

Installation Instructions

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 through Electro Cam Corp. are listed on the Rotary Cam Price List.

CAUTION

Unit damage may occur when using a solid coupling with shaft misalignment greater than 0.005". Shimming of the individual unit to its mounting surface must take place because of tolerance stackups.

WARNING

Do not attempt to remove the shaft. Doing so will damage the unit and void the warranty.

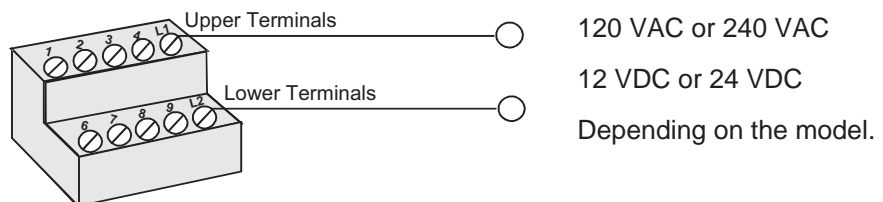
Turn power to the machine off prior to installation.

Installation Procedure

Conduct the following procedure to install the EC-3000 or EC-3400 Series Rotary Cam Limit Switch.

1. Mount the unit securely to the machine using the holes in the mounting feet and the mounting dimensions in Figure 2 through Figure 4 for the EC-3000 Series units and Figure 5 through Figure 7 for the EC-3400 Series units.
2. Remove the gasketed cover.
3. Connect the wires traveling through the sealed conduit entrance. Typically, the black wire connects to terminal L1, and the white wire connects to terminal L2. Refer to Figure 1 for the layout of a terminal block.

Figure 1—Terminal Block. The number of terminal blocks varies from model to model.



4. The interrupter discs may be adjusted at this time.
5. Replace the gasketed cover on the unit.
6. Inspect the conduit entrance to ensure it is properly sealed to prevent contamination.

Mounting Dimensions

Figure 2—Mounting Dimensions for EC-3004.

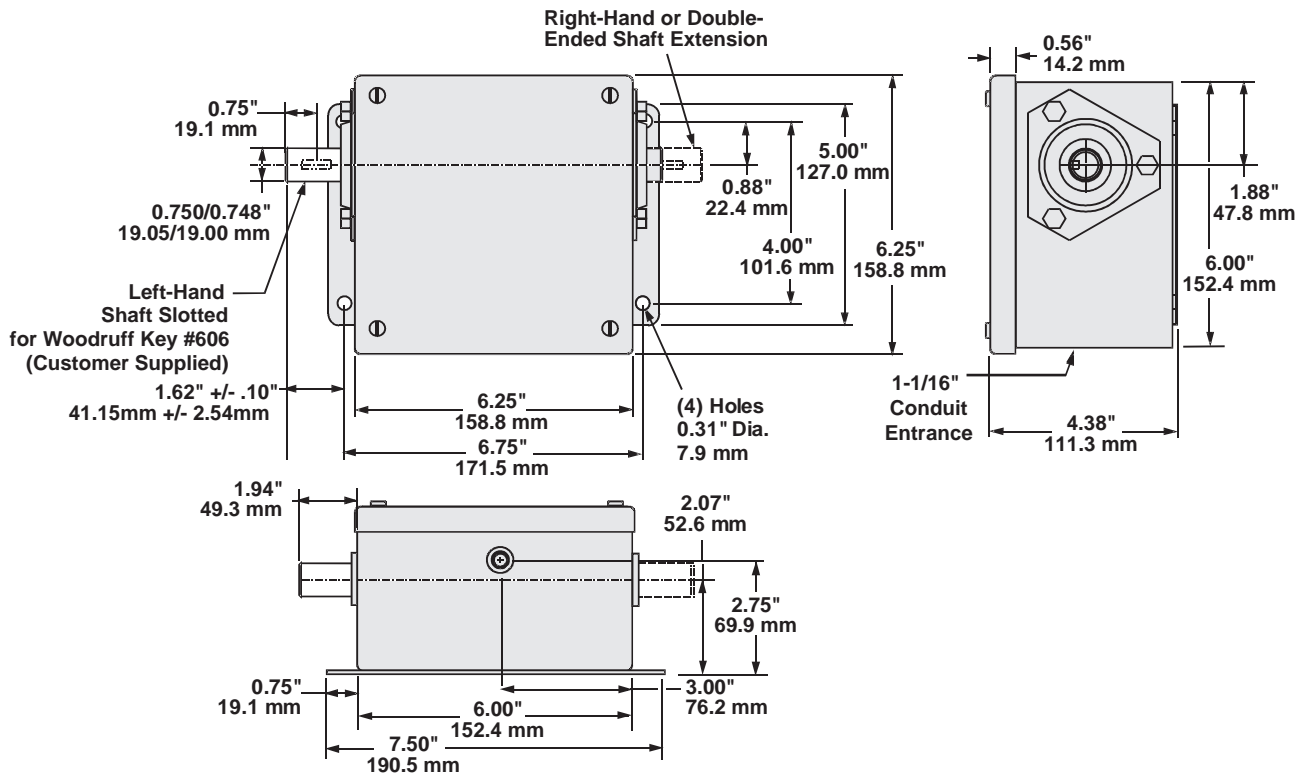
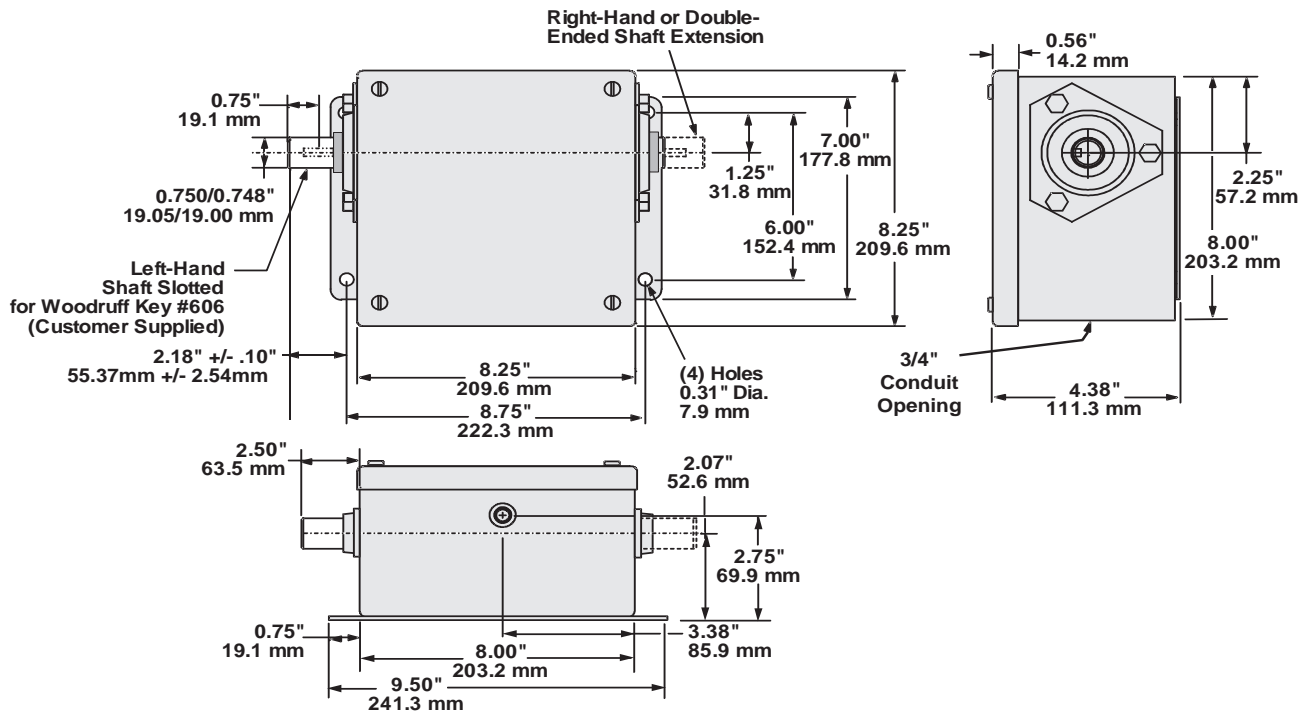
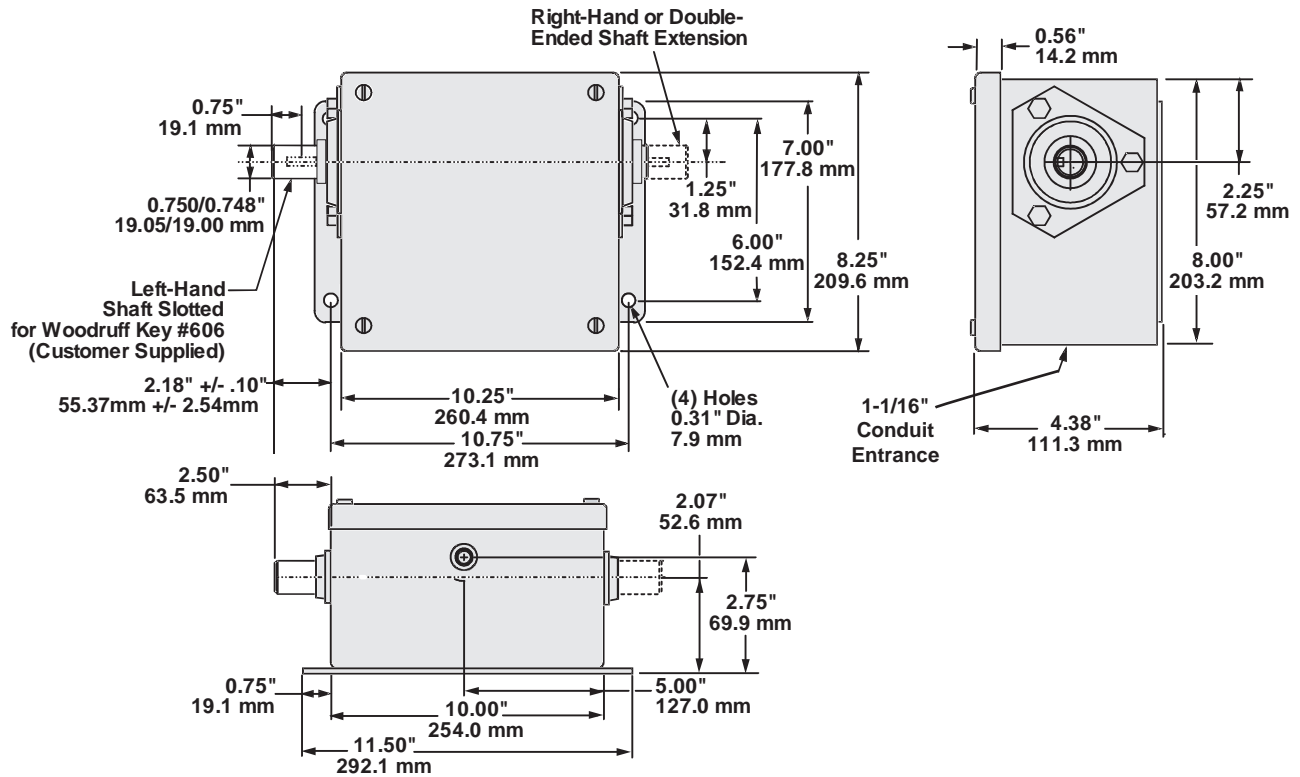


Figure 3—Mounting Dimensions for EC-3008.



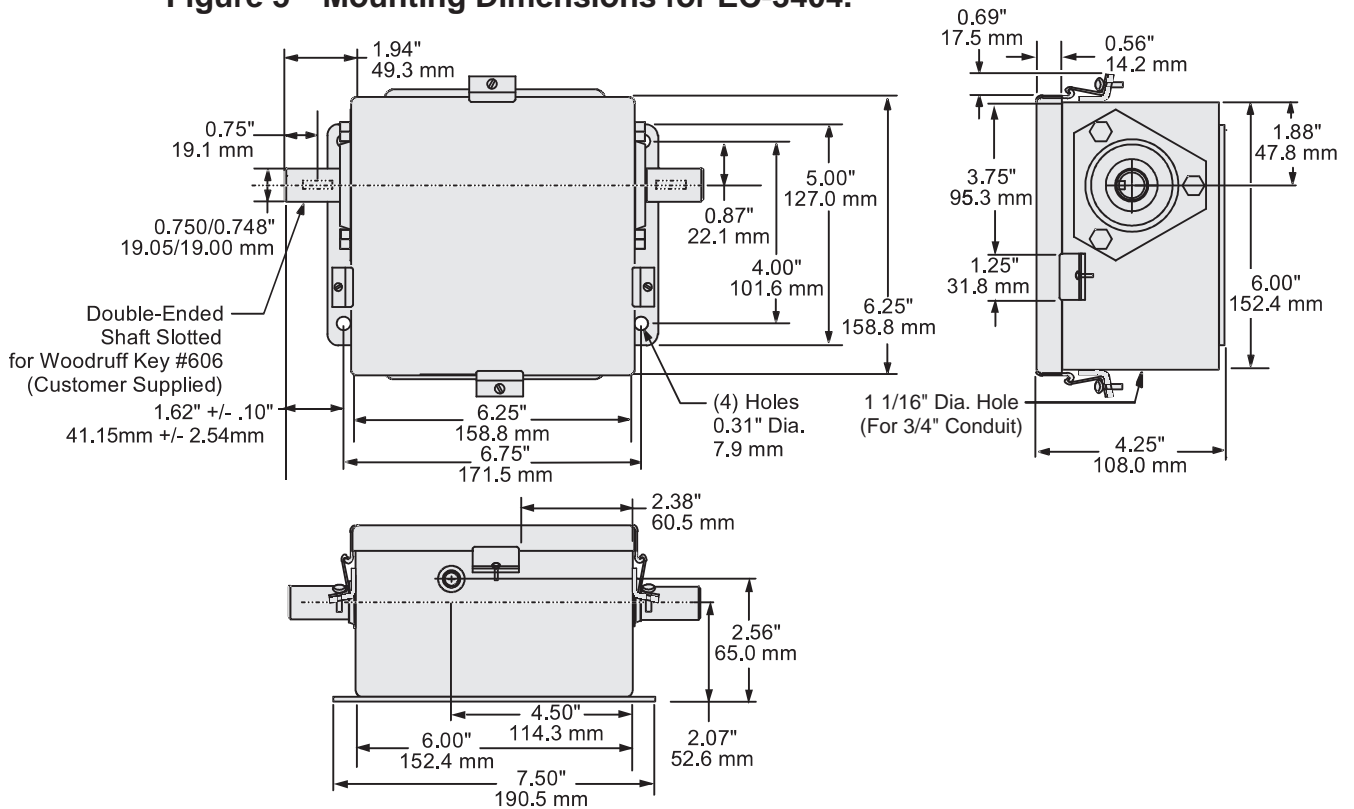
Mounting Dimensions

Figure 4—Mounting Dimensions for EC-3012.



Mounting Dimensions - NEMA 4X Units

Figure 5—Mounting Dimensions for EC-3404.



Output Wiring

Output modules act like switches; they do not supply power to loads. Output modules available for the EC-3000 and EC-3400 Series units include DC, AC, and Reed Relay. Module signals are isolated from one another, allowing AC and DC modules to be mixed on the same control. An output module is required for each output being used. Refer to Page 5 for further module information.

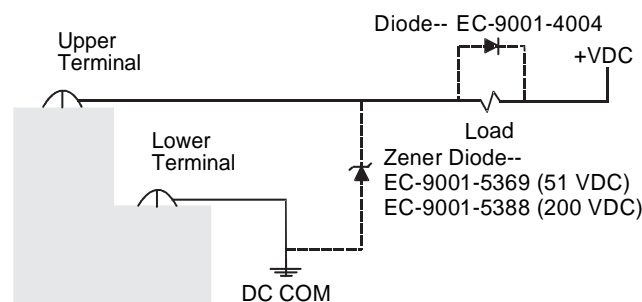
DC Output Wiring

DC output modules can be wired to sink or source the load circuit.

Sinking*

To sink, connect the positive VDC directly to one side of the load device. Connect the other side of the load to the upper terminal of the output module. Connect the lower terminal to DC common.

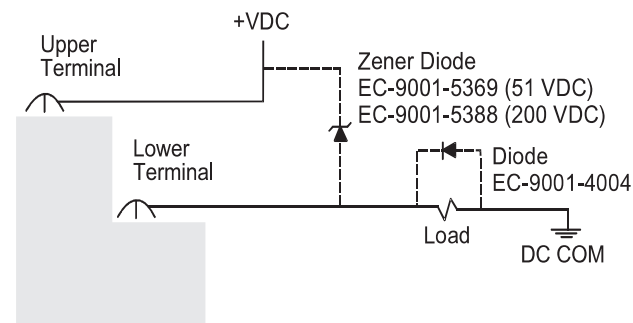
Figure 8—Sinking Output*



Sourcing*

To source, connect the positive VDC directly to the upper terminal of the output module. Connect the lower terminal to one side of the load device. Connect the other side of the load to DC common.

Figure 9—Sourcing Output*



Diodes

Most applications will function properly without the diodes shown in the above diagrams. However, highly inductive DC loads may damage modules by generating voltage spikes when switched off. This type of inductive load may need to be suppressed by a diode, using one of the following two methods.

- Connect a Zener diode across the terminals. This will not significantly increase the load turn-off time. The voltage rating of the diode must be greater than the normal circuit voltage.
- Connect a reverse-biased diode across the load. This may increase the load turn-off time.

*See back page for discussion of Sinking and Sourcing.

Output Wiring

AC Output Wiring

AC output modules are wired with the load connected to the lower terminal of the output module, while the external power supply is connected to the upper terminal.

Resistor

If the load is affected by the module's off-state leakage of 2 mA maximum, a resistor may be added (refer to Figure 10). However, most applications will function properly without the resistor.

A resistor across a PLC input card may speed up the response time of that PLC input.

Varistor/R-C Suppressor

When other switching devices are in series or parallel with the AC output module, voltage spikes may damage the module. A varistor or an R-C suppressor can be used as shown in Figure 11. The varistor will absorb the potential voltage spike, thereby protecting the components from damage. An R-C suppressor suppresses interference. Most applications will function properly without

the varistor or R-C suppressor. However, use one of the following two methods to suppress voltage spikes if needed:

- For infrequent switching, connect a varistor (MOV) across the terminals.
- For continuous switching, connect an R-C suppressor in parallel with the load.

Figure 10—For Loads Affected by Off-State Leakage.

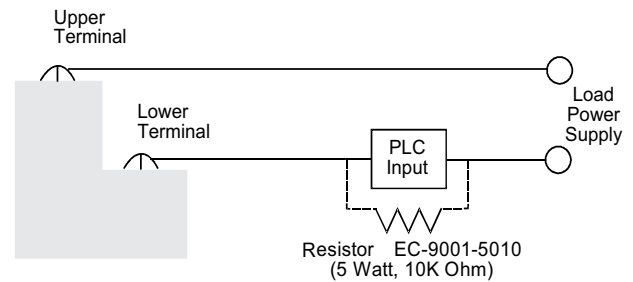
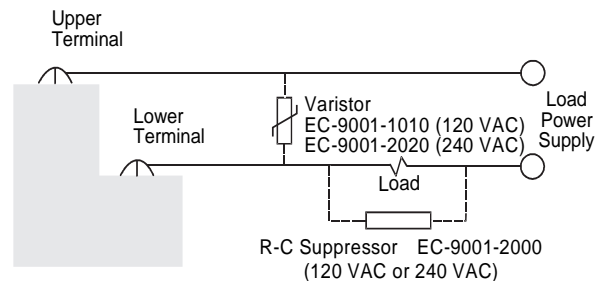


Figure 11—For Loads Connected to Other Switching Devices.



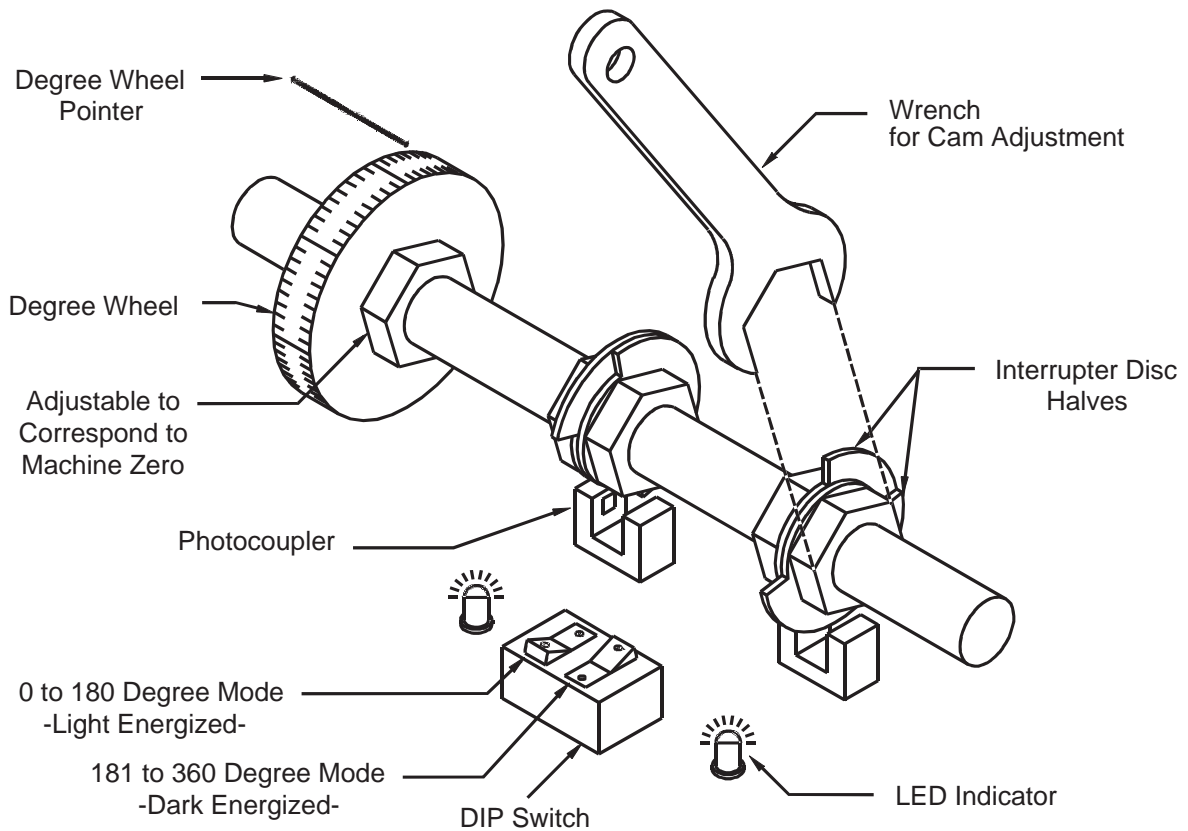
Unit Operation

Description of Operation

As shown in Figure 12, 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 the 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 disc halves seat tightly to the shaft with O-rings. The gap, or open window, in the interrupter is adjusted by applying a 1" wrench to the hex shoulder of the disc interrupter. There are no lock screws or other devices used.

Figure 12—Layout and Adjustment of the Cams.



Setup Procedure

Zero the Degree Wheel

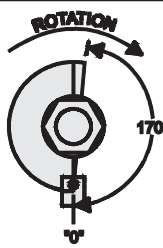
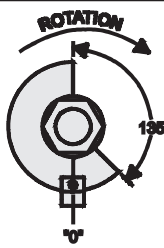


To zero the degree wheel and pointer after the Rotary Cam Switch has been properly mounted to the machine, follow this procedure.

1. Jog the machine to the designated zero position, or home position.
2. Notice the direction that the shaft rotates, clockwise or counterclockwise, when the machine moves in its forward direction.
3. Remove the gasketed cover from your unit, using a screw driver.
4. With the machine stopped at its zero position, turn the internal degree wheel so that the pointer reads 0°, using the 1" wrench provided. The degree wheel is numbered every 90° in both directions with arrows indicating the direction. Use the set of numbers that correspond to the direction your machine rotates.

Note: If the control has the optional external degree wheel and pointer, set it to read 0° also.

5. Determine for each of the cams within your unit, where in the revolution each will need to turn “on” and “off”. Use Table 2 for examples of setting “on” times for interrupter discs.

Table 2—Examples of Setting “on” Times.

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°

-CFX units:

Jumper IN (Dark Energized Mode) 181° - 360°

Jumper OUT (Light Energized Mode) 0° - 180°

Setup Procedure

Cam Setup

Each cam, consisting of two interrupter disc halves, is set up individually and operates independently of the other cams.

To avoid confusion, always use the same disc half to start each cam setup. For example, if you use the left half of the interrupter disc on the first cam to turn the output “on”, use the left half of the other cams to turn those outputs “on” as well.

A DIP switch is associated with each cam, and determines whether that output “on” time duration will be more than or less than 180°.

1. Select the cam to be set up, and jog the machine to the output “on” degree position. Determine if the output should be “on” less than or more than 180°.

If the “on” time is less than 180°, set the DIP switch to the 0° to 180° position, or Light Energized mode. The output will turn “on” when the gap passes through the photocoupler light beam.

If the “on” time is more than 180°, set the DIP switch to the 180° to 360° position, or Dark Energized mode. The output will turn “on” when the interrupter disc breaks the photocoupler light beam.

2. In the Light Energized mode (0° to 180°), turn both interrupter disc halves so the corresponding output LED is illuminated. Rotate one interrupter disc half in the reverse direction, opposite the machine rotational direction, until the LED turns off. Then, slowly rotate the same disc half forward to the exact position where the LED turns back “on”. This is the leading edge of the gap position.

Or, in the Dark Energized mode (180° to 360°), turn both interrupter disc halves so the corresponding output LED is “off”. Then, slowly rotate one interrupter disc half in the forward direction to the exact position where the LED turns “on”. This is the leading edge of the disc position.

3. Jog the machine to the output “off” degree position.
4. For both the Light Energized and Dark Energized modes, turn the other interrupter disc half in the direction of machine rotation, to the exact position where the LED goes off.
5. Check the “on/off” settings for this cam, and make any fine adjustments necessary.
6. Repeat Steps 1 through 5 for each cam that needs to be set up.
7. When all cams have been properly set up, replace the gasketed cover on the unit, and tighten the cover screws securely to prevent contamination.