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GAS -Spring Return Actuator - (GASRE24-450 & GASEX24-450)

24V, On/Off, Floating and Modulating
Automatic adaptation to valve, precision control and high energy efficiency with minimal operating noise.

Features

- Actuator with spring return action and pushing force of 450 lbs. (2000 N), in 'normally retracted' or 'normally extended' versions
- DC 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 adaptor 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
- Spring assembly in Stainless 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^2) with screw terminals
- Three knock-out cable entries for M20×1.5 (2×) and M16×1.5
- Fitting 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

After a new start, up to 45 s of waiting time will pass before the drive is available again. Depending on the type of connection (see the wiring diagram), the device can be used as a modulating drive (0...10 V and/or 4...20 mA), a On/Off (2-point) drive (extend/retract) or a Floating (3-point) drive (extend/stop/retract). 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 spring function is active again and the setpoint position is adopted again (without calibration). If the hand crank is unfolded, the drive stays in this position.

Calibration and feedback signal

The drive calibrates itself automatically, whether it is used in a modulating, On/Off (2-point)or Floating (3-point) mode. Voltage needs to be applied to terminal 21. As soon as voltage is applied to either terminals 2a or 2b for the first time and the waiting period (both LEDs green) of approximately 45 seconds has elapsed, the drive 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.

Calibration and feedback signal - Continued
The control signal and the feedback signal are adjusted to this effective stroke. After an interruption to the voltage or a spring return action, no re-calibration is performed and the values are 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 0-10 VDC feedback. The feedback signal always increases as the shaft extends.

Re-Calibration
To re-calibrate, voltage needs to be applied to either terminals 2a or 2b and terminal 21. Prior to re-calibration if power has been disconnected or terminal 21 has lost power there will be a waiting period (both LEDs flash green) of approximately 45 seconds. 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 actuator 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.

Spring Return
If the voltage supply fails or is switched off, or if a terminal 21is disconnected, the brush- less DC motor releases the gear and the drive is moved into the respective end position (depending on the design version) by the pre-tensioned spring. As this happens, the control function of the drive is disabled for approximately 45 seconds (both LEDs green) so that the end position can be reached in every case. The reset speed is controlled with the help of the motor so that there are no pressure surges in the line. The brushless DC motor has three functions: as a magnet to hold the position, as a brake (by acting as a generator) and as a motor for the control function. After a spring return function, the drive does not re- calibrate itself.

Connection as a On/Off (2-point) Actuator
This activation can take place via two cables. Voltage is applied to terminals 2a and 21. Applying the voltage (24 V) to terminal 2b causes the actuator shaft to extend. After this voltage has been switched off, 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 the calibration was performed. Terminals 3i, 3u must not be connected.

Connection as a Floating (3-point) Actuator
Applying voltage to terminals 21, 2a or 2b makes it possible to move the valve to any desired position. If voltage is applied to 2b, the actuator shaft extends. The shaft retracts when voltage is applied 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 the calibration was performed. Terminals 3i, 3u 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.

Apply voltage to terminal 21.

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 y0 = 0...10 V corresponds to the effective valve extention of 0 to 100%.

Modulating Actuator (0...10 V and/or 4...20 mA) - Continued
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"
Both LEDs lit green:	Waiting time after switching on or after spring return
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 avoi- ded.
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 1,5 mm2 (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, comprising the front section, rear section and connection cover, only serves the purpose of a cover. The crank for manual adjustment is located on the front. The DC motor, the control electronics, the supporting components and the maintenance-free gear are accommodated in the housing.

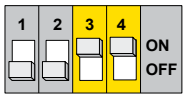
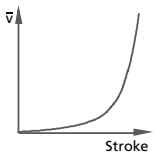
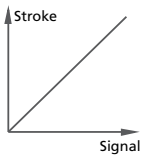
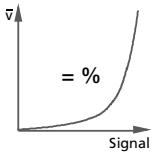
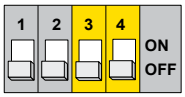
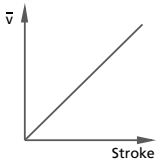
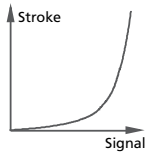
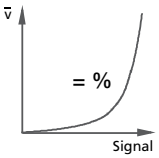
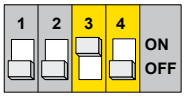
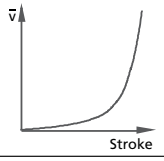
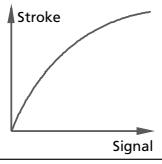
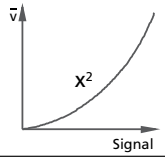
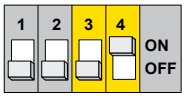
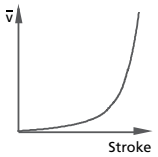
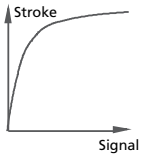
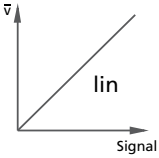
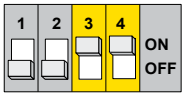
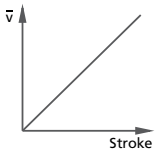
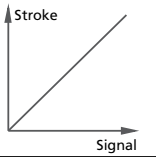
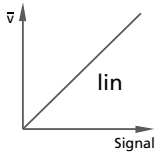
Auxiliary Changeover Switch
0372333 001 Switching capacity max. 250 V~, min. current 250 mA at 12 V (or 20 mA at 20 V) Switching capacity max. 12...30 V=, max. current 100 mA
0372333 002 Switching capacity max. 250 V~, min. current 1 mA at 5 V Switching capacity max. 0.1...30 V=, current 1...100 mA. Even if used only once above 10 mA or up to 50 V, the gold coating will be destroyed. The switch can then be used only for higher switching outputs.

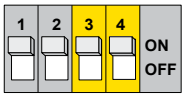
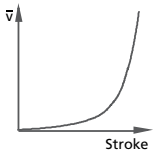
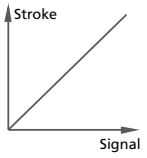
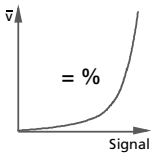
Warnings
- If the temperature of the medium in the valve is high, the drive columns and the shaft may also reach high temperatures.
- Drives with safety functions must be regularly checked to see that they are in working order (trial run).
- If a failure of the final control element could cause damage, additional protective precautions must be taken.
- It is forbidden to dismantle the springs in the device due to the high risk of injuries.

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

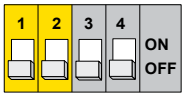
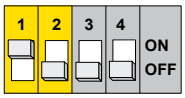
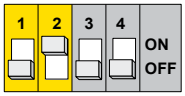
GAS - Curve Characteristic Switch Settings

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

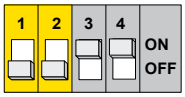
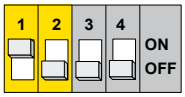
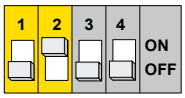
Desired Characteristic Curve	Switch Coding	Characteristic Curve for Valve	Characteristic Curve for Drive	Effective on Valve
Equal Percentage	 = Default Setting for Stand Alone GA Actuator			

GAS - Stroke Times

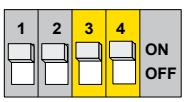
SSM Valve Stroke Times GA(S) Total Stroke = 1.93" (49mm)

Size / Valve Stroke		Switch Coding	2.5" & 3" .79" (20mm)	4" & 5" 1.58" (40mm)	6" & 8" 1.69" (43mm)	10" & 12" 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 / Valve Stroke		Switch Coding	2.5" & 3" .75" (19mm)	4" & 6" 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 / Valve Stroke		Switch Coding	2.5" & 3" .75" (19mm)	4" & 6" 1.5" (38mm)
GA(S) Stroke Time	153 s/in. (6s/mm)	 = Default Setting for Stand Alone GA Actuator	114 Sec.	228 Sec.

GAS - Specifications

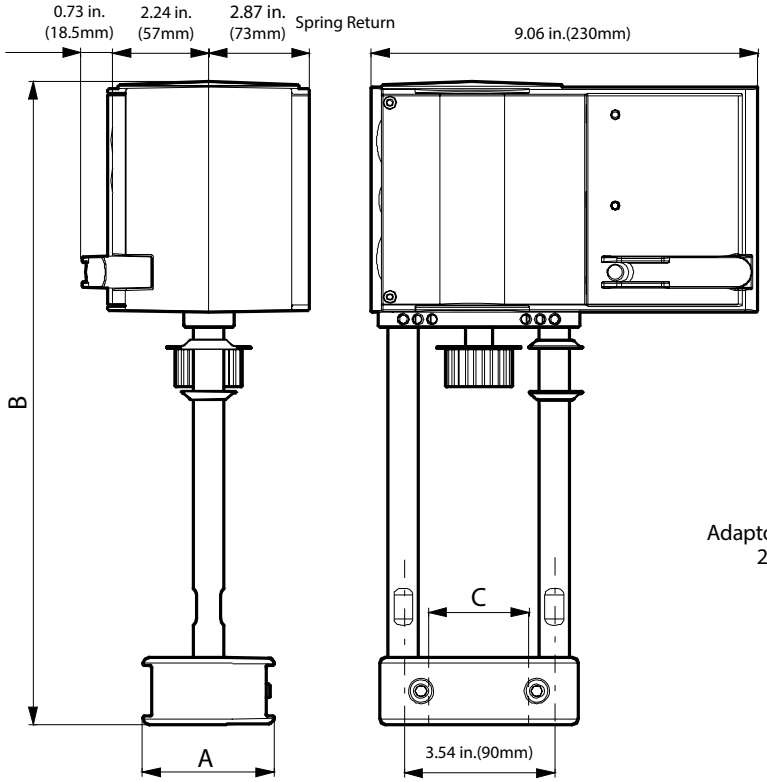
Technical Specifications

Spring Return	**GASRE24-450**	On/Off, Floating and Modulating, Shaft Normally Retracted
	GASEX24-450	On/Off, Floating and Modulating, Shaft Normally Extended
Power Requirements	**On/Off, Floating and Modulating**	24 VAC (±20%) at 50/60 Hz or 24 VDC (±15%)
Positioner[1]	**Control Signal 1**	0 to 10 V, Ri> 100 kΩ
	Control Signal 2	4 to 20 mA, Ri = 50Ω
	Position Feedback Signal	0 to 10 V, Load >2.5 kΩ
Action		Direct or Reverse Acting
Switching Range		300 mv
Power Consumption[2]	**Spring Return**	7.5W, 20VA
Force	**Spring Return**	450 lbs. (2,000 N) Power stroke and spring stroke
Stroke		0" to 1.93" (0-49mm)
Max. Temperature of Medium[3]		266˚F (130˚C)
Ambient Conditions	**Temperature**	14˚F to 131˚F (-10˚ to 55˚C)
	Humidity	0 to 95% RH without condensation
Level of Protection		IP 66. Not intended for outdoor use without additional protection.
Enclosure		Self-extinguishing plastic
Gear Materials	**Gears & Gearbox** **Mounting Column** **Mounting Bracket**	Steel Stainless Steel Cast Light Alloy
Electrical Connection		13 AWG (2.5 mm²) with screw terminals. Three knock-out cable entries for M20×1.5 (2×) and M16×1.5
Motor Run Time sec. per in. (mm)		51 (2), 102 (4), 153 (6), Dip Switch Adjustable
Spring Run Time[4]		15… 30 seconds
Number of Spring Returns		> 40,000
Response Time - 3-Point		200 ms
Weight	**Spring Return**	12.3 lbs. (5.6 kg)
UL Listed		Temperature-Indicating and Regulating Equipment, XAPX, XAPX7. File E366456

[1] Also for On/Off (2-point) or Floating (3 point) depending on the connection for 24V~
[2] Design the transformers for this value, otherwise functional faults may occur.
[3] An intermediate piece is required for medium temperatures between 266˚F (130˚C) and 464˚F (240˚C)
[4] 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.

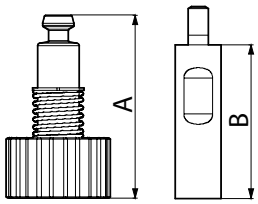
Disclaimer - *The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Bray office. Bray, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.*

GAS - Dimensions



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

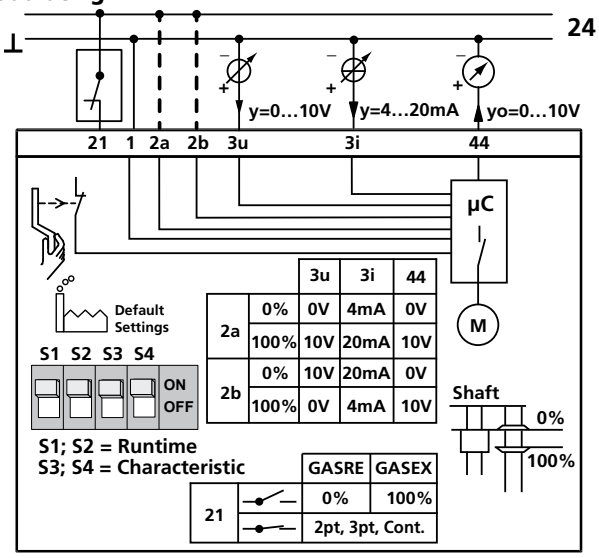
Adaptor for media temperatures between 266˚F (130˚C) and 464˚F (240˚C)



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

GAS - Wiring

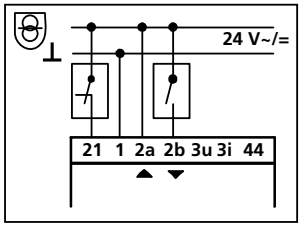
Modulating



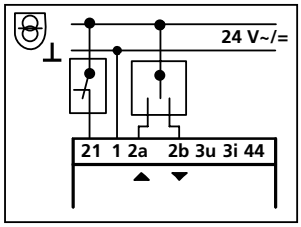
		3u	3i	44
2a	0%	0V	4mA	0V
	100%	10V	20mA	10V
2b	0%	10V	20mA	0V
	100%	0V	4mA	10V

		GASRE	GASEX
21		0%	100%
		2pt, 3pt, Cont.	

On/Off (2 Point)



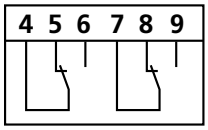
Floating (3 Point)



= Extra Low Voltage

Options

0372333 001
0372333 002
(Auxillary Switches)



Y = modulating signal
21= Latch voltage for the spring. Lose of power here causes the spring to drive to the fail position.
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