

# PG-EG Actuator

## Hydraulic Powered Electric Actuator for Engine Control

### Application

The PG-EG Actuator is used on diesel engines to replace PGA/PGG/PGE-type governors, providing the advantages of electronic control with the convenience of the existing PG-type drive and linkage. We recommend the PG-EG Actuator for installations involving unattended starts.

The actuator does not need a separate oil supply.

The actuator operates with drive speeds from 200 to 1200 rpm. Applications with a high drive speed or high ambient temperatures may require an oil cooler.

### Description

The PG-EG Actuator converts a given electrical input signal into a proportional hydraulic output shaft position, to control engine fuel flow. The actuator provides the muscle for Woodward analog and digital controls.

The PG-EG Actuator is available with several servo options, giving a full range of work and torque output (see table on next page).

All current PG governor bases (designed to exactly fit any drive designed for a PGE locomotive governor, PGA or PGG governor) can be used with the PG-EG.

The proven PG pump and accumulator is reversible or may be set for one-way rotation (advised for generator applications).

The actuator uses standard PG output shafts and power levers. The PG-EG actuator will adapt to most engines being built today and is available for retrofit to most existing engines, in many cases without changes to linkage drive or other configurations.

Maintenance procedures are similar to those needed with a PG governor.

The actuator's electric-to-hydraulic transducer uses a Woodward-built torque motor which converts the 0–200 mA control signal to a given output position.

This actuator is available for use with either direct- or reverse-acting electronic controls. Direct-acting actuators will cause a shutdown if the electrical current to the actuator is lost or interrupted.

Direct- and reverse-acting units use the same hardware and can be re-calibrated from one into the other.

A 140  $\mu\text{m}$  wire-mesh filter is accessible from the outside of the PG-EG. The filter protects the small orifice in the pilot valve, which is an integral part of the electric actuator.



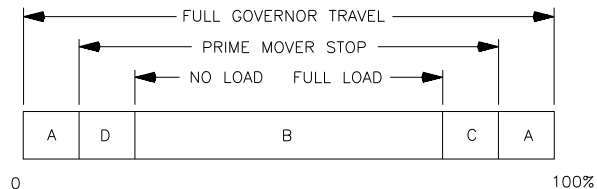
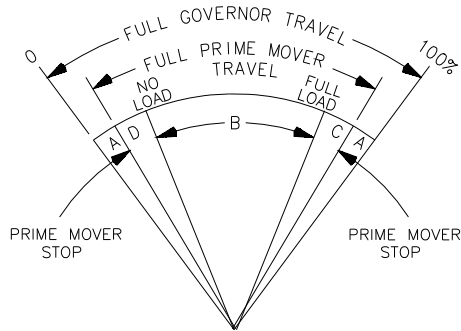
- Proportional electric/hydraulic actuator
- Rotary output
- Works with all Woodward 0–200 mA output electronic controls
- Self-contained oil supply
- Compliant with applicable CE Directives:  
—Machinery Directive

## Specifications

### Control Qualities

|                   |   |
|-------------------|---|
| Hysteresis        | Within 3% of maximum travel when measured over full travel. Within 0.5% of maximum travel when measured over 4% of full travel at 0.1 Hz. |
| Temperature Drift | Nominally $\pm 1$ degree per 38 °C (100 °F)   |
| Time Constant     | 65 to 85 ms for $\pm 50$ mA step with 1379 kPa (200 psi) actuator oil pressure and 80 SUS viscosity oil                                   |
| Linearity         | Within 2.5% of full travel  |

### Work Output



- A - OVERTRAVEL TO INSURE PRIME MOVER STOPS ARE REACHED.  
 B - NO LOAD TO FULL LOAD TRAVEL - NORMALLY 2/3 OF FULL GOVERNOR TRAVEL IS RECOMMENDED.  
 C - TRAVEL REQUIRED TO ACCELERATE THE PRIME MOVER.  
 D - TRAVEL REQUIRED TO DECELERATE OR SHUT DOWN PRIME MOVER.

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MAXIMUM WORK CAPACITY OVER FULL GOVERNOR TRAVEL OF 42° IS \* . SEE ABOVE FOR RECOMMENDED GOVERNOR OUTPUT TRAVEL. IN SPECIAL APPLICATIONS MIN AND MAX PRIME MOVER STOPS MAY BE OUTSIDE THE GOVERNOR STOPS.

| Type                                   | 12                      | 29                      | 58                      | 200                     | 300                     | 500                     |
|--|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| <b>Sump Capacity</b>                   | 1.4 liters<br>1.5 qt US | 1.4 liters<br>1.5 qt US | 1.4 liters<br>1.5 qt US | 6.2 liters<br>6.5 qt US | 6.2 liters<br>6.5 qt US | 6.6 liters<br>7.0 qt US |
| <b>Maximum Work Output</b>             | 16 J<br>12 ft-lb        | 39 J<br>29 ft-lb        | 79 J<br>58 ft-lb        | 237 J<br>175 ft-lb      | 422 J<br>311 ft-lb      | 648 J<br>478 ft-lb      |
| <b>Rotary Travel</b>                   | 30°                     | 30°                     | 30°                     | 42°                     | 42°                     | 42°                     |
| <b>Serrated Output Shaft Dimension</b> | 0.750-48                | 1.000-48                | 1.000-48                | 1.125-48                | 1.500-60                | 1.500-60                |
| <b>Weight</b>                          | 39-54 kg<br>85-120 lb   | 39-54 kg<br>85-120 lb   | 39-54 kg<br>85-120 lb   | 159 kg<br>350 lb        | 159 kg<br>350 lb        | 227 kg<br>500 lb        |
| <b>Maximum Drive Speed Range</b>       | 200-1200 rpm            | 200-1200 rpm            | 200-1200 rpm            | 200-1200 rpm            | 200-1200 rpm            | 200-1200 rpm            |
| <b>Recommended Drive Speed</b>         | 250-1000 rpm            | 250-1000 rpm            | 250-1000 rpm            | 400-1000 rpm            | 400-1000 rpm            | 400-1000 rpm            |
| <b>Internal Hydraulic Pressure</b>     | 690 kPa<br>100 psi      | 690 kPa<br>100 psi      | 1724 kPa<br>250 psi     | 1379 kPa<br>200 psi     | 2482 kPa<br>360 psi     | 1931 kPa<br>280 psi     |

All standard PG bases are available for PG-EG 12, 29, and 58 (see manual 36693, PG Base Assemblies).

**Construction** Base and power block are cast iron. Column is aluminum. Internal parts are case-hardened steel.

**Vibration Resistance** Random: 0.01 G<sup>2</sup>/Hz at 10 Hz, 0.1 G<sup>2</sup>/Hz at 100 Hz, 0.1 G<sup>2</sup>/Hz at 1000 Hz, 0.05 G<sup>2</sup>/Hz at 2000 Hz (12.8 Grms); 3 hours per axis.  
Woodward advises that PG-EG actuators be equipped with an oil spray to minimize the effects of vibration.

### Header Optional Features

**Booster Servomotor**

A booster servomotor may be used with the PG-EG to help the prime mover start quickly by moving the actuator output toward the maximum-fuel position at start-up.

**Governor Heat Exchanger**

A remote heat exchanger may be required to lower governor oil temperatures in applications where governor oil tends to exceed 93 °C (200 °F).

**Drive/Hydraulic Specifications**

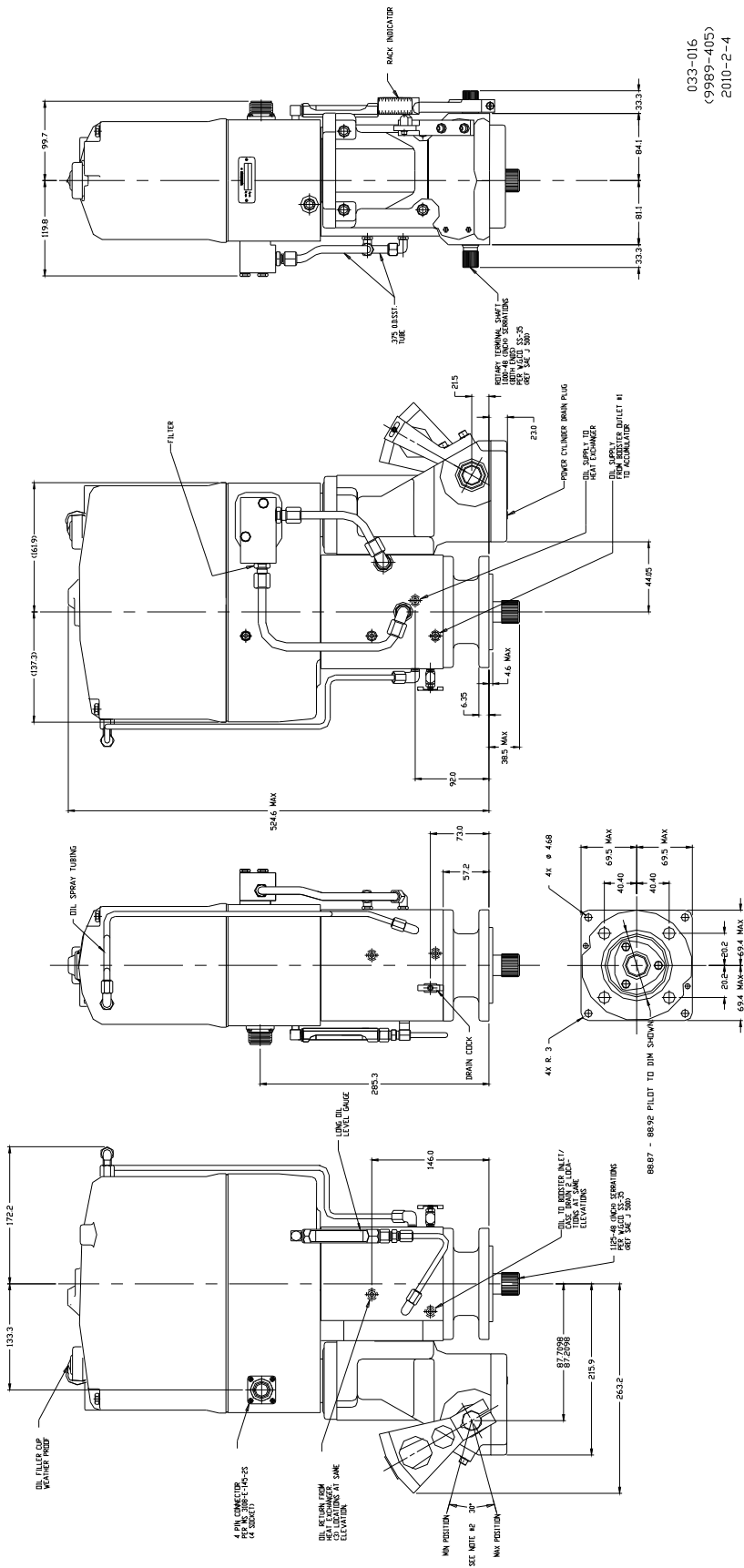
|                                  |  |
|----------------------------------|--|
| Drive Speed and Rotation         | 200 to 1200 rpm. Available with check valves or with plugs (for fixed CW or CCW operation). Woodward recommends the use of plugs for applications with drive speeds above 1000 rpm. <b>NOTE</b> —Drive power for different types of PG-EG actuators will vary depending upon speed, internal pump pressure, pump volumetric displacement, pump efficiency, and oil viscosity. Contact Woodward if further information is required. |
| Hydraulic Supply                 | Self-contained sump. See Woodward Manual 25071, Oils for Hydraulic Controls, for specific recommendations. In most cases, the same type and weight of oils used in the engine can be used in the governor.   |
| Ambient Temperature Range        | –29 to +93 °C (–20 to +200 °F)   |
| Operating Temperature            | –29 to +104 °C (–20 to +220 °F), within the limits of the oil being used in the governor.  |
| <b>Electrical Specifications</b> |  |
| Electrical Connector             | 4 pin connector per MS 3108E-14S-2S (4 socket), located in column.   |
| Coil Resistance                  | 23–26 $\Omega$ at 20 °C  |

Technical Manual 36637

***Regulatory Compliance*****Other European Compliance:**

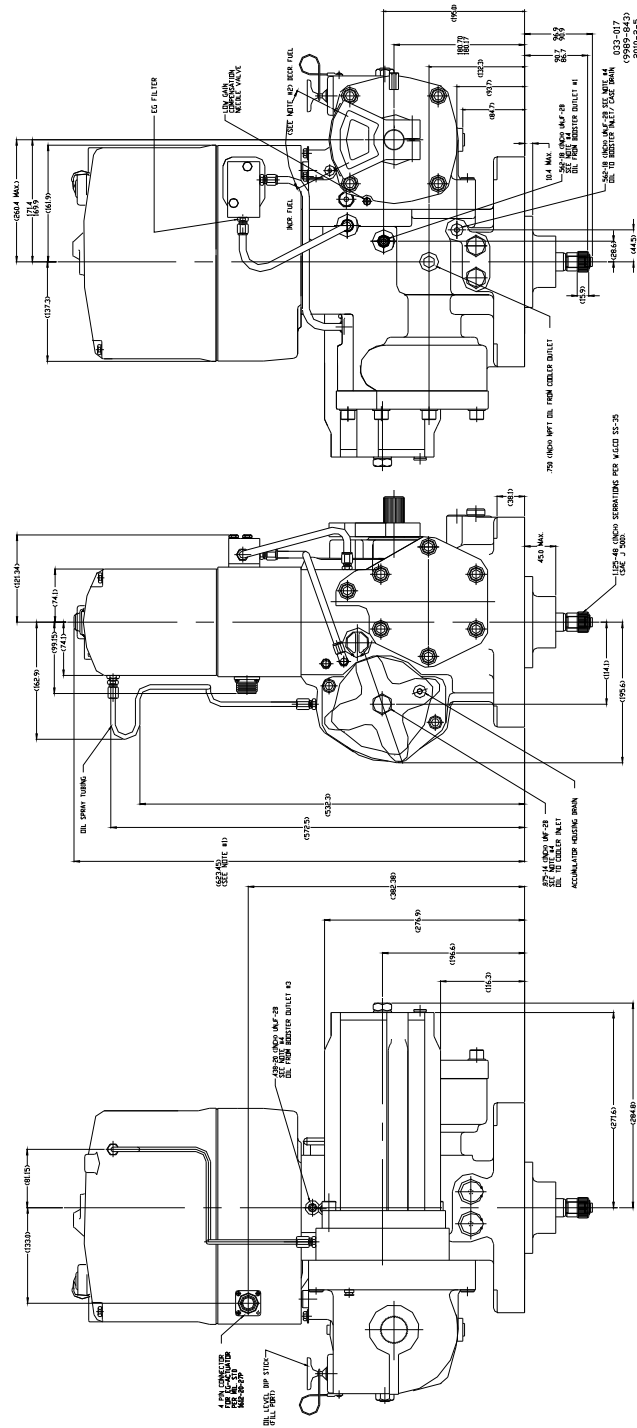
Compliance with the following European Directives or standards does not qualify this product for application of the CE Marking:

**Machinery Directive:** Compliant as partly completed machinery with Directive 2006/42/EC of the European Parliament and the Council of 17 May 2006 on machinery.



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**PG-EG 58 Actuator Outline Drawing (PG Base)**  
(Do not use for construction)



**PG-EG 200 Actuator Outline Drawing**  
(Do not use for construction)



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