

GTD-Series

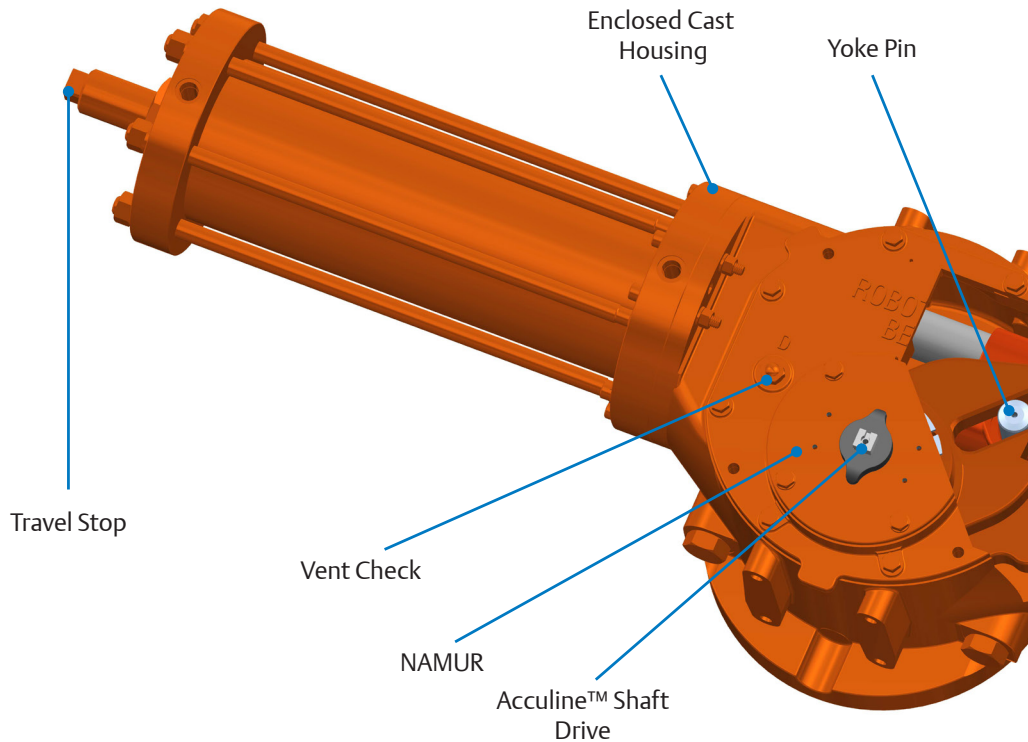
Direct Gas Actuators



BETTIS™


EMERSON™

GTD-Series Direct Gas Actuators



For more than 50 years Bettis™ and Shafer™ brand actuators have been supplied to the natural gas industry for demanding and critical applications associated with high pressure service. These two world class leaders have drawn upon their experience to produce a high-pressure direct gas actuator while preserving decades of field proven reliability.

Features and Benefits

Enclosed Cast Housing

Heavy duty cast ductile iron housing resists warping or twisting under heavy loads and during wide temperature swings. The cast housing is more stable than fabricated plate housings, minimizing the possibility of stem and component misalignment. Rugged cast accessory mounting pads (not tack welded or bolted-on) provide a safe, consistent and maintenance friendly automation package.

Corrosion Resistance

GTD-Series actuators use rugged Xylan™ coating, combining PTFE and organic polymers for excellent corrosion protection. The PTFE component also provides low coefficients of friction. Xylan™ bonds so effectively to the chemically prepared cylinder surface that, unlike nickel, chrome and most metallic platings, cracking and flaking are virtually eliminated.

Water Ingress Protection

GTD-Series actuators meet IP67M specifications for severe high pressure deluge test, offering both superior water ingress and internal corrosion protection.

Acculine™ Shaft Drive

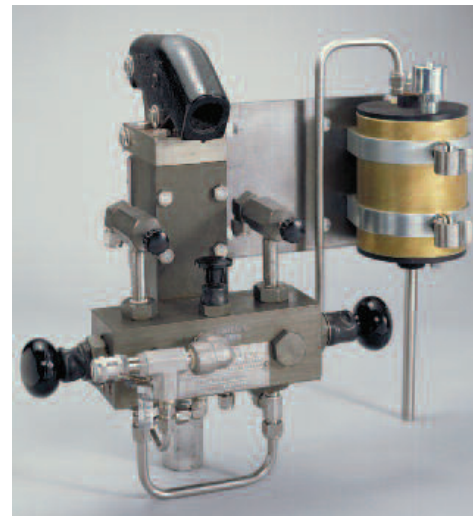
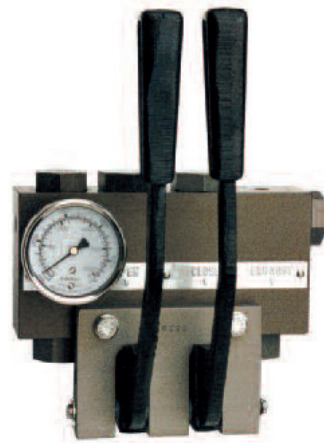
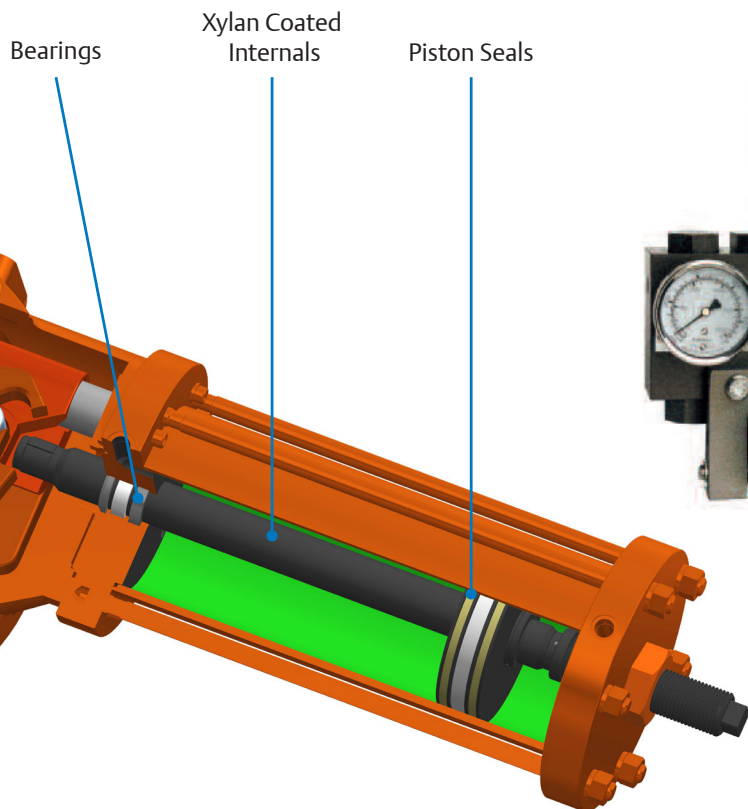
This unique drive assures a positive yoke seal, maintains accurate alignment and eliminates accessory shaft side loads.

NAMUR

This mounting configuration allows accessory hardware standardization and compatibility with a broad range of control and signal generating devices.

Vent Checks

GTD-Series actuators have two individual drive module vent checks to release over-pressure and seals to prevent dust, corrosive atmospheres, nesting insects and water ingress. The lower vent passage isolates valve stem leakage and can be attached to a fugitive emissions monitoring device.



Adjustable Travel Stops

The independently adjustable, blowout-proof travel stop in the gas cylinder allows for a true 10° travel adjustment total that significantly adds sealing life to the valve seats.

Yoke Pin

The hardened yoke pin rotates within heavy-duty journal bearings. This design advantage allows the yoke pin to roll along the yoke slot. Unlike a bronze-based sliding block design which drags along the yoke slot, the rolling yoke pin maximizes mechanical efficiency at this crucial torque generating location.

Piston/Rod Seals/Wear Bands

The dual, mechanically-energized nitrile piston seals are designed to provide excellent sealing in low or high pressure applications. The nitrile seals are selected specifically for natural gas pipeline service and are produced utilizing the latest curing techniques, advanced elastomeric compounds and durometers. They have been designed to be more stable than ordinary seal compounds, especially in pipelines containing methanes and sulfides. All pistons feature wide PTFE wear guide bands to ensure exceptional seal and cylinder service life.

Controls

The GTD-Series control systems are easy to service and require no special tools for maintenance. They are corrosion resistant and do not require a weatherproof enclosure for protection. Individual components may be easily replaced, if necessary.

Hand Pump

The hand pump is used solely to safely open and close the valve in the absence of pipeline pressure, with unique design features for this application. The pump requires far fewer strokes than competitive models, so it can close a valve quicker in an emergency. The pump self-neutralizes automatically. There is no hand pump selector valve needing to be returned to a neutral position for the actuator to function with power gas.

An innovative control valve eliminates erratic hand pump operation by impeding hydraulic fluid flow into the reservoir tank, preventing air from being trapped in the hydraulic cylinder.

Directional Control Valve

The Shafer "Poppet Block" valve includes two integral 316 stainless steel filters. Power gas is filtered through a replaceable 140 micron strainer element and dry gas for the instrumentation is additionally filtered through a replaceable 25 micron strainer element.

A poppet block exhaust check provides an atmospheric barrier preventing condensation from collecting inside the actuator cylinders.

Specifications

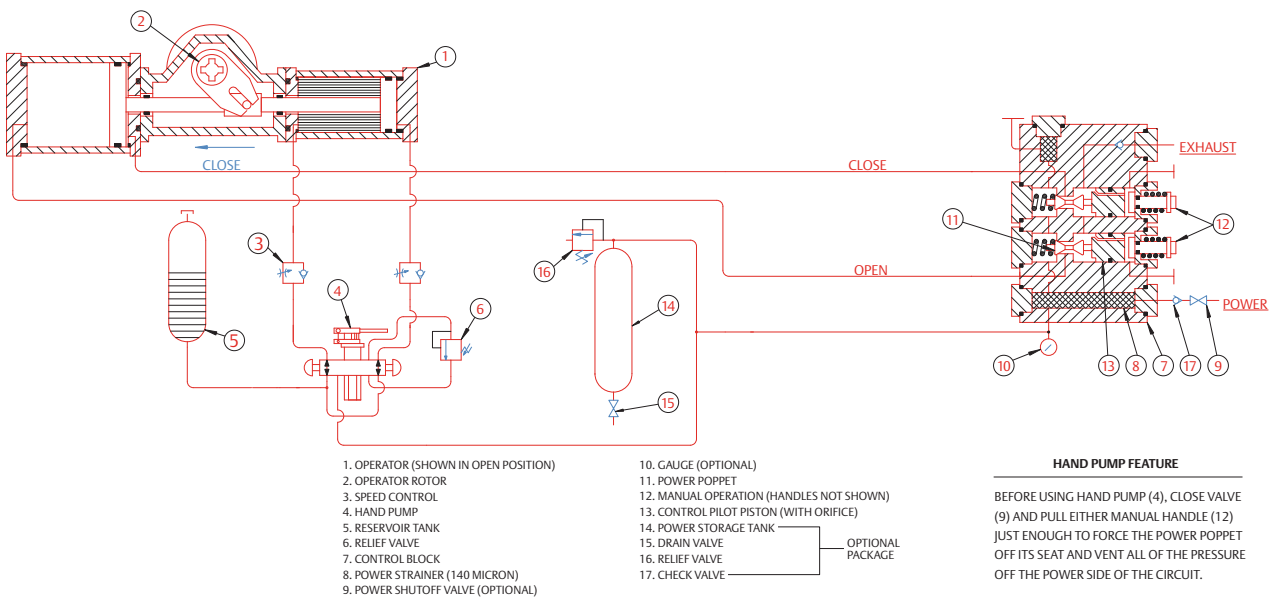
GTD Model Expression	Maximum Operating Pressure		Torque Expression CCW Rotation		Hand Pump Strokes
	psig	bar	lbf-in/psig	Nm/bar	
01X03.5	1289	89	39.3	64.4	12
01X04.0	987	68	51.3	84.0	12
2X04.0	1230	85	62.3	102.1	18
2X05.0	787	54	97.1	159.1	18
3X05.0	1132	78	119.0	194.9	35
3X06.0	786	54	171.1	280.5	35
4X06.0	1295	89	209.6	343.5	60
4X07.0	951	66	285.5	467.8	60
4X08.0	728	50	372.0	609.7	60
5X08.0	1266	87	484.4	793.8	139
5X09.0	1000	69	613.6	1005.6	139
5X10.0	810	56	757.6	1241.6	139
7X10.0	1310	90	934.4	1531.2	265
7X12.0	910	62	1345.4	2204.9	265

The estimated weight includes gas cylinder module, hydraulic cylinder module, drive housing module controls and hydraulic fluid

Actuator torque output is determined by multiplying the actuator's torque expression by the power pressure supplied to the actuator.

$$(\text{Torque Output} = \text{Torque Expression} \times \text{Power Supply Pressure})$$

GTD System Schematic



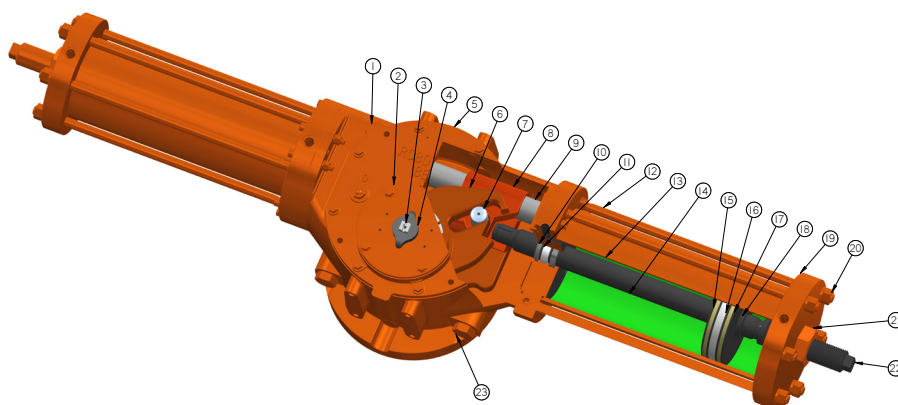
Materials of Construction

Product Concept

The GTD-Series high-pressure, direct gas actuator features an integrated package with established performance history in direct gas service. The package consists of a Bettis® scotch-yoke design actuator combined with the standard Shafer® gas/hydraulic controls. All of the fundamental GTD-Series components have been proven in thousands of natural gas applications worldwide.

Operating Ranges

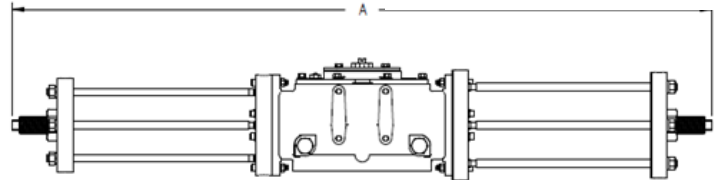
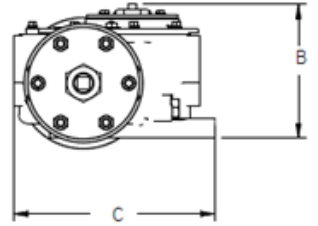
GTD-Series actuators are powered by high pressure natural gas and produce guaranteed minimum output torques to 1,200,000 lbf-in (135,000 Nm). Standard operating temperatures range from -20°F to +200°F (-29°C to +93°C). Optional temperature ranges extend the capabilities from -50°F to +350°F (-46°C to +177°C).



Item number	Description	Material
1	Housing Cover	Ductile Iron
	Housing Cover Bolting	Alloy Steel
2	Yoke Cover	Ductile Iron
	Yoke Cover Bolting	Carbon Steel
3	Indicator Hub	Ductile Iron
	Indicator Coupling Plate	Stainless Steel
	Indicator/Yoke Bearings	Acetal Plastic
4	Indicator	Nylon
5	Housing	Ductile Iron
6	Yoke	Ductile Iron
	Yoke/Yoke Pin Bushing	Polyethylene
	Yoke Bearing	Steel Backed PTFE/Sintered Bronze
7	Yoke Pin	Alloy Steel
	Yoke Pin Bearing	Steel Backed PTFE/Sintered Bronze
	Yoke Pin Thrust Bearing	Polyethylene
8	Guide Block	Ductile Iron
9	Guide Bar	Alloy Steel
	Guide Bar Bearing	Steel Backed PTFE/Sintered Bronze
10	Piston Rod Wiper	Polyurethane
11	Piston Rod Bearing	Acetal Plastic
12	Tie Bars	Alloy Steel
13	Cylinder	Carbon Steel
14	Piston Rod	Alloy Steel
15	Piston Seal	Polyurethane
16	Piston Bearings	Polyethylene
17	Piston	Carbon Steel
18	Split Rings	Alloy Steel
	Retainer Ring	Stainless Steel
19	Inner/Outer End Caps	Carbon Steel
	End Cap Bolting	Alloy Steel
20	Tie Bar Nuts	Carbon/Alloy Steel
21	Stop Screw Nut	Carbon Steel
22	Stop Screw	Alloy Steel
23	Housing Plug	Carbon Steel
-	Weather Seals	Nitrile

Overall Dimensions

GTD Model Expression	A		B		C		Weight (Bare Actuator)		Estimated Weight with Controls	
	in	mm	in	mm	in	mm	lbs	kg	lbs	kg
01X03.5	43.55	1106.2	8.33	211.5	9.65	245.1	144	65	203	92
01X04.0	43.55	1106.2	8.33	211.5	9.65	245.1	150	68	210	95
2X04.0	49.11	1247.4	8.73	221.7	10.69	271.5	191	87	255	116
2X05.0	49.11	1247.4	8.73	221.7	10.69	271.5	204	93	265	120
3X05.0	59.64	1514.9	9.50	241.2	14.41	365.9	334	152	370	168
3X06.0	59.64	1514.9	9.50	241.2	14.41	365.9	352	160	387	176
4X06.0	71.82	1824.2	10.96	278.5	16.78	426.2	569	258	646	293
4X07.0	71.82	1824.2	10.96	278.5	16.78	426.2	589	267	676	307
4X08.0	71.82	1824.2	10.96	278.5	16.78	426.2	636	288	711	323
5X08.0	87.20	2214.9	14.36	364.8	20.94	531.9	1142	518	1210	549
5X09.0	87.20	2214.9	14.36	364.8	20.94	531.9	1232	559	1275	578
5X10.0	87.20	2214.9	14.36	364.8	20.94	531.9	1232	559	1285	583
7X10.0	102.06	2592.3	17.02	432.3	25.18	639.6	1920	871	2176	987
7X12.0	102.06	2592.3	17.02	432.3	25.18	639.6	2138	970	2934	1331



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