

SERIES 2G DIAPHRAGM ACTUATORS

Series 2G diaphragm actuators are designed for on/off or throttling control of Norris angle-disc butterfly valves and other types of quarter-turn valves. Series 2G actuators can be configured with spring-return (“fail-safe”) operation or with a double-acting diaphragm for low-pressure applications.

Series 2G actuators are available in four size ranges with torque output to 17,000 in./lbs. The field-proven design easily adapts to various mounting styles and shaft types. A wide range of accessories is available, including electric and pneumatic positioners and limit switches.

Features

- Actuates with as little as 10 psig supply air
- Provides precise control when used with positioners, switches, solenoids or other available accessories
- Efficiency of gear and rack design saves compressor energy
- Operates using air, natural gas, nitrogen or other readily available gases
- Optional fail-safe operation:
 - (1) with spring-return models or
 - (2) pressure-balanced units equipped with reserve air
- Valve action is easily changed in the field (fail-open to fail-closed and vice-versa) without having to change parts
- Rugged, weatherproof construction includes totally enclosed gear and rack, as well as gear case seals to protect moving parts from corrosion
- Closed yoke to protect the diaphragm stem from corrosive atmospheres
- Offers versatility for reliable, inexpensive operation of valves in on/off, throttling or proportioning systems



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DESCRIPTION

Spring-Return Actuation

The basic force of spring-return diaphragm actuators is transmitted through the diaphragm plate in response to pressure on one side of the diaphragm. Energy stored in the spring (due to compression) returns the diaphragm to its original position (spring-to-open or spring-to-close).

Should operating air supply be interrupted, the spring acts as a “fail-safe” feature which can be set to fail-open or fail-closed.

The rack-and-pinion operator is designed to allow the operating action to be reversed easily in the field without changing components. There is no need to remove the valve from the line.

Pressure-Balanced Actuation

The pressure-balanced unit is designed for use when supply pressures are too low for cylinder actuators and the fail-safe feature is not required.

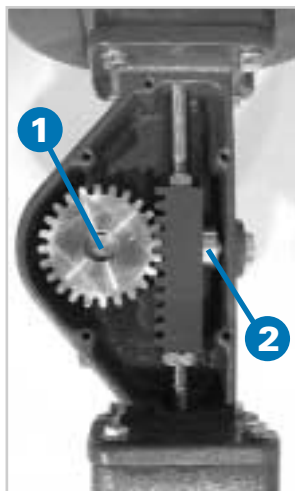
In a pressure-balanced actuator, air pressure is required to change the diaphragm position in either direction. Pressure is exerted from the top of the diaphragm to extend the operator stem, and from the bottom of the diaphragm to retract the stem. In case of failure of the operating system, the valve will stay in the last position. No fail-safe operation is intended. However, a reserve air tank can be used to supply the force necessary to move the valve disc to a “safe” position if the fail-safe feature is required without the use of springs.

Mounting

On all standard Norriseal diaphragm actuators, a direct-mounted, weatherproof rack-and-pinion operator is used to convert the linear thrust of the actuator stem into rotary operating torque.

Rack-and-Pinion Operator

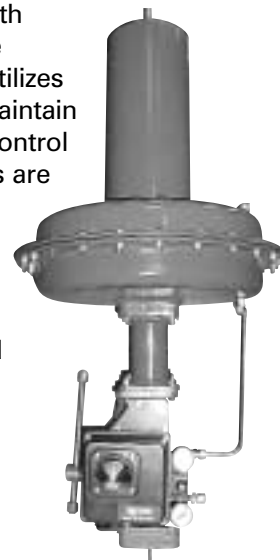
1. Disc indicator clearly shows valve disc position from full-open to fully closed in increments of 10 degrees
2. Adjustable rack guide controls engagement of rack and pinion and minimizes backlash



Throttling Control

A Norriseal diaphragm actuator with positioner provides precise valve throttling control. The positioner utilizes full available supply pressure to maintain the disc position required by the control system. Valve torque requirements are met regardless of the variance of forces with the system.

Butterfly valves provide good throttling control when the valve opening is between 30 degrees and 60 degrees. With an opening of less than 20 degrees or more than 70 degrees, proportional disc movement no longer produces linear flow characteristics.



Standard Configurations

Standard Norriseal diaphragm actuators in 35-, 70-, and 180-square-inch sizes are designed for maximum performance and economy. All working parts of the direct-mounted, closed-yoke units are protected from atmospheric corrosion.

How to Use Sizing Charts

The charts on pages 4 and 5 are designed for sizing closed-yoke diaphragm actuators for all Norriseal R-Series and M-Series valves from 2 inches (50 mm) through 20 inches (500 mm).

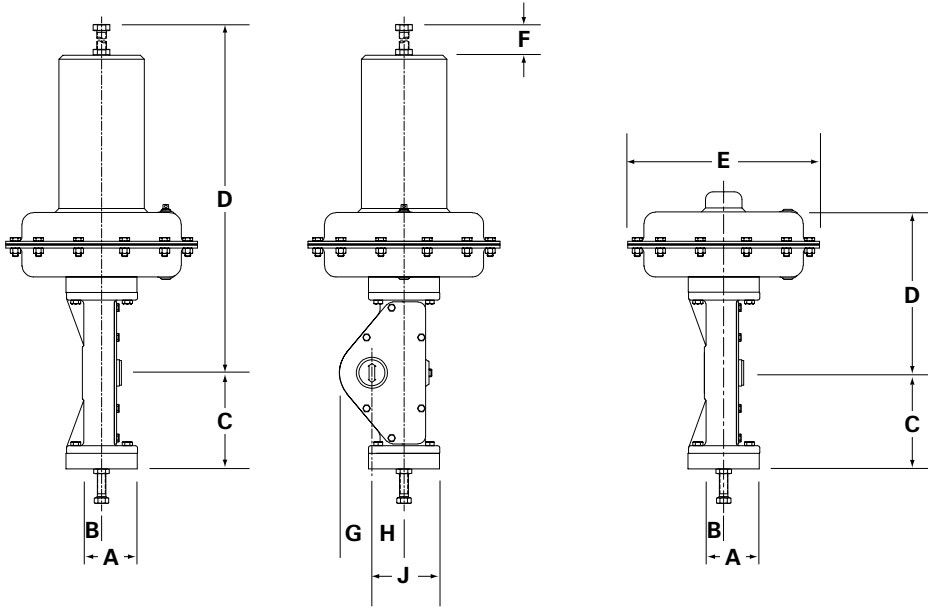
The most common operating conditions are covered in these charts and a 50% torque service factor is included in the sizing. If conditions vary from those outlined (for example, if minimum recommended operating air pressure is not available), consult the Norriseal Applications Engineering Department in Houston.

1. Establish wet or dry service conditions. Find required valve size in corresponding chart. Typical dry services are steam, gases, vapors, solvents, etc.
2. Determine maximum line pressure or maximum differential shutoff pressure of flow medium. Check to be sure it is within values shown in column 2.
3. Select column for actuator required: spring-to-close, spring-to-open, or pressure balanced. Determine air supply pressure available to diaphragm actuator. Check to be sure it is within values shown in column 3.
4. Find diaphragm model number in column 4.



Dimensions

For specific valve dimensions, consult valve data sheet covering individual model numbers.



*Spring-Return Models:
2G11, 2G13, 2G15, 2G17*

*Pressure-Balanced Models:
2G12, 2G14, 2G16, 2G18*

SERIES 2G DIAPHRAGM ACTUATOR DIMENSIONS

Model	Valve Size Inches (mm)	Dimensions, Inches (mm)												
		A	B	C	D	E	F*	G	H	J				
2G11	2-4 (50-100)	2.35 (60)	1.25 (32)	8.5 (216)	18.09 (460)	9.50 (241)	2.97 (75)	2.13 (54)	2.09 (53)	4.19 (106)				
2G12	2-4 (50-100)				10.69 (272)		—							
2G13	2-8 (50-200)				25.44 (646)	4.50 (114)								
2G14	2-8 (50-200)				11.53 (293)	—								
2G15	6-8 (150-200)		1.63		44.34 (1126)	20.50 (521)	—							
2G15	10-12 (250-300)				10.78 (274)									
2G16	6-8 (150-200)				1.25		18.69 (475)							
2G16	10-12 (250-300)				1.63		—							
2G17	10-12 (250-300)		2.44 (62)		2.13	11 (280)	41.56 (1056)				5.25 (133)	3.63 (92)	3.56 (90)	6.13 (156)
2G17	14-20 (350-500)				3.13		17.22 (437)							
2G18	10-12 (250-300)	2.13												
2G18	14-20 (350-500)	3.13												

*Maximum extension. No preload or spring.

DIMENSIONS AND SIZING (WET SERVICE)

SIMPLIFIED SIZING CHART — DIAPHRAGM ACTUATORS

1 Valve Size Inches (mm)	2 Max. Line Pressure (psi)	Spring-to-Close		Spring-to-Open		Pressure Balanced	
		3 Min. Supply Pressure (psi)	4 Model Number	3 Min. Supply Pressure (psi)	4 Model Number	3 Min. Supply Pressure (psi)	4 Model Number
2 (50)	50	8	2G1307025	9	2G1305025	3	2G14
		17	2G1108041	22	2G1105041	5	2G12
	100	8	2G1307025	9	2G1305025	3	2G14
		17	2G1108041	22	2G1105041	5	2G12
	200	8	2G1307025	9	2G1305025	3	2G14
		17	2G1108041	22	2G1105041	5	2G12
2.5 (65)	50	8	2G1307025	10	2G1305025	3	2G14
		17	2G1108041	22	2G1105041	5	2G12
	100	8	2G1307025	10	2G1305025	3	2G14
		17	2G1108041	22	2G1105041	5	2G12
	200	8	2G1307025	10	2G1305025	3	2G14
		17	2G1108041	22	2G1105041	5	2G12
3 (75)	50	8	2G1307025	10	2G1305025	3	2G14
		17	2G1108041	23	2G1105041	5	2G12
	100	8	2G1307025	10	2G1305025	3	2G14
		17	2G1108041	23	2G1105041	5	2G12
	200	9	2G1310025	10	2G1305025	3	2G14
		18	2G1110041	23	2G1105041	6	2G12
4 (100)	50	9	2G1312025	12	2G1305025	3	2G14
		18	2G1108042	29	2G1105041	6	2G12
	100	10	2G1310025	12	2G1305025	5	2G14
		27	2G1108042	29	2G1105041	8	2G12
	200	12	2G1320025	12	2G1305025	5	2G14
		41	2G1108038	29	2G1105041	11	2G12
5 (125)	50	10	2G1315025	13	2G1305025	5	2G14
		41	2G1108038	30	2G1105041	9	2G12
	100	12	2G1322025	13	2G1305025	6	2G14
		41	2G1108038	30	2G1105041	13	2G12
	200	15	2G1335025	17	2G1310025	9	2G14
		6	2G1532025	7	2G1510025	5	2G16
6 (150)	50	15	2G1332025	17	2G1310025	8	2G14
		9	2G1517023	8	2G1515025	5	2G16
	100	21	2G1317023	19	2G1315025	9	2G14
		10	2G1525023	11	2G1330025	5	2G16
	200	25	2G1325023	27	2G1330025	13	2G14
		12	2G1532023	13	2G1510023	7	2G16
8 (200)	50	29	2G1332023	34	2G1310023	17	2G14
		16	2G1525026	15	2G1510023	8	2G16
	100	39	2G1325026	38	2G1315023	19	2G14
		20	2G1525024	21	2G1530023	10	2G16
	200	49	2G1325024	53	2G1330023	—	—
		20	2G1525024	19	2G1525023	10	2G16
10 (250)	50	25	2G1520055	23	2G1515026	11	2G16
	100	30	2G1530055	30	2G1525026	15	2G16
	200	19	2G1735044	20	2G1705044	9	2G18
12 (300)	50	29	2G1527055	30	2G1525026	15	2G16
		20	2G1737044	21	2G1705044	10	2G18
	100	30	2G1530055	34	2G1520024	17	2G16
		38	2G1753044/45	34	251730044	17	2G18
	200	28	2G1732043	25	2G1710044	12	2G18
		29	2G1735043	27	2G1715044	13	2G18
14 (350)	50	37	2G1737044/45	32	2G1725044	16	2G18
	100	39	2G1737044/45	37	2G1710043	18	2G18
	200	50	2G1740043/45	49	2G1725043	24	2G18
16 (400)	50	47	2G1735043/45	44	2G1720043	22	2G18
18 (450)	50	50	2G1740043/45	48	2G1725043	24	2G18
20 (500)	50						

DIMENSIONS AND SIZING (DRY SERVICE)

SIMPLIFIED SIZING CHART — DIAPHRAGM ACTUATORS

1 Valve Size Inches (mm)	2 Max. Line Pressure (psi)	Spring-to-Close		Spring-to-Open		Pressure Balanced	
		3 Min. Supply Pressure (psi)	4 Model Number	3 Min. Supply Pressure (psi)	4 Model Number	3 Min. Supply Pressure (psi)	4 Model Number
2 (50)	50	8	2G1307025	9	2G1305025	3	2G14
		17	2G1108041	17	2G1105041	5	2G12
	100	8	2G1307025	9	2G1305025	3	2G14
		17	2G1108041	18	2G1105041	5	2G12
	200	9	2G1310025	10	2G1305025	3	2G14
		27	2G1108042	20	2G1105041	6	2G12
2.5 (65)	50	8	2G1307025	9	2G1305025	3	2G14
		17	2G1108041	17	2G1105041	5	2G12
	100	8	2G1307025	9	2G1305025	3	2G14
		17	2G1108041	18	2G1105041	5	2G12
	200	9	2G1310025	10	2G1305025	3	2G14
		27	2G1108042	20	2G1105041	6	2G12
3 (75)	50	8	2G1307025	9	2G1305025	3	2G14
		17	2G1108041	18	2G1105041	5	2G12
	100	9	2G1310025	10	2G1305025	3	2G14
		17	2G1108041	19	2G1105041	5	2G12
	200	10	2G1312025	11	2G1305025	4	2G14
		27	2G1108042	22	2G1105041	8	2G12
4 (100)	50	10	2G1312025	11	2G1305025	3	2G14
		27	2G1108042	21	2G1105041	7	2G12
	100	12	2G1317025	12	2G1305025	5	2G14
		41	2G1108038	24	2G1105041	10	2G12
	200	13	2G1325025	14	2G1305025	7	2G14
		—	—	31	2G1107041	15	2G12
5 (125)	50	12	2G1320025	12	2G1305025	5	2G14
		41	2G1108038	26	2G1105041	12	2G12
	100	13	2G1327025	15	2G1305025	7	2G14
		—	—	40	2G1105042	17	2G12
	200	24	2G1322023	23	2G1322025	12	2G14
		—	—	—	—	—	—
6 (150)	50	10	2G1522023	8	2G1517025	5	2G16
		24	2G1322023	21	2G1317025	11	2G14
	100	10	2G1522023	9	2G1522025	5	2G16
		24	2G1322023	23	2G1322025	12	2G14
	200	15	2G1522026	13	2G1510023	7	2G16
		37	2G1322026	34	2G1310023	17	2G14
8 (200)	50	16	2G1527026	17	2G1520023	9	2G16
		41	2G1327026	44	2G1320023	22	2G14
	100	23	2G1517055	20	2G1527023	10	2G16
		—	—	—	—	—	—
	200	28	2G1525055	27	2G1520026	14	2G16
		—	—	—	—	—	—
10 (250)	50	26	2G1522055	26	2G1520026	13	2G16
	100	29	2G1527055	29	2G1522026	15	2G16
	200	28	2G1732043	40	2G1527024	20	2G16
12 (300)	50	28	2G1730043	26	2G1717044	12	2G18
		—	—	40	2G1527024	20	2G16
	100	29	2G1735043	27	2G1717044	13	2G18
		—	—	45	2G1517055	22	2G16
	200	47	2G1735043/45	45	2G1720043	23	2G18
14 (350)	50	37	2G1732044/45	31	2G1722044	16	2G18
	100	38	2G1735044/45	35	2G1730044	18	2G18
	200	—	—	48	2G1725043	24	2G18
16 (400)	50	47	2G1735043/45	44	2G1720043	21	2G18
	100	—	—	49	251725043	24	2G18
	200	—	—	—	—	—	—
18 (450)	50	—	—	—	—	—	—
20 (500)	50	—	—	—	—	—	—

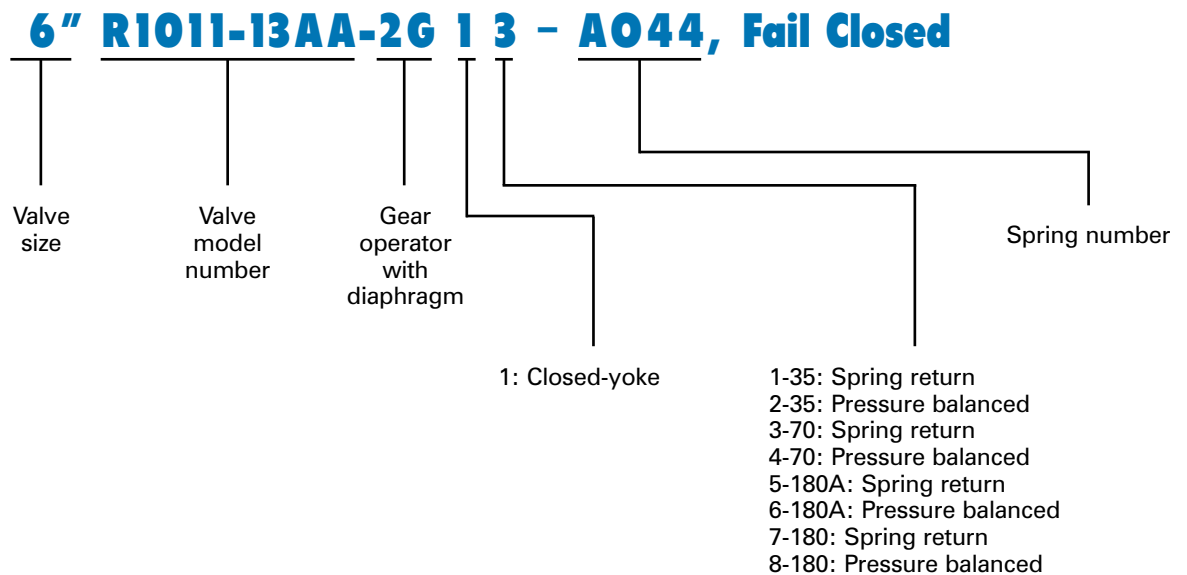
HOW TO ORDER

State valve size and model number (see individual valve data sheets) and actuator model number from column 4 of sizing charts. If spring-return diaphragm is required, state actuator action — fail-closed or fail-open.

When a positioner is to be included for throttling control, state signal pressure: 3 to 15, 3 to 9 or 6 to 30 psi.

If other accessories are to be included in the assembly, the detailed function of the apparatus should be submitted to the Norriseal Application Engineering Department with the order.

MODEL CODE



Engineered Performance

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