

3103 Gas Valve

with TM-55P Actuator

Applications

The 3103/TM-55P gas valve actuator combines our state of the art electrohydraulic technology with our proven mechanical hardware.

The 3103 is designed to operate with sour gas (high sulfur content gas) that can cause problems for other gas valves. The 3103 provides a high level of accuracy, and its excellent open-loop positioning characteristics provide consistent valve positions from lite-off to full load.

It employs a self-cleaning feature that ensures rapid and accurate response to any position changes required by the electronic control.

Use of the TM-55P hydraulic actuator improves overall performance by providing a generous amount of torque. This provides stable control of the gas turbine and allows the gas valve to overcome friction caused by gas contaminant buildup.

Description

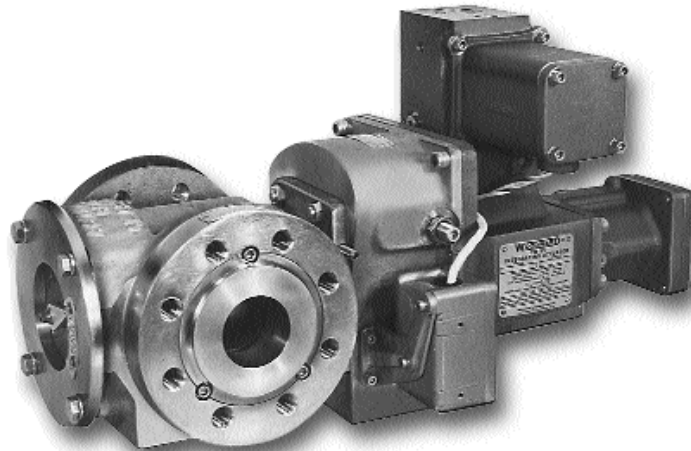
The 3103 gas valve is integrally mounted with an adapter to a TM-55P Actuator receiving electric positioning signal from an electronic control. The valve/actuator is designed for use with all Woodward electronic controls to control industrial applications of gas turbines.

The TM-55P is an electrohydraulic, proportional actuator which converts electric control input to angular shaft output for positioning the rotary fuel metering sleeve of the valve. The essential element of the actuator is a torque motor servovalve which generates a differential pressure applied to both ends of, and to operate, the second-stage spool valve. Input current to the torque motor gives proportional displacement of the spool valve and subsequent proportional movement of the servo piston.

The 3103 gas valve is a rotary sleeve-and-shoe type throttling valve capable of metering 23 to 18 144 kg/h (50 to 40 000 lb/h). Metering port area is determined by input shaft positioning from the actuator. Various metering port configurations of up to 1290 mm² (2.0 in²) are available.

Features

The 3103 valve is constructed of stainless steel with through-hardened stainless steel internal parts. Its design incorporates an inlet guide tube to minimize contaminant accumulation in the valve housing. Sleeve support bearings are positively sealed from the gas. A valve angle indicator is furnished on the valve.



- Optional porting configurations
- Contaminant resistance
- Internal mechanical feedback
- Optional electrical position transducer
- Dry coil torque motor
- Redundant coil options
- Integral part of the total turbine control system
- UL and CSA Approved

The TM-55P actuator has an anodized aluminum case. Internal parts are through-hardened stainless steel. Hydraulic fluid is sealed from the torque motor by a preformed packing ring between the armature and servovalve housing to eliminate pickup of contaminants from the fluid. Additionally, the supply pressure inlet contains a 40 µm filter fitting. Internal mechanical feedback is standard in the TM-55P for good open loop accuracy. An optional electrical

position transducer for accurate position indication can be installed at assembly. The actuator is factory adjusted for bias in the minimum fuel direction in the event of a loss of supply pressure or input current.

The adapter housing provides adjustable maximum and minimum flow stops and an adjustable minimum position indicator switch. The switch can provide normally open, normally closed operation, or connections for both.

3103 Gas Valve Specifications

Supply Characteristics

Contaminants	Solid particles <10 µm diameter 30 ppm by volume maximum >10 µm diameter 0.3 ppm by volume maximum
Metered Fuel Types	Natural, propane and methane service
Specific Gravity	0.5 to 1.05
Temperature	–40 to +149 °C (–40 to +300 °F) –29 to +149 °C (–20 to +300 °F) (restriction for CE Marking)

Gas Flow Requirements

Inlet Pressure	6206 kPa (900 psia) maximum 4964 kPa (720 psia) maximum (restriction for CE Marking)
Pressure Differential	172 to 6206 kPa (25 to 900 psi)
Gas Flow Range	23 to 18 144 kg/h (50 to 40 000 lb/h) (0.6 sp gr) maximum flow capacity is dependent upon available gas conditions
Accuracy	±5% of point, or ±0.25% of maximum flow, whichever is larger ±2% of point at stops

TM-55P Actuator Specifications

Fluid Types	Mineral or synthetic based oils, diesel fuels, kerosenes, gasolines, or light distillate fuels
Specific Gravity	0.6 to 1.0
Recommended Viscosity	6.0 to 400 centistokes 150 – 200 SSU ISO 32 Grade
Supply Pressure	Any nominal level between 2758 and 8274 kPa (400 to 1200 psig) Supply may be from positive displacement or centrifugal type pumps
Supply Filter	40 µm (nominal)
External Filtration Required	10 µm (nominal)
Hydraulic Cleanliness Level	ISO 4406 20/18/15 minimum
Return Pressure	690 kPa (100 psi) maximum
Operating Temperature	–40 to +121 °C (–40 to +250 °F)
Flow Requirements	Woodward recommends the use of a pressure switch to make sure that correct supply pressure to the actuator is established prior to start-up and continually thereafter.

	Supply Pressure		Steady State Flow		Maximum Transient	
	psig	kPa	gal(US)/min	L/min	gal(US)/min	L/min
Single Coil	400	2758	0.3	1.1	2.5	9.5
	1000	6895	0.5	1.9	2.7	10.2
Dual Coil	400	2758	0.5	1.9	2.7	10.2
	1000	6895	0.8	3.0	3.0	11.4

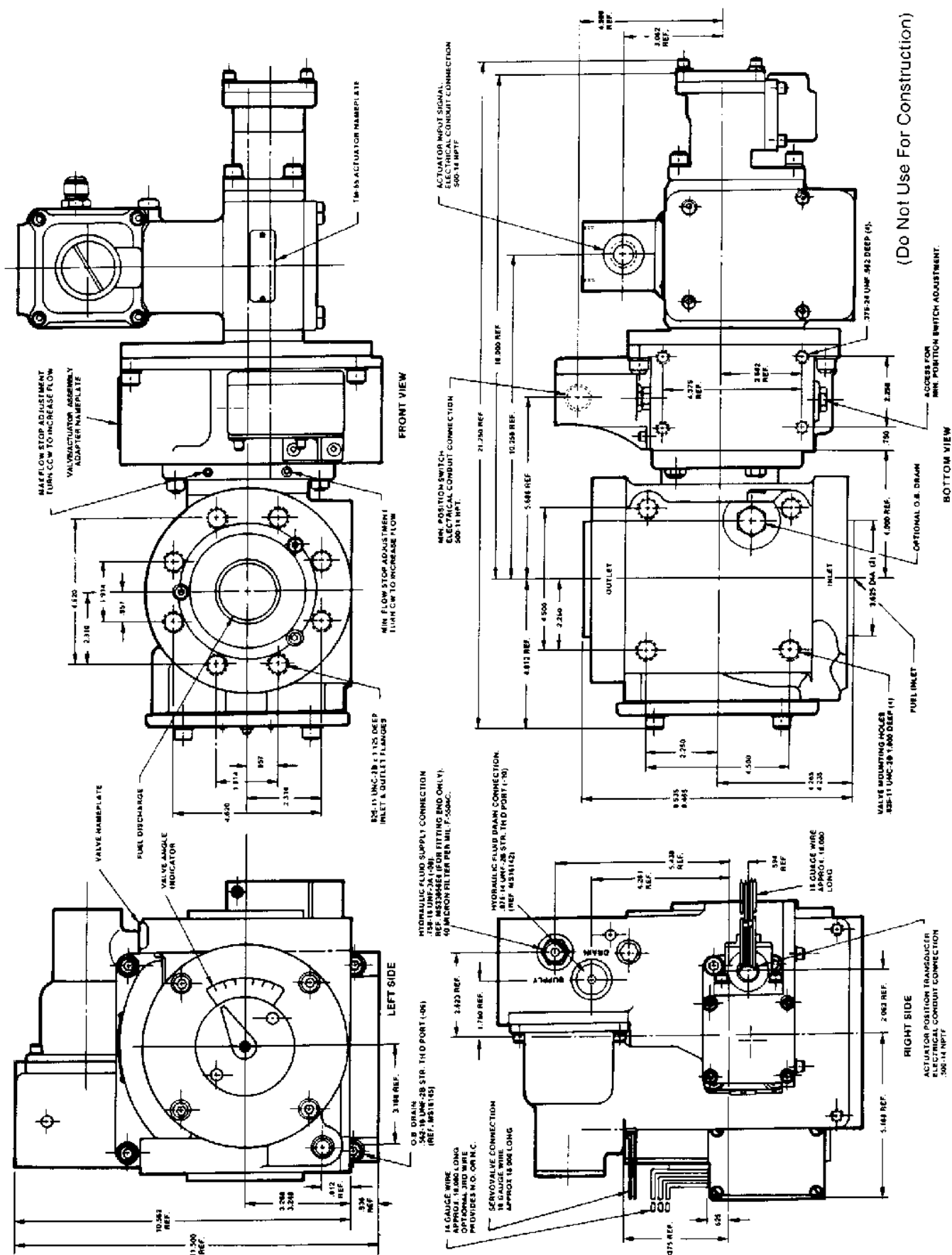
Control Input Requirements

The valve/actuator is designed for use with all Woodward electronic controls.

Standard Input Signal	0.020 to 0.200 A coil current from 0° to 45° stroke
Coil Resistance	Single—26 Ω @ 20 °C (68 °F) Dual—40 Ω @ 20 °C (68 °F)

Electrical Position Transducer (options)

RVDT accurate to ±0.16° linearity
Linear synchro transmitter accurate to ±0.35° linearity
Potentiometer accurate to ±1.0 over 60° range



Outline Drawing of 3103 Gas Valve with TM-55P Actuator
(Do not use for construction)

3103 Valve / TM-55P Actuator Specifications

Construction

Weight	100 lbs (45.36 Kg)
Mounting Attitude	No restrictions

Adjustments

Level Adjustment	Provides the actuator with bias on position versus input signal
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Null current shifts of up to $\pm 4\%$ 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.

Maximum, Minimum Flow Stop Adjustments	Furnished on the adapter housing
Adjustable Minimum Position Indicator Switch	Furnished on the adapter housing

Valve/Actuator Control Qualities

Hysteresis	2.0%
Repeatability	2.0%
Threshold	Less than 0.25% of maximum input current (200mA)

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 0.013 mm (0.0005 inch) total oscillation in output shaft position.



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