

# PROMATION ENGINEERING

*Precision Actuation for Industry*

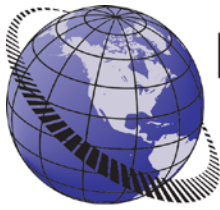
## Installation & Operation Manual

This IOM is for the following  
ProMation Engineering Products:

**P1.A-MWOEM1**







# PROMATION ENGINEERING

Precision Actuation for Industry

## Field Manual P1.A-MWOEM1 120vac 3 Pos Control (0-90-45-0° Rotation) ISO5211 F05/07 8P17



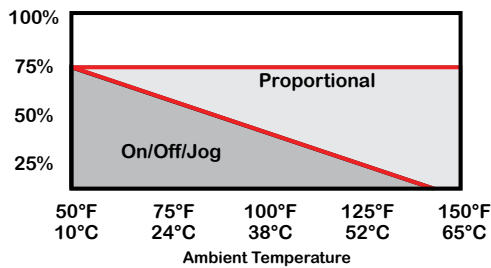
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# Product Specifications

Actuator Specifications	P1.A	
Torque "lb/Nm	<b>445"lbs/50Nm</b>	
Supply Voltage	120vac	230vac
Max Inrush Current	0.6A	0.4A
Running Current	0.6A	0.3A
Motor	Split Phase Capacitor	
Runtime (90°@60Hz/vdc)	20 sec	
Runtime (90°@50Hz)	24 sec	
Duty Cycle	25%	
Motor Starts	1200 per hour	
Weight	7lbs/4kg	
Mechanical Connections	ISO5211 F05/F07 8pt 17mm	
Electrical Entry	(2) 1/2" NPT	
Electrical Terminations	14-18ga	
Environmental Rating	NEMA 4/4X	
Manual Override	5mm Hex Drive	
Control	On/Off/Jog	
Actuator Case Material	Aluminum Alloy, Powder coated	
Motor Protection	230°F/110°C Thermal F* Class *Totally Enclosed Non-Ventilated Motors	
Ambient Temperature	-22°F to +125°F	
Operating Range	-30°C to +52°C	



## Introduction

This document provides necessary information for set-up, calibration, testing and use of the P Series half-turn electric actuators stated on the cover page. Each unit is shipped from the factory with initial calibration of cams and switches completed for 0-180 degree operation. However, these are general settings and serve as a starting point for proper calibration of the actuator in its real-world application.

## Safety

Safety is a basic factor any time you maintain and operate mechanical equipment. Appropriate handling methods and proper use of tools and clothes can help prevent serious accidents -- accidents which can cause injuries to you or a fellow worker. This manual was created to enable a trained user to install, adjust and troubleshoot your ProMation actuator.

Only competent and trained personnel should install, maintain and operate ProMation Actuators. Any work related to this actuator must be carried out in accordance with this manual and related codes and regulations. Local workplace health and safety rules should always be followed.

## Duty cycle

Duty cycle is the percent of time that an actuator spends running as a fraction of the total time. Duty Cycle is directly related to heat; excessively repositioning an actuator typically results in motor overheating which can cause permanent damage and/or reduced service life.

Duty cycle can be calculated as follows:

(example P2 series actuator running 3 seconds ON and 30 seconds OFF)

Runtime = 3s, Total time = 3s + 30s = 33s, therefore this duty cycle would be 9% (3/33)

Additionally, ProMation P series actuators are designed for a maximum of 1200 starts per hour (one start every 3 seconds maximum).

## Shipping and Handling

1. This actuator is shipped in the FULLY CW (position indicator shows "CLOSE") position.
2. **NOTE, THIS ACTUATOR MUST HAVE WATER TIGHT EMT FITTINGS, WITH CONDUIT DRAINAGE INSTALLED AND POWER SUPPLIED TO UNIT TO KEEP THE HEATER WARM AT THE TIME OF INSTALLATION.**
3. **Storage:** This unit should NOT be stored outside unless it is powered up and has proper conduit terminations. When NOT powered up, it should be stored in a clean, dry environment at all times.
4. This actuator has been **factory calibrated to operate between 0 degrees and 90 degrees with a stop set for the 45 degree position (from the 90 degree direction ONLY).** It should not require recalibration of these settings. If any travel adjustment is necessary, please refer to pages 5 & 6 for instructions.
5. **The actuator CANNOT operate with a rotation greater than 90 degrees.**



**NOTE:** The P1.A main output drives 90° while the indicator rotates 180° in the opposite direction.

## Product Mounting and Setup

1. Fully CLOSE the valve or damper to which the actuator is to be mounted.
  - Keep in mind this actuator rotates CW (as viewed from above the unit) when driving CLOSED.
2. Assemble necessary linkage components and attach the actuator to the driven device.
3. Tighten mounting bolts, making sure actuator is centered on the device drive shaft.
4. Utilize the manual override (8mm hex output drive on bottom of actuator) to check for unobstructed manual operation from fully CW to fully CCW positions BEFORE applying power to the unit.
5. Make the electrical connections per wiring diagram on page 4.
  - For operation all six marked connections are needed: G, N, H, 17, 18, and 19. The balance of the connections are indicator outputs.
  - Connections 49, 48, and 47 are for the indicator outputs. They are dry type Form C rated 3A @ 250vac MAX.
    - A. 49 is the indicator lamp for the 0 degree position and corresponds to the 0 degree position stop (cam SW2).
    - B. 48 is the indicator lamp for the 45 degree position and corresponds to the 45 degree position stop (cam SW4).
    - C. 47 is the indicator lamp for the 90 degree position and corresponds to the 90 degree position stop (cam SW3).
  - Connections 49, 48, and 47 must be connected to indicators (as shown on page 4) or properly insulated if indicators are not used. Each respective connection will become hot when the actuator stops at the corresponding position.
6. Do NOT apply power at this time.

**Warning: DO NOT operate manual override when power is present. Geartrain damage and personal injury may occur.**

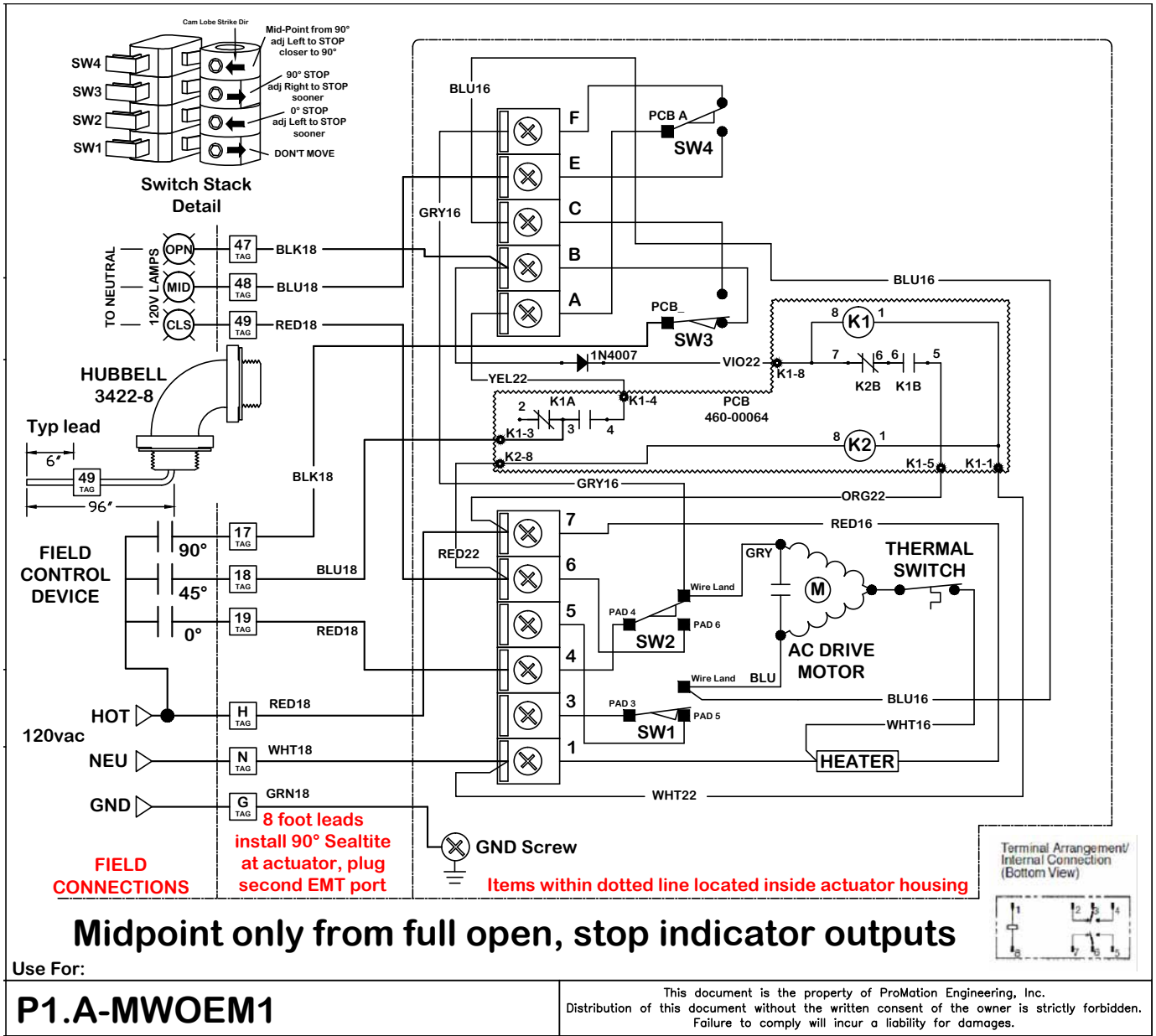
**Do not use powered tools to turn the manual override -- it will DAMAGE the gear train or motor and VOID the warranty.**

## Installation Notes

- There are no mechanical stops on this model.
- These actuators are designed to be used between a horizontal and upright position. Do NOT mount the assembly with the actuator top below a horizontal position.
- When installing conduit, use proper techniques for entry into the actuator. Use drip loops to prevent conduit condensate from entering the actuator.
- Both NPT conduit ports MUST use proper equipment to protect the NEMA 4X integrity of the housing.
- The internal heater is to be used in ALL applications.
- Do NOT install the actuator outdoors or in humid environments unless it is powered up and the heater is functioning.
- Use proper wire size to prevent actuator failure (see chart on page 4 for proper wire sizing).
- All terminals accept 14-18AWG solid/stranded wire.

## Operation Notes

**Once a move begins it must be completed. If it is not completed, such as during a power failure, sending an incorrect signal can result in the actuator rotating 360 degrees.**



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### Wire Sizing Chart

MAX distance between Actuator and Supply (feet)		
Actuator/ Voltage	P1.A 120VAC	P1.A 230VAC
Amps	0.6A	0.4A
Wire Gage		
18	1377	3960
16	2165	6223
14	3497	10052

Wire sizing data is provided in the Wire Sizing Data table to assist in the selection of the proper wire size for these actuators using various wire sizes over distance.

Please make sure to reference the correct voltage and do not exceed the indicated length of the wire run for each model.

## Check End of Travel Settings

The actuators are tested, calibrated and shipped in the Full CW (0 degree) position and End of Travel cams are set at 90 degrees from each other. An additional cam is set for the Midpoint (45 degree) position, accessible from the 90 degree position only.

- A. Set the control device (valve or damper) to the closed position.
- B. Mount the actuator to the device to be controlled (valve or damper).
- C. Insure that the CW (0 degree) End of Travel cam trips the CW End of Travel switch at the correct CW point.
  - C.1. If the switch does not change state at the correct **CW (0 degree)** position, adjust **CAM 2** per instructions below.
- D. Manually move (see Manual Override on page 6) the actuator so the valve or damper is in the fully CCW (90 degree) position.
- E. Insure that the CCW (90 degree) End of Travel cam trips the CCW End of Travel switch at the correct CCW point.
  - E.1. If the switch does not change state at the correct **CCW (90 degree)** position, adjust **CAM 3** per instructions below.
- F. Manually move (see Manual Override on page 6) the actuator so the valve or damper is at the Midpoint (45 degree) position.
- G. Insure that the Midpoint (45 degree) Travel cam trips the Midpoint Travel switch at the correct point.
  - G.1. If the switch does not change state at the **Midpoint (45 degree)** position, adjust **CAM 4** per instructions below.

## Adjusting the actuator CW, CCW, and Midpoint positions

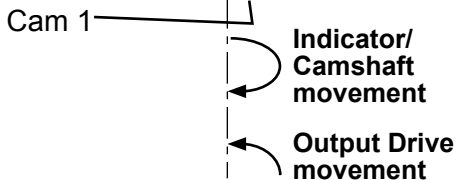
Cam adjustments controlling 0 degree, 90 degree, and 45 degree positions

**Remove power from this device BEFORE making any End of Travel cam adjustments.**



### Cam 1 Adjustment (Obsolete)

- 1A. The lower cam is **Cam 1** but is rendered obsolete. Adjustments to it will not affect actuator operation.

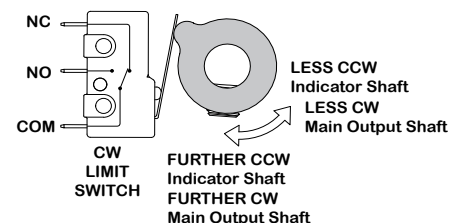


**NOTE: The P1.A main output drives 90° while the indicator/camshaft rotates 180° in the opposite direction.**

### Cam 2 Adjustment (0 degree position)

- 2A. The second cam is **Cam 2, the CW (0 degree)** end of travel adjustment. Once the actuator is at its required CW position with POWER OFF, use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the LEFT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft (CW) until slight pressure is felt. Then SLOWLY rotate the hex key to the RIGHT until you hear the “click” on the second switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

- 2B. Apply power to the actuator and drive CCW at least 15-20 degrees. Then drive the actuator CW until the cam stops the electrical travel. Check to be sure this is the correct CW position you require. Repeat step 2A if further adjustment is needed. Remove power from the actuator.



Cam 2

## Adjusting the actuator Auxiliary Switches

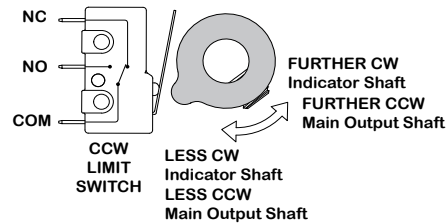
**Remove power from this device BEFORE making any End of Travel cam adjustments.**

### Cam 3 Adjustment (90 degree position)



Cam 3

3A. The lower cam is **Cam 3, the CCW (90 degree)** end of travel adjustment. Once the actuator is at its required CCW position, with POWER OFF, use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the RIGHT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft (CW) until slight pressure is felt. Then SLOWLY rotate the hex key pushing the cam to the LEFT until you hear the “click” on the bottom switch indicating that correct adjustment has been achieved. Tighten the cam.



3B. Apply power to the actuator and drive CW at least 15-20 degrees. Then drive the actuator CCW until the cam stops the electrical travel. Check to be sure this is the correct CCW position you require. Repeat step 3A if further adjustment is needed.

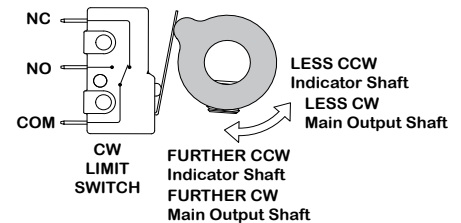
### Cam 4 Adjustment (45 degree position)



Cam 4

4A. The fourth cam is **Cam 4, the midpoint (45 degree)** travel adjustment. Once the actuator is at its required 45 degree position with POWER OFF, use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the LEFT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft (CW) until slight pressure is felt. Then SLOWLY rotate the hex key to the RIGHT until you hear the “click” on the second switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

4B. Apply power to the actuator and drive CCW at least 15-20 degrees. Then drive the actuator CW until the cam stops the electrical travel. Check to be sure this is the correct 45 degree position you require. Repeat step 4A if further adjustment is needed. Remove power from the actuator.



**Warning: DO NOT operate manual override when power is present. Geartrain damage and personal injury may occur.**

**Do not use powered tools to turn the manual override -- it will DAMAGE the gear train or motor and VOID the warranty.**

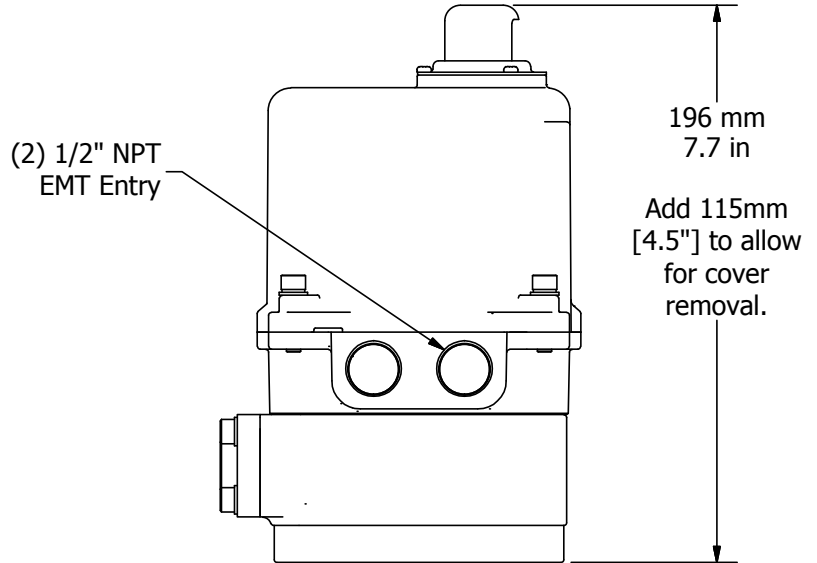
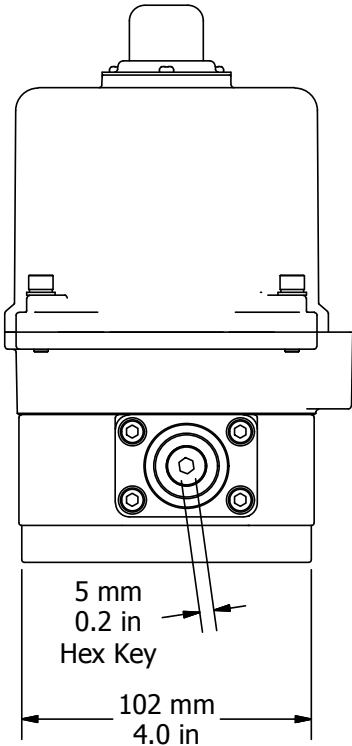
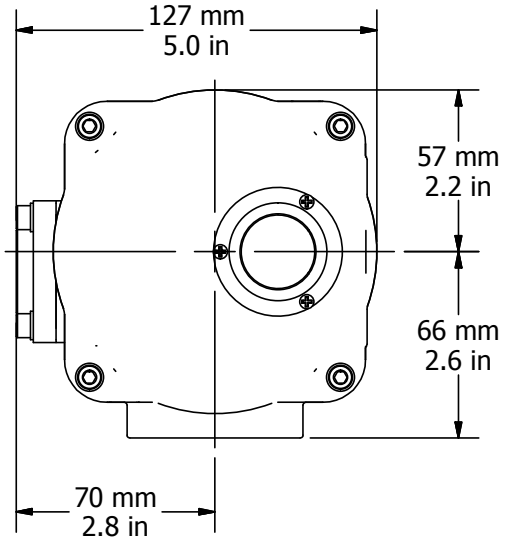
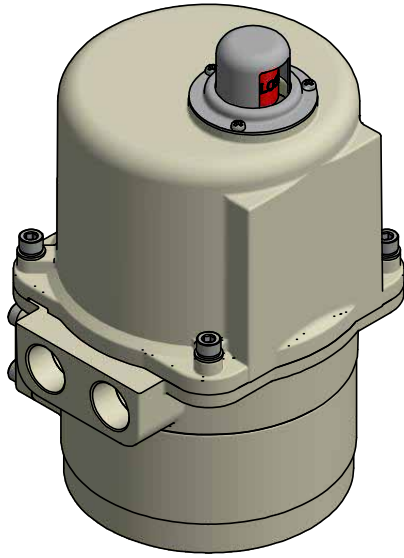


Manual Override

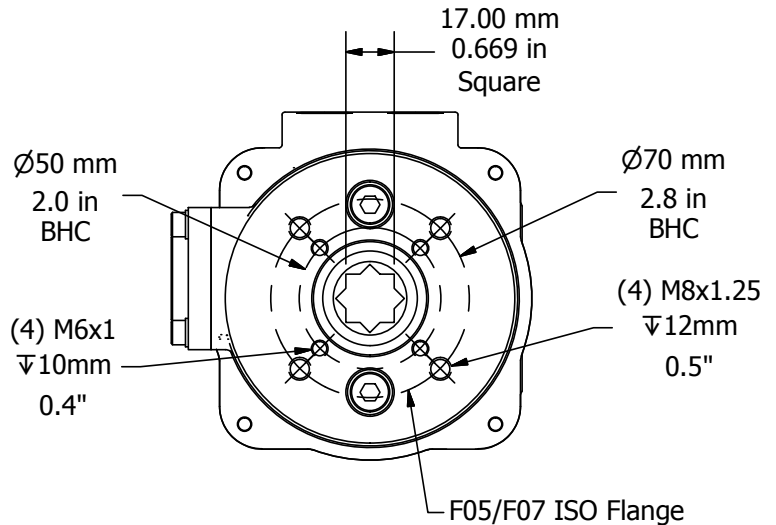
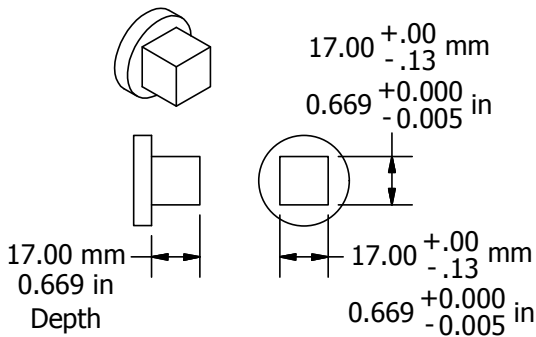


# Mechanical Data

## P1.A Series Dimensional Data



### Drive Coupling Fabrication Data

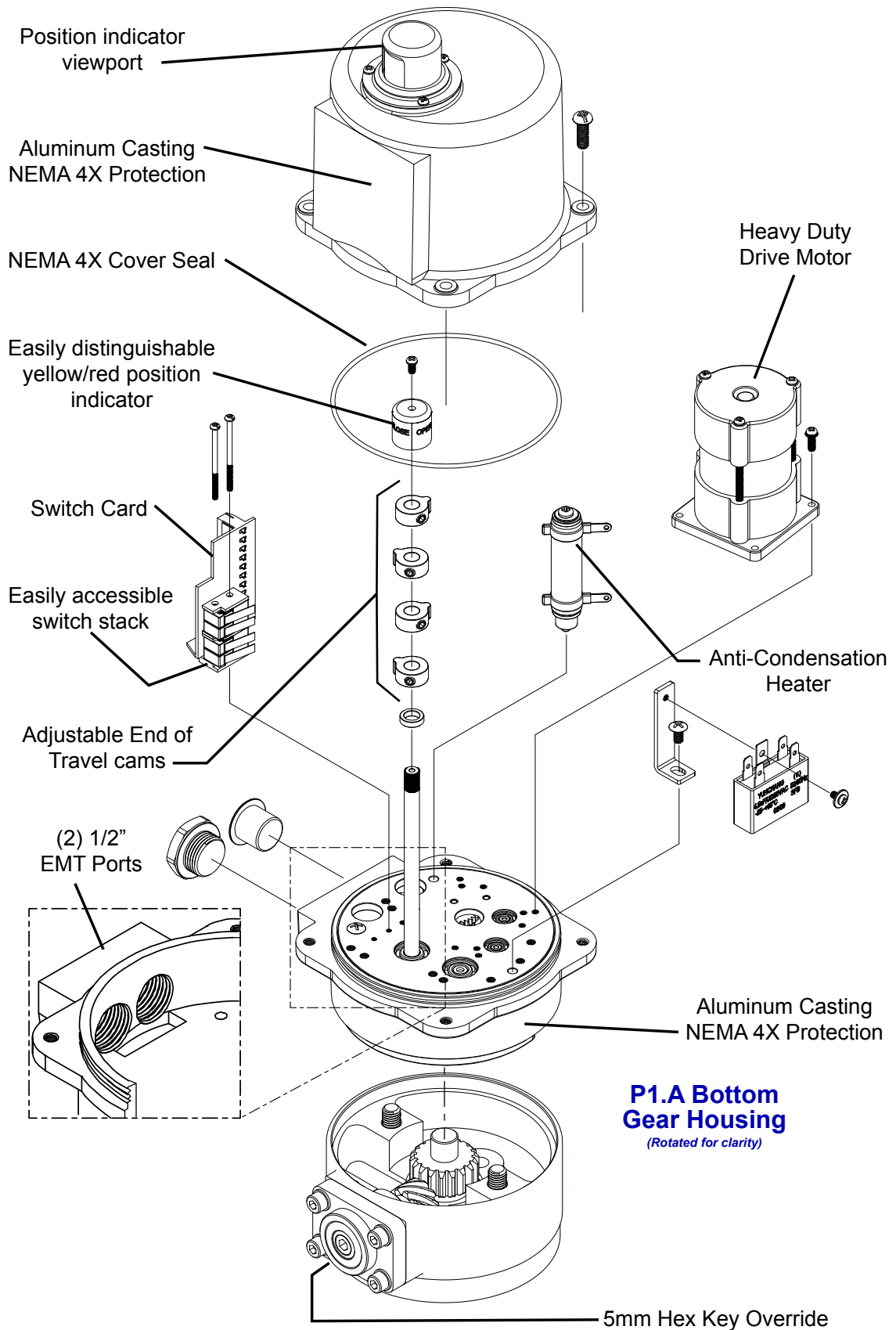


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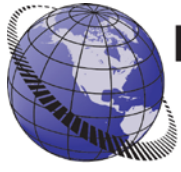
# Mechanical Data

## P1.A Series Exploded View

(P1.A-120N4 unit is shown)



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# Industrial Applications

ProMation Engineering actuators have been installed to operate process controls such as butterfly valves, ball valves, high performance valves, plug valves, gate valves and dampers, in a broad range of demanding industrial applications.

**Power  
Generation**



**Water  
Processes**



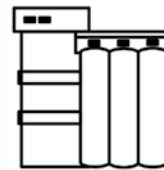
**Mining**



**Oil and Gas**



**Agriculture**



**Chemicals**



## Complete Support

ProMation Engineering is committed to providing superior customer support for your sales, project management and installation teams. Contact us today.

### Full Documentation

We offer complete wiring diagrams, field installation manuals and set up documentation for all our products, both in printed and digital form. We regularly host customized educational webinars for our customers.

### RapidQuote

Most quotes and estimates are generated within hours of the request.

### ProMation Engineering Services

ProMation Engineering can provide design and technical services for OEM's, projects with customized requirements and specialized operations.

ProMation Engineering follows a policy of continual product updates and enhancements. Our website is the best place to obtain the latest product documentation, including the wiring diagrams for these controllers. Visit us at [www.promationei.com](http://www.promationei.com) or use the code to link to the site.



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