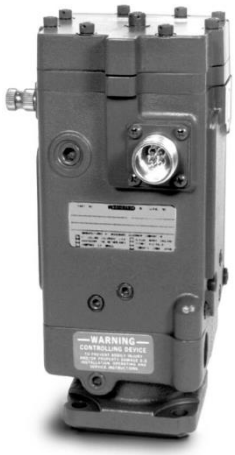
Product Specification **82516**
(Revision AA, 1/2019)

EG-3P/EG-6P/EG-10P

Proportional Actuators

Applications



The EG-3P/6P/10P (proportional) actuators are designed for use on diesel, gas and gasoline engines, or turbines. They are particularly well suited for use in control systems requiring a proportional mechanical output or a proportional electrical input.

Description

The EG-3P/6P/10P actuators convert an electrical signal to a proportional rotary output shaft position to control the flow of fuel or energy medium to a prime mover. These actuators are suitable for controlling diesel and gas engines or steam and industrial-commercial gas turbines driving alternators, dc generators, pumps, compressors, papermaking machines, or locomotives. A Woodward hydraulic amplifier can provide larger work capacities.

The actuator provides the “muscle” for a Woodward 2301A, 723, 723PLUS, or similar integrating electric control system. The actuator will provide a mechanical output position in proportion to a dc control signal increasing from a nominal minimum to a maximum value.

Standard Features

Critical moving parts are made from either case hardened, through hardened, or surface-nitrited steels. All O-rings and shaft seals are made of a fluoro-elastomer base. All moving parts are submerged in oil. The actuators may be mounted either vertically or horizontally.

Special Features

The actuators can be used for installations where prime movers operate in tandem to drive a common load. With two actuators connected in series, only one electric control is required to supply a common signal to each prime mover’s actuator. These actuators are also recommended for applications involving unattended starts.

Oil Pump Model
The actuator with an oil pump requires a drive from the prime mover or other means, such as an electric motor, to rotate the pilot-valve bushing and to power the pump gears to develop the required oil pressure. The actuator does not have its own oil sump.

Electric Motor Drive
An electric-motor drive which includes a self-contained sump is available for use with the EG-6P/10P. The motors are available in ac and dc configurations in most common voltages.

- Proportional electric mechanical transducer
- Rotary output
- 4.5, 6, or 10 ft-lb (6.1, 8.1, or 13.6 J) work capacity
- Oil motor or oil pump option
- EG-3P and EG-10P models are available with certification for North American Hazardous Locations
- EG-3P and EG-10P models are available that are compliant with the applicable CE Directives – ATEX, Pressure Equipment, and Machinery
- EG-10P models are available with certification from TIIS for use in explosive atmospheres in Japan and certification from KGS for use in explosive atmospheres in Korea

Oil Motor Model
An oil motor actuator requires a supply of 80 to 500 psi (552 to 3448 kPa) pressure oil from an external source to rotate the pilot valve bushing and to provide the required work. Work output and stalled torque of the oil motor model are in direct proportion to the supply pressure.

Compensation
Many EG actuators operate with oil supplied directly from the prime mover. Certain multi-viscosity motor oils require a compensation system within the actuator to provide needed stability. A needle valve is included in the compensation system to allow response adjustment.

Radiation Resistance
Radiation-resistant parts are available for special applications.

Position Feedback
A position feedback transducer (RVDT) is available to monitor output shaft position.

Note: Unless otherwise specified, these actuators are tested and shipped for vertical operation. When used in a horizontal application, these actuators will have an 8 degree shift in terminal shaft calibration.

References

Manual 82560	*EG-3P Actuator*
Manual 82566	*EG-6P/10P Actuator*
Manual 56102	*Hydraulic Amplifier (Elec. Controlled)*
Manual 25071	*Oils for Hydraulic Controls*

Regulatory Compliance

European Compliance for CE Marking:

These listings are limited only to those EG-3P or EG-10P units bearing the CE Marking.

ATEX Directive:	Declared to 94/9/EC Council Directive of 23 March 1994 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres. Zone 2, Category 3, Group IIG Ex nA IIC T3 Gc

Other European Compliance:

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

EMC Directive:	Not applicable to this product. Electromagnetically passive devices are excluded from the scope of the 2004/108/EC Directive
Machinery Directive:	Compliant as partly completed machinery with 2006/42/EC
Pressure Equipment Directive:	Compliant as “SEP” per Article 3.3 to 97/23/EC

Other International Compliance for EG-10P:

TIIS (EG-10P):	Certified for use in explosive atmospheres in Japan per TIIS Certificate Numbers TC18079 and TC18151 as Ex e II T3.
Korea (EG-10P):	Certified for use in explosive atmospheres in Korea per KGS Certificate Number 06-2-046-Q1 as Ex e II T3
IECEx (EG-3P):	Certified for use in hazardous locations IECEx TUR 13.0013X Ex nA IIC T3 Gc
IECEx (EG-10P):	Certified for use in hazardous locations IECEx LCIE 12.0001X Ex e IIC T4 Gb IP54

North American Compliance:

These listings are limited only to those units bearing the CSA or UL agency identification.

EG-3P:	CSA Certified for Class I, Division 2, Groups A, B, C, D, T4 for use in Canada and the United States and UL Listed for Class I, Division 2, Groups B, C, D, T4 for use in the United States
EG-10P:	CSA Certified for Class I, Division 1, Group D, and Division 2, Groups B, C, D, T3 for use in Canada and UL Listed for Class I, Division 1, Groups B, C, D and Division 2, Groups B, C, D, T3 for use in the United States
EG-10P with RVDT:	CSA Certified for Class I, Division 1, Group D and Division 2, Groups B, D, T3 for use in Canada and UL Listed for Class I, Division 1, Groups B, C, D and Division 2, Groups B, D, T3 for use in the United States
EG-10PS:	CSA Certified for Class I, Divisions 1 and 2, Group D, T3 for use in Canada and UL Listed for Class I, Divisions 1 and 2, Group D for use in the United States

Specifications

All Models

Output Shaft	0.375”-36 serrations (standard/EG-3P) both sides of the case; 0.500”-36 serrations (standard/EG-6P/10P) either side of the case. Special output shafts are available.
Angular Travel	42° nominal travel available with 28° travel from no load to full load at rated speed recommended
Calibration	2° to 3° off minimum shaft position at 20 mA. 36° ±3° additional travel at 160 mA
Temperature Drift	Nominally ±1° of output per 100 °F (56 °C)
Transducer Coil Resistance	Single Coil Units: 30 to 35 Ω at 20 °C (68 °F) Dual Coil Units: 14 to 16 Ω at 20 °C (68 °F)
Nominal Coil Input Current Range	20 to 160 mA for single or two actuators operating from one electric control
Electrical Connector	4-pin S2102-14S-2P. Hazardous location electrical connections are screw terminals in a conduit box.
Hydraulic Oil Supply Fluid	Hydrocarbon oil. Consult Woodward for recommended synthetic oils. If multi-viscosity oils are used, the compensated model is suggested.
Hydraulic Oil Viscosity	100 to 200 SUS at operating temperature recommended. 50 SUS minimum, 3000 SUS maximum (7.5 cSt to 650 cSt)
Oil Temperatures of Continuous Operation	140 to 200 °F (60 to 93 °C) depending on oil viscosity
Ambient Temperature Range	–20 to +200 °F (–29 to +93 °C). The primary temperature concern is for the hydraulic fluid properties in the actuator.
Case and Base Construction	Cast or ductile iron
Cover, Subcap, and Drain Adapter	Cast aluminum
Mounting Configuration	Vertical (or horizontal with proper adjustments; non-interchangeable)
Mounting Studs	Two 5/16” diameter (EG-3P); four 5/16” diameter (EG-6P/10P)

Oil Pump Models (EG-3P/10P)

Work Output	EG-3P—Maximum 4.5 ft-lb (6.1 J). Travel is 2/3 full travel for a work output of 3.0 ft-lb (4.1 J). Stalled torque rating is 6.2 lb-ft (8.4 N·m). EG-10P—Maximum 9.3 ft-lb (12.6 J). Travel is 2/3 full travel for a work output of 6.2 ft-lb (8.4 J). Stalled torque rating is 12.8 lb-ft (17.4 N·m).
Time Constant	0.08 second (EG-3P); 0.17 second (EG-10P)
Hydraulic Source	Engine lubricating system or a separate sump
Supply Pressure	EG-3P—1 ft (300 mm) of lift to a maximum of 100 psi (690 kPa) EG-10P—1 ft (300 mm) of lift to a maximum of 50 psi (345 kPa)
Flow	Peak demand of 2 US gal/min (7.6 L/min) during transients; steady-state flow of 0.5 US gal/min (1.9 L/min) with 250 SUS oil supply
Filter	20 to 25 µm (nominal)
Pump Capacity	92.7 cubic inches (1519 cm^3)/minute/1000 rpm
Pump Power Required	EG-3P—0.5 hp (373 W) at 1800 rpm recommended for motor drive EG-10P—0.18 hp (134 W) at 1000 rpm required for EG-10P. 0.5 hp (373 W) at 1000 rpm recommended for motor drive
Supply Inlet	0.250”-18 NPTF (2). Use one or supply through mounting surface
Drain	11/32” dia. base, must have free discharge. For horizontal mounting, use 0.250-18 NPTF in cover.
Weight	EG-3P—9.25 lb (4.2 kg) EG-10P—16.0 lb (7.3 kg)
Drive Rotation	Plugged for either clockwise or counterclockwise
Recommended Drive Speed	1500 to 4000 rpm
Drive Coupling	EG-3P—.562-6 spline extends 0.375” (9.5 mm) from mounting hub (standard) EG-10P—.562-6 spline extends 0.562” (14.3 mm) from mounting surface (standard)

Oil Motor (EG-3P/10P)

Work Output :

	Actuator Operating Oil Pressure		Recommended Output Maximum Work Output		Shaft Travel is 2/3 Full Travel for a Work Output of:	
EG-3P	400 psi	2758 kPa	4.5 ft-lb	6.1 J	3.0 ft-lb	4.1 J
	300 psi	2068 kPa	3.3 ft-lb	4.5 J	2.2 ft-lb	3.0 J
	200 psi	1379 kPa	2.2 ft-lb	3.0 J	1.4 ft-lb	1.9 J
	100 psi	690 kPa	1.1 ft-lb	1.5 J	0.7 ft-lb	0.9 J
EG-10P	400 psi	2758 kPa	9.3 ft-lb	12.6 J	6.2 ft-lb	8.4 J
	300 psi	2068 kPa	7.0 ft-lb	9.5 J	4.7 ft-lb	6.4 J
	200 psi	1379 kPa	4.6 ft-lb	6.2 J	3.1 ft-lb	4.2 J
	100 psi	690 kPa	2.3 ft-lb	3.1 J	1.5 ft-lb	2.0 J

Time Constant ..... EG-3P—$0.5P^{-1/2} + 0.0028P^{1/2}$ sec
EG-10P—$1.06P^{-1/2} + 0.0059P^{1/2}$ sec
where P=supply pressure in psig (1 psig=6.895 kPa)

Supply Pressures ..... 80 to 500 psi (552 to 3448 kPa). Pressures outside this range are not recommended.

Supply Flow ..... Peak demand of 4 US gal/min (15 L/min) during transients. Steady-state flow 1.4 US gal/min (5.3 L/min) maximum, depending on orifice size and operating pressure

Filter ..... 10 to 15 µm (nominal)

Pressure Inlet ..... 0.250”-18 NPTF to pilot valve

Orifice (to oil motor supply):

Supply Pressure (psi)	Supply Pressure (kPa)	Orifice Diameter (inch)	Orifice Diameter (mm)
80 to <100	552 to <690	0.076	1.9
100 to 175	690 to 1207	0.062	1.6
>175 to 300	>1207 to 2068	0.055	1.4
>300 to 500	>2068 to 3448	0.047	1.2

Drain ..... 0.75”-14 NPTF on drain adapter. Must have free discharge. For horizontal mounting, use 0.250”-18 NPTF in cover.

Weight ..... EG-3P—11 lb (5 kg)
EG-10P—17 lb (8 kg)

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