

# PROMATION ENGINEERING

*Precision Actuation for Industry*

## Installation & Operation Manual

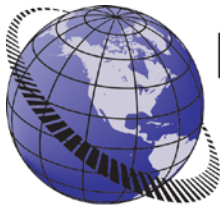
This IOM is for the following  
ProMation Engineering Products:

P1-120N4-090180

P1-230N4-090180







# PROMATION ENGINEERING

Precision Actuation for Industry

## Field Manual P1- Series HV with 0°-90°-180° option On/Off/Jog Control ISO5211 F03/05 8P14



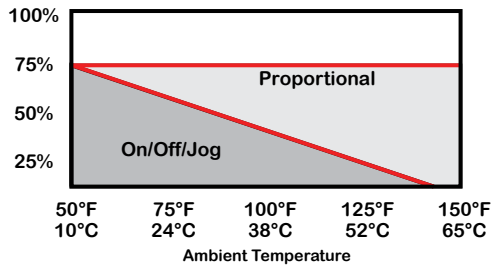
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# Product Specifications

Actuator Specifications	P1	
Torque "lb/Nm	<b>300"lbs/35Nm</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)	12 sec	
Runtime (90°@50Hz)	13 sec	
Duty Cycle	25%	
Motor Starts	1200 per hour	
Weight	5lbs/3kg	
Mechanical Connections	ISO5211 F03/F05 8pt 14mm	
Electrical Entry	(2) 1/2" NPT	
Electrical Terminations	14-18ga	
Environmental Rating	NEMA 4/4X	
Manual Override	8mm Socket 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

The following procedure is to be followed for set-up, calibration, testing and use of the P Series quarter-turn electric actuators. Each unit is shipped from the factory with initial calibration of cams and switches completed for 0-90 degree operation. However, these are general settings and serve as a starting point for proper calibration of the actuator in its real-world application. There are no mechanical stops on this model.

## Safety

Safety is a basic factor any time you maintain and operate mechanical equipment. Use of proper handling methods, 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 P Series actuator.

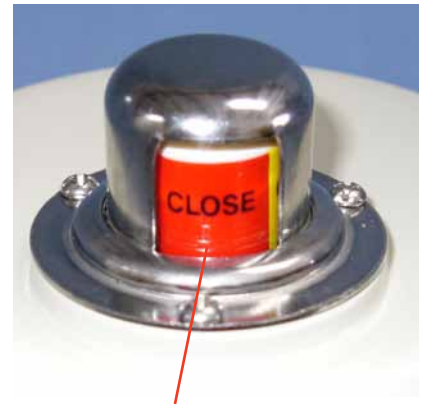
Only competent and trained personnel should install, maintain and repair ProMation Actuators. Any work related to this Actuator must be carried out in accordance with this manual and related codes and regulations. Local workplace health and safety rules should always be followed.

## 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; overusing an actuator typically results in motor overheating which can permanently damage it. Overheating also consumes more electricity. Generally speaking, the hotter a motor becomes, the longer 'rest' it needs to cool down so it runs efficiently.

## 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 180 degrees with stops at 90 degrees from both directions. Most quarter-turn products will not require recalibration of these settings.** If any travel adjustment is necessary, please refer to pages 5 & 6 for instructions.



The actuator is shipped from the factory in its fully CW position. The top illustration shows Red for CW, Yellow for CCW.

## 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.

**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.**

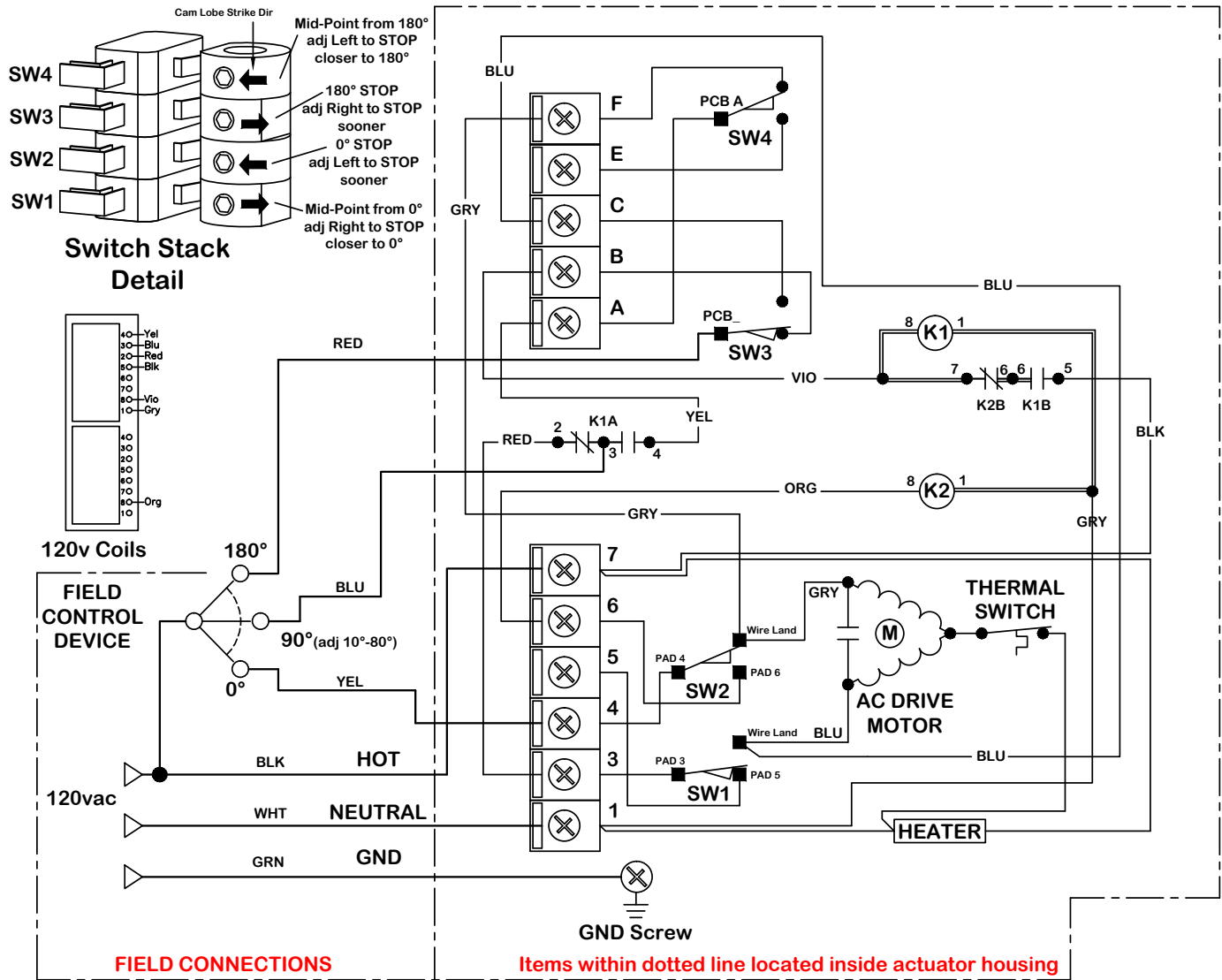
5. Make the electrical connections per wiring diagram on page 4.
  - The five necessary wires (RED, BLU, YEL, BLK, & WHT) are already passed through the EMT opening.
  - There are no AUX switches for this unit.
6. Do NOT apply power at this time.

## Installation Notes

- There are no mechanical stops on this model.
- These actuators are designed to be used in either a horizontal or 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.
- **Do NOT parallel wire multiple actuators together without utilizing isolation relays! If this is your intention, please contact ProMation Engineering for a multiple actuator parallel wiring diagram.**

# Wiring Diagram

## On/Off/Jog Control



### Wire Sizing Chart

MAX distance between Actuator and Supply (feet)		
Actuator/ Voltage	P1 120VAC	P1 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 ProMation P1 series actuators using various wire sizes over distance.

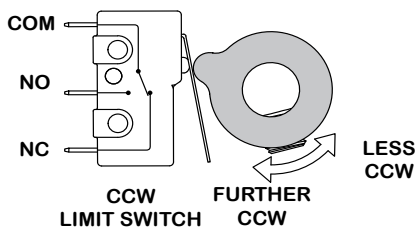
Please make sure to reference the correct voltage and do not exceed the indicated length of the wire run for each model.

## Adjusting the actuator 0 and 90 degree positions

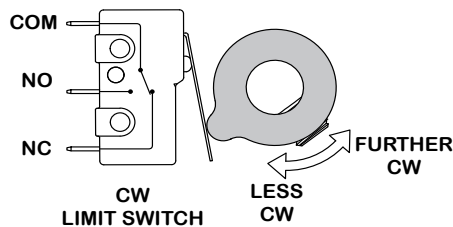
This actuator has been factory calibrated to operate between 0 degrees and 180 degrees with stops set for 90 degrees from either direction. These settings are for your reference. Your actuator has been initially calibrated at the factory and **you may not need to perform this calibration.**



Cam 1



Cam 2



### Adjust Cam 2

1. The SECOND cam is the 0° limit switch. Apply power and drive the actuator to the 0° position.

POWER OFF the actuator and use the manual override (8mm socket drive) to position the actuator to your required 0° position.

Use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the RIGHT a few 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 switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

2. Apply power to the actuator and drive towards 90° at least 15-20°. Then drive the actuator back to 0° until the cam stops the electrical travel. Check to be sure this is the correct 0° position you require. Repeat step 1 if further adjustment is needed.



Manual Override

3. Apply power to the actuator and drive the actuator to the 90° position.

### Adjust Cam 1

4. The First cam is the 90° limit switch when traveling from 0°.

POWER OFF the actuator and use the manual override (8mm socket drive) to position the actuator to your required 90° position.

Use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the LEFT a few 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 switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

5. Apply power to the actuator and drive towards 0° at least 15-20°. Then drive the actuator back to 90° until the cam stops the electrical travel. Check to be sure this is the correct 90° position you require. Repeat step 4 if further adjustment is needed.

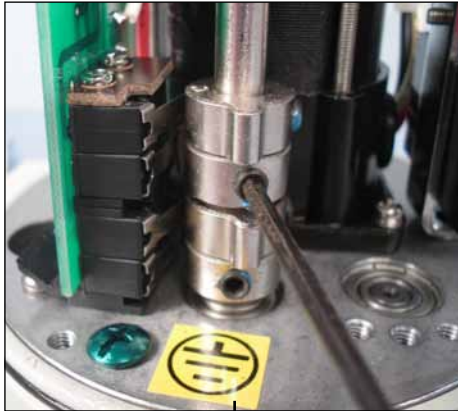
6. Apply power to the actuator and drive the actuator to the 180° position.

***You must drive the actuator all the way to the 180° position or the motor will not reverse direction.***

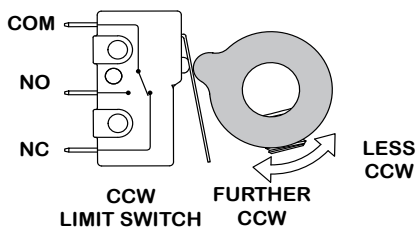
## Adjusting the actuator 180 and 90 degree (returning) positions

This actuator has been factory calibrated to operate between 0 degrees and 180 degrees with stops set for 90 degrees from either direction. These settings are for your reference. Your actuator has been initially calibrated at the factory and **you may not need to perform this calibration.**

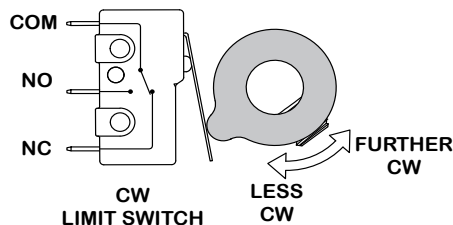
***The actuator must be all the way to the 180° position.***



Cam 4



Cam 3



### Adjust Cam 3

7. The THIRD cam is the 180° limit switch.

POWER OFF the actuator and use the manual override (8mm socket drive) to position the actuator to your required 180° position.

Use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the LEFT a few 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 switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

8. Apply power to the actuator and drive towards 0° at least 15-20°. Then drive the actuator back to 180° until the cam stops the electrical travel. Check to be sure this is the correct 180° position you require. Repeat step 7 if further adjustment is needed.

9. Apply power to the actuator and drive the actuator to the 90° position.

### Adjust Cam 4

10. The FOURTH cam is the 90° limit switch when traveling from 180°. POWER OFF the actuator and use the manual override (8mm socket drive) to position the actuator to your required 90° position.

Use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the RIGHT a few degrees to reset the switch roller arm. Then snug the set screw up against the camshaft (CW) until slight pressure is felt.

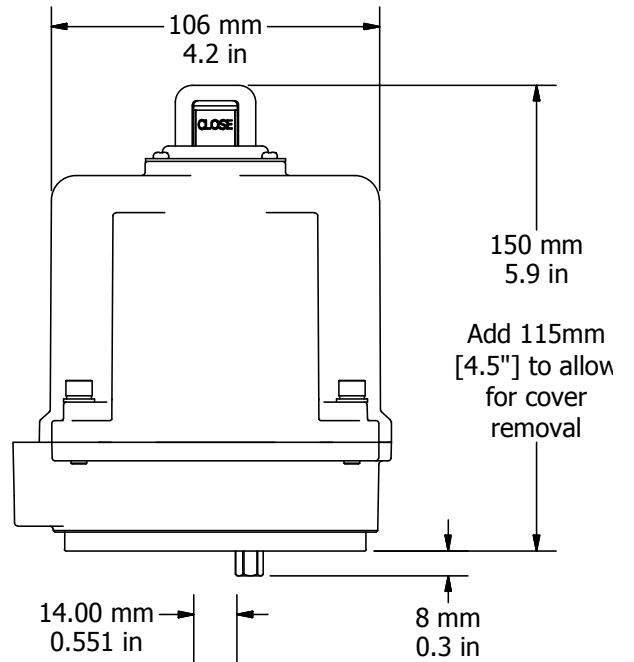
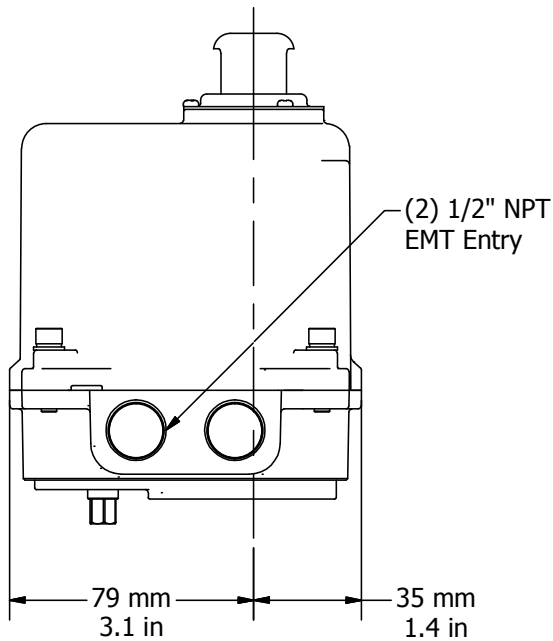
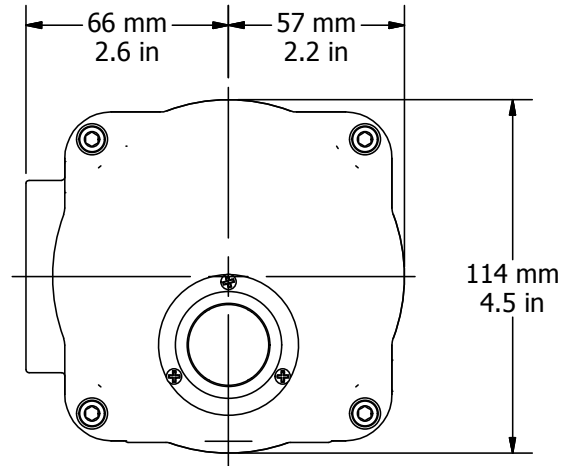
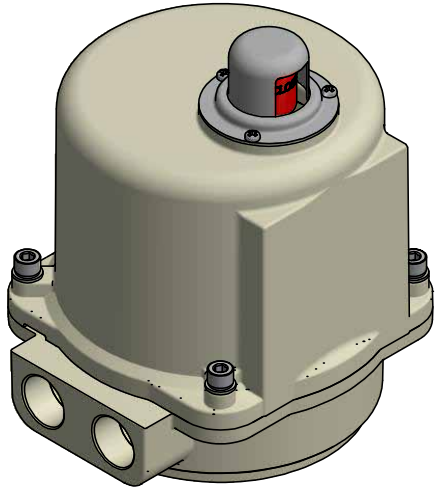
Then SLOWLY rotate the hex key to the LEFT until you hear the “click” on the switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

11. Apply power to the actuator and drive towards 180° at least 15-20°. Then drive the actuator back to 90° until the cam stops the electrical travel. Check to be sure this is the correct 90° position you require. Repeat step 10 if further adjustment is needed.

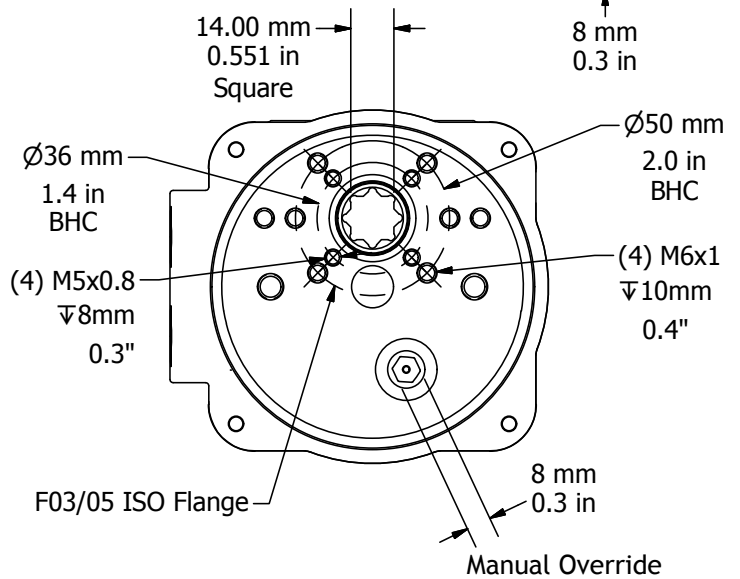
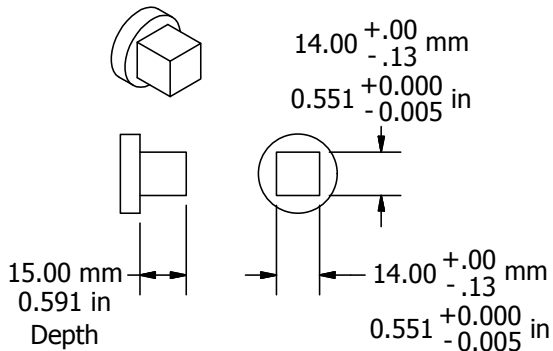


# Mechanical Data

# P1 Series Dimensional Data



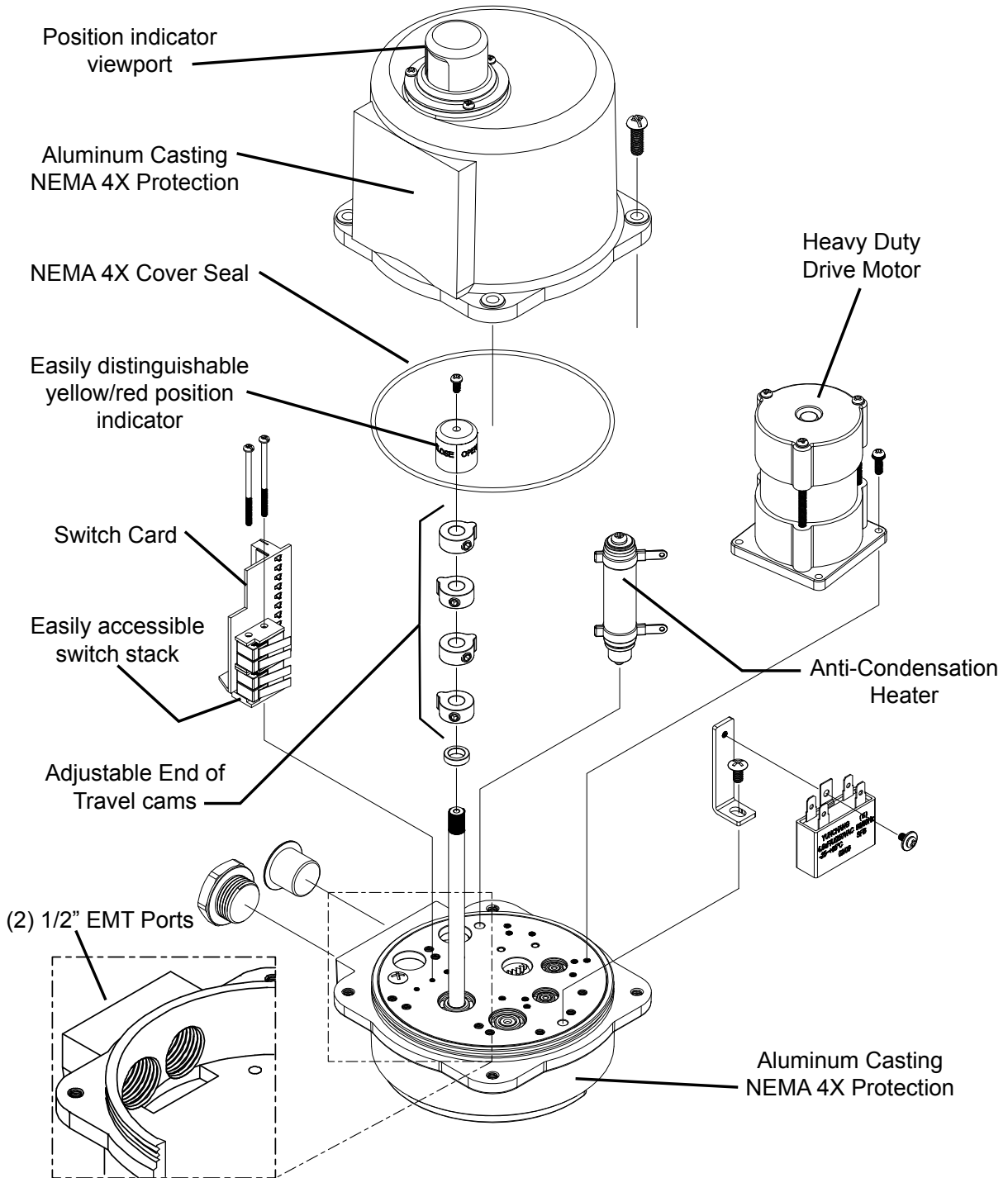
### Drive Coupling Fabrication Data



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# Mechanical Data

## P1 Series Exploded View (P1-120N4 unit is shown)



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## **Commissioning**

**After completing all mounting and wiring procedures and main power is available, it is now possible to commission the actuator.**

1. Utilize the manual override to rotate the actuator and damper, valve or other connected device through its full travel from fully CW to fully CCW and back again to check for any possible interference.
  - Do NOT utilize any mechanical advantage devices to rotate the handwheel (pipes, wrenches, extension bars, etc.).
2. Start at the CW position.
3. Apply correct power to the unit.
  - 3.A Measure correct power on terminals 7 (Hot / L1) & 1 (Neu / L2) on the terminal block.
  - 3.B Measure correct power on the two heater terminals on the switch board.
4. Command the field device to generate a 90° signal. The actuator rotates in a CCW direction (as viewed from above).
  - Measure terminals 3 and 1 for correct voltage (matching that measured in step 4.A).
5. Command the field device to generate a 180° signal. The actuator rotates in a CCW direction (as viewed from above).
  - Measure terminals B and 1 for correct voltage (matching that measured in step 4.A).
6. Command the field device to generate a 90° signal. The actuator rotates in a CW direction (as viewed from above).
  - Measure terminals F and 1 for correct voltage (matching that measured in step 4.A).
7. Command the field device to generate a 0° signal. The actuator rotates in a CW direction (as viewed from above).
  - Measure terminals 4 and 1 for correct voltage (matching that measured in step 4.A).
8. Generate a mid-position signal at the field device to move the actuator off its full CW trip position.
9. Test the possible functions: 0-90°, 0-180°, 90°-180°, 180°-90°, 180°-0°, 90°-0°.
10. Actuator is now commissioned and operational.

# 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**



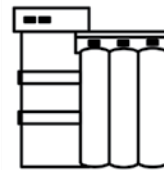
**Mining**



**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.



**PROMATION  
ENGINEERING**

*Precision Actuation for Industry*

16138 Flight Path Drive  
Brooksville, FL 34604

Phone (352) 544-8436 Fax (352) 544-8439

email: [sales@promationei.com](mailto:sales@promationei.com)



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