

TM-25LP and TM-200LP

Linear-Proportional Actuators

Application

The TM-25/200LP actuators provide 25 mm (1 inch) of linear movement of valves for steam or gas turbines.

Description

The TM-25LP and TM-200LP actuators are electric-hydraulic, proportional actuators for positioning steam and fuel-control valves requiring low/high force linear inputs.

Factory setting determines if the actuator output shaft extends or retracts on increasing current.

Features

The actuators have aluminum cases and through-hardened stainless-steel internal parts.

A 40 μ m low-capacity screen is provided in the supply inlet fitting to protect the torque motor servovalve in case of failure of the external filter.

The units will operate with either centrifugal or fixed-displacement type pumps providing hydraulic pressure.

The actuators are calibrated at the factory for bias in the minimum-fuel direction in event of the loss of input current.

A dual-coil torque motor is optional for redundancy. The dual-coil actuator has an optional position-feedback transducer.

For more information, refer to Woodward Manual 82450.

Specifications

Output Shaft

Hardened 17-4 stainless steel 0.625-inch (15.88 mm) round, with one-inch square (645 mm²) 17-4 stainless steel rod end attached by 0.375-inch (9.52 mm)/24-threads/inch threads. Optional rod end features 0.625-inch (15.88 mm) slot with 0.500-inch (12.70 mm) hole to pin linkage to valve. Other designs are available.

Work Capacity

TM-25LP	72 J (53 ft-lb) at 2586 kPa (375 psig)
TM-200LP	231 J (170 ft-lb) at 8274 kPa (1200 psig)

Output Force

TM-25LP	2833 N (637 lb) maximum at 2586 kPa (375 psig) in either direction
TM-200LP	9074 N (2040 lb) maximum at 8274 kPa (1200 psig) in either direction

Response Time Constant (25% to 75% step)

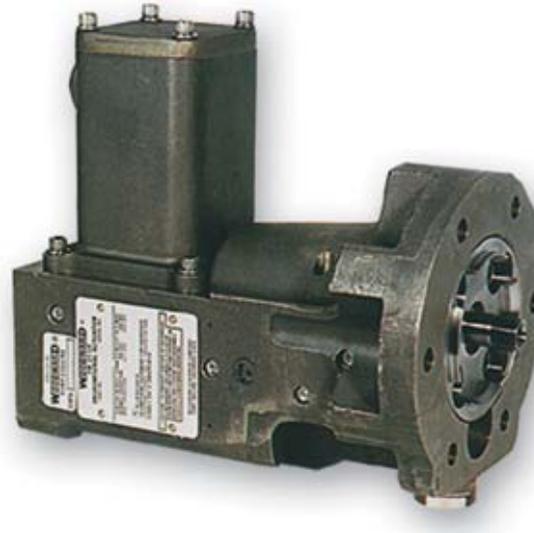
TM-25LP	0.065 second at 1724 kPa (250 psi)
	0.150 second at 690 kPa (100 psi)
TM-200LP	0.045 second at 6895 kPa (1000 psi)

Hysteresis

TM-25LP	±1% of travel
TM-200LP	±1% of travel

Side Load

TM-25LP	222 N (50 lb) maximum
TM-200LP	222 N (50 lb) maximum



- Proportional electric-hydraulic
- 25 mm (1 inch) linear output
- Maximum work ratings from 72 to 231 J (53 to 170 ft-lb)
- Corrosion resistant construction
- Models are available with certification for Canada Hazardous Locations
- Models are available with listings for United States Hazardous Locations
- Models are available compliant with the applicable CE Directives — ATEX, Pressure Equipment, Machinery
- Models are available with TIIS and Korea-KC certification for use in hazardous locations

HYDRAULIC SUPPLY REQUIREMENTS

Fluid Types

Mineral or synthetic based oils, diesel fuels, kerosenes, gasolines, or light distillate fuels.

Specific Gravity

0.6 to 1.0

Recommended Viscosity

0.6 to 400 centistokes; 150–200 SSU; ISO 32 grade

External Filtration Required

10 µm nominal, 25 µm absolute

Hydraulic Cleanliness Level

ISO 4406 20/18/15 minimum

Woodward recommends adequate dither be used on all hydraulic actuators to minimize mA threshold and hysteresis which can result from second stage static friction or hydraulic contamination.

Dither is a low amplitude, relatively high frequency periodic signal that is superimposed on the servovalve input current signal. A typical dither signal generated by a Woodward control is:

25 Hz, 0–10 mA (tunable) amplitude
25% duty cycle, bipolar, square wave

Adequate dither is defined as that amount which produces no more than 0.0005 inch (0.013 mm) total oscillation in output shaft position.

Supply Pressure

TM-25LP 552–2586 kPa (80–375 psig)
TM-200LP 2758–8274 kPa (400–1200 psig)

Minimum Supply Flow (Steady State)

TM-25LP 3.8 L/min (1.0 US gal/min)
TM-200LP 3.8 L/min (1.0 US gal/min)

Maximum Supply Flow (Transient)

TM-25LP 18.9 L/min (5.0 US gal/min)
TM-200LP 18.9 L/min (5.0 US gal/min)

HYDRAULIC TEMPERATURE REQUIREMENTS

Ambient Temperature Range

–40 to +93 °C (–40 to +199 °F)

Hydraulic Fluid Temperature Range

16 to 79 °C (60 to 175 °F)

ELECTRICAL CHARACTERISTICS

(For both TM-25LP and TM-200LP)

Input Current Range

20 to 200 mA

Null current shifts of up to ±4% of maximum rated current (200 mA) can occur due to variations in the following parameters: hydraulic supply and return pressures, hydraulic fluid temperature servovalve, and actuator wear.

Due to the inherent null shifts and position drift of all hydraulic servovalves and proportional actuators, engine control applications must be designed with these errors in mind.

Coil Resistance (at 21 °C / 70 °F)

26 Ω (single-coil)
40 Ω (dual-coil)

Maximum Coil Current

460 mA TM-25LP dual coil
250 mA TM-25LP single coil
250 mA TM-200LP

Position Feedback Transducer

Optional on dual-coil models only

CONNECTIONS

2-wire connection in 0.500-inch/14-TPI rigid conduit connector; 2x 18 AWG (0.8 mm²) wires extend approximately 91 cm (36 inches)

0.750-inch/16 TPI Hydraulic Supply connection
UNJF-3A (-08) (MS 33656)

0.875-inch/14 TPI Hydraulic Drain connection
UNJF-3A (-10) (MS 33656)

MOUNTING

The attitude of installation does not affect the performance of the actuator.

Six-inch (152 mm) mounting flange with 2.938-inch (74.62 mm) hub contains six 0.438-inch (11.13 mm) bolt holes on 4.875-inch (123.82 mm) bolt circle; flange is approximately 0.625-inch (15.88 mm) thick.

TERMINAL SHAFT OPTIONS

TM actuators are available with either internal (female) 0.375-24 UNF threads or external (male) 0.375-24 threads. A clevis-type rod end can also be purchased and installed on the external threads.

MASS / WEIGHT

9 kg (20 lb), approximate dry weight

REGULATORY COMPLIANCE

European Compliance for CE Marking:

These listings are limited only to those TM-25LP units bearing the CE Marking.

ATEX – Potentially Explosive Atmospheres 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.

TM-25LP Single Coil: LCIE 12 ATEX 3022 X; Zone 1, Category 2, Group II, Ex e IIC T4 Gb IP54

TM-25LP Dual Coil: Zone 2, Category 3, Group II, Ex nA IIC T4 Gc IP54; LCIE 12 ATEX 3064 X; Zone 1, Category 2, Group II, Ex d IIB T4 Gb c IIB T4 IP54

Note: Special conditions for safe use are provided in manual 82450.

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 of the European Parliament and the Council of 17 May 2006 on machinery.

Pressure Equipment Directive: Compliant as “SEP” per Article 3.3 to Pressure Equipment Directive 97/23/EC of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment.

Other International Compliance:

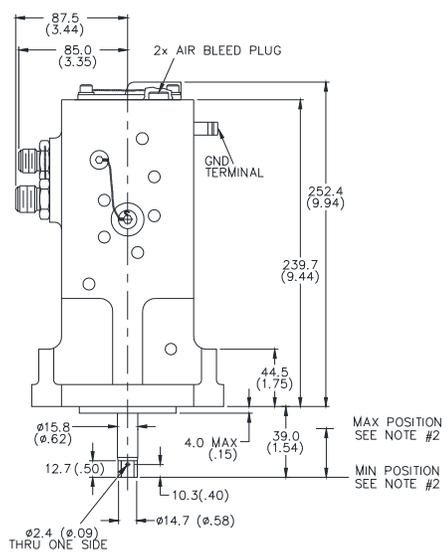
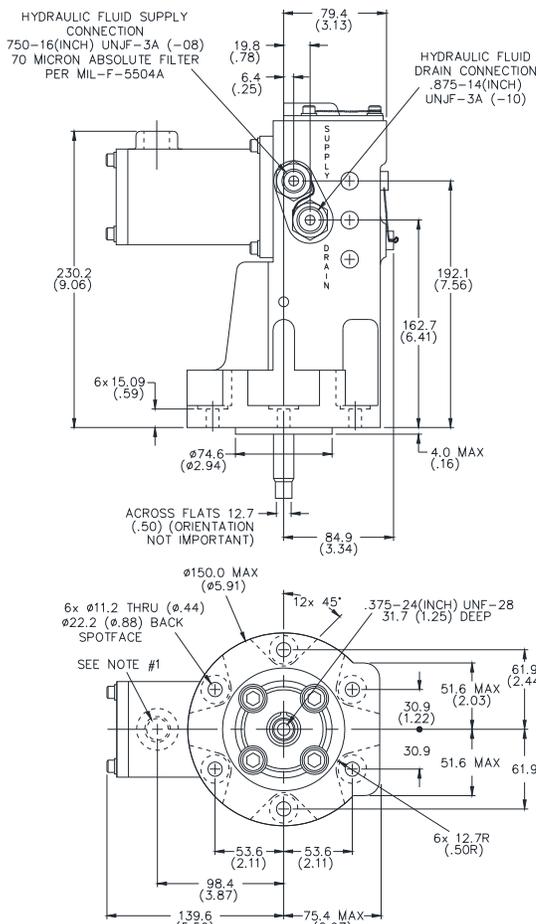
TIIS: The TM-25LP Single Coil Actuator is certified for use in Japanese hazardous locations per TIIS Certificate TC17927 as Ex e II T3 (155 °C).

KC Korea: Certified for use in explosive atmospheres per KTL Certificate 14-KB4BO-0390X as Ex e IIC T4

IECEX: TM-25LP Single Coil: LCI 12.0010X Ex e IIC T4 Gb IP54
TM-25LP Dual Coil: LCI 12.0011X Ex nA IIC T4 Gc IP54;
Ex d IIB T4 Gb IP54

North American Compliance: These listings are limited only to those units bearing the CSA agency identification.

CSA: CSA Certified for use in the United States and Canada Single and dual coil actuators certified for Class I, Division 2, Groups A, B, C, & D
Dual coil actuators certified for Class I, Division 1, Groups C & D

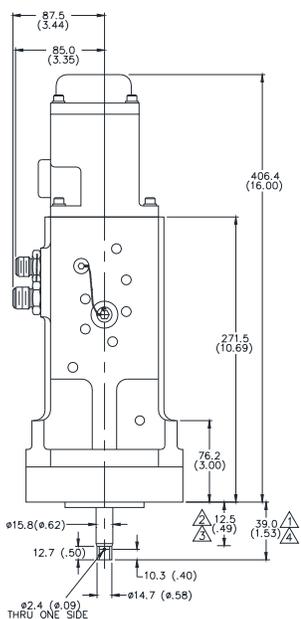
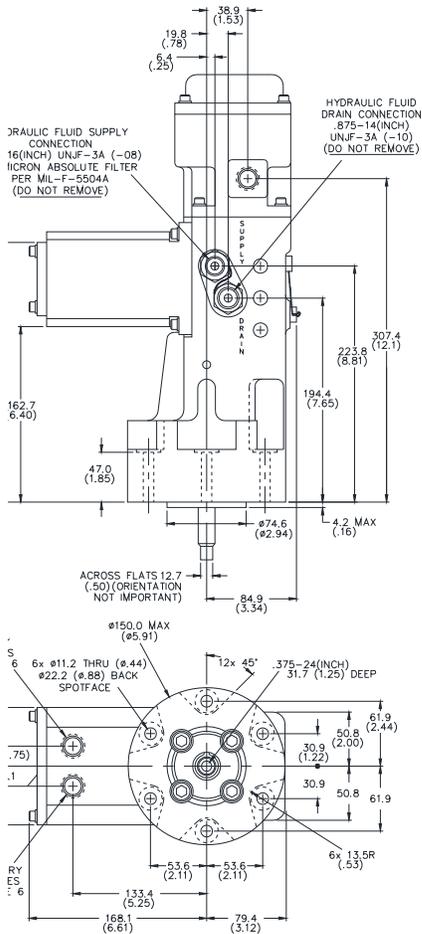


- NOTES:
- 0.500-14 (INCH) NPTF RIGID CONDUIT CONNECTION. ACTUATOR ELECTRIC INPUT SIGNAL, 18 AWG WIRE (2) EXTENDS APPROX 914 MM FROM OPENING.
 - 25 MM STROKE AVAILABLE. RECOMMENDED STROKE BETWEEN NO LOAD AND FULL LOAD IS 17.
 - PISTON RETRACTS TOWARD MAX POSITION WITH CURRENT INCREASE.
 - INCHES SHOWN IN PARENTHESIS.
 - SEE REGULATORY COMPLIANCE SECTION FOR LISTINGS.

METRIC

824-040E
2012-2-16

Outline Drawing of Single Coil TM-25/200LP Actuator (Do not use for construction)

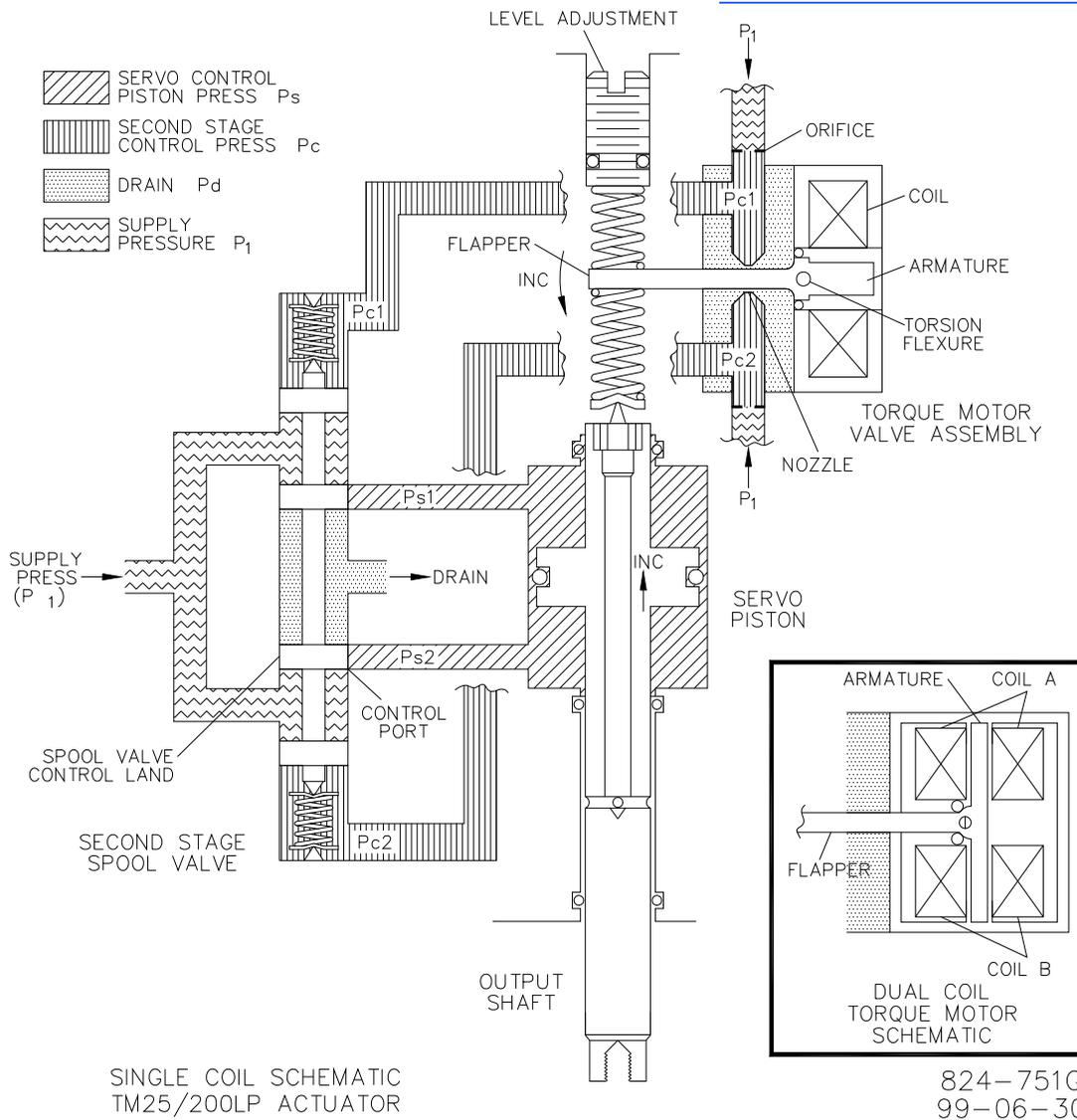


- NOTES:
- ▲ MIN CURRENT POSITION FOR RETRACTING TYPE ACTUATOR.
 - ▲ MIN CURRENT POSITION FOR EXTENDING TYPE ACTUATOR.
 - ▲ MAXIMUM CURRENT POSITION FOR RETRACT TYPE. 26.57 (NOM) STROKE AVAILABLE.
 - ▲ MAXIMUM CURRENT POSITION FOR EXTEND TYPE. 26.57 (NOM) STROKE AVAILABLE.
- ACTUATOR INPUT SIGNAL, .500-14(INCH) NPTF ELECTRICAL CONDUIT CONNECTION. 4x 18 AWG WIRE. 4x WIRE EXTENDS APPROX 3048 MM FROM EACH OPENING.
 - ACTUATOR POSITION TRANSDUCER SIGNAL, .500-14(INCH) NPTF ELECTRICAL CONDUIT CONNECTION. 5x 18 AWG WIRE. 5x WIRE EXTENDS APPROX 3048 MM FROM EACH OPENING.
 - INCHES SHOWN IN PARENTHESIS.
 - SEE REGULATORY COMPLIANCE SECTION FOR LISTINGS.

METRIC

824-753
2012-4-4

Outline Drawing of Dual Coil TM-25/200LP Actuator (Do not use for construction)



Single/Dual Coil Schematic TM-25/200LP Actuator

A change in control signal to the torque motor results in a proportional change in terminal shaft position as follows: In the actuator, the torque motor servovalve is energized by the electronic control to generate a hydraulic pressure differential which is applied to the ends of the second stage spool valve. Hydraulic supply pressure to the servo piston is controlled by the second stage spool valve to move the double-acting piston and provide terminal shaft movement. Internal mechanical feedback re-centers the torque motor flapper which equalizes pressure across the second stage spool valve and stops terminal shaft movement.



PO Box 1519, Fort Collins CO, USA 80522-1519
1000 East Drake Road, Fort Collins CO 80525
Tel.: +1 (970) 482-5811 • Fax: +1 (970) 498-3058
www.woodward.com

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