

Bray Commercial Division 13788 West Road, Suite 200A Houston, Texas 77041

BCDSales@Bray.com Phone: 1-888-412-2729 www.braycommercialdivision.com © 2022 Bray International, Inc. 12/11/24

VA(M)S-70 Series —70 lb-in (8 Nm) Electric Actuator

IOM Manual



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VA(M)S-70 Series - Installation, Operation and Maintenance Manual

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Те	Technical Specifications - VA(M)S-70 Series Actuator							
		VAS24-70-(A) VAS24-70-T-(A) VAMS24-70-(A)			VAS120-70-(A)			
Type	Actuator Models	Spring Return On/Off with optional Auxiliary Switches (-A)	Spring ReturnSpring ReturnOn/Off & FloatingModulatingwith optional Auxiliarywith optional AuxiliarySwitches (-A)Switches (-A)		Spring Return On/Off with optional Auxiliary Switches (-A)			
	Torque		70 lb-in	. (8 Nm)				
	Operating Voltage	24 VAC (18 to 30 V) at 50/60 Hz 24 VDC (21.6 to 28.8 V)	24 VAC (19.2 to 2) 24 VDC (21.	AC 120 V (102 to 132 V) at 60 Hz				
	Power Consumption	VAC - 6.1 VA Running, 1.2 VA Holding	VAC - 7.9 V 5.5 VA	0.05 A Running, 0.03 A Holding				
		VDC - 3.5 W Running, 0.5 W Holding	VDC - 3.5 V 1.9 W F					
	Input Signal	N/A	0(2) to 10 VDC N/A 0(4) to 20 mA (with 500- ohm Resistor)		N/A			
	Min. Transformer Size	7 VA per Actuator	8 VA per	Actuator	N/A			
Electrical	Input Signal Adjustments	N/A	AC 19.2 to 28.8 V at 50/60 Hz or DC 24 V +20%/-10%,Class 2 or SELV, Minimum Pulse Width: 500 ms	Factory Setting - DC 0 to 10 V, CW Rotation with Signal Increase Selectable DC 0 (2) to 10 V or 0 (4) to 20 mA with Field- Furnished 500 ohm 0.25 W Min. Resistor Switch Selectable - Direct or Reverse Action	N/A			
	Control Input Impedance	N/A	3000 Ohms	100k Ohms, Current Input: 500 Ohms with Field Fur- nished 500 Ohm Resistor	N/A			
	Feedback Signal	N,	/Α	DC 0 (2) to 10 V for De- sired Rotation Range up to 95°. Corresponds to Rota- tion Limits, 0.5 mA at 10 V Maximum	N/A			
	Auxiliary Switch Rating	(-A) Models) Two Single- with Gold ove	 (-A) Models) Two Single- Pole, Double-Throw (SPDT), Double-Insulated Switches with Gold over Silver Contacts: AC 120 V, 5.8 A Resistive, 1/4 hp, 275 VA Pilot Duty 					
	Equipment Rating	Class 2	(SELV)	N/A				
	Electrical Connection	48 in. UL 758 Type AWM H	25 in. (6 mm) Ferrule Ends					
	Conduit Connections	Integral Connectors for 3/8 in. (10 mm) Flexible Metal Conduit						
	Manual Override	Manual Override Crank						
Operation	Spring Return	Direction is Selectable with Mounting Position of Actuator: Actuator Side A is away from damper or valve: CCW Spring Return Actuator Side B is away from damper or valve: CW Spring Return						
	Rotation Range	Maximum Full Stroke: 95° - (Adjustable Stop: 35 to 95° Maximum Position (Modulating Only))						
	Electric Stall Detection							

Те	Technical Specifications - VA(M)S-70 Series Actuator - Continued								
		VAS24-70-(A)	VAS24-70-T-(A) VAMS24-70-(A)		VAS120-70-(A)				
Type	Actuator Models	Spring Return On/Off with optional Auxiliary Switches (-A)	Spring Return Spring Return On/Off & Floating Modulating with optional Auxiliary with optional Auxiliary Switches (-A) Switches (-A)		Spring Return On/Off with optional Auxiliary Switches (-A)				
Operation	Runtime for 90° of Rotation	Power On (Running) 55 to 71 Seconds for 0 to 70 Ib-in (8 N·m) Load, at All Operating Conditions 60 Seconds Nominal at Full Rated Load (0.25 rpm) Power Off (Spring Return- ing) 13 to 26 Seconds for 0 to 70 Ib-in (8 N·m) Load, at Room Temperature 21 Seconds Nominal at Full Rated Load, 39 Seconds Maximum with 70 Ib-in (8 N·m) Load at -4°F (-20°C) 108 Seconds Maximum with 53 Ib-in (6 N·m) Load at -40°F (-40°C)	Power On (Running) 150 Se Ib·in (8 N·m) Load, At A Power Off (Spring Running) Ib·in (8 N·m) Load, a 22 Seconds Nominal at Fu Maximum with 70 Ib·in (8 N	 Power On (Running) 55 to 71 Seconds for 0 to 70 lb-in (8 N·m) Load, at All Operating Conditions 60 Seconds Nominal at Full Rated Load (0.25 rpm) Power Off (Spring Return- ing) 13 to 26 Seconds for 0 to 70 lb-in (8 N·m) Load, at Room Temperature 21 Seconds Nominal at Full Rated Load, 39 Seconds Maximum with 70 lb-in (8 N·m) Load at -4°F (-20°C) 108 Seconds Maximum with 53 lb-in (6 N·m) Load at -40°F (-40°C) 					
	Cycle Life	60,000 Full Stroke Cy	cles with 70 lb·in. (8 N·m) Loa	d, 1,500,000 Repositions with	70 lb·in. (8 N·m) Load				
	Mechanical Connections	Round Shafts - 5/16 to 5/8 in. (8 to 16 mm) Square Shafts - 1/4 to 1/2 in. (6 to 12 mm)							
	Enclosure	NEMA	2 (IP54) for all mounting orier	tations	N/A				
	Ambient Conditions (Non-Condensing)	Operating — -40° to 140°F (-40° to 60°C); 90% RH Maximum, Non-condensing Storage — -40° to 185°F (-40° to 85°C); 95% RH Maximum, Non-condensing							
invironmental	Audible Noise Rating	Running — < 47 dBA at 70 Ib-in (8 N·m) Load, at a Distance of 39-13/32 in. (1 m) Holding — < 20 dBA at a Distance of 39-13/32 in. (1 m)	Running — 35 dBA at 70 Distance of 39 Holding — < 20 dBA at a D Returning — <52 dBA a	Running — < 47 dBA at 70 Ib-in (8 N·m) Load, at a Distance of 39-13/32 in. (1 m) Holding — < 20 dBA at a Distance of 39-13/32 in. (1 m)					
		at 70 lb·in. (8 N·m) Load - (All at a Distance of 39- 13/32 in. (1 m))	(All at a Distance o	at 70 lb·in. (8 N·m) Load - (All at a Distance of 39- 13/32 in. (1 m))					
	Dimensions								
	Weight	3.5 lb. (3.9 lb w/ Aux. Switches) 4.2 lb.							
Conditions	Agency Certifications	UL Listed, CCN XAPX, File and Similar Use; ar UL Listed, CCN XAPX7, File for Household and Simil CE Mark - This product is i Di	ical Controls for Household Electric Actuators. utomatic Electrical Controls d Regulating Equipment want provisions of the EMC EC.						
	Warranty	5 Years limited from time of shipment.							

IMPORTANT: Do not install multiple DMS series actuators connected to the same mechanical load. Master-slave application of DMS or VAMS series actuators requires that each actuator be connected to independent loads.

Warning - These actuators are designed for use only in conjunction with operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add safety devices or alarm systems that protect against, and/or warn of, control failure.

To avoid excessive wear or drive time on the motor, use a controller and/or software that provides a time-out function to remove the signal at the end of rotation (stall).

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

Applications

The VA(M)S-70 Series Electric Spring Return Actuators are direct-mount valve actuators that operate on AC/DC 24 V power. These bidirectional actuators are used to provide accurate positioning on Bray Ball Valves in Heating, Ventilating, and Air Conditioning (HVAC) applications. Integral line voltage auxiliary switches, available only on the (-A) models, indicate end-stop position, or perform switching functions within the selected rotation range.

IMPORTANT:

Use this VA(M)S24-70 Series Electric Spring Return Actuator only to control equipment under normal operating conditions. Where failure or malfunction of the electric actuator could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the electric actuator.

Parts Included

 One electric VA(M)S24-70 Series actuator with 48 in. UL 758 Type AWM Halogen-Free Cable w/ 18 AWG (0.85 mm²) Conductors & 0.25 in. (6 mm) Ferrule Ends.

Special Tools Needed

- Commissioning Tool or digital voltmeter
- T-20 TORX® driver

IMPORTANT:

Use this VA(M)S24-70 Series Electric Spring Return Actuator only to control equipment under normal operating conditions. Where failure or malfunction of the electric actuator could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the electric actuator.

IMPORTANT:

Before specifying VA(M)S24-70 Series Electric Spring Return Actuators for plenum applications, verify acceptance of exposed plastic materials in plenum areas with the local building authority. Building codes for plenum requirements vary by location. Some local building authorities accept compliance to U L 1995, Heating and Cooling Equipment, while others use different acceptance criteria

IMPORTANT:

Do not install or use this VA(M)S24-70 Series Electric Spring Return Actuator in or near environments where corrosive substances or vapors could be present. Exposure of the electric actuator to corrosive environments may damage the internal components of the device, and will void the warranty.



Mounting Positions for Chilled Water and Condensing Atmosphere Applications

Mounting

To mount the actuator to Spring Return Port A (Coil) Open:

 Turn the valve stem to the position outlined in (Figure 1)



Figure 1: Positioning the Valve Stem

 Mount optional Thermal Barrier to the valve if fluid temperature exceeds 212° F (100° C). See the Mounting the Thermal Barrier section for more information.

NOTE:

Proceed to Step 7 if the ball valve linkage is on actuator Side B.

3. Remove the linkage from Side A (Figure 2).



Figure 2: Removing the Linkage

4. Turn the valve stem to the position outlined in (Figure 3)



Figure 3: Inserting the Drive Shaft

5. Install linkage base on Side B using the two # 10-14 x 2.75 in. long screws (Figure 4). The recommended torque is 20 to 24 lb· in. (2.3 to 2.7 N·m).



Figure 4: Installing the Linkage

6. Insert fixed pointer and M4x0.7x83 mm long screw into the Side A actuator hub. Direct the arrow on the pointer to 100%.



Figure 5: Installing the Fixed Pointer

 Install the actuator on the ball valve (Figure 6). Tighten the actuator mounting screw to a torque of 10 to 12 lb· in. (1.1 to 1.4 N·m) and snap in the large adjustable pointer into place.



Figure 6: Mount the Actuator

Mounting

To mount the actuator to Spring Return Port A (Coil) Closed:

1. Turn the valve stem to the position outlined in (Figure 7).



Figure 7: Positioning the Valve Stem

 Mount optional Thermal Barrier to the valve if fluid temperature exceeds 212° F (100° C). See the Mounting the Thermal Barrier section for more information.

NOTE:

Proceed to Step 7 if the ball valve linkage is on actuator Side A.

3. Remove the linkage from Side B (Figure 8).



Figure 8: Removing the Linkage

4. Insert the drive shaft into Side A (Figure 9).



Figure 9: Inserting the Drive Shaft

- Install linkage base on Side A using the two # 10 14 x 2.75 in. long screws. The recommended torque is 20 to 24 lb·in. (2.3 to 2.7 N·m).
- 6. Insert fixed pointer and M4x0.7x83 mm long screw into the Side B actuator hub. Direct the arrow on the pointer to 0% (Figure 11).



Figure 10: Installing the Linkage



Figure 11: Installing the Fixed Pointer

 Install the actuator on the ball valve (Figure 12). Tighten the actuator mounting screw to a torque of 10 to 12 lb· in. (1.1 to 1.4 N·m) and snap the large adjustable pointer into place.



Mounting the -HT Thermal Barrier



Figure 13: Optional -HT Thermal Barrier

To mount the optional -HT thermal barrier:

 Install the thermal barrier drive shaft into the thermal barrier by aligning the tab on the drive shaft with the slot on the thermal barrier (Figure 14).



Figure 14: Installing the Drive Shaft into the Thermal Barrier

- 2. Rotate the drive shaft to align marks on the top of the thermal drive shaft with matching marks on the valve stem.
- Mount the thermal barrier onto the valve using the four included M5x16 mm machine screws and four M5 flange nuts. Tighten the screws to a recommended torque of 21 to 25 lb·in.
 (2.4 to 2.8 N·m) (Figure 15).

Figure 12: Mount the Actuator



Figure 15: Installing the Barrier

4. Proceed to actuator mounting instructions. Follow the same steps as mounting directly to the valve when mounting the actuator to the thermal barrier.

NOTE:

Depending on your application, you may position the assembly in any of the four 90° increments on the valve.

Manual Override:

Use only the supplied manual override crank to reposition the actuator hub when using the manual override feature.

IMPORTANT:

Applying excessive torque to the manual override or operating the manual override with a power tool may damage the internal components of the actuator and cause premature failure.

To reposition the actuator hub, proceed as follows:

- 1. De-energize the actuator.
- 2. Insert the hex end of the manual override crank into the manual override adjustment point on the face of the actuator.
- Rotate the manual override crank in the direction indicated by the arrow on the label.

- 4. The actuator requires 8-1/2 manual override crank rotations from the full spring return position to fully reposition the actuator hub. At the end of travel, the rotation resistance increases. Do not force the manual crank past this point.
- 5. While holding the manual crank in the wound position, rotate and hold the red lock shaft approximately 10° then release the manual crank to lock the actuator hub in place.

NOTE:

Insert and slightly rotate the manual crank in the direction indicated by the arrow on the label to unlock the actuator hub. Alternately, the actuator hub automatically unlocks when power is applied to the actuator, and returns the actuator to normal drive and spring return operation.



Figure 16: Adding Flexible Metal Conduit

- 1. Feed the actuator cables through the field supplied conduit.
- Push the conduit into the holes in the actuator and secure it with the supplied 10-32x9/16 in. screws, as illustrated in Figure 16. The product label marks the position of holes for the screws. Drive the screws through the product label in the marked positions. Drive the screwhead flush with the plate to secure the conduit.

IMPORTANT:

Careful workmanship is required to secure flexible metal conduit. Cut the conduit end perpendicular to its axis. Insert the cut end into the bottom of the holes in the actuator and hold the conduit in place while securing it with the screws provided. Check a completed installation by pulling on the conduit to ensure its retention.

Setup and Adjustments Mode Selection Switch:

Actuators have an external mode selection switch to calibrate, select input signal range, and reverse control logic. The switch is accessible from both A and B sides of the actuator as illustrated in Figure 17. Actuators are delivered in Direct Acting (DA), DC 0 to 10 V input signal mode. To change to Reverse Acting (RA) mode, move the mode selection switch from DA to RA. The input signal range is selectable between DC 0 to 10 V or DC 2 to 10 V. If the CAL function is not used, both input signal ranges are proportioned across the full rotation range of 0 to 100% rotation.





Side A of Actuator

Figure 17: Mode Selection

For example, if a DC 0 to 10 V input signal is selected and the rotation range is limited to 75° , the rotation range limit will be reached at DC 8.3 V.

Control Response:

The installation side of the actuator and the position of the mode selection switch combine to determine control response from the actuator. See Figure 18.



Calibration (CAL) Function:

The CAL function enables the actuator to redefine the selected input signal range proportionally across a reduced rotation range. The actuator maintains calibration when power is lost or removed.

Follow these steps to calibrate the input signal range:

- 1. With power applied to the actuator, move the mode selection switch to the CAL position and leave it in this position for approximately 5 seconds. The actuator begins rotating until the end-stops are found.
- 2. Move the mode selection switch to the desired input signal range. Selection can be made while the calibration process is in progress, or after it is complete. The selected input signal is proportionally reconfigured to the reduced rotation range.

Note:

During normal operation, if the actuator stroke increases due to seal or seat wear, input signals are automatically reconfigured to the increased rotation range in approximately 0.5° increments.

3. If the actuator mounting position is changed or if the linkage is adjusted, repeat Step 1 and Step 2 to repeat the CAL function.

Note:

The mode selection switch must remain out of the CAL position for at least 2 seconds before re-initiating the CAL function.

Note:

If the mode selection switch is left in the CAL position, the actuator defaults to 0-10 V input signal range, DA.

* 0° is the spring return position.

Figure 18: Control Response

Auxiliary Switch (-A Models):

The (-A) models include two integral auxiliary switches with a switch adjuster accessible on either face of the actuator. (See Figure 2 and Figure 3.) The factory setting for auxiliary switch No. 1 is 11° closing, and the nominal setting for auxiliary switch No. 2 is 81° opening (relative to the 0 to 90° rotation range as printed on the product label). See the Technical Specifications table for the auxiliary switch ratings.

The switch point of Auxiliary Switch No. 1 is fixed. The switch point of Auxiliary Switch No. 2 is independently and continuously adjustable from 74 to 5% position. For the most accurate switch positioning, see Figure 19 and use the method in the following example. To change the switch point of Auxiliary Switch No. 2, proceed as follows:

1. Position the actuator in the full spring return position.

Note: The switch is factory set to trip when the actuator reaches the 10% position.

2.Rotate the switch adjuster until it points to the desired switch point.



Figure 19: Switch Trip Point Settings

- 3. Connect Auxiliary Switch No. 2 to a power source or an ohmmeter and apply power to the actuator. The actuator moves to the fully open position and holds while power is applied.
- 4. Observe the switch point. If required, repeat Step 1 through Step 3.



Wiring:

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AC/DC 24 V ~(+)

-(A)								
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E	BLK/ RED	BLK/ BLU	BLK/ GRY	WHT/ RED	WHT/ BLU	WHT/ GRY		
	21	22	23	24	25	26		
(NC	NO	СОМ	NC			
	_						_	





