Martin®
Air Cannon Controller
- Multiple Circuit



Operator's Manual
M4097

Important

MARTIN ENGINEERING HEREBY DISCLAIMS ANY LIABILITY FOR: DAMAGE DUE TO CONTAMINATION OF THE MATERIAL; USER'S FAILURE TO INSPECT, MAINTAIN AND TAKE REASONABLE CARE OF THE EQUIPMENT; INJURIES OR DAMAGE RESULTING FROM USE OR APPLICATION OF THIS PRODUCT CONTRARY TO INSTRUCTIONS AND SPECIFICATIONS CONTAINED HEREIN. MARTIN ENGINEERING'S LIABILITY SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF EQUIPMENT SHOWN TO BE DEFECTIVE.

Observe all safety rules given herein along with owner and Government standards and regulations. Know and understand lockout/tagout procedures as defined by American National Standards Institute (ANSI) z244.1-1982, *American National Standard for Personnel Protection - Lockout/Tagout of Energy Sources - Minimum Safety Requirements* and Occupational Safety and Health Administration (OSHA) Federal Register, Part IV, 29 CFR Part 1910, *Control of Hazardous Energy Source (Lockout/Tagout); Final Rule*.

The following symbols may be used in this manual:

⚠ DANGER

Danger: Immediate hazards that will result in severe personal injury or death.

⚠ WARNING

Warning: Hazards or unsafe practices that could result in personal injury.

⚠ CAUTION

Caution: Hazards or unsafe practices that could result in product or property damages.

IMPORTANT

Important: Instructions that must be followed to ensure proper installation/operation of equipment.

NOTE

Note: General statements to assist the reader.

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Introduction

General

The Martin® Air Cannon Controller is a reliable, practical system for firing Martin® Air Cannons at predetermined intervals. The controller uses programmable logic to energize the air cannons' solenoids. It reduces the chance for human error and is expandable to control multiple air cannons in several structures where material flow problems exist.

The controller is used to fire cannons in a timed sequence. It is available with up to 10 outputs.

Each controller has a factory-set on-time of 1 second and an adjustable off-time of 1 to 65,000 seconds. Manual override selector knobs are mounted on the outside of the enclosure.

Overview of controller operation

The controller can be used to fire air cannons in three ways:

- Manually fire individual cannons using the manual override selector knobs.
- Automatically fire all cannons in a timed sequence.
- Automatically fire all cannons in a timed sequence when activated by an external switch.

  (An example of an external switch is a paddle-type flow switch that monitors flow of material as shown in Figure 1. When material stops flowing from the hopper, the flow switch inputs are closed and the controller is enabled to begin the firing sequence. Whenever material is flowing from the hopper, the flow switch inputs are opened and the controller is disabled; the firing sequence is deactivated.)

To manually fire individual cannons, it is not necessary to program the controller. The selected cannon fires when activated by the selector knobs on the outside of the controller.

To automatically fire all cannons in a timed sequence, the controller must be programmed for the desired number of air cannons to sequence (from 1 up to 10 air cannons) and the desired off-time (the length of time between each cannon firing).

To automatically fire all cannons in a timed sequence when activated by an external (flow) switch, the controller must be programmed as described above, and the switch must be connected to the controller as follows:

- When connected to the controller's ENABLE terminal block, the cannons will fire in the programmed sequence (e.g., cannons 1 through 10 fire in sequence) until the switch disables the controller and deactivates the firing sequence. When the switch enables the controller again (activates firing), the controller resets the sequence to begin with cannon 1 (e.g., if the switch disabled the controller after firing cannon 3, the sequence will start by firing cannon 1 the next time it is activated).

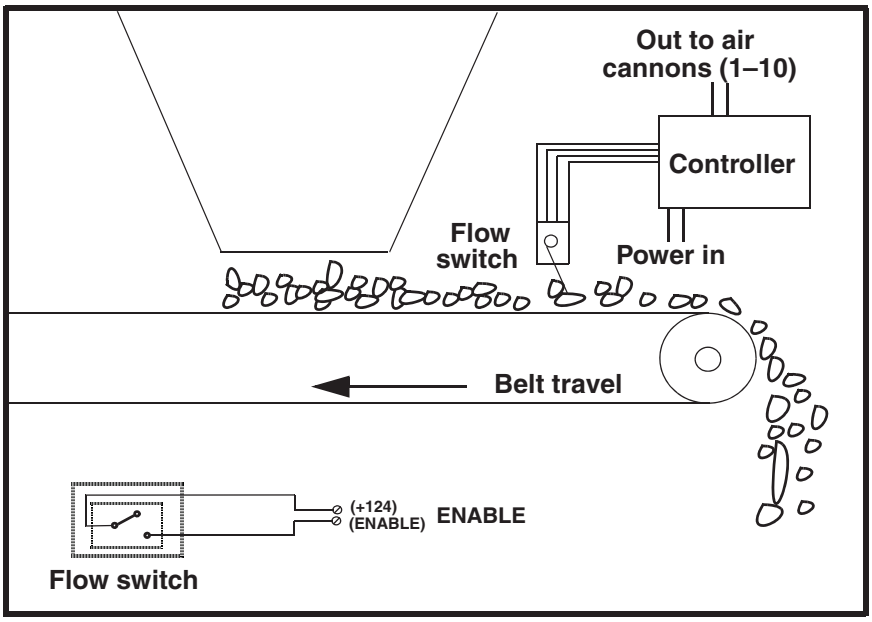


Figure 1. Flow switch inputs open, controller disabled

References

The following documents are referenced in this manual:

- American National Standards Institute (ANSI) z244.1-1982, *American National Standard for Personnel Protection - Lockout/Tagout of Energy Sources - Minimum Safety Requirements,* American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.
- Federal Register, Volume 54, Number 169, Part IV, 29 CFR Part 1910, *Control of Hazardous Energy Source (Lockout/Tagout); Final Rule*, Department of Labor, Occupational Safety and Health Administration (OSHA), 32nd Floor, Room 3244, 230 South Dearborn Street, Chicago, Illinois 60604.
- *The National Electrical Code (NEC),* National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

Safety

All safety rules defined in the above documents and all owner/employer safety rules must be strictly followed when working on this equipment.

Material required

Only standard hand tools are required to install this equipment.

Before Installing Controller



1. Remove controller from shipping box.
2. If anything is missing or damaged, contact Martin Engineering or a representative. Keep any damaged goods subject to examination.

⚠WARNING

Before installing equipment, lock out/tag out energy source to hopper, conveyor, and/or conveyor accessories.

3. Turn off and lock out/tag out energy source according to ANSI standards (see “References”).



⚠WARNING

If equipment will be installed in an enclosed area, test gas level or dust content before using a cutting torch or welding. Using a cutting torch or welding in an area with gas or dust may cause an explosion.

4. If using a cutting torch or welding, test atmosphere for gas level or dust content.

Installing Controller

To install the controller, follow the procedures in this manual corresponding to the following steps:

1. Mount the controller enclosure on a wall.
2. Wire individual air cannon solenoids to controller or, if air cannons are wired to a solenoid enclosure, wire solenoid enclosure to controller.
3. If using an external flow switch, wire dry contact to controller.

Mounting enclosure

⚠WARNING

All electrical work must be done to National Electrical Code (NEC) standards.

1. Determine location for controller.

⚠CAUTION

Do not mount controller in area subject to shock, vibration, temperatures exceeding 130°F (55°C), or explosion. Damage to controller circuitry could result.

2. Mount onto wall with fasteners.
3. Drill conduit holes in controller enclosure for solenoid and power wires. Use care not to damage internal components. Drill in most weather-proof location available on enclosure.
4. Using electrical connectors, route wires from solenoid valves to controller enclosure.

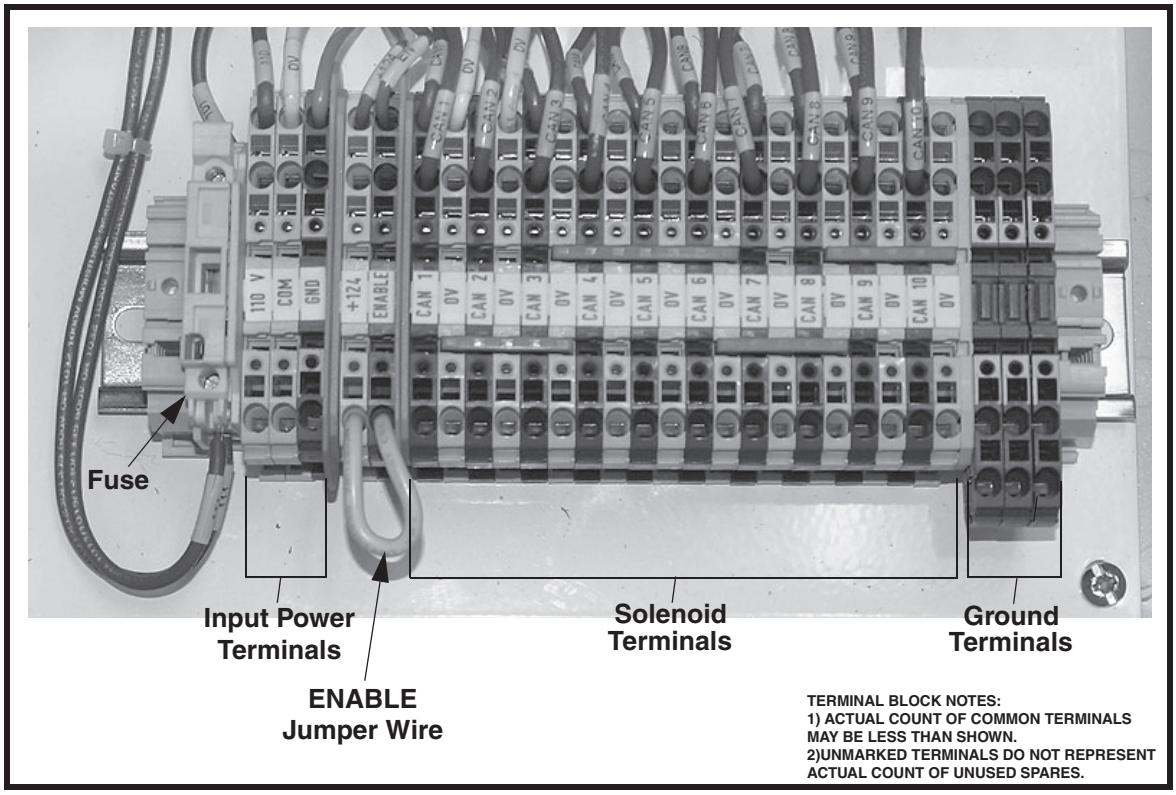


Figure 2. Terminal Block Layout

Wiring air cannon solenoids to controller

NOTE

Only wiring required is power wire to controller and N terminals on controller's printed terminal strip.

1. Connect wires from air cannon solenoids to terminal strip outputs 1 through 10 and N terminals (see Figure 2). Connect number 1 solenoid to 1 supply and N, number 2 solenoid to 2 supply and N, etc. Continue until all solenoids are connected.
2. Connect ground wire from each solenoid to controller enclosure. Route power wire (115 VAC, 60 Hz) into controller enclosure.
3. Connect power safety ground wire to terminal block labeled GND.
4. Connect power wires to terminal blocks labeled 110V and COM. Connect phase to 110V and neutral to COM.
5. Ensure ENABLE jumper is in place.



Figure 3. Air Cannon Inputs

NOTE

PLC uses an octal numeral system.

6. Determine number of air cannons to be controlled.
7. Move "+124" wire (A) to terminal number (1—10) that corresponds with number of air cannons to be controlled. For example, to use ten air cannons connect "+124" wire to 10 as labeled.
8. If using an external flow switch, follow the procedure under "Wiring external flow switch to controller." If not, follow the procedures under "After installing controller."

Wiring external flow switch to controller

⚠WARNING

Before making any connections, lock out/tag out electrical supply to controller according to ANSI standards (see "References").

NOTE

See Figure 2. ENABLE always resets the controller to cannon 1 while material flows. See "Overview of controller operation" under "Introduction" for more information.

2. To use ENABLE, do the following:
   a. Remove factory-installed jumpers between ENABLE terminal blocks.
   b. Connect external flow switch dry contact to ENABLE terminals.
   c. Connect external flow switch ground to controller.

After Installing Controller

Manually firing air cannons

1. To manually fire cannons 1 through 10, turn selector knob on door of controller enclosure to number of cannon you wish to fire. Turn HAND-OFF-AUTO knob to HAND (see Figure 4), hold for 1 second, and release. (Selected cannon will fire and knob will return to OFF automatically.)
2. When finished with manual firings, return selector knob to O. (This disconnects the manual mode, and prevents accidental firing if the HAND-OFF-AUTO switch is turned to HAND.)

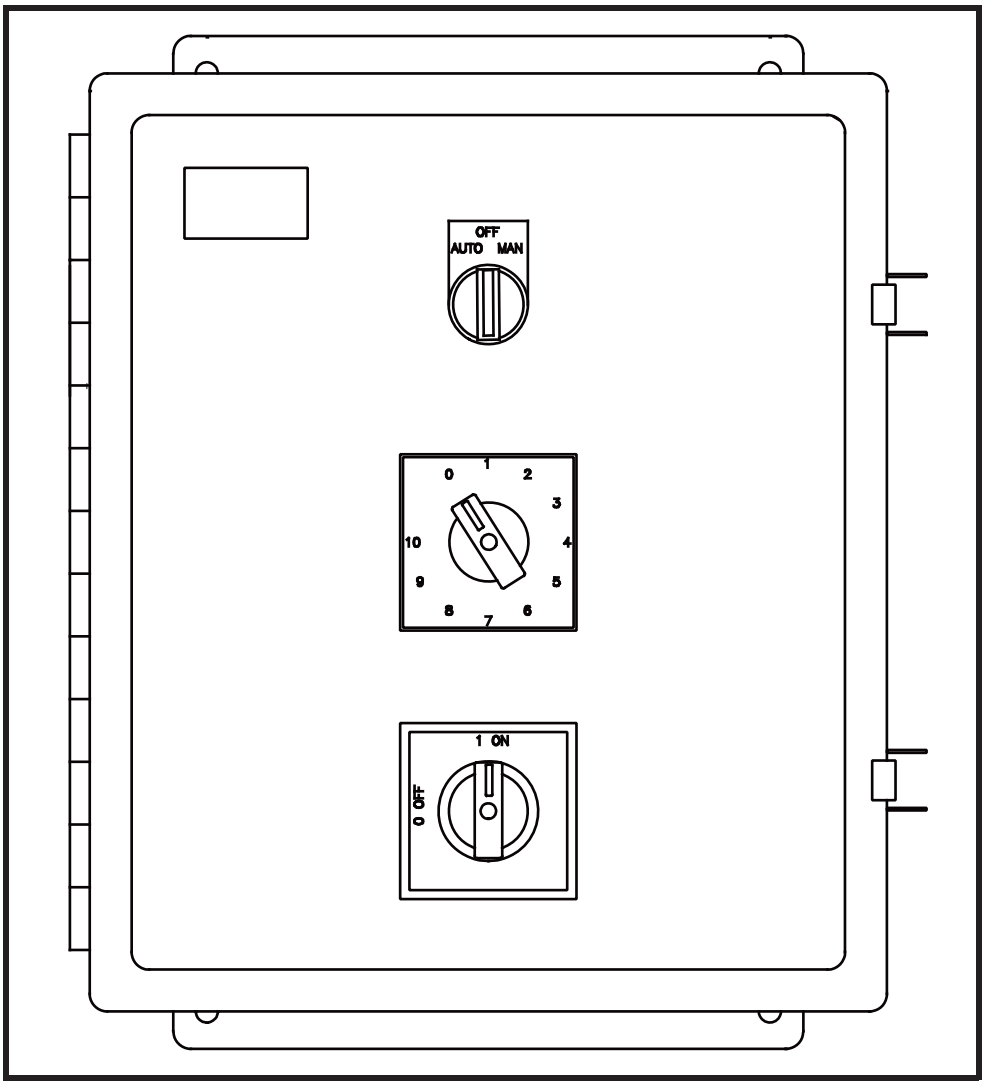


Figure 4. Air Cannon Controller Door

Programming Controller

NOTE

Before programming the control system, determine the number of air cannons to be controlled and the off time between firings.

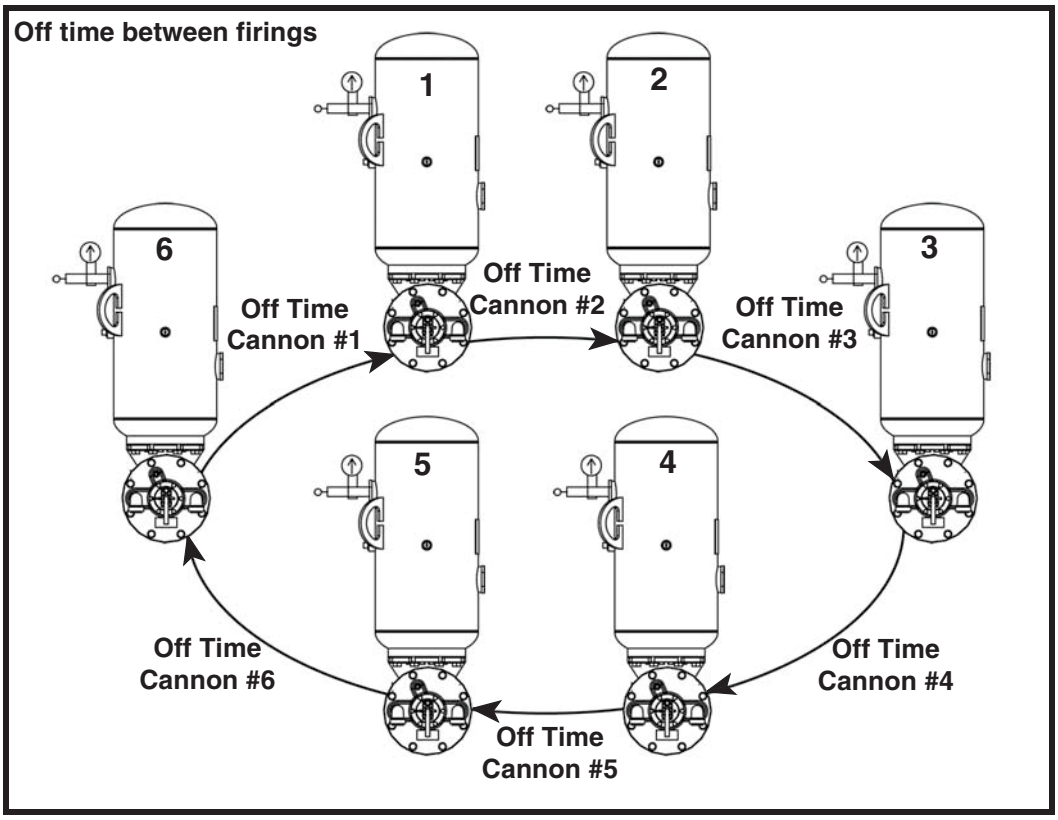


Figure 5. Off Time Selection



Figure 6. Display Screen Functions

Button	Function
ESC	Cancels the current operation, and returns to the immediately preceding operation.
▲	Scrolls up the menu or increments the selected number.
▼	Scrolls down the menu or decrements the selected number.
OK	Goes into each control screen or enters the current operation.



Figure 7. Main Display Screen

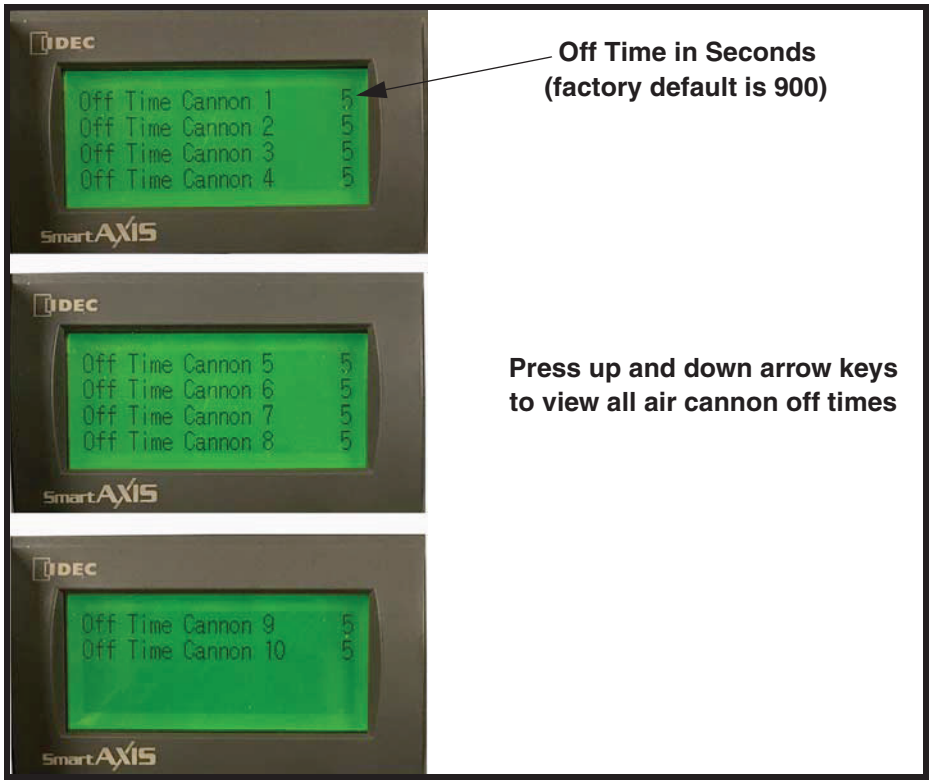


Figure 8. Air Cannon Off Time Screens



Figure 9. Inputting Off Time

Setting off time

1. To change off time value:
   a. Navigate to desired air cannon.
   b. Press and hold “OK” button until the time value flashes.
   c. Using the left and right arrow buttons navigate to the desired digit.
   d. Use the up and down arrow buttons to change the value.
   e. Press “OK” button to enter value.

Parts Numbers

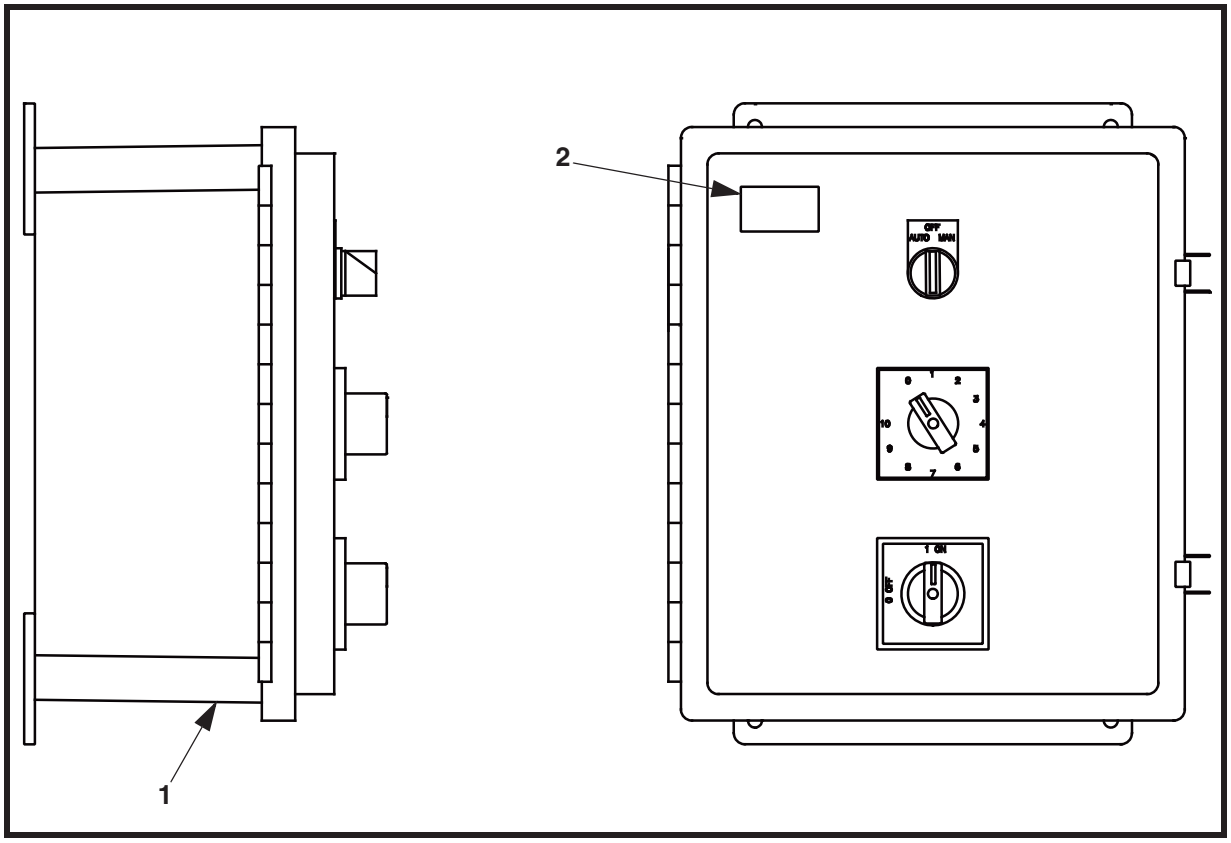
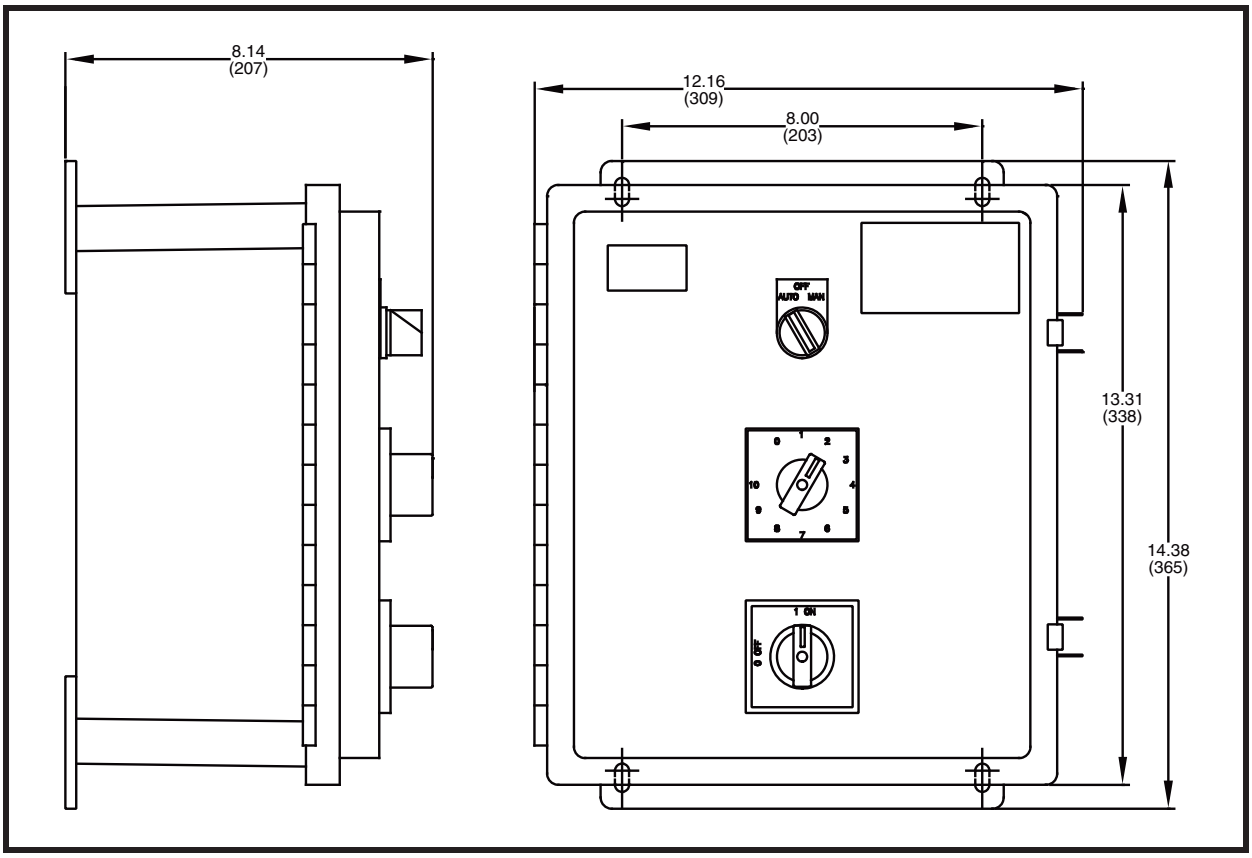


Figure 10. Martin® Air Cannon Controller - multiple circuit, P/N 38901

Item	Description	Part No.	Qty
1	Air Cannon Controller NEMA 4	38901	1
2	Martin Products Label	38048	1
3	Operator Manual	M4097	1

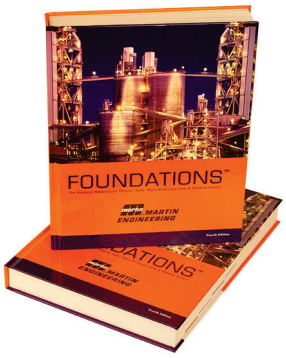


Note: All dimensions are given in inches (mm) and are for reference only.

Figure 11. Air Cannon Controller Dimensions

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Martin Engineering Australia Pty Ltd
102 Christensen Road South,
Stapylton, QLD 4210 Australia
1300 627 364 | salesau@martin-eng.com
www.martin-eng.com.au

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