


Series 70 Actuators **24 VAC/DC and 120 VAC** **800 to 18,000 lb.-in.**

DOCUMENT	
CONTENTS	Specifications
	Model Selection
	Features
	Dimensions
	Wiring
LOOKING FOR MORE	
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Application

Bray's years of proven success in quarter turn electric actuation, combined with innovative engineering, has produced the modern Series 70. The Series 70 has become the industry standard in the Commercial HVAC industry due to its compact, reliable design that mounts directly to Bray's industry leading butterfly and industrial ball valves without the need for brackets and linkages. Available in torque outputs from 800 to 18,000 lb.-in. (90 to 2033 NM), 24 VAC/DC and 120 VAC, On/Off and Modulating units all in NEMA 4x and IP65 rated housings.

These actuators are ideal for use on valves for Chillers, Cooling Towers, Boilers, Heat Exchangers and other outdoor applications. Furthermore, its advanced electronics assure reliable compatibility with virtually any analog control signal used in today's building automation and temperature control system.

There is no better choice for building automation!

System Types

Air Handling Units
Heat Exchangers
Computer Rooms
and more.



Features and Benefits

- **Compact Design and Direct Mounting**
Assists in field operation
- **High Visibility Beacon Position Indicator**
Reduces pump head requirements for added energy efficiency
- **Manual Dec clutchable Override Handwheel**
Manual positioning without disconnecting power
- **Servo NXT Option for Modulating Control**
One Touch Menu driven pushbutton selection of all settings
- **Available with Battery Backup on 24 VAC/DC Models**
Assures return to a predetermined position upon loss of power supply

Series 70 - Specifications

Construction	
Housing	ASTM B85 Pressure Die Cast Aluminum - Polyester Powder Coated
Motor	120 VAC 24 VAC/DC Single Phase, Reversible, Permanent Split Capacitor Induction Motor Permanent Magnet-Brush D.C. Motor
Heater	Optional, 5 Watt PTC style
Terminal Strip	Switch Plate 12 - 22 AWG (2.0 - 0.65mm) Servo 14 - 24 AWG (1.63 - 0.51mm)
Torque Limiting	Optional, Open and Closed preset at factory - Standard on 13,000 & 18,000 lb.-in.
Auxiliary/Limit Switches: SPDT	120 VAC 10A- 1/3 HP
	220 VAC 10A-1/2 HP
	250 VDC 1/4A
	12 VDC 2A
Exposed Fasteners	Stainless Steel
Travel Stops	Externally adjustable at both 0 and 90 degrees
Conduit Entries	800 lb.-in. Two 1/2" NPT
	1200 lb.-in. and Higher Two 3/4" NPT
Weight	See Dimensions
Enclosure	Designed to meet NEMA Type 4, 4x and IP65 specifications
Warranty	3 Years
Certifications	UL/CSA 120V. CE 24 & 120V

Operating Conditions	
Motor Insulation	120 VAC: Class F, 311°F (155°C) thermal trip at 275°F (135°C) 24 VAC/DC: Class B, Fast Blow Fuse 5A 250VAC
Ambient Temperature	-20° to 150°F (-29° to 65°C)
Continuous Duty	Will operate continuously at a maximum ambient temperature of 104°F (40°C)
Manual Operation	Pull to Engage, Push to Disengage - 30:1 drive ratio, 13 & 18K lb.-in. models are 90:1

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.

Torque and Motor Data						
24 V Models	Voltage 50/60 Hz	(lb.in)	(NM)	Stroke Time*	Full Load Amps	Power Consumption VA
70-24-0081H & 70-24-0081SVH	24 VAC/DC	800	90	60 Sec.	2.90	70
70-24-0201H & 70-24-0201SVH	24 VAC/DC	2000	226	80 Sec.	3.50	84
70-24-0501H	24 VAC	5000	565	90 Sec	4.00	96
70-24-0501SVH	24 VAC/DC	5000	565	90 Sec.	4.00	96

All 24V current ratings include heaters and servos

- 24V heater = 208 mA
- 24V modulating servo current draw = 0.3 A

Torque and Motor Data						
120 VAC Models	Voltage 50/60 Hz	(lb.in)	(NM)	Stroke Time*	Full Load Amps	Locked Rotor Amps
70-0081H & 70-0081SVH	120 VAC	800	90	30 Sec	0.80	1.00
70-0121H & 70-0121SVH	120 VAC	1,200	135	30 Sec	0.75	2.10
70-0201H & 70-0201SVH	120 VAC	2,000	226	30 Sec	0.85	2.10
70-E301H & 70-E301SVH	120 VAC	3,000	339	30 Sec	1.00	2.10
70-0501H & 70-0501SVH	120 VAC	5,000	565	30 Sec	1.60	3.00
70-0651H & 70-0651SVH	120 VAC	6,500	734	30 Sec	2.30	3.10
70-1300H & 70-1300SVH	120 VAC	13,000	1,470	110 Sec	2.30	3.10
70-1800H & 70-1800SVH	120 VAC	18,000	2,034	110 Sec	2.50	3.10

For 120V models, heater and servo current draws are additive

- 120V Heater + 42 mA
- 120V servo + 0.3 A

*Stroke Times shown are with 60 Hz power.

Actuators with 50 Hz power supply will be 20% slower.

Series 70 - Servo NXT Specifications

Specifications - Servo NXT		
Power Requirements	120 VAC	+/- 10% (50/60Hz)
	24 VAC	+/- 10% (50/60Hz)
	24 VDC	-10%, + 30%
	5 VA	For NXT electronic module alone (see S70 Power Consumption for full power requirements)
	Fuse	5A Fast Blow 5mm x 20mm
Input Signal	Control Signal	4-20mA, 0-10VDC, 0-5 VDC, 2-10VDC
	Input Impedance	>100 Meg Ohms (0-10V, 2-10V, 0-5V) and 200 Ohms (4-20mA)
Output Signal	Operating Modes	4-20mA, 0-10VDC, 0-5 VDC
	Required Control Panel Impedance	≤ 400 Ohms (4-20mA Output Mode) ≥ 1,000 Ohms (0-10VDC Output, 0-5VDC Output)
	NXT Loop Power	12 VDC Max, Do not supply external power (4-20mA Output) 24mA Max, Do not supply external power (0-10, 0-5VDC Output)
Resolution	Absolute Position Accuracy	< 1%
	Dead Band Adjustment	1% (+/- 0.5%) to 6% (+/- 3%) (3% default) 1% minimum increment
Speed Control	Open/Close Speed	0% - 100% (default). Step size: 20%. Actuator open/close speed referenced below
Operating Mode	Normal Mode	Modulating - Follow Setpoint
	Loss of Signal	Settable to Open, Close, or Last
	Reverse Acting Modes	Flashing "ON" LED = Reversed input and output signal Solid "ON" LED = Reversed input and normal output signal
	Auto Calibration	Automation of storing calibration settings
	Manual Operation	Keypad electrical manual operation of actuator (Open, Stop, Close)
	Control Box Operation	Optional inputs available
Torque Protection	Stall Detection	Motor detected stationary > 2 Seconds (800 to 6500 lb.-in. units only)
	Torque Limit	Optional connected Open/Close Torque Limit switch
Environmental	Ambient Temperature	-22°F (-30°C) to 150°F (65°C), Non condensing humidity

The Servo NXT offers precise modulating service for accurate position control.

- One touch automatic calibration
- User-friendly interface
- Advanced control of proportional band and dead band
- Automatic pulsing mode for precise positioning
- Self diagnostics
- Action on loss of command signal
- Go to position commands



Actuator Open/Close Speed Chart

Speed Setting	24 VAC/DC	120 VAC	120 VAC 13k/18k
100	60	30	110
80	119	59	219
60	178	88	328
40	237	117	437
20	296	146	546
0	355	175	655

Series 70 - Model Selection Charts

24 V Actuators

800 lb.in Model Number	24 VAC/DC	24 VAC/ 30 VDC	On/ Off	Modulating	Heater	AUX. Switches	Battery Backup
70-24-0081H	●		●		●	●	
70-24-0081SVH	●			●	●	●	
70-24-0081H-BBU		●	●		●	●	●
70-24-0081SVH-BBU		●		●	●	●	●

2000 lb.in Model Number	24 VAC/DC	24 VAC/ 30 VDC	On/ Off	Modulating	Heater	AUX. Switches	Battery Backup
70-24-0201H	●		●		●	●	
70-24-0201SVH	●			●	●	●	
70-24-0201H-BBU		●	●		●	●	●
70-24-0201SVH-BBU		●		●	●	●	●

5000 lb.in Model Number	24 VAC/DC	24 VAC	24 VAC/ 30 VDC	On/ Off	Modulating	Heater	AUX. Switches	Battery Backup
70-24-0501H		●		●		●	●	
70-24-0501SVH	●				●	●	●	
70-24-0501H-BBU			●	●		●	●	●
70-24-0501SVH-BBU			●		●	●	●	●

120 VAC Actuators

800 lb.in Model Number	120 VAC	On/ Off	Modulating	Heater	AUX. Switches
70-0081H	●	●		●	●
70-0081SVH	●		●	●	●

1200 lb.in Model Number	120 VAC	On/ Off	Modulating	Heater	AUX. Switches
70-0121H	●	●		●	●
70-0121SVH	●		●	●	●

2000 lb.in Model Number	120 VAC	On/ Off	Modulating	Heater	AUX. Switches
70-0201H	●	●		●	●
70-0201SVH	●		●	●	●

3000 lb.in Model Number	120 VAC	On/ Off	Modulating	Heater	AUX. Switches
70-E301H	●	●		●	●
70-E301SVH	●		●	●	●

5000 lb.in Model Number	120 VAC	On/ Off	Modulating	Heater	AUX. Switches
70-0501H	●	●		●	●
70-0501SVH	●		●	●	●

6500 lb.in Model Number	120 VAC	On/ Off	Modulating	Heater	AUX. Switches
70-0651H	●	●		●	●
70-0651SVH	●		●	●	●

13000 lb.in Model Number	120 VAC	On/ Off	Modulating	Heater	AUX. Switches
70-1300H	●	●		●	●
70-1300SVH	●		●	●	●

18000 lb.in Model Number	120 VAC	On/ Off	Modulating	Heater	AUX. Switches
70-1800H	●	●		●	●
70-1800SVH	●		●	●	●

Note: Heaters are optional

To receive units without a heater, remove the "H" from the part number. (Ex.: 70-0501, 70-24-0501-BBU)

Application Note:

Use Series 70 actuators 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.

Series 70 - External Features

High-Visibility Position Indicator
 Prominently labeled and color coded
 High impact, heat and chemical resistant
 O-Ring weather seal for dome cover
 No protrusion through enclosure

Captive Cover Bolts
 placed outside sealing area

O-Ring Seal
 To ensure a weather proof enclosure- NEMA 4, 4X, IP65



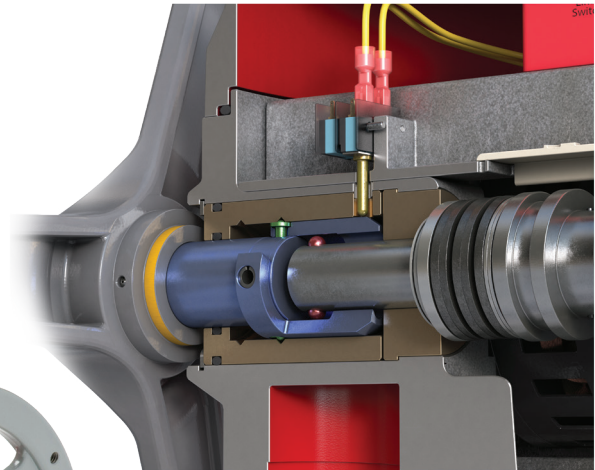
Mechanical Travel Stop Bolts
 Lock-nut to prevent loosening
 Sealed to prevent moisture ingress
 Designed to prevent over-travel while operating the actuator manually
 Prevents adjustment of travel stops below 90° limit switch adjustment
 Permits up to 5° over travel

Extremely Low Profile Actuator
 Direct mounting to Bray valves

Die-Cast Aluminum Housing
 High quality polyester powder coating
 Easy to remove and re-install cover



Conduit Entries
 The Series 70 features two conduit connections one for power, one for control wiring.

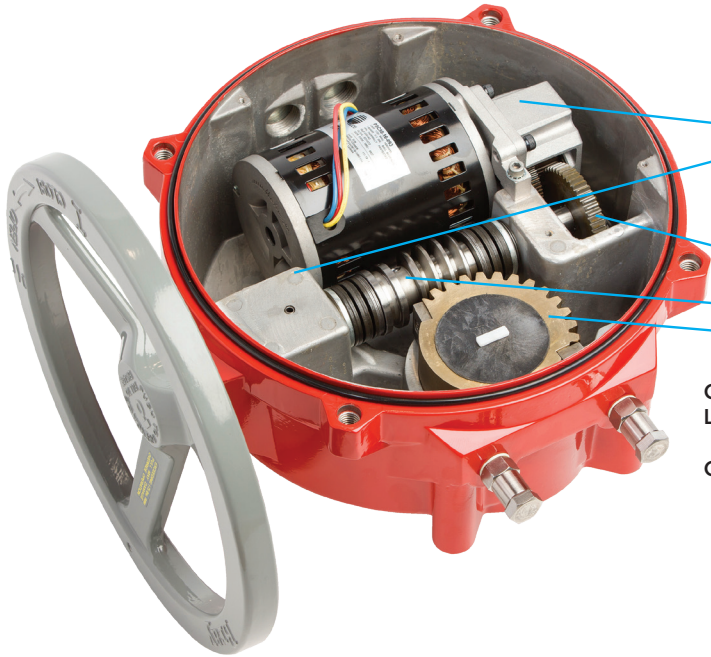


Handwheel Manual Override
 Pull Out Handwheel to engage override/
 push-in to disengage

Yellow stripe around handwheel shaft
 notes override is engaged

Electrical switch interrupts power to
 the motor

Series 70 - Internal Features



Power Center

BEARINGS

- Motor Gear** - Permanently sealed ball bearing
- Worm Shaft** - Sintered Bronze bushing with heavy duty thrust bearing

GEARING

- Spur Gearing** - AGMA Class 9, Alloy Steel, Nitride Hardened
- Worm** - Chromoly
- Worm Gear** - Aluminum Bronze

- Capacitor (120V Only)** - Metalized Polyester
- Lubrication** - High Temperature Synthetic Grease

- Override Wheel** - 17-4PH Stainless Steel Hardened to H 900

Control Center

SERVO NXT - Provides precise modulating control of valve position

One Touch Programming

Menu driven, pushbutton-programming with LED confirmation of all settings:

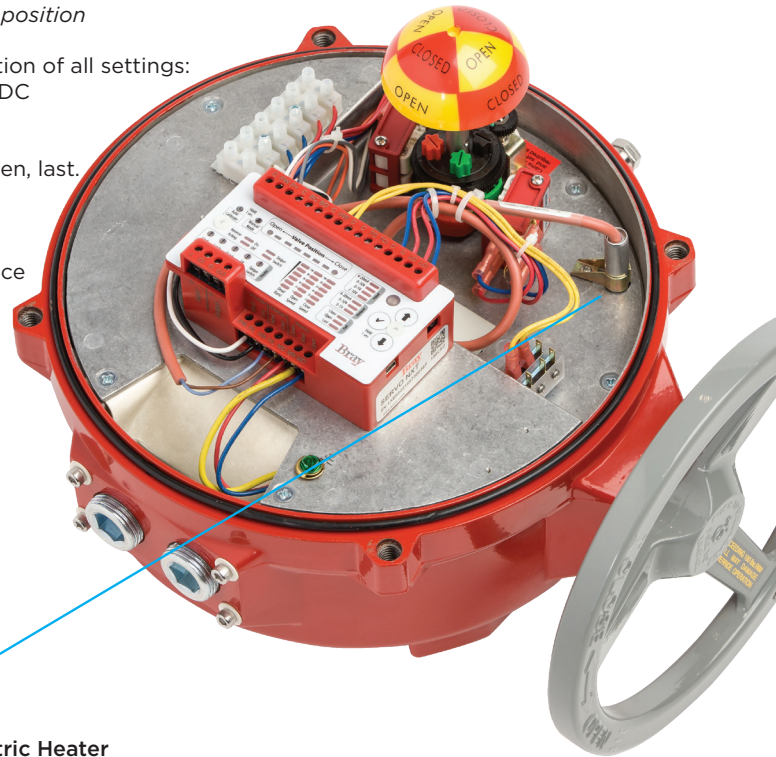
- Configurable Input Control - 4-20 mA, 0-10, 0-5 or 2-10 VDC
- Position Feedback - 4-20 mA, 0-10 or 0-5 VDC
- Auto Calibrating sequence for travel limits
- Fail Position (loss of input signal) - Configurable close, open, last.
- Speed Control - Independent for open & close direction

Including:

- Manual Mode - Local operation via Servo NXT user interface
- Fault display - Simplifies troubleshooting
- Stall detection - Eliminates mechanical damage in case of obstruction or bad switch settings

Optical Independent isolation of all inputs/outputs

- Provides interoperability with all controllers
- Earth ground tolerant
- Allows for parallel operation



Electric Heater

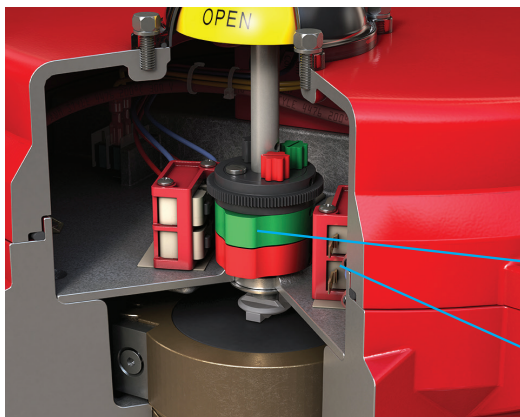
- Self-regulating temperature controlled

Patented Travel Limit Switch Cams

- Green Open/Red Closed
- Infinitely Adjustable

2 SPDT Auxiliary Switches

- Indicate travel position to remote customer control systems

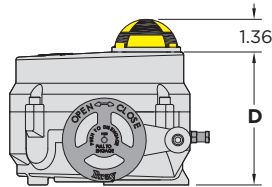
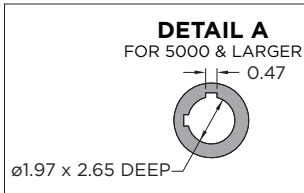
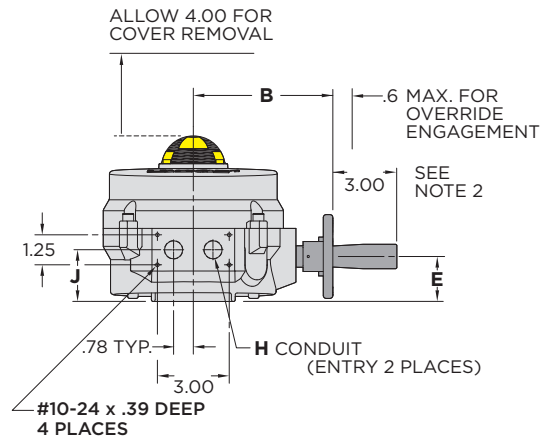
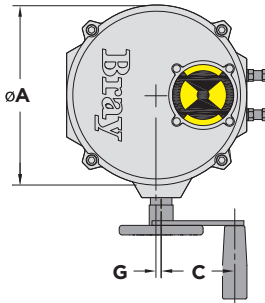
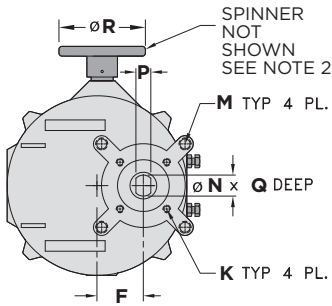


Series 70 - Dimensions

70-0081 TO 70-0651

Series 70 Actuator - DIMENSIONS In./.(mm)

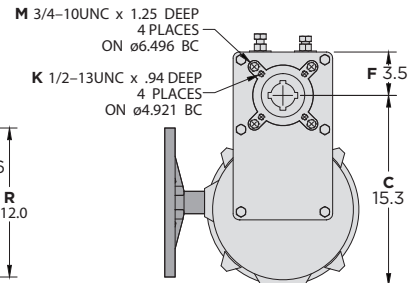
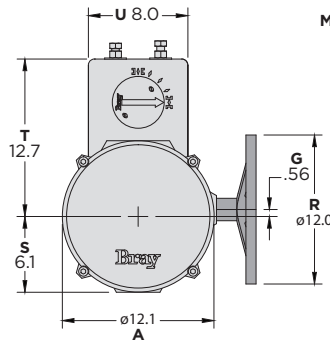
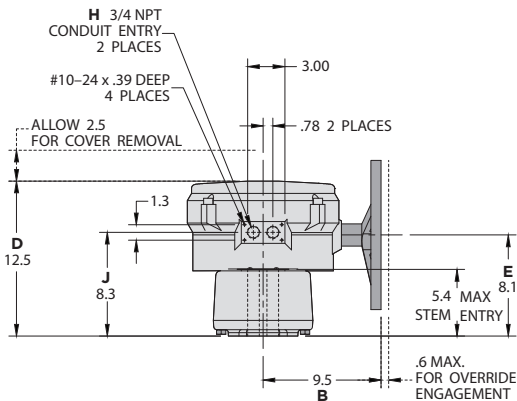
Actuator Model Number	øA	B	C	D	E	F	G	H	J	K UNC x B.C. (MM x B.C.)	M UNC x B.C. (MM x B.C.)	N	P	Q	øR	Weight lbs. (kg)
S70-0081	7.5 (191)	5.8 (147)	3.0 (76)	5.6 (141)	1.9 (48)	1.94 (49.2)	.19 (4.7)	1/2 (M20 x 1.5)	2.2 (55)	5/16-18 x ø2.76 [M8 x 1.25 x ø70]	—	.75 (19.0)	.51 (13.0)	1.75 (44.5)	3.5 (89)	13 (6)
S70-0121 S70-0201 S70-E301	10.1 (256)	7.8 (198)	3.7 (93)	6.6 (168)	2.4 (62)	2.69 (68.3)	.56 (14.3)	3/4 (M25 x 1.5)	2.6 (66)	5/16-18 x ø2.76 [M8 x 1.25 x ø70]	1/2-13 x ø4.92 [M12 x 1.75 x ø125]	1.18 (30.0)	.87 (22.0)	2.22 (56.3)	8.0 (203)	28 (13)
S70-0501 S70-0651	12.1 (308)	9.5 (241)	5.5 (139)	7.2 (183)	2.9 (73)	3.19 (80.9)	.56 (14.3)	3/4 (M25 x 1.5)	3.1 (78)	1/2-13 x ø4.92 [M12 x 1.75 x ø125]	3/4-10 x ø6.50 [M20 x 2.5 x ø165]	See Detail A			12.0 (305)	48 (22)



70-1300 TO 70-1800

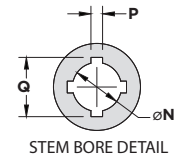
Series 70 Actuator - DIMENSIONS In./.(mm)

Actuator Model Number	øA	B	C	D	E	F	G	H	J	K UNC x B.C. (MM x B.C.)	M UNC x B.C. (MM x B.C.)	N	P	Q	øR	S	T	U	Weight lbs. (kg)
S70-1300 S70-1800	12.1 (308)	9.5 (241)	15.3 (389)	12.5 (316)	8.1 (206)	3.5 (89)	.56 (14.3)	3/4 (M25 x 1.5)	8.3 (211)	1/2-13 x ø4.921 F12 (12 x 125 BC x 23.9)	3/4-10 x ø6.496 F16 (20 x 165 BC x 31.8)	See Stem Bore Detail			12.0 (305)	6.1 (155)	12.7 (322)	8.0 (203)	118 (54)



STEM BORE DETAIL In./.(mm)

Size	N	P	Q
70-1306 70-1806	2.51 (63.6)	0.63 (15.9)	3.05 (77.5)
70-1316 70-1816	1.97 (50.0)	0.47 (12.0)	2.38 (60.6)

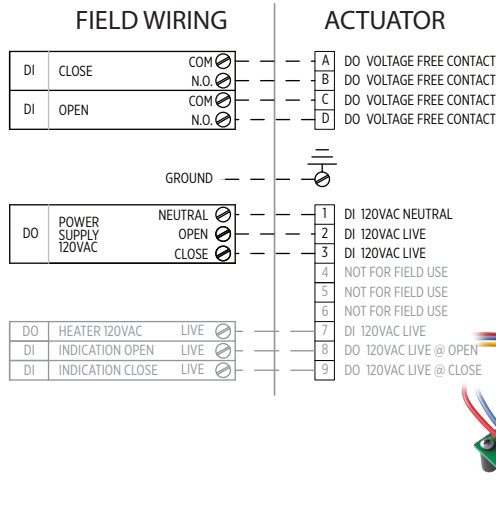


Series 70 - Wiring - On/Off

**70-0081H / 70-0121H / 70-0201H / 70-E301H /
70-0501H / 70-0651H / 70-1300H / 70-1800H**

120 VAC ON/OFF IRB

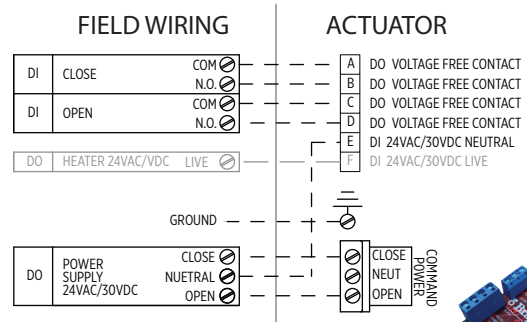
REFERENCE WIRING DIAGRAM: WD-000045



70-24-0081H / 70-24-0201H

24 VAC/DC ON/OFF PRO

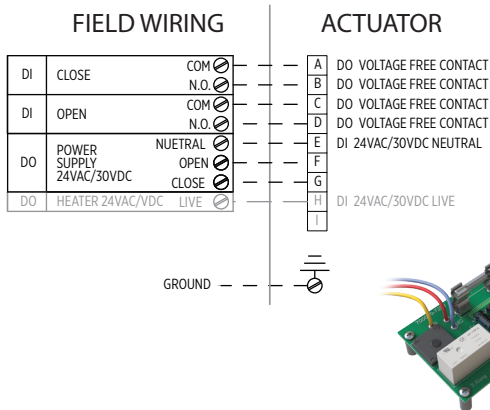
REFERENCE WIRING DIAGRAMS: WD-000276 AND WD-000327



70-24-0501H

24 VAC/ON/OFF PCB

REFERENCE WIRING DIAGRAM: WD-000111



CALIBRATION SEQUENCE:

PLEASE VISIT THE S70 INDUSTRIAL ELECTRIC ACTUATOR SECTION OF OUR WEBSITE AND REFER TO THE QUICK START GUIDE AND VIDEO TUTORIAL LINK IN THE DOCUMENTS SECTION.

TERMINAL STRIP:

14-24 AWG FOR CONTROLLER & BBU, MAX TIGHTENING TORQUE 3.5 IN-LBS
14-22 AWG FOR OTHER, MAX TIGHTENING TORQUE 8 IN-LBS
105 °C, 300V MIN RATED WIRE

NOTES:

1. HEATER OPTIONAL.
2. SWITCHES ARE SPDT (FORM C).
3. DO NOT INSTALL OR USE THE SERIES 70 ELECTRIC 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.

LEGEND:

TERMINAL SYMBOLS X ○ ●
FIELD WIRING
FACTORY WIRING
GROUND

FUSE:

FAST BLOW 250V 5A 5x20MM

LIMIT SWITCH:

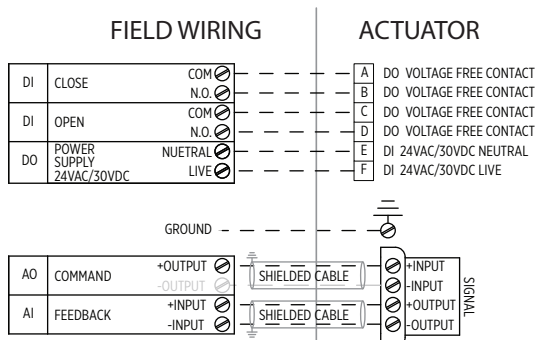
125/250VAC, 10A, 1/2 HP
125/250VDC, 0.25A INDUCTIVE
125/250VDC, 0.5A RESISTIVE

Series 70 - Wiring - Modulating

70-24-0081SVH / 70-24-0201SVH / 70-24-0501SVH

24 VAC/DC SERVO NXT

REFERENCE WIRING DIAGRAMS: WD-000347 AND WD-000554



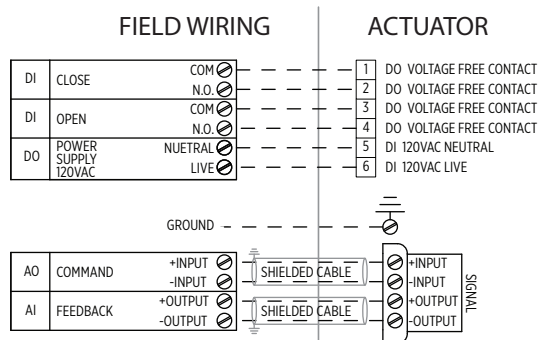
THE COMMAND SIGNAL IS FACTORY WIRED FOR 3 WIRE (POWER LIVE, POWER NEUTRAL, COMMAND SIGNAL POSITIVE). THE JUMPER WIRE FROM COMMAND SIGNAL NEGATIVE TO POWER NEUTRAL CAN BE REMOVED FROM THE NXT CONTROL MODULE FOR 4 WIRE USE.



**70-0081SVH / 70-0121SVH / 70-0201SVH /
70-E301SVH / 70-0501SVH / 70-0651SVH /
70-1300SVH / 70-1800SVH**

120 VAC SERVO NXT

REFERENCE WIRING DIAGRAM: WD-000339



CALIBRATION SEQUENCE:

PLEASE VISIT THE S70 INDUSTRIAL ELECTRIC ACTUATOR SECTION OF OUR WEBSITE AND REFER TO THE QUICK START GUIDE AND VIDEO TUTORIAL LINK IN THE DOCUMENTS SECTION.

TERMINAL STRIP:

14-24 AWG FOR CONTROLLER & BBU, MAX TIGHTENING TORQUE 3.5 IN-LBS
14-22 AWG FOR OTHER, MAX TIGHTENING TORQUE 8 IN-LBS
105 °C, 300V MIN RATED WIRE

NOTES:

- HEATER OPTIONAL.
- SWITCHES ARE SPDT (FORM C).
- WHEN USING 0-10VDC, 0-5VDC & 2-10VDC, THE COMMON OF THE COMMAND SIGNAL SHOULD NOT BE GROUND/EARTH REFERENCED.
- COMMAND SIGNAL AND FEEDBACK SIGNAL MUST BE ISOLATED FROM EACH OTHER AND ANY OTHER CIRCUITS.
- COMMAND SIGNAL & FEEDBACK SIGNAL WIRES SHOULD BE SHIELDED PROPERLY & SHIELD SHOULD BE GROUNDED/EARTHED ON ONE END ONLY, PREFERABLY THE CONTROLLER END.
- FEEDBACK LOOP IS POWERED BY THE SERVO, DO NOT SUPPLY EXTERNAL POWER.
- FEEDBACK LOAD DEVICE NOT TO EXCEED 400 OHMS (4-20mA CONFIGURATION).
- DO NOT INSTALL OR USE THE SERIES 70 ELECTRIC 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.

LEGEND:

TERMINAL SYMBOLS X ⊗ ●
FIELD WIRING
FACTORY WIRING
GROUND

FUSE:

FAST BLOW 250V 5A 5x20MM

LIMIT SWITCH:

125/250VAC, 10A, 1/2 HP
125/250VDC, 0.25A INDUCTIVE
125/250VDC, 0.5A RESISTIVE

Bray COMMERCIAL

Bray Commercial provides automated Butterfly, Ball, Globe and Pressure Independent Control Valves to the commercial building HVAC market throughout the world. Wherever valve performance is required to maintain climate controlled environments, Bray can provide the required automated valves to meet the demanding flow applications of chiller/boiler isolation, air handlers and terminal units for new construction, retrofit and/or LEED certification applications in buildings.

Building Types

- Healthcare
- Data Centers
- Government and Municipal
- Sports/Entertainment/Convention Centers
- K-12 and University Education
- Transportation
- Hotels
- Office Buildings
- Retail

SINCE 1986, BRAY HAS PROVIDED FLOW CONTROL SOLUTIONS FOR A VARIETY OF INDUSTRIES AROUND THE WORLD.

VISIT BRAYCOMMERCIALDIVISION.COM TO LEARN MORE ABOUT BRAY PRODUCTS AND LOCATIONS NEAR YOU.

CORPORATE HEADQUARTERS

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