



## GA Series - Actuator — Operating Instructions

03/10/20

### GA Non-Spring Return Actuator - (GA24-562)

24 V, On/Off, Floating and Modulating

Automatic adaptation to valve, precision control and high energy efficiency with minimal operating noise.

#### Features

- Extending or retracting force of minimum 562 lb. (2500 N)
- Stepping motor with electronic control unit and electronic load-dependent cut-off
- Automatic detection of control signal applied (modulating or floating), display via 2 LEDs
- The type of characteristic curve (linear, quadratic or equal percentage) can be adjusted in the drive
- Independent adaptation to valve stroke between 0.31 in.(8 mm) and 1.57 in.(40 mm), captive even if the power is turned off
- Direction of travel can be selected via screw terminals when making electrical connection or remotely
- Hand crank for external manual adjustment with motor cut-off and as trip for re-calibration
- Easy assembly with valve, spindle connection takes place automatically after application of control voltage
- Many adaptors kits allow assembly on third-party valves

#### Technical Description

- Two-part housing made of self-extinguishing red plastic and sealing to IP66 (equivalent to NEMA 4) protection class
- Maintenance-free gearbox in sintered steel, gearbox base-plate in steel
- Patented drive-valve coupling
- Mounting column made of Stainless Steel and mounting bracket for fitting valve made of cast light alloy
- Electrical connections 13 AWG (max. 2.5 mm<sup>2</sup>) with screw terminals
- Three knock-out cable entries for M20 x 1.5 (2x) and M16 x1.5
- Installation position: vertical to horizontal, but not upside down

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#### Accessories

##### Auxillary Switches

0372333 001 Continuously adjustable, min. 100 mA and 12 V, additional load 6(2) A

0372333 002 Gold-plated contacts, from 1 mA and up to 30 V, further range 3(1) A

##### Adaptor kits for Industrial Globe Valves

GA-MTG-01 DG250-x and DG3-x

GA-MTG-02 DG4-x, DG5-x and DG6-x

##### Fittings

0386263 001 Screwed cable fitting M16 X 1.5

0386263 002 Screwed cable fitting M20 X 1.5

##### High Media Temperature Kit

0372336 240 Adaptor required for medium temperatures between 266°F (130°C) and 464°F (240°C)

#### Operation

Depending on the type of connection (see the connection diagram), the device may be used as a modulating drive (0...10 V and/or 4...20 mA), as a On/Off (2-point) drive (extend/retract) or as a Floating (3-point) drive (extend/stop/retract) with an intermediate position.

The run time of the drive can be set according to the specific requirements, using switches S1 and S2. Switches S3 and S4 are used to configure the characteristic curve (equal percentage, linear or quadratic) The external hand crank allows you to adjust the position manually. When the hand crank is folded out, the motor is switched off. After the hand crank is folded back, the set point position is adopted again. If the hand crank is unfolded, the drive stays in this position.

#### Calibration and feedback signal

When used as a modulating drive, the device calibrates itself automatically. As soon as voltage is applied to either terminal 2a or 2b for the first time, it moves to the lower limit stop on the valve, thus enabling automatic connection with the valve spindle. Then it moves to the upper limit stop and the value is recorded and saved with the help of a path measurement system. The control signal and the feedback signal are adjusted to this effective stroke. There is no re-calibration if the voltage is interrupted or if the voltage supply is removed. The values remain saved. Calibration must be performed in order to utilize the feedback signal when On/Off (2-point) or Floating (3-point) control is required. Terminal 44 is 0-10VDC feedback. The feedback signal always increases as the shaft extends.



### Re-Calibration

To re-calibrate, voltage needs to be applied to either terminal 2a or 2b and the voltage signal input circuit needs to be completed by installing a jumper between terminals 3u and 1. To trigger re-calibration, fold the hand crank out and back in again twice within 4 seconds. Each time the hand crank is folded out rotate it slightly in either direction until a clicking sound is heard. Both the LEDs will then flash red.

During re-calibration, the feedback signal is inactive, or it corresponds to a value of "0". Re-calibration uses the shortest run time. The re-calibration is only valid once the entire procedure has been completed. Folding the hand crank out again will interrupt the procedure.

If the valve drive detects a blockage, it will report this by setting the feedback signal to 0 V after approx. 90 s. However, the drive will try to overcome the blockage during this time. If it is possible to overcome the blockage, the normal control function is activated again and the feedback signal is restored.

### Connection as a On/Off (2-point) Actuator

This activation can take place via two cables. Voltage is applied to terminal 2a. Applying the voltage to terminal 2b extends the actuator shaft. After this voltage has been switched off from 2b, the drive moves to the opposite end position. The electronic motor switch-off responds in the end positions (valve limit stop, or when maximum stroke is reached) or in case of overload (no limit switches).

The coding switch can be used to set the run times. The characteristic curve cannot be selected in this case (resulting in the characteristic curve for the valve). The feedback signal is active as long as calibration was performed and a jumper is installed between terminals 3u and 1. Terminal 3i must not be connected.

### Connection as a Floating (3-point) Actuator

Applying voltage to terminal 2a or 2b makes it possible to move the valve to any desired position. If voltage is applied to terminal 2b, the actuator shaft extends. The shaft retracts when voltage is applied to terminal 2a. In the end positions (at the valve stop, or when the maximum stroke is reached) or in case of an over- load, the electronic motor switch-off responds (no limit switches). The direction of the stroke can be changed by transposing the connections.

The coding switch is used to set the run times. In this case, the characteristic curve cannot be selected (resulting in the characteristic curve for the valve). The feedback signal is active as long as calibration was performed and a jumper is installed between terminals 3u and 1. Terminal 3i must not be connected.

### Modulating Actuator (0...10 V and/or 4...20 mA)

The built-in positioner controls the drive depending on the controller input signal  $y$ .

The input signal used is a voltage signal (0...10 V) at terminal 3u, or a current signal at terminal 3i. If an input signal is present at both terminals (3u (0...10 V) and 3i (4...20 mA)) simultaneously, the input with the higher value takes priority.

Mode of action 1 (apply voltage to internal connection 2a): As the input signal increases, the valve shaft extends.

Mode of action 2 (apply voltage to internal connection 2b): As the input signal increases, the valve shaft retracts.

The starting point and the control span are fixed. After the voltage supply is applied and after calibration, the drive moves to each valve stroke between 0% and 100%, depending on the input signal. The electronics and the path measurement system ensure that no stroke is lost, and the drive does not require re-calibration at intervals. When the end positions are reached, the position is checked, corrected as necessary and stored again. This ensures parallel running of several drives of the same type. Feedback signal  $y_0 = 0...10\text{ V}$  corresponds to the effective valve extension of 0 to 100%.

The coding switch can be used to set the characteristic for the valve. Equal-percentage and square characteristics can only be produced if the device is used as a proportional-action drive. Further switches can be used to select the run-times (can be used for the On/Off (2-point), Floating (3-point) or proportional functions).



**LED Display**

The display consists of two dual-color LEDs (red / green).

Both LEDs flashing red:	Calibration procedure
Upper LED lit red:	Upper limit stop or "shaft fully retracted" position reached
Lower LED lit red:	Lower limit stop or "shaft fully extended" position reached
Upper LED flashing green:	Drive running, "shaft retracting"
Upper LED lit green:	Drive stationary, last direction of running "is shaft retracting"
Lower LED flashing green:	Drive running, moving towards "fully extended" position
Lower LED lit green:	Drive stationary, last direction of running "is shaft extending"
No LED lit:	No voltage supply (terminal 2a or 2b)
Both LEDs are flashing red and green:	Drive is in manual mode

**Engineering and Installation Notes**

Penetration of condensate or dripping water, etc. along the valve spindle into the drive should be avoided.

The valve is plugged directly onto the drive and is fixed with screws (no further settings are needed). The drive is automatically connected to the valve spindle. When the device is delivered, the drive spindle is in the middle position.

The housing contains three breakthrough-type cable lead-throughs which are broken open automatically when the cable lead-through is screwed in.

The stepping motor/electronics concept guarantees parallel running of several valve drives of the same type. The cross-section of the connecting cable should be selected according to the line length and the number of drives. With five drives connected in parallel and a line length of 54.7 yards (50 meters), we recommend using a cable cross-section of 16 AWG (1.5 mm<sup>2</sup>) (power consumption of the drive × 5).

**Fitting Outdoors**

If the devices are fitted outdoors, we recommend that additional measures be taken to protect them against the effects of the weather.

**Additional Technical Information**

The red housing (consisting of the front and back sections and the connecting lid) only serves the purpose of a cover. The DC motor, the control electronics, the load-bearing parts and the maintenance-free gear unit are accommodated in the housing. The drive shaft and column are made of rustproof materials. The interior plates and the gear unit are made of steel. The valve axle guide way and the valve collar connection are made of die-cast aluminum.

**Warnings**

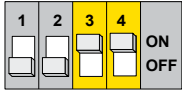
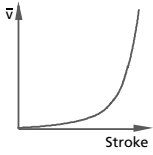
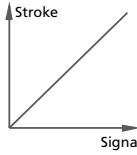
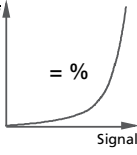
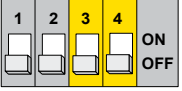
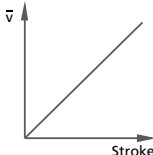
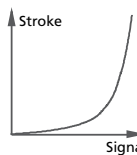
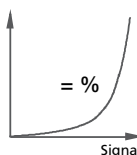
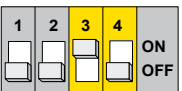
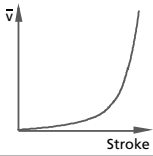
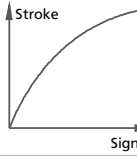
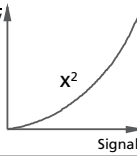
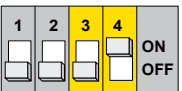
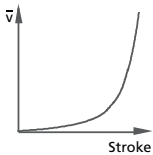
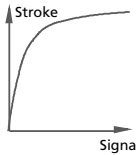
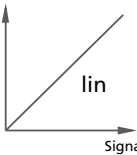
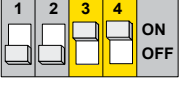
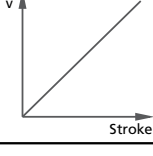
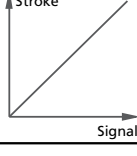
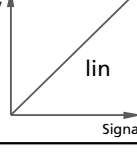
- If the temperature of the medium in the valve is high, the drive columns and the shaft may also reach high temperatures.
- If a failure of the final control element could cause damage, additional protective precautions must be taken.

**CE Conformity**

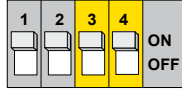

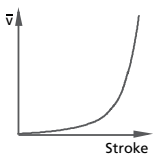
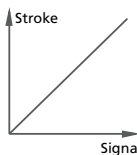
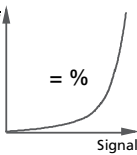
EMC Directive 2004/108/EC	Machinery Directive 98/37/EEC/I/B	Low Voltage Directive 2006/95/EC
EN 61000-6-1	DIN EN 150 14121	EN 60730-1
EN 61000-6-2		EN 60730-2-14
EN 61000-6-3		Over-voltage category III
EN 61000-6-4		Degree of pollution III



## GA - Curve Characteristic Switch Settings

Desired Characteristic Curve	Switch Coding	Characteristic Curve for Valve	Characteristic Curve for Drive	Effect on Valve
Equal Percentage	 <p>Default setting for Globe Valves</p>			
Equal Percentage	 <p>Default setting for Simple Set Max</p>			
Quadratic	 <p>Optional setting</p>			
Linear	 <p>Optional setting</p>			
Linear	 <p>Optional setting</p>			

Desired Characteristic Curve	Switch Coding	Characteristic Curve for Valve	Characteristic Curve for Drive	Effective on Valve
Equal Percentage	 <p> = Default Setting for Stand Alone GA Actuator</p>			



## GA - Stroke Times

### SSM Valve Stroke Times GA(S) Total Stroke = 1.93" (49mm)

Size		Switch Coding	2.5" & 3"	4" & 5"	6" & 8"	10" & 12"
Valve Stroke			.79" (20mm)	1.58" (40mm)	1.69" (43mm)	1.89" (48mm)
GA(S) Stroke Time	51 s/in. (2s/mm)	Default Setting for Simple Set Max	40 Sec.	80 Sec.	86 Sec.	96 Sec.
	102 s/in. (4s/mm)	Optional Setting	80 Sec.	160 Sec.	172 Sec.	192 Sec.
	153 s/in. (6s/mm)	Optional Setting	120 Sec.	240 Sec.	258 Sec.	288 Sec.

### DG Valve Stroke Times GA(S) Total Stroke = 1.93" (49mm)

Size		Switch Coding	2.5" & 3"	4" & 6"
Valve Stroke			.75" (19mm)	1.5" (38mm)
GA(S) Stroke Time	51 s/in. (2s/mm)	Default Setting for Globe Valves	38 Sec.	76 Sec.
	102 s/in. (4s/mm)	Optional Setting	76 Sec.	152 Sec.
	153 s/in. (6s/mm)	Optional Setting	114 Sec.	228 Sec.

### Stand Alone Actuator Stroke Times GA(S) Total Stroke = 1.93" (49mm)

Size		Switch Coding	2.5" & 3"	4" & 6"
Valve Stroke			.75" (19mm)	1.5" (38mm)
GA(S) Stroke Time	153 s/in. (6s/mm)	Default Setting for Stand Alone GA Actuator	114 Sec.	228 Sec.



## GA - Specifications

Technical Specifications		
<b>Non-Spring Return</b>	GA24-562	On/Off, Floating and Modulating
<b>Power Requirements</b>	<b>On/Off, Floating and Modulating</b>	24 VAC ( $\pm 20\%$ ) at 50/60 Hz or 24 VDC ( $\pm 15\%$ )
<b>Positioner<sup>1</sup></b>	<b>Control Signal 1</b>	0 to 10 V, $R_i > 100\text{ k}\Omega$
	<b>Control Signal 2</b>	4 to 20 mA, $R_i = 50\Omega$
	<b>Position Feedback Signal</b>	0 to 10 V, Load $> 2.5\text{ k}\Omega$
<b>Action</b>		Direct or Reverse Acting
<b>Switching Range</b>		300 mv
<b>Power Consumption<sup>2</sup></b>	<b>Non-Spring Return</b>	10W, 18VA
<b>Force</b>	<b>Non-Spring Return</b>	562 lbs. (2,500 N)
<b>Stroke</b>		0" to 1.93" (0-49mm)
<b>Max. Temperature of Medium<sup>3</sup></b>		266°F (130°C)
<b>Ambient Conditions</b>	<b>Temperature</b>	14°F to 131°F (-10° to 55°C)
	<b>Humidity</b>	0 to 95% RH without condensation
<b>Level of Protection</b>		IP 66. Not intended for outdoor use without additional protection.
<b>Enclosure</b>		Self-extinguishing plastic
<b>Gear Materials</b>	<b>Gears &amp; Gearbox Mounting Column Mounting Bracket</b>	Steel Stainless Steel Cast Light Alloy
<b>Electrical Connection</b>		13 AWG (2.5 mm <sup>2</sup> ) with screw terminals. Three knock-out cable entries for M20×1.5 (2×) and M16×1.5
<b>Motor Run Time sec. per in. (mm)</b>		51 (2), 102 (4), 153 (6), Dip Switch Adjustable
<b>Response Time - 3-Point</b>		200 ms
<b>Weight</b>	<b>Non-Spring Return</b>	9.1 lbs. (4.1 kg)
<b>UL Listed</b>		Temperature-Indicating and Regulating Equipment, XAPX, XAPX7. File E366456

<sup>1</sup> Also for On/Off (2-point) or Floating (3 point) depending on the connection for 24V~

<sup>2</sup> Design the transformers for this value, otherwise functional faults may occur.

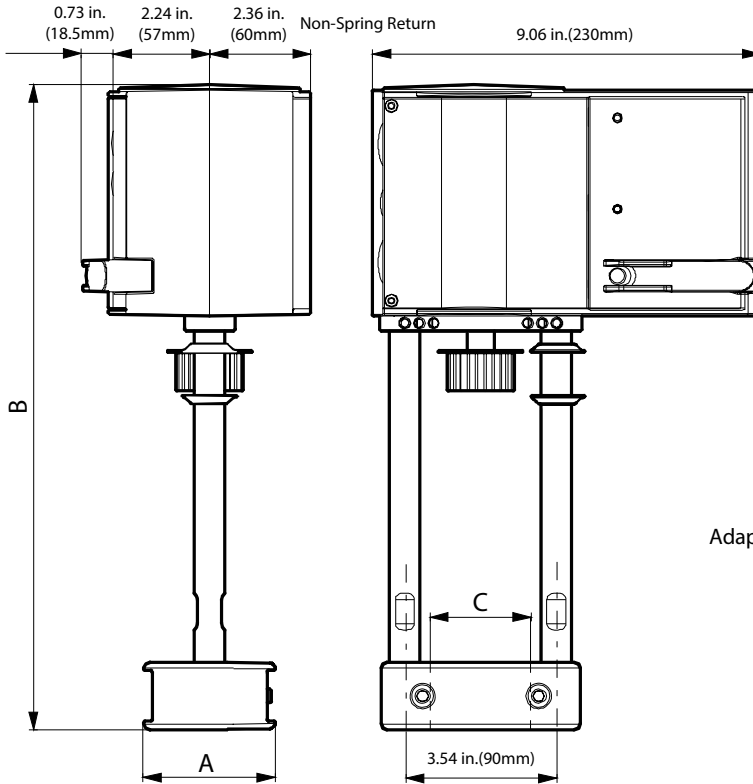
<sup>3</sup> An intermediate piece is required for medium temperatures between 266°F (130°C) and 464°F (240°C)

<sup>4</sup> The return time corresponds to a stroke of 0.55 in. (14 mm) to 1.58 in. (40 mm) and does not depend on the set run time.

*Disclaimer - The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Bray office. Bray, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.*

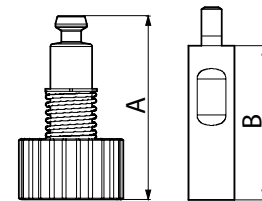


## GA - Dimensions



Description	A	B	C
GA Series	2.52 in. (64mm)	11.38 in. (289mm)	1.73 in. (44mm)

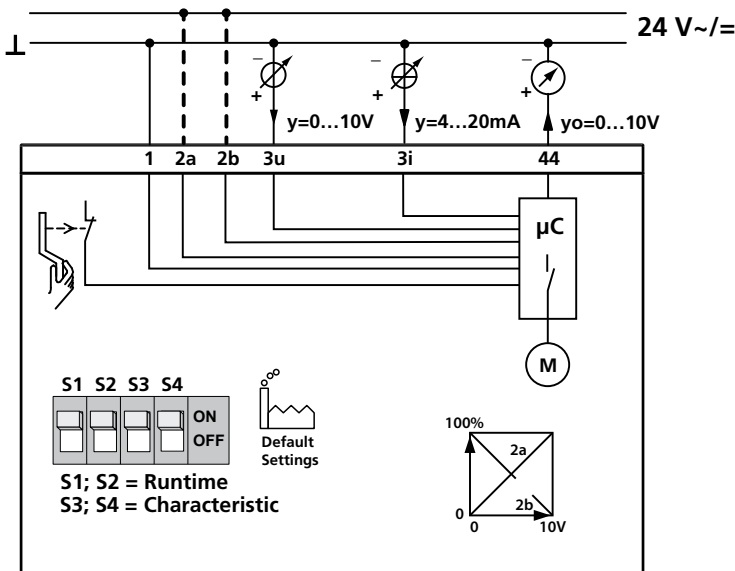
Adaptor for media temperatures between 266°F (130°C) and 464°F (240°C)



Part Number	A	B
0372336 240	4.31 in. (109.4mm)	3.94 in. (100mm)

## GA - Wiring

### Modulating



Y = modulating signal

1= Neutral/Common for power and signal

2a/2b- These terminals determine forward acting/reverse acting. One should be powered with 24V.

2a = Extends. 0 volts = 0% extended. 10V = 100% extended

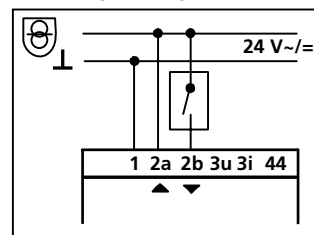
2b = Retracts. 0 volts = 100% extended. 10V = 0% extended

3u = 0 .. 10 V, in case of control by voltage

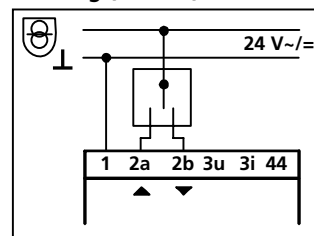
3i = 4 .. 20 mA, in case of control by current

44 = 0 .. 10 V Feedback, independent from the use of 3u or 3i

### On/Off (2 Point)



### Floating (3 Point)



= Extra Low Voltage

### Options

0372333 001

0372333 002

(Auxillary Switches)

