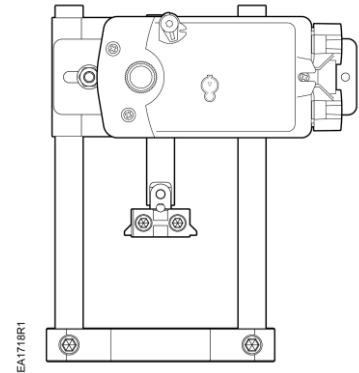


## Pressure Independent Control Series

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### Rack & Pinion Actuators




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**Description** The Pressure Independent Control Series Rack & Pinion Actuator couples an OpenAir® GPC Actuator to a 1-1/2- or 2-inch Pressure Independent Control Series two-way valve using a linkage. The linkage transforms the actuator rotary movement into the linear motion required to position the valve.

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- Features**
- Bi-directional fail-safe spring return
  - Orderable as direct (Normally Open) or reverse (Normally Closed) acting
  - Brushless DC motor technology with stall protection
  - Pre-cabled
  - Plenum-rated
  - 60-second run time
  - Integrated 1/2-inch NPT conduit connection
  - Modulating control signal selectable 0 to 10V or 2 to 10V
  - Modulating actuator has 0(2) to 10 Vdc feedback
  - Floating actuator and linkage must be ordered separately


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**Application** The Pressure Independent Control Series valves are used to control water and glycol solutions to 50 percent in small to large air handling units and central plant applications.

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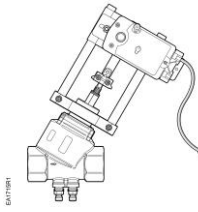
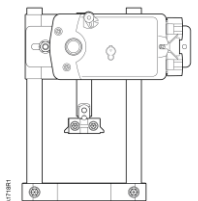
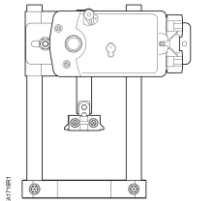
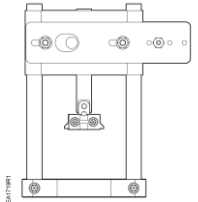
**Warning/Caution Notations** **WARNING:**  Personal injury or loss of life may occur if you do not perform a procedure as specified.

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**CAUTION:**  Equipment damage may occur if you do not perform a procedure as specified.

**Product Numbers** Table 1 provides a complete description of the product numbers.

**Table 1. Pressure Independent Control Series Rack & Pinion Actuator Product Numbers.**

Product Number	Description
<p>337NO-xxxx-xx 337NC-xxxx-xx</p> 	<p>Assembly consisting of: OpenAir® Electronic Modulating Actuator, linkage, and 1-1/2- inch or 2-inch Pressure Independent Control Series two-way valve body.</p> <p>Product Number 337NO/NC-xxxx-xx includes: valve, linkage and OpenAir GPC161.1P Electronic Actuator for 0 to 10 Vdc modulating control with a 24 Vac or 24 Vdc supply voltage.</p> <p>The xxxx of the product number specifies a particular Pressure Independent Control Series valve body.</p> <p>For details and complete product numbers, see <i>Pressure Independent Control Series 2-Way Valves and Electronic Valve Actuators Submittal Sheet</i>, 154-087 for details and product numbers.)</p>
<p>599-03615 + GPC131.1P</p> 	<p>Linkage and OpenAir GPC131.1P Electronic Actuator (purchased separately)</p> <p>The linkage and actuator can be field installed on a 1-1/2- or 2-inch Pressure Independent Control Series valve.</p> <p>For details on the actuator, see <i>OpenAir™ GPC Series Spring Return, 35 lb-in (4 Nm), Rotary Electronic Damper Actuators Technical Instructions</i> (155-782).</p>
<p>599-03617NO 599-03617NC</p> 	<p>Assembly consisting of: OpenAir GPC161.1P Electronic Actuator and linkage.</p> <p>The assembly is ready for field installation on a 1-1/2- or 2-inch Pressure Independent Control Series valve.</p> <p>For details on the actuator, see <i>OpenAir™ GPC Series Spring Return, 35 lb-in (4 Nm), Rotary Electronic Damper Actuators Technical Instructions</i> (155-782).</p>
<p>599-03615</p> 	<p>Linkage only.</p> <p>For replacement or mounting of an alternate OpenAir GPC electronic actuator on the linkage and installation of that linkage/actuator assembly on a 1-1/2-inch or 2-inch Pressure Independent Control Valve Series valve.</p>

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**Specifications**

<b>Power supply</b>	Operating voltage	24 Vac $\pm$ 20%, 24 Vdc $\pm$ 20%
	Frequency	50/60 Hz
	Power consumption 599-03615 linkage + GPC131.1P actuator	3.5 VA running, 2.8 VA holding
	599-03617 assembly (with GPC161.1P actuator)	3.5 VA running, 2.8 VA holding
	Equipment rating 24 Vac/Vdc	Class 2, in accordance with UL/CSA
<b>Control signal</b> <b>(599-03617 assembly with GPC161.1P actuator)</b>	Input signal voltage input	0 (2) to 10 Vdc (max. 35 Vdc)
	input resistance	100K ohms
	Position output feedback signal	0 (2) to 10 Vdc, $\pm$ 1 mA maximum
<b>Run Time for 90°</b>	Operating with motor	60 seconds
	On power loss with spring return	15 seconds, typical
<b>Ambient conditions</b>	Ambient temperature operation	-25 to 130°F (-32 to 55°C)
	storage and transport	-40 to 158°F (-40 to 70°C)
	Ambient humidity (non-condensing)	95% rh
<b>Mounting</b>	Nominal angle of rotation	90°
	Maximum angular rotation	95°
	Enclosure	NEMA 1 (see Figure 1.)
<b>Linkage</b>	Frame	Aluminum alloy frame
	Construction	Steel rack, pinion and stem shaft pre-lubricated, bronze bushings
<b>Agency certification</b>	GPC Actuator	UL-listed per UL 60730 cUL to CSA 60730
	<b>NOTE:</b> These actuators were approved for installation in plenum areas by Underwriters Laboratories, Inc. (UL) per UL 2043.	
<b>Physical characteristics</b>	Actuator enclosure	IP54
	Pre-connected cable	18 AWG, 3 ft (0.9 m)
	Dimensions	See Figure 2.
	Weight	1.32 lb (0.60 kg)

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For valve specifications, see the following document:

*Pressure Independent Control Series Two-Way, Brass Valve Bodies, 1/2-inch to 2-inch, ANSI 250 Technical Instructions (155-774).*

For OpenAir® Electronic Damper Actuator specifications, see the following document:

*OpenAir® GPC Series Spring Return, 35 lb-in (4 Nm), Rotary Electronic Damper Actuators Technical Instructions (155-782).*

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## Operation

### 599-03617 assembly with GPC161.1P actuator

A continuous 0 to 10 Vdc signal from a controller to Terminal Y (8, gray) operates the actuator, and the valve opens and closes. The linkage proportionally translates the rotary actuator stroke into a linear valve stem motion.

A 0 to 10 Vdc position output feedback signal at Terminal U (9, pink) is available to monitor the position of the actuator.

In the event of a power failure or when the operating voltage is absent, the actuator returns to the fail-safe (90°) position and the valve opens or closes depending on the configuration ordered.

In the event of a stall, the actuator is overload protected over the full range to prevent damage.

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### 599-03615 linkage with GPC131.1P actuator

When power is applied to control signal Y1 or Y2, the actuator operates as described in the table below. The linkage translates the rotary actuator stroke into a linear valve stem motion.

**Table 2. Floating Actuator Operation.**

Operation	Valve Motion When Signal Y1 is Energized	Valve Motion When Signal Y2 is Energized
NO	Closes	Opens
NC	Opens	Closes

In the event of a power failure or when operating voltage is absent, the actuator returns to the fail-safe (90°) position and the valve opens or closes depending on the configuration ordered.

In the event of a stall, the actuator is overload protected over the full range to prevent damage.

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### Life expectancy

An improperly-tuned loop will cause excessive repositioning that will shorten the life of the actuator.

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## Installation and Mounting

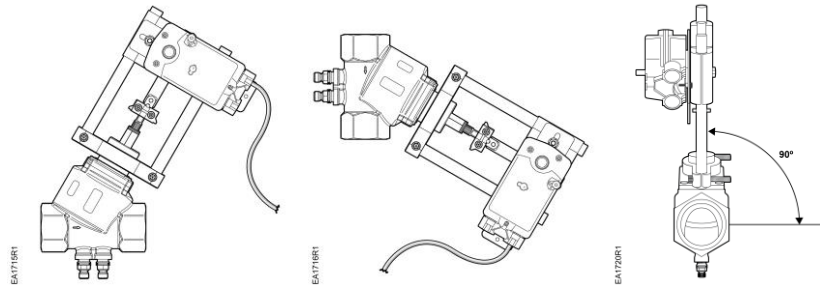
Pressure Independent Control Series Rack & Pinion Actuators are suitable for water applications where the actuator mounts on the linkage perpendicularly.

Pressure Independent Control Series Rack & Pinion Actuators can be installed on normally-open Pressure Independent Control Series valves for direct or reverse-acting control applications. The actuator orientation and the position of the actuator shaft adapter on the linkage determine whether the linkage shaft rotates clockwise or counterclockwise for the proper control action. *Pressure Independent Control Series Rack & Pinion Actuators Installation Instructions* (A6V11611545), shipped with the assembly, provides details to configure the assembly for the desired control application.

Install the Pressure Independent Control Series Rack & Pinion Actuator so that the flow of the medium follows the direction of the arrow cast on the valve body. Figure 1 shows acceptable NEMA 1 mounting positions. Do not mount the assembly so that the actuator is below horizontal or upside-down.

Allow sufficient space for servicing the assembly. See *Dimensions* and the recommended service envelope in Figure 2.

**Installation and Mounting, Continued**



**Figure 1. Acceptable Mounting Positions.**

**Wiring**

All wiring must conform to NEC, and local codes and regulations.

Use earth ground isolating step-down Class 2 transformers. Do not use autotransformers.

Determine the supply transformer rating by summing the total VA of all actuators used. The maximum rating for a Class 2 step-down transformer is 100 VA.

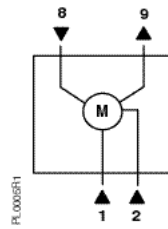
Table 3 shows the recommended maximum actuators per Class 2 circuit and includes a safety factor of 80% of the transformer VA. Operating additional actuators requires additional transformers or separate 100 VA power trunks.

**Table 3. Recommended Maximum Power Consumption (VA) for a Class 2 Step-Down Transformer.**

Actuator	Power Consumption	Actuator per Class 2 Supply Circuit
GPC131.1P	4.3 VA	23
GPC161.1P		

## Wiring Diagrams

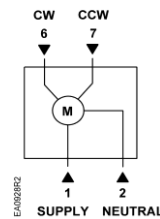
### 599-03617 Assemblies (599-03615 linkage with GPC161.1P actuator)



**Table 4. 599-03617 Assemblies for Modulating Control with 24 Vac or 24 Vdc Supply Voltage.**

Standard Symbol	Function	Terminal Connection	Standard Color
1	Supply (SP)	G	Red
2	Neutral (SN)	G0	Black
8	0 to 10 Vdc input signal	Y	Gray
9	Output for 0 to 10 Vdc position feedback indication	U	Pink

### 599-03615 linkage with GPC131.1P actuator



**Table 5. 599-03615 linkage with GPC131.1P for 24 Vac or 24 Vdc Three-position Floating Control.**

Standard Symbol	Function	Terminal Connection	Standard Color
1	Supply (SP)	G	Red
2	Neutral (SN)	G0	Black
6	Control signal clockwise	Y1	Violet
7	Control signal counterclockwise	Y2	Orange

## Start Up/ Commissioning

- Check that the wires are connected correctly.
- *OpenAir® GPC Series Spring Return, 35 lb-in (4 Nm), Rotary Electronic Damper Actuators Technical Instructions (155-782).*

## Service



**WARNING:**  
 Do not open the actuator.

If the linkage or actuator is inoperative, replace the unit.

## Dimensions

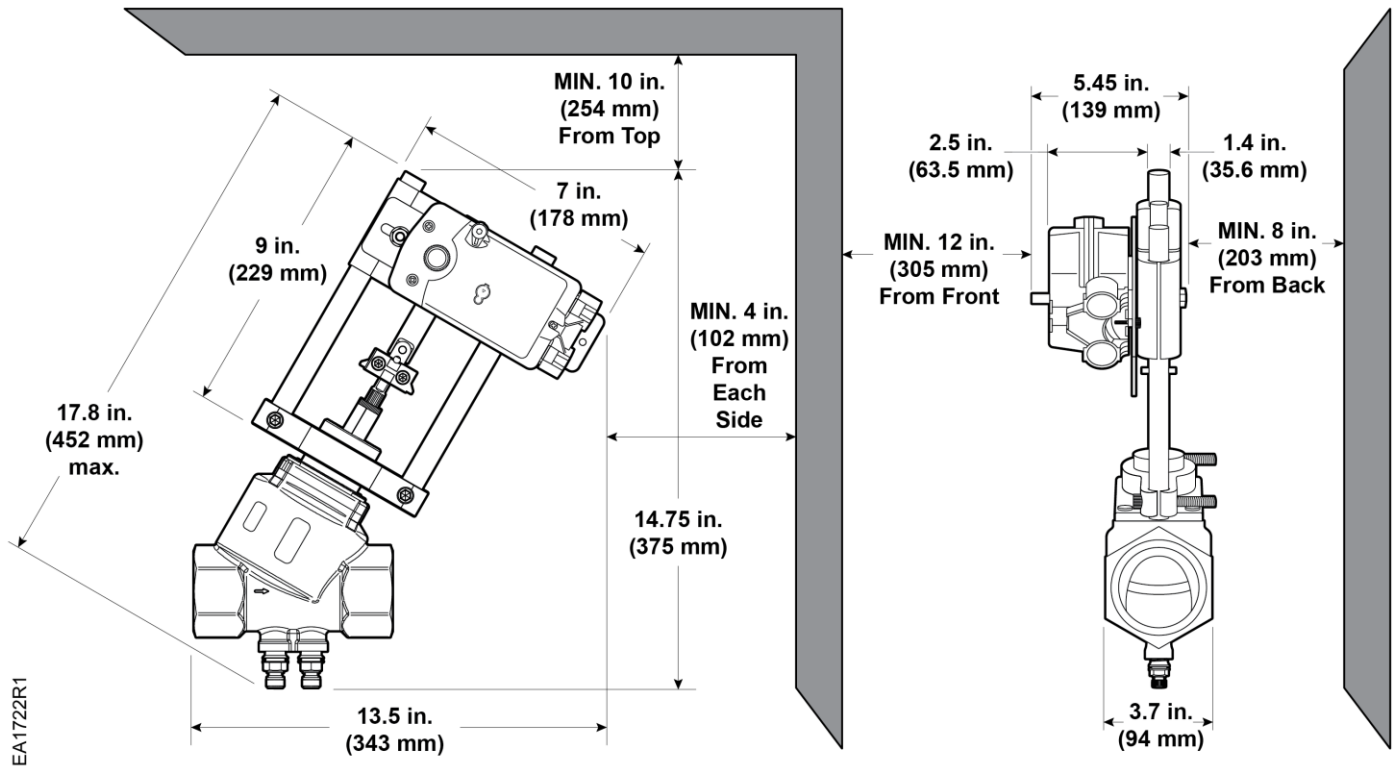


Figure 2. Dimensions of the Pressure Independent Control Series Rack & Pinion Actuator in Inches (Millimeters).

**NOTES:** For valve dimensions, see the following documents:

*Pressure Independent Control Series Two-Way, Brass Valve Bodies, 1/2-inch to 2-inch, ANSI 250 Technical Instructions (155-774)*

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