

Glo-Tech II™ System

Hot Valve with R-Series Electric Actuator



Applications

Woodward's Glo-Tech II™ hot valve/actuator system provides precise control of high-temperature gases in an on-engine environment. The Glo-Tech II includes a high-temperature butterfly-type rotary valve controlled by an electric actuator designed for use in reciprocating engine applications. These applications may include wastegates, exhaust gas recirculation (EGR), compressor recirculation (bypass), waste heat recovery (WHR), and exhaust throttles.

Description

The Glo-Tech II hot valve system is a high-temperature butterfly valve mated with a high performance electric actuator that is used to regulate high-temperature gases in turbocharged reciprocating engines. The valve is designed to be positioned by an R-Series electric rotary actuator through an anti-backlash coupling capable of tolerating misalignment. Valve sizes range from 40 mm to 150 mm and are constructed using high-temperature materials that allow continuous gas temperatures between 400 °C and 650 °C. Two basic valve configurations are available: a swing-through, non-contacting version and a sharp-edge contacting version with improved closed flow leakage capability.

The R-Series actuator accepts a variety of position demand types from another controlling device to position the valve. The actuator's output shaft is moved to correspond with the requested position and internal electronic feedback assures that the output shaft precisely follows the requested position. These actuators accept either a (4 to 20) mA, (0 to 200) mA, CAN, or PWM (pulse width modulated) command signal while providing a 4 to 20 mA or CAN output shaft position signal. External devices can use these signals as direct feedback of the output shaft's position. A single discrete output and CAN messages can be used to indicate fault conditions within the actuator. A key-switch input safely powers down the internal control module and motor while keeping the unit connected to the system's power source. An access plate allows electrical connections to be made directly to the control module in the actuator housing, and all wiring is routed through gland nuts to maintain an ingress protection rating of IP67. The actuators are able to operate over a temperature range of -40 °C to +105 °C, with an additional option of external liquid cooling modules that can extend the T_{amb} range to 165 °C.

Refer to the Glo-Tech II manual (26913) for more detailed information.

Diesel and gas engine exhaust applications

Valve

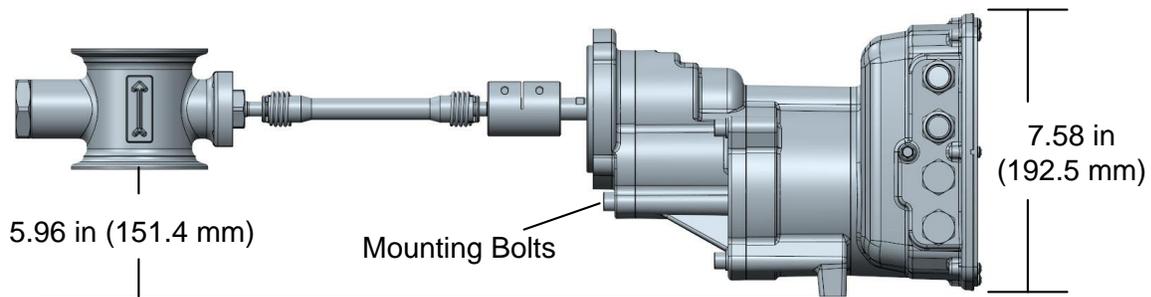
- 650 °C max gas temp
- Differential pressure to 5 bar depending on valve size.
- 40 mm to 150 mm valve size range
- Low-leak, contacting valve configurations available
- Decades of "hot valve" experience

Actuator

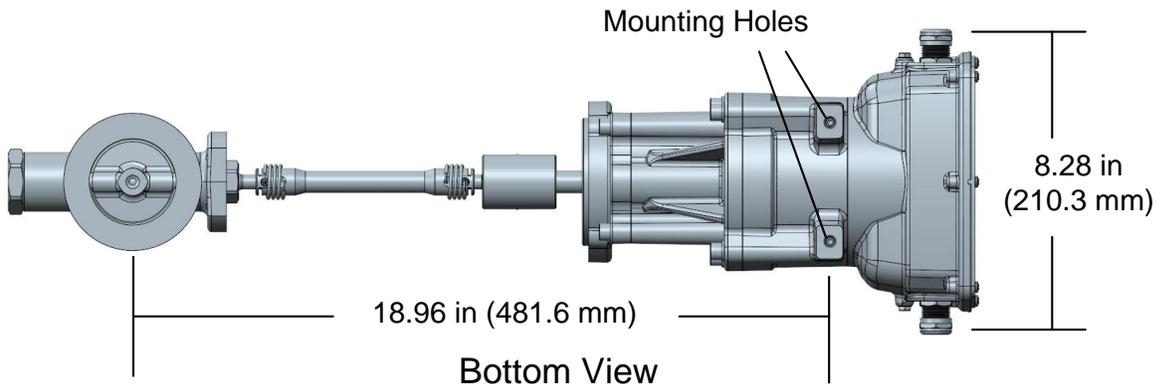
- High-torque, low-current electric actuator
- High-resolution valve positioning
- Robust control capability maintains precise, stable control over a wide friction range
- -40 °C to +105 °C actuator operating range
- Accurate, non-contacting, position sensing
- Custom cabling options

Installation

All input and output signals run through two M20 threaded ports, using cable glands as needed to maintain the Class I, Division 2, ATEX Zone 2, IP67 and Type 4 enclosure rainproof. Field wiring is connected to internal screw-less cage-clamp-style terminal blocks.



Side View



Example Outline Drawing for the 60 mm Valve Configuration
(Do not use for construction)

Valve size, valve drive distance, and standoff bracket configuration depend on specific application requirements.

Regulatory Compliance

Actuator:

European Compliance for CE Mark: EMC, ATEX Zone 2

Other European Compliance: Compliance as partly completed machinery to Directive 2006/42/EC

Agency Listings:

- Designed to CSA standards for ordinary locations
- Designed to CSA Class I, Division 2 and AEx Zone 2 component listing

Integrated Valve:

Other European Compliance:

- Compliance as partly completed machinery to Directive 2006/42/EC.
- The parameters of this device put it into the SEP area of the PED.

Specifications

Valve

Inlet Pressure (max)	5 bar (72.5 psig)	
Pressure Differential (max)	Valve Size (mm)	Max dp @ 650 °C (bar)
	40-60	5.0
	80	3.5
	125	4.0
	150	TBD
Misalignment between valve and actuator (max)	2° maximum in any direction between valve and actuator axis	

Actuator Inputs and Outputs

Power Input	18–32 Vdc with out-of-range diagnostics, 24 W continuous, 89 W max
Electrical Current	1.0 A continuous, 3.7 A transient
Torque Output	R-11 = 11 Nm Transient (2 s max), 5.5 Nm Steady state R-30 = 30 Nm Transient (2 s max), 15 Nm Steady state R-120 = 120 Nm Transient (2 s max), 60 Nm Steady state
Command Input	PWM: (8.4 to 32) V, (100 to 3000) Hz (accepts push-pull and high-side or low-side open collector) Analog: (0 to 200) mA, (4 to 20) mA CAN
Output Shaft Rotation	R-11, R-30: 73° ±2° R-120: 90° ± 2°
Position Feedback Output	(4 to 20) mA corresponding to (0 to 100) % travel
Discrete Input	Key-switch low power standby mode. Applying input power to the key-switch input activates the actuator, making it ready to position in less than 300 ms. Removing the key-switch input power safely shuts down the actuator, and its power draw is less than 2 mA.
Discrete Output	Normally “ON” and turns “OFF” to indicate a detected fault (high-side or low-side drive – factory configured)

Performance

Accuracy	±1.36 % over the full rotational travel and temperature range + input signal error
Max Slew Time (10% to 90% travel)	R-11 < 75 ms R-30 < 105 ms R-120 < 600 ms
Small Signal Bandwidth	6 Hz (minimum)
Repeatability	≤1.0 % of full stroke at 25 °C
Gearbox Backlash	< 0.5 degrees

Environmental

Gas Inlet Temperature	(–40 to +650) °C / (–40 to +1202 °F) valve only
Ambient Temperature	(–40 to +105) °C / (–22 to +221 °F) entire assembly, with the external cooling option this can be extended to 165 °C (329 °F) under specific conditions
Storage Temperature	(–40 to +125) °C, unpowered, entire assembly
Mechanical Vibration	US MIL-STD-202F, procedure 214A: TC(F), SAE J1455 Engine Data 0.3 G ² /Hz Random, 10 Hz to 2000 Hz, 3 hours/axis, 22.1 Grms
Mechanical Shock	40 G peak, 11 ms duration, saw-tooth pulse (test derived from US MIL-STD 810C, M516.5, Procedure 1)
Ingress Protection	IP67 per IEC 60529, Type 4 enclosure
Humidity	95 % Relative Humidity—12 hours at 60 °C and 7 hours at 25 °C with 5 hours of transition for 5 complete cycles
Chemical Resistance	The actuator uses materials proven capable of withstanding normal engine environment chemicals per SAE J1455, such as diesel fuel, engine oil, and antifreeze.



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