circuitry. The DC open collector transistor outputs are designed for applications requiring sinking-type outputs. These switches provide automation solutions to improve productivity in shaft-based machinery.

Although generally used in dedicated machine applications not requiring setpoint adjustment for speed changes or product changeover, they can accommodate multiple setpoints by assigning groups of interrupters to specific tasks.

Typical applications for the EC-2000 Series and EC-2400 Series switches include cartoners and case packers, palletizers, gluing machines, pick and place equipment, and similar machinery.

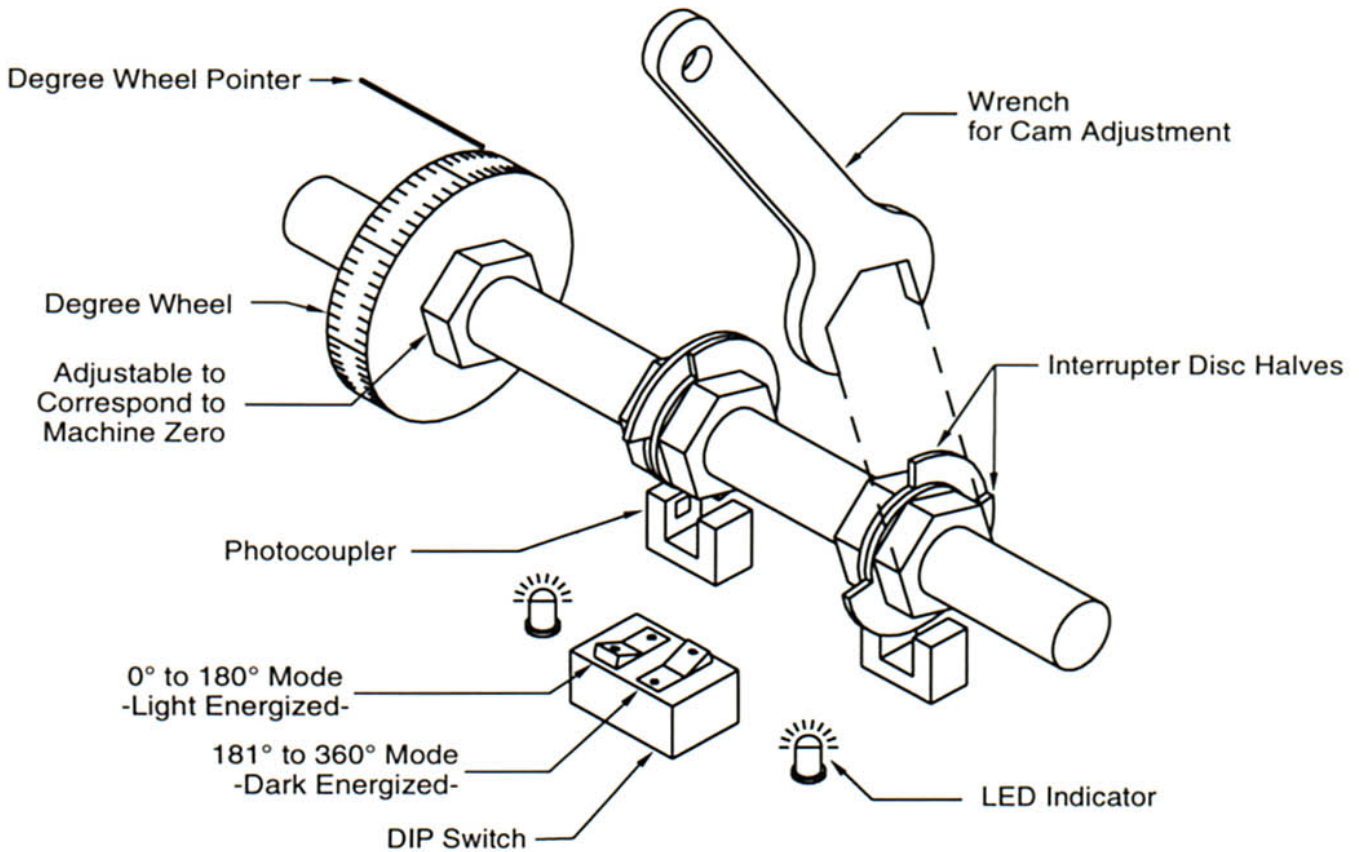
Features

- Units available with 4, 8, 12, 16, or 24 open collector transistor outputs, capable of sinking 0 to 200 mA
- Input voltage is 12 to 30 VDC
- Heavy-duty construction for industrial environments
- LED's indicate output status
- EC-2000 units housed in gasketed NEMA 12 JIC, oil-tight enclosures; EC-2400 units housed in NEMA 4X stainless steel enclosures
- Sealed ball bearings
- Internal degree wheel and pointer
- Right, left, or double-ended shaft extensions; double-ended stainless steel shaft with a #606 Woodruff key provision standard with NEMA 4X models
- Many options available, including external degree wheel and pointer, multi-pulse generating discs, sprocket disengagement clutch, CFX models for high vibration, CF models for highly contaminating environments, and special shafts

Electro Cam Corp.

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

Theory of Operation



As shown above, each output switch is controlled by interrupter discs with two halves. These discs break the beam of light in the corresponding photocoupler. If the DIP switch associated with a photocoupler is in the "0° to 180°," or Light Energized mode, the output and the corresponding LED will be switched on when the beam is unbroken. If the DIP switch is in the "181° to 360°," or Dark Energized mode, the output and the corresponding LED will be switched on

when the interrupter breaks the beam. The gap, or open window in the interrupter is adjusted by using a wrench to turn the disc halves. Disc halves seat tightly to the shaft with O-rings. The discs are easy to adjust with a wrench, and require no cumbersome locking screws or other devices. Below is a chart showing a few examples of setting "on" times by adjusting the gap and the DIP switch positions.

| SWITCH MODE | ENERGIZED BY | "ON" TIME | EXAMPLE CAM SETTINGS | | | |
|-------------------------------|--------------------------------------|----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| 0° - 180° Light Energized | Photocoupler Light Beam -PASSING- | Fully Adjustable 1° to 180° | From 0° to 170° "ON" for 170° | From 45° to 180° "ON" for 135° | From 90° to 135° "ON" for 45° | From 315° to 322° "ON" for 7° |
| | | | | | | |
| 181° - 360° Dark Energized | Photocoupler Light Beam -BLOCKED- | Fully Adjustable 181° to 359° | From 170° to 0° "ON" for 190° | From 180° to 45° "ON" for 225° | From 135° to 90° "ON" for 315° | From 322° to 315° "ON" for 353° |

Standard Models

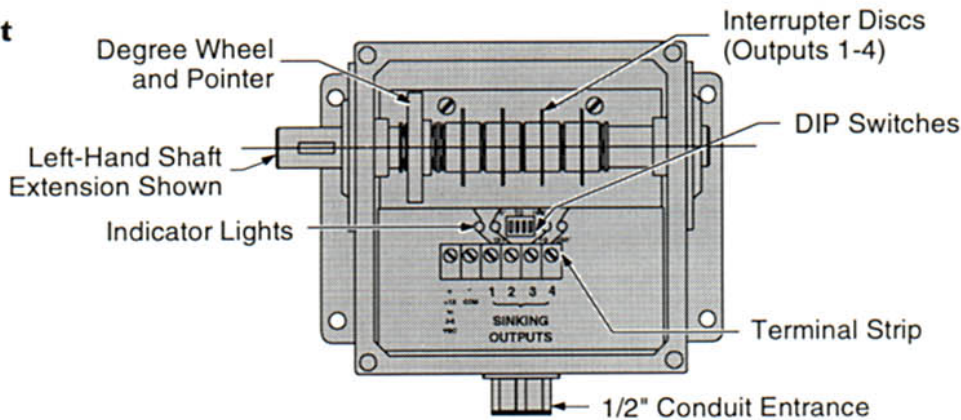
All EC-2000 Series units are housed in gasketed NEMA 12 JIC, oil-tight enclosures. All EC-2400 Series units are housed in NEMA 4X stainless steel enclosures. The NEMA 4X also has a stainless steel double-ended shaft with a #606 Woodruff key provision as standard. Five standard EC-2000 Series units and four standard EC-2400 Series units are available.

| Model | Outputs | Standard Shafts |
|-----------------|---------|-------------------------|
| EC-2004/EC-2404 | 4 | Right, left, or double* |
| EC-2008/EC-2408 | 8 | Right, left, or double* |
| EC-2012/EC-2412 | 12 | Right, left, or double* |
| EC-2016/EC-2416 | 16 | Double only |
| EC-2024 | 24 | Double only |

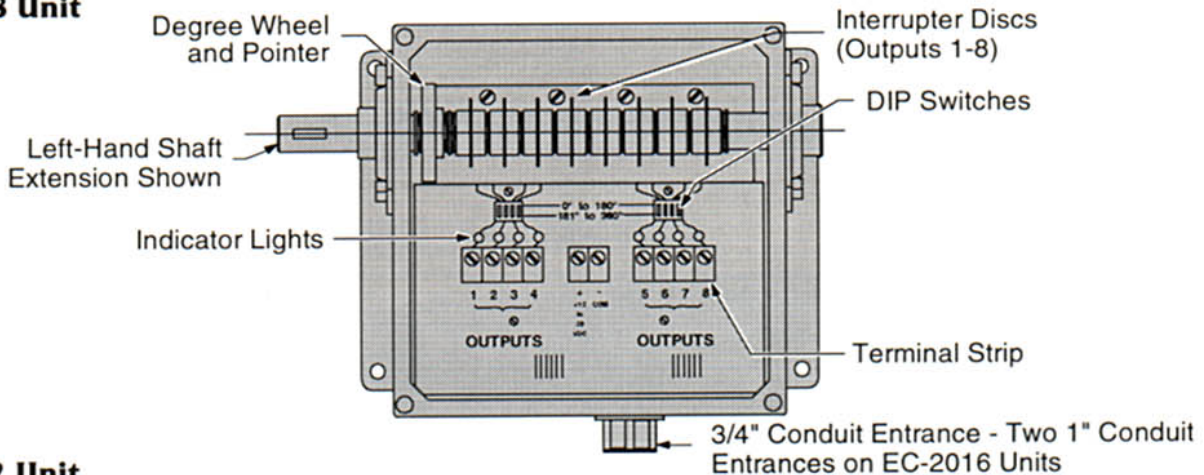
*A double-ended shaft is standard on all EC-2400 Series units.

Note: See the dimensional drawings on pages 4 through 7 for shaft illustrations. Special shafts can be supplied. Please enclose shaft drawing and specs with your order.

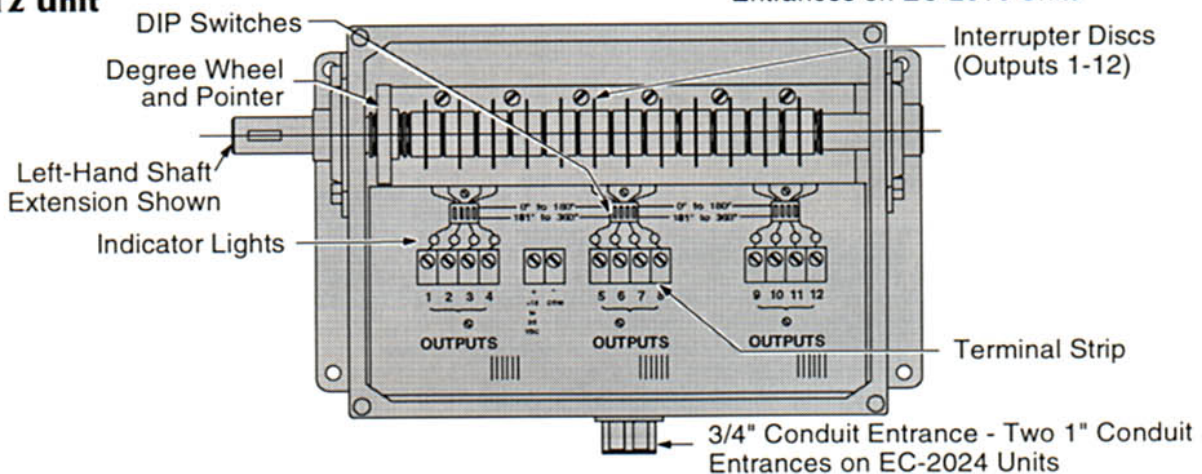
EC-2004 Unit



EC-2008 Unit



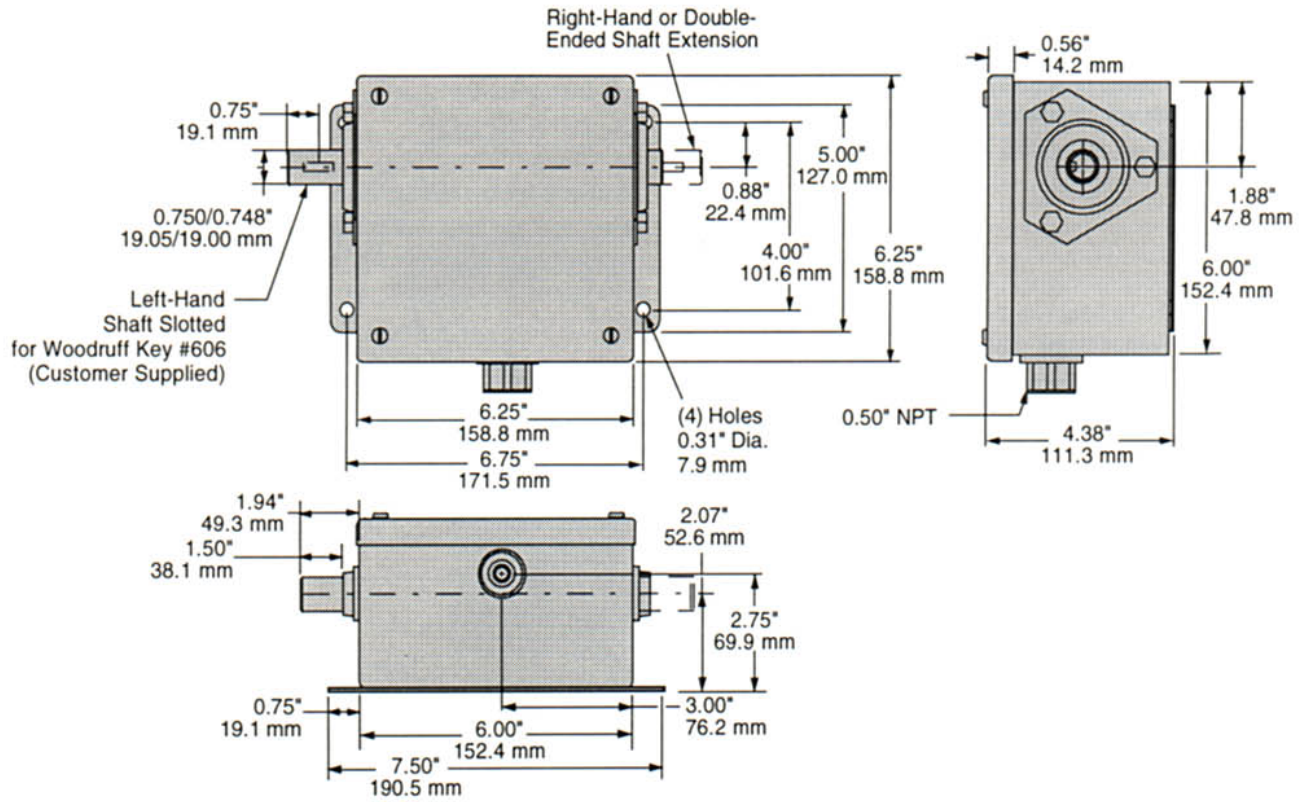
EC-2012 Unit



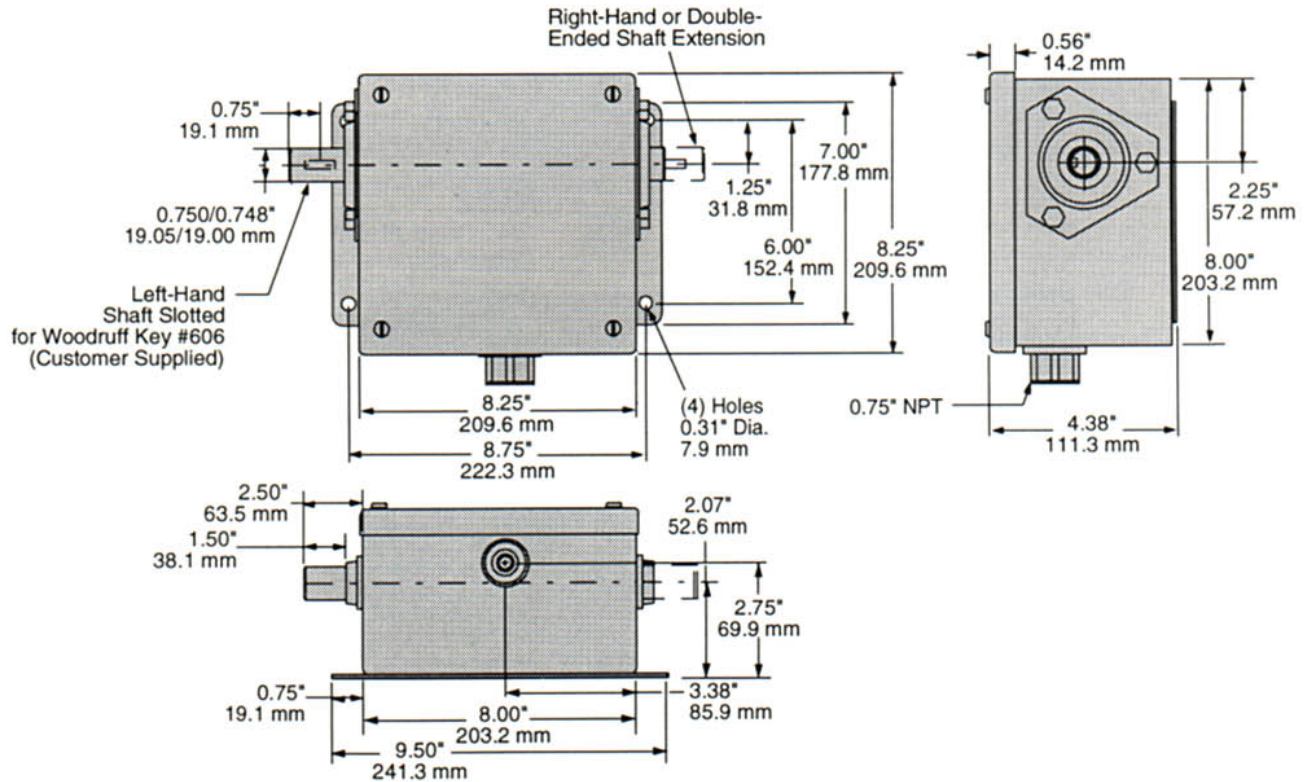
The EC-2016 units each consist of two sets of EC-2008 circuitry within one enclosure. The unit has a double-ended shaft specially made for the size of the EC-2016 enclosure. There are two separate 1" conduit entrances in the EC-2016.

The EC-2024 unit consists of two sets of EC-2012 circuitry within one enclosure. The unit has a double-ended shaft specially made for the size of the EC-2024 enclosure. There are two separate conduit entrances in the EC-2024.

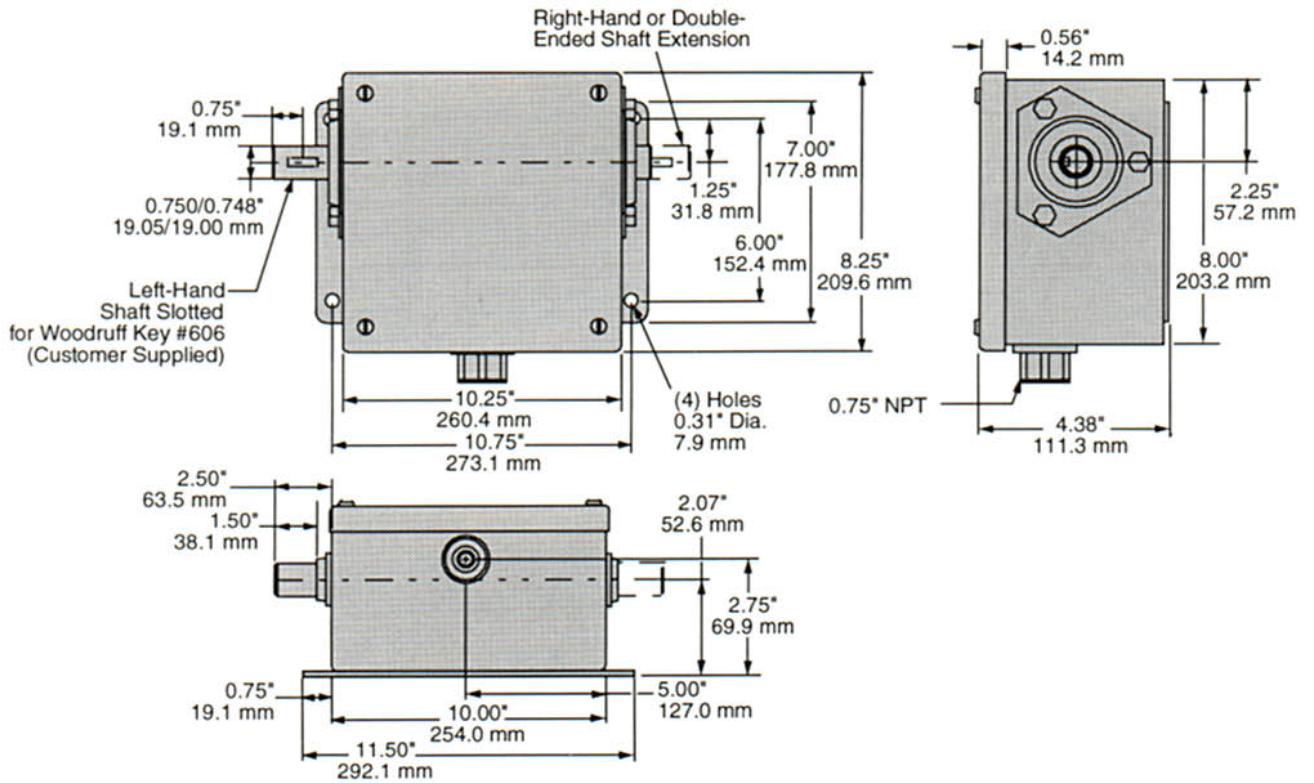
Dimensions—EC-2004



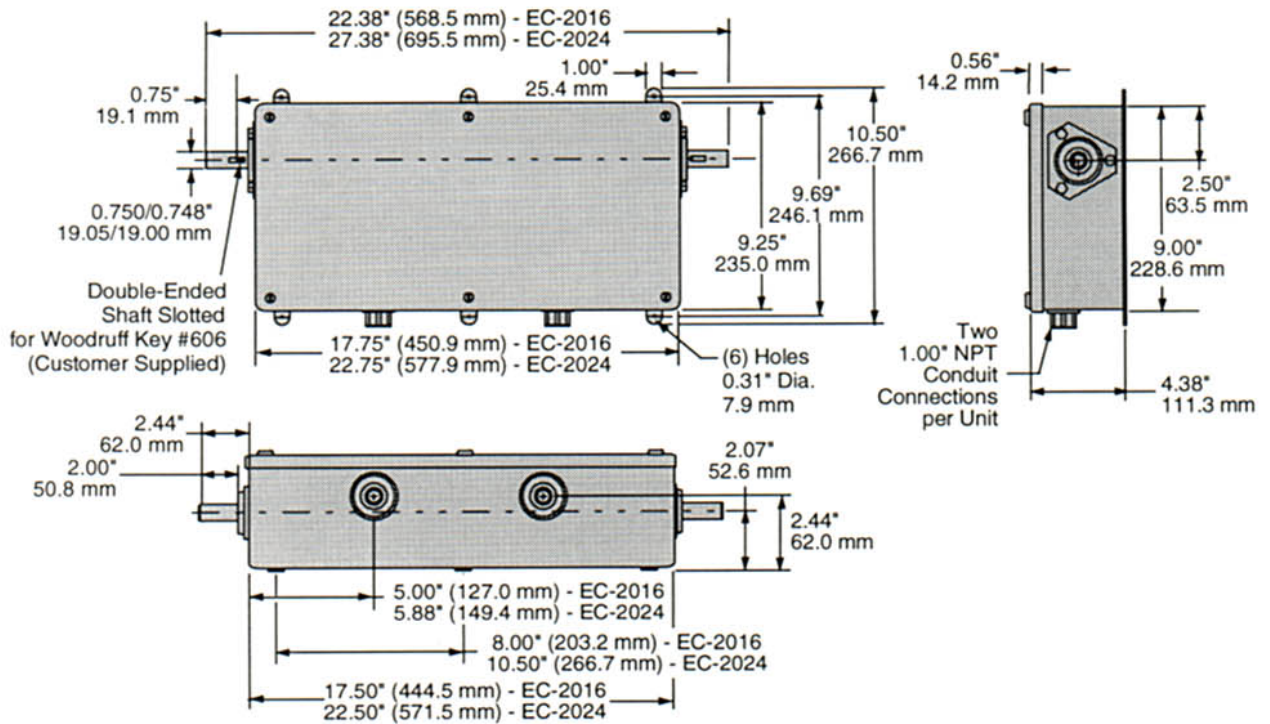
Dimensions—EC-2008



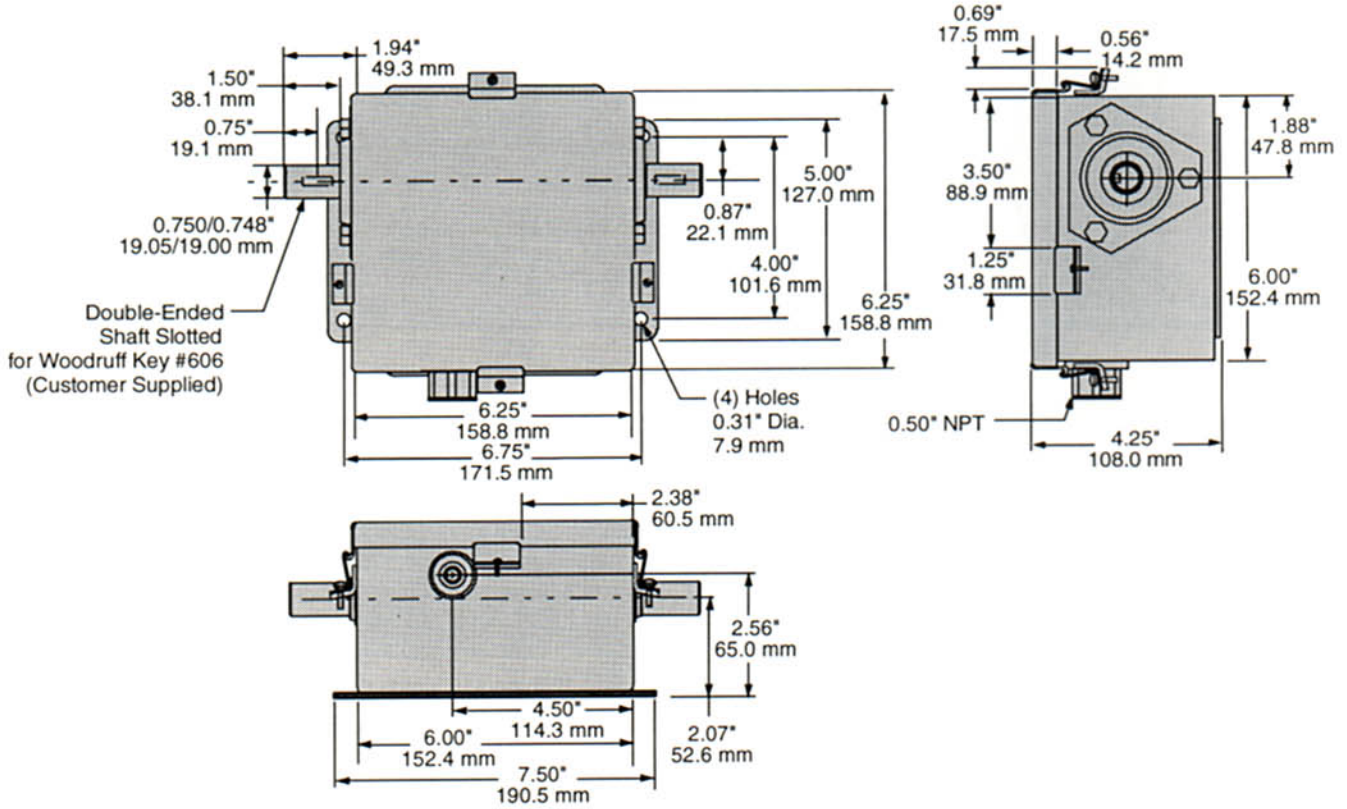
Dimensions—EC-2012



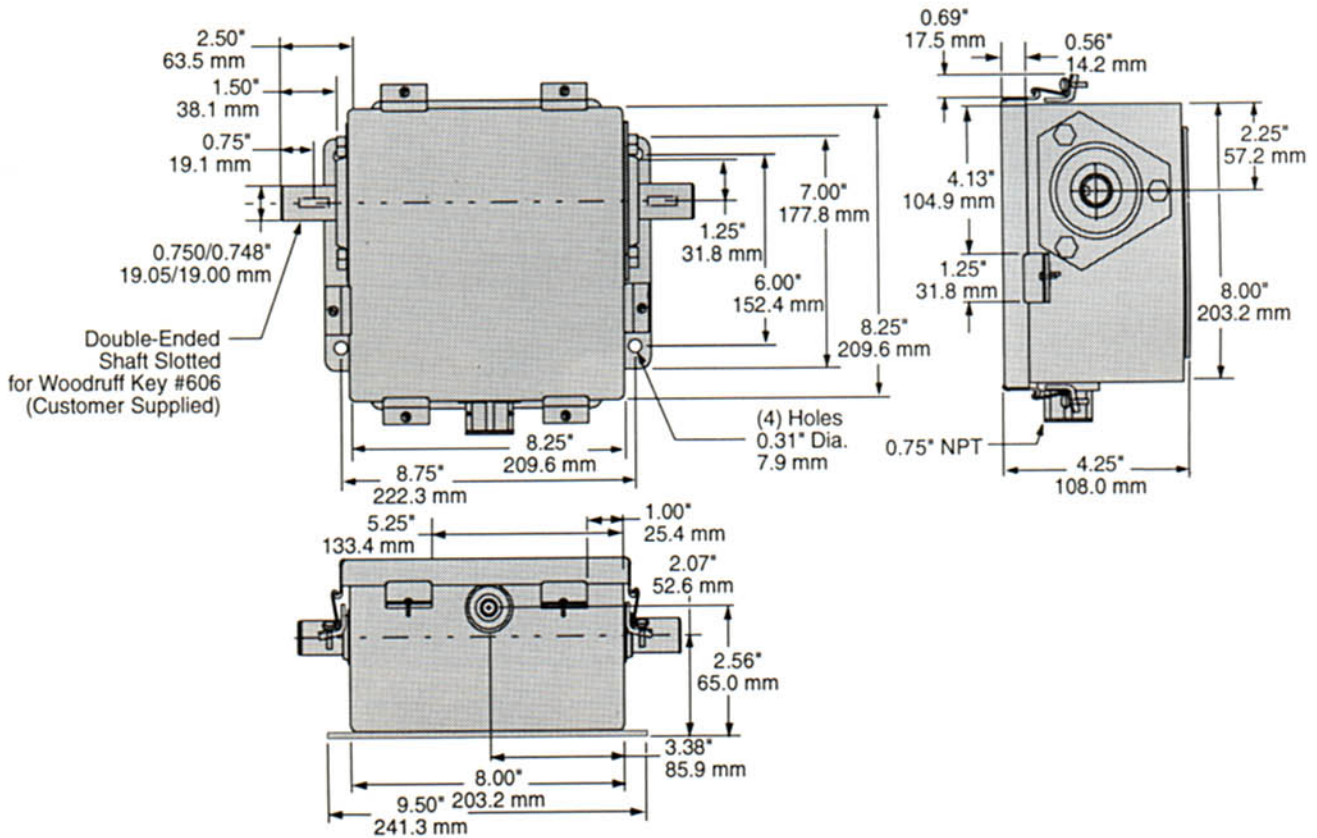
Dimensions—EC-2016/EC-2024



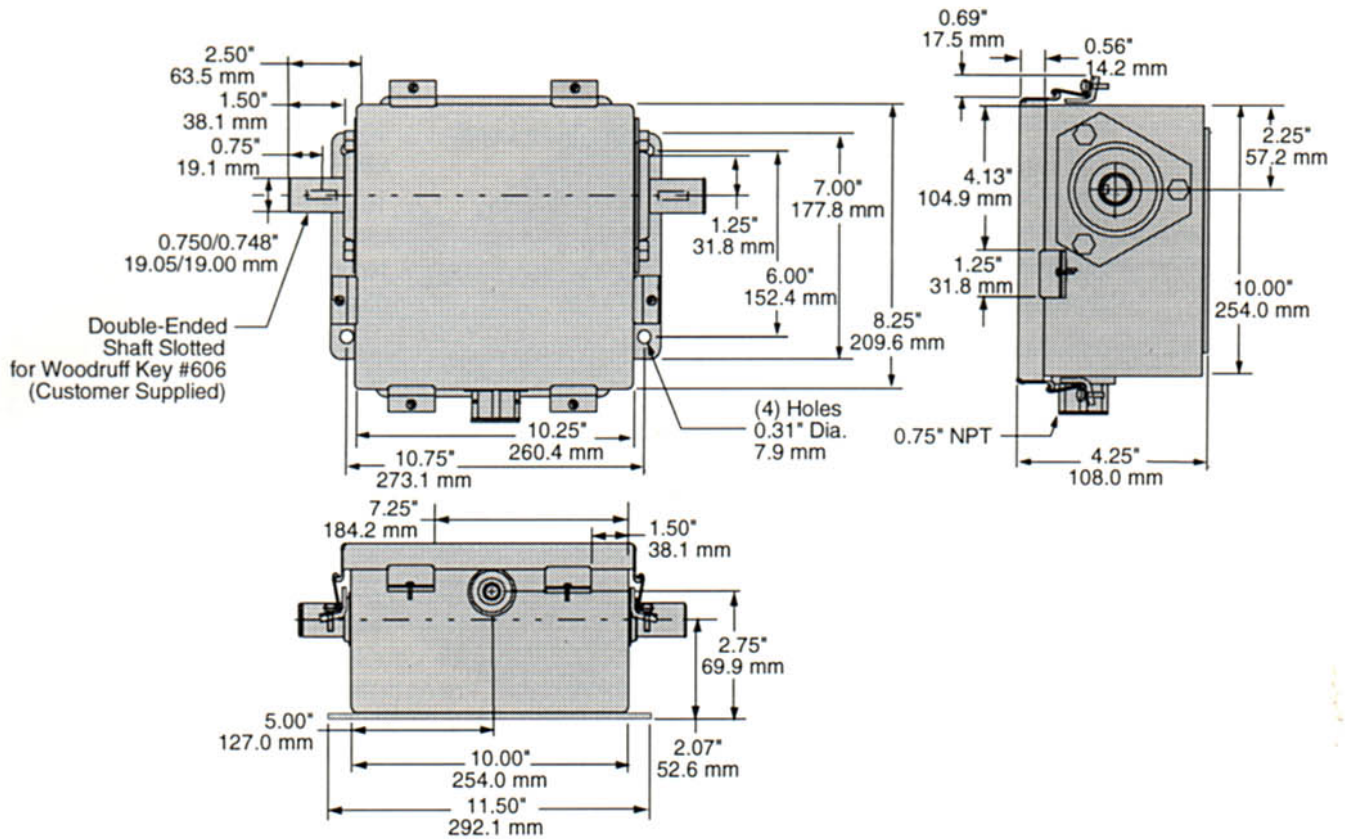
NEMA 4X Dimensions—EC-2404



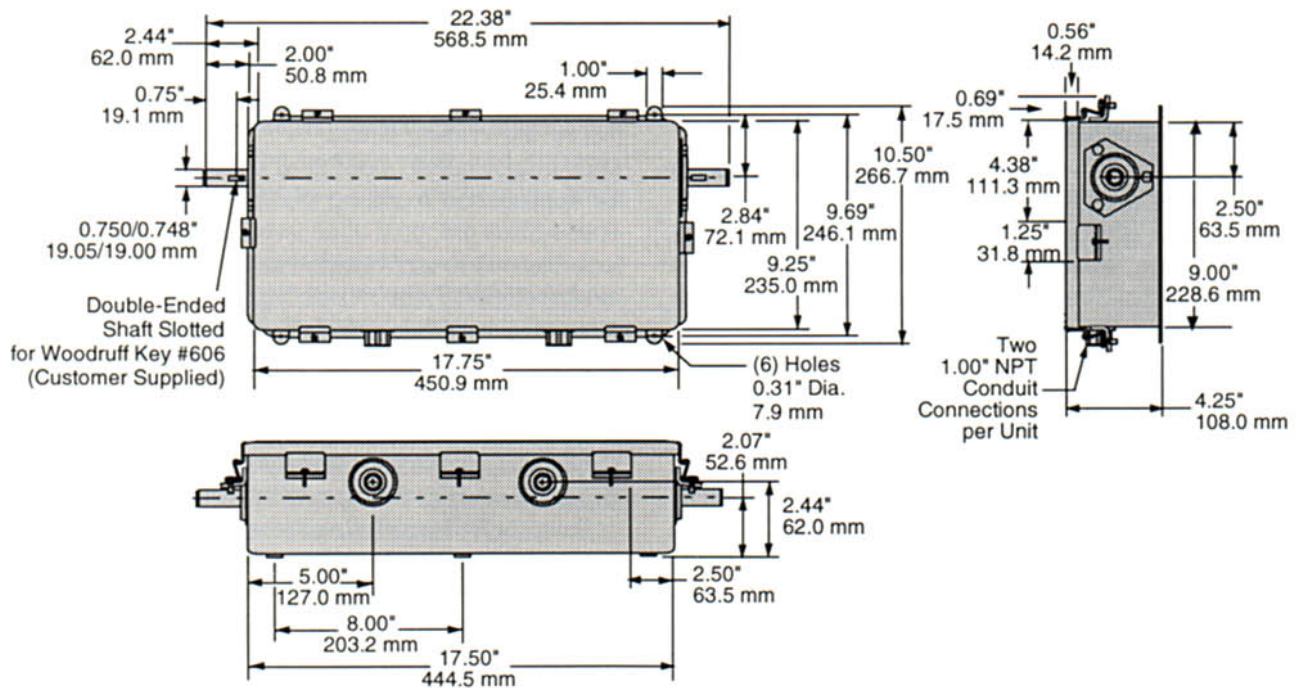
NEMA 4X Dimensions—EC-2408



NEMA 4X Dimensions—EC-2412



NEMA 4X Dimensions—EC-2416



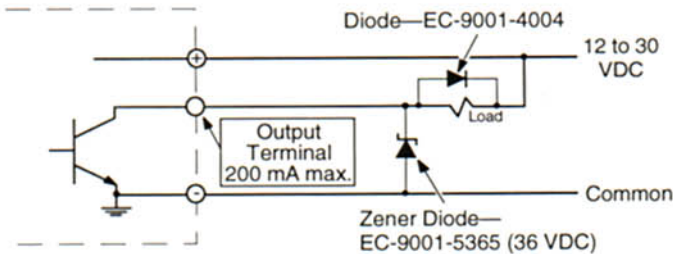
Specifications

| | | | |
|--------------------------|--|-----------------------|---|
| Max Speed: | 3000 RPM, clockwise or counterclockwise rotation | Shaft Size: | 3/4" diameter shaft extensions. The shaft is rated at 32,000 psi yield and necked down to 0.500" internally. Power transmission through shaft should be based on these figures. |
| Max Phase Shift: | 1°/1000 RPM | Max Side Load: | 100 lbs. at speeds up to 1800 RPM 200 lbs. at speeds up to 500 RPM |
| Ambient Temp: | 0° to 60°C (32° to 140°F) | Bearing Life: | 10 yrs. (87,660 hrs.) continuous running with 75 lbs. side load at 1000 RPM. Note: Consult factory if higher speeds or larger loads are required. |
| Input Voltage: | 12 to 30 VDC | Net Weight: | EC-2004/2404 8.00 lbs. 3.6 kg EC-2008/2408 12.75 lbs. 5.7 kg EC-2012/2412 14.00 lbs. 6.3 kg EC-2016/2416 24.00 lbs. 10.8 kg EC-2024 30.00 lbs. 13.5 kg |
| Input Current: | 110 mA maximum—EC-2004 220 mA maximum—EC-2008 330 mA maximum—EC-2012 | | |
| Output Type: | Open Collector (Sinking) Transistor Outputs | | |
| Output Current: | 0 to 200 mA per channel | | |
| Output Volt Drop: | 0.5 VDC @ 200 mA | | |

Installation

Output Wiring

Wire the sinking outputs to the four-connection terminal strips. Each output connection is numbered and identified on the upper printed circuit board in the unit. The following diagram will assist you with wiring your unit. For inductive loads, use diodes for suppressing voltage spikes as indi-



cated. Noise suppression diodes are available through Electro Cam Corp.

Shaft Connection Precaution

The shaft can be coupled to the machine using a chain and sprocket, timing pulley and belt, or a direct in-line shaft-to-shaft coupling. If a shaft-to-shaft coupling is used, Electro Cam Corp. recommends the use of a flexible coupling. Flexible couplings available from Electro Cam Corp. are listed on the Rotary Cam Price List. For side load limitations, please refer to specifications above.

Using a solid coupling with shaft misalignment greater than 0.005" (T.I.R.) may damage the unit. Because of tolerance stackups, this will require shimming of the individual unit to its mounting surface.

Optional Features

External Degree Wheel and Pointer

An internal degree wheel and pointer is included with each EC-2000 and EC-2400 unit for reference during cam adjustment. To visually determine shaft position without removing the cover, an optional external degree wheel and pointer is available. This option must be ordered with the unit, and requires a double-ended shaft for mounting. Specify mounting on left- or right-hand shaft (see mounting dimensions), and clockwise or counterclockwise rotation as viewed from the end of the shaft.

Sprocket Disengagement Clutch

The sprocket disengagement clutch is essential in situations where the shaft needs to be easily disconnected from the sprocket without removing the chain. The clutch not only allows for disengagement of one station of the machine to check operation without joggling the entire machine, but it simplifies the adjustment of the rotary cam limit switch. The clutch automatically locks back in the home position after one revolution. The clutch has a 3/4" bore with the provision for a #606 Woodruff key. There are five standard and numerous special sprockets available.

Pulse Generating Discs

Multi-output pulse generating discs are an option offered for applications requiring multiple outputs per revolution. These discs are most often used to generate timing pulses for tachometers, motion detection, glue stitching, or wherever multi-pulse signals are required. Standard pulse discs are available with 1, 2, 3, 4, 6, 7, 10, 16, 20, 32, 60, and 64 slots per revolution. Order pulse generating discs with the unit. The discs are factory mounted on the cam shaft, replacing one set of adjustable cams.

CFX for High Shock / Vibration

EC-2000 and EC-2400 units have a CFX option for applications such as punch presses where extremely high shock or vibration is prevalent. The CFX option has clear conformal coating on both sides of the printed circuit board and removable jumpers replace the DIP switch, eliminating the possibility of intermittent connection in the DIP switch.

CF for Highly Contaminating Environments

EC-2000 units are available with the CF option, which adds clear conformal coating to both sides of the printed circuit board. CF is standard on EC-2400 units.