The OpenAir direct-coupled fail-safe/fail-in-place electronic actuators are designed for modulating, two-position, and floating control of laboratory fume hoods, constant or variable volume installations for the control of supply and exhaust and terminal units.

Features

- Fast operation, 2 seconds runtime
- One model performs all control signals:
  - 2-position
  - Floating
    - Accepts Siemens FHC/LRC pulsed control signal
  - Modulating (0(2) to 10 Vdc and 4(0) to 20 mA)
- Feedback standard on all models
- Highly accurate positioning
- Brushless DC motor technology with stall protection
- Models available with dual, independently adjustable auxiliary switches
- Unique self-centering shaft coupling
- 53 lb-in (6 Nm) torque
- UL and cUL listed, CE certified
- 24 Vac/dc compatible
- Manual override capability

Application

Used in laboratory fume hoods, constant or variable air volume installations for the control of supply and exhaust air terminals; 53 lb-in (6 Nm) torque.

Models designed for applications that require the damper to return to a fail-safe position when there is a power failure; or models for fail-in-place.

Product Numbers

<table>
<thead>
<tr>
<th>Types</th>
<th>Operating Voltage</th>
<th>Dual Adjustable Auxiliary Switches</th>
<th>Action</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fail-safe</td>
<td>Fail-in-Place</td>
<td>53 lb-in (6 Nm)</td>
</tr>
<tr>
<td>GNP191.1P</td>
<td>24 Vac/dc</td>
<td>–</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>GNP196.1P</td>
<td>–</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>GAP191.1P</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>GAP196.1P</td>
<td>–</td>
<td>●</td>
<td>–</td>
<td>●</td>
</tr>
</tbody>
</table>
## Warning/Caution Notations

| WARNING: | Personal injury/loss of life may occur if you do not perform a procedure as specified. |
| CAUTION: | Equipment damage may occur if you do not perform a procedure as specified. |

## Specifications

### Power Supply
- **Operating voltage**: 24 Vac/dc \(\pm 20\%
- **Frequency**: 50/60 Hz
- **GAP19x**
  - Power consumption: 28 VA/19W
  - Equipment rating: Class II, according to UL/CSA Class III per EN 60730
- **GNP19x**
  - Power consumption: 20 VA/13W
  - Running: 8 VA/5W
  - Holding: 8 VA/5W

### Control Signal Y/Y1
- **Modulating input signal (wires 8-2)**
  - Voltage input signal
  - Input resistance
  - Repositioning resolution
- **Floating input signal (wires 8-2)**
  - Voltage input signal
  - Input resistance

### Control Signal Y2
- **Floating input signal (wires 7-2)**
  - Voltage input signal
  - Input resistance

### Feedback Signal
- **Position output signal (wires 9-2)**
  - Maximum output current: DC \(\pm 1\text{mA}\)

### Auxiliary Switches
- **GNP196.1P**
  - Contact loading: 6 A resistive, 2 A inductive
  - Voltage (no mixed operation 24 Vac/230 Vac)
  - Switching range for auxiliary switches: 5° to 90°
  - Step increments: 5°
- **GAP196.1P**
  - Contact loading: 6 A resistive, 2 A inductive
  - Voltage (no mixed operation 24 Vac/230 Vac)
  - Switching range for auxiliary switches: 5° to 90°
  - Step increments: 5°

### Function
- **Running torque**: 53 lb-in (6 Nm)
- **Maximum torque**: 142 lb-in (16 Nm)
- **Runtime for 90°**
  - Operating with motor: < 2 seconds
  - Fail-safe (on power loss) (for GNP19x only): 2 seconds

### Fail-Safe Operation
- **GNP Actuator Series**
  - On initial power-up, and after a power-fail event, the GNP actuators require up to 90 seconds for the capacitors to fully charge. During this time the actuator will respond to positioning commands, but will not power-fail until the capacitors are fully charged.

### Mounting
- **Nominal angle of rotation**: 90°
- **Maximum angular rotation**: 95°
- **Shaft size**: 1/4 to 3/4-inch (6.4 to 20.5 mm) dia.
- **Minimum shaft length**: 1/4 to 1/2-inch (6.4 to 13 mm) square
- **Minimum shaft length (GNP19x only)**: 3/4-inch (20 mm)
Housing

| Enclosure | NEMA 1 IP54 according to EN 60 529 (limited positions; see OpenAir™ GNP/GAP Series Installation Instructions [129-541]) |
| Material | Die-cast aluminum alloy |
| Gear lubrication | Silicone-free |

Ambient Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature operation</td>
<td>-0°F to 122°F (-18°C to 50°C)</td>
</tr>
<tr>
<td>Ambient temperature storage/transport</td>
<td>-26°F to 158°F (-32°C to 70°C)</td>
</tr>
<tr>
<td>Ambient humidity (non-condensing)</td>
<td>95% rh</td>
</tr>
</tbody>
</table>

Agency Certification

<table>
<thead>
<tr>
<th>Certification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL listed</td>
<td>UL 873</td>
</tr>
<tr>
<td>cUL listed</td>
<td>C22, 2 No. 24-93</td>
</tr>
</tbody>
</table>

CE Conformity

Electromagnetic compatibility (EMC) 2004/108/EC

NOTE: These devices were approved for installation in plenum areas by Underwriters Laboratories, Inc. (UL) per UL 1995.

Miscellaneous

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length</td>
<td>3 feet (0.9 m) length</td>
</tr>
<tr>
<td>Life cycle</td>
<td>Designed for over 100,000 full stroke cycles and a minimum of seven million repositions at rated torque and temperature</td>
</tr>
<tr>
<td>Dimensions</td>
<td>8-3/8-in. H × 3-1/4-in. W × 2-3/8-in. D (212 mm H × 83 mm W × 60 mm D)</td>
</tr>
<tr>
<td>Shipping weight</td>
<td>3 lbs 6 oz</td>
</tr>
</tbody>
</table>

Service Parts

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>985-098</td>
<td>Adjustment Tool.</td>
</tr>
<tr>
<td>985-092</td>
<td>Anti-Rotation (Mounting) Bracket.</td>
</tr>
</tbody>
</table>

Figure 1. Series Service Parts.

Operation

2-position control

Two-position control requires three wires. Apply 24 Vac/dc power to wire 1 (red) and wire 2 (black). Applying a 24 Vac/dc control signal to wire 7 (orange) causes the actuator to rotate counterclockwise. When the operating voltage is removed from wire 7 (orange), the actuator rotates clockwise.

Floating control

The actuator’s angle of rotation is proportional to the length of time the signal is applied. A 24 Vac/dc control signal to wire 8 (gray) causes the actuator to rotate clockwise. A 24 Vac/dc control signal to wire 7 (orange) causes the actuator to rotate counterclockwise. With no control signal applied, the actuator holds its position.

Modulating control

Apply a continuous 0(2) to 10 Vdc or 0(4) to 20 mA control signal between wire 8 (gray) and wire 2 (black) to operate the damper actuator. The angle of rotation is proportional to the control signal.

A 0 to 10 Vdc modulating output signal is available between wire 9 (pink) and wire 2 (black) to monitor the position of the actuator.
Fail-safe

In the event of a power failure, the GNP fail-safe actuator returns to the fail-safe position (see Figure 5.)

NOTE: The operation described above is valid for the factory default setting for rotation direction (Figure 5 and Figure 6).

Mechanical Range Adjustment

Actuator rotary range with the shaft adapter mounted at position "0".

Setting range for switches A and B
Setting step: 5°
Switching hysteresis: 2°

To change the settings of A and B:

1. Make sure the actuator is in the "0", fail-safe position. The scale is valid only in the "0" position.
2. Use the adjustment tool provided with the actuator to turn the switch adjustment dials to the desired setting at which a signal is to be given.

Factory setting:
Switch A = 5°
Switch B = 85°

NOTE: Use the long arm of the "†" to point to the position of switch A. Use the narrower tab on the red ring to point to the position of switch B.
Actuator Operation
Settings

- The black position indicates the active switch setting.
- For Siemens FHC/LRC pulsed control signal applications, see Figure 7.
- On initial power-up, and after a power-fail event, the GNP actuators require up to 90 seconds to fully charge their capacitors. During this time the actuator will respond to positioning commands, but will not power-fail until the capacitors are fully charged.

<table>
<thead>
<tr>
<th>Modulating Control</th>
<th>2-Position Control</th>
<th>Floating Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Modulating Diagram" /></td>
<td><img src="image" alt="2-Position Diagram" /></td>
<td><img src="image" alt="Floating Diagram" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0 to 10Vdc</th>
<th>2 to 10Vdc</th>
<th>0 to 20mA</th>
<th>4 to 20mA</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="0 to 10Vdc Diagram" /></td>
<td><img src="image" alt="2 to 10Vdc Diagram" /></td>
<td><img src="image" alt="0 to 20mA Diagram" /></td>
<td><img src="image" alt="4 to 20mA Diagram" /></td>
</tr>
</tbody>
</table>

Rotation Direction
Power Fail Direction
GNP19.... Only

![Rotation Direction Diagram](image)

Figure 5. Setting.

![Siemens Factory Default Setting](image)

Figure 6. Siemens Factory Default Setting.
Siemens FHC/LRC
Pulsed Control Signal

<table>
<thead>
<tr>
<th>Actuator Action</th>
<th>Wire 7 (Orange)</th>
<th>Wire 8 (Gray)</th>
<th>Wire 7 (Orange)</th>
<th>Wire 8 (Gray)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotate clockwise</td>
<td>24V</td>
<td>24V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotate counterclockwise</td>
<td></td>
<td></td>
<td>24V</td>
<td>24V</td>
</tr>
<tr>
<td>Hold position</td>
<td>24V</td>
<td>24V</td>
<td>24V</td>
<td></td>
</tr>
<tr>
<td>Hold position</td>
<td></td>
<td>24V</td>
<td></td>
<td>24V</td>
</tr>
</tbody>
</table>

Figure 7. Pulsed Control Signal.

CAUTION:
Unused wires must be properly terminated.

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.
The maximum rating for a Class 2 step-down transformer is 100 VA. Determine the supply transformer rating by summing the VA ratings of all actuators and all other components used. It is recommended that one transformer power no more than 10 actuators (or 80% of its VA).

WARNING:
Mixed switch operation is not permitted to the switching outputs of both auxiliary switches (A and B).
Either AC line voltage from the same phase must be applied to all six outputs of the dual auxiliary switches, or UL-Class 2 voltage (SELV for CE conformance) must be applied to all six outputs.

NOTE: With plenum cables only UL-Class 2 voltage (SELV for CE conformance) is permitted.
Wiring, Continued

**WARNING:**
Installations requiring CE Conformance:
- Except for the auxiliary switches (See Warning above) all wiring for 24 Vac/dc actuators must only be safety extra-low voltage (SELV) or protective extra-low voltage (PELV) per HD384.
- Use safety transformers per EN61558 with double isolation, designed for 100% duty-cycle for supplying SELV or PELV circuits.
- Over-current protection for supply lines is maximum 10A.

**Wire Designations**
Each wire has the standard symbol printed on it. See Table 2.

**Table 2. Wire Designations.**

<table>
<thead>
<tr>
<th>Connecting</th>
<th>Standard Symbol</th>
<th>Function</th>
<th>Color</th>
<th>Color Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Vac/dc Actuator</td>
<td>1</td>
<td>Supply</td>
<td>Red</td>
<td>RD</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Common</td>
<td>Black</td>
<td>BK</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>2-position control signal</td>
<td>Orange</td>
<td>OG</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Modulating: 0 (2) to 10 Vdc/0 (4) to 20 mA Floating: (CW) Control signal</td>
<td>Gray</td>
<td>GY</td>
</tr>
<tr>
<td>Auxiliary Switches</td>
<td>9</td>
<td>Feedback: 0 to 10 Vdc</td>
<td>Pink</td>
<td>PK</td>
</tr>
<tr>
<td></td>
<td>S1</td>
<td>Switch A Common</td>
<td>Gray/red</td>
<td>GYRD</td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>Switch A N.C.</td>
<td>Gray/blue</td>
<td>GYBU</td>
</tr>
<tr>
<td></td>
<td>S3</td>
<td>Switch A N.O.</td>
<td>Gray/pink</td>
<td>GYPK</td>
</tr>
<tr>
<td></td>
<td>S4</td>
<td>Switch B Common</td>
<td>Black/red</td>
<td>BKRD</td>
</tr>
<tr>
<td></td>
<td>S5</td>
<td>Switch B N.C.</td>
<td>Black/blue</td>
<td>BKBU</td>
</tr>
<tr>
<td></td>
<td>S6</td>
<td>Switch B N.O.</td>
<td>Black/pink</td>
<td>BKPK</td>
</tr>
</tbody>
</table>
Wiring Diagrams

CAUTION:
Unused wires must be properly terminated.

2-Position Control

NOTE: Two-position control requires three wires.

Floating Control

Modulating Control

Service

WARNING:
Do not open the actuator.
If the actuator is inoperative, replace the unit.
Troubleshooting

![WARNING:]

To avoid injury or loss of life, pay attention to any hazardous voltage (For example, 120 Vac) when performing checks.

- Check that the wires are connected correctly.
- Check that DIP switches are set correctly, if used.
- Use a Digital Multimeter (DMM) to verify that the operating voltage is within range.

If the actuator is not working, check the damper for blockage. If blocked, remove the obstacle and cycle the actuator power off and on. The actuator should resume normal operating mode.

Dimensions

**Figure 11. GNP/GAP Dimensions in Inches (Millimeters).**