

## Series 70 Actuators 24V and 120V 600 to 18,000 lb.-in.

### 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 600 to 18,000 lb.-in. (68 to 2033 NM), 24V and 120VAC, 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 Declutchable 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	
<b>Housing</b>	ASTM B85 Pressure Die Cast Aluminum Polyester Powder Coated
<b>Motor</b>	<b>120VAC:</b> Single Phase, Reversible, Permanent Split Capacitor Induction Motor <b>24VAC/DC:</b> Single Phase, Permanent Magnet-Brush D.C. Motor
<b>Heater</b>	Optional, 5 Watt PTC style
<b>Terminal Strip</b>	<b>Switch Plate:</b> 12 - 22 AWG (2.0 - 0.65mm) <b>Servo:</b> 14 - 24 AWG (1.63 - 0.51mm)
<b>Torque Limiting</b>	Optional, Open and Closed preset at factory - Standard on 13,000 & 18,000 lb.-in.
<b>Auxiliary/Limit Switches: SPDT</b>	<b>120VAC</b> 10A- 1/3 HP <b>220VAC</b> 10A-1/2 HP <b>250VDC</b> 1/4A <b>12VDC</b> 2A
<b>Exposed Fasteners</b>	Stainless Steel
<b>Travel Stops</b>	Externally adjustable at both 0 and 90 degrees
<b>Conduit Entries</b>	<b>600 lb.-in.</b> Two 1/2" NPT (BSP) <b>1200 lb.-in. and Higher</b> Two 3/4" NPT
<b>Weight</b>	See Dimensions
<b>Enclosure</b>	Designed to meet NEMA Type 4, 4x and IP65 specifications
<b>Certifications</b>	UL, CSA and CE approved (most models)

OPERATING CONDITIONS	
<b>Motor Insulation</b>	<b>120VAC:</b> Class F, 311°F (155°C) thermal trip at 275°F (135°C) <b>24VAC/DC:</b> Class B, Fast Blow Fuse 5A@250VAC
<b>Ambient Temperature</b>	-20 to 150°F (-29° to 65°C)
<b>Continuous Duty</b>	Will operate continuously at a maximum ambient temperature of 104°F (40°C)
<b>Manual Operation</b>	Pull to Engage, Push to Disengage - 30:1 drive ratio, 12 & 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.

POWER							
Model	Voltage 50/60 Hz	Torque		90° Stroke Time*	Current Draw (Amps)		Power Consumption/ Transformer Sizing**
		(lb.-in)	(NM)		Full Load	Locked Rotor	
70-24-0061 & 70-24-0061SV	24 VAC/DC	600	68	60 Sec. AC 40 Sec. DC	1.80	-	43
70-24-0201 & 70-24-0201SV	24 VAC/DC	2000	226	60 Sec. AC 40 Sec. DC	2.00	-	48
70-24-0501	24 VAC	5000	565	60 Sec	4.00	-	96
70-24-0501SV	24 VAC/DC	5000	565	60 Sec. AC 40 Sec. DC	4.00	-	96
70-0061 & 70-0061SV	120VAC	600	68	30 Sec	0.80	1.00	120
70-0121 & 70-0121SV	120VAC	1,200	135	30 Sec	0.78	2.10	252
70-0201 & 70-0201SV	120VAC	2,000	226	30 Sec	1.00	2.10	252
70-0301 & 70-0301SV	120VAC	3,000	339	30 Sec	1.20	3.00	360
70-0501 & 70-0501SV	120VAC	5,000	565	30 Sec	1.60	3.00	360
70-0651 & 70-0651SV	120VAC	6,500	734	30 Sec	2.30	3.10	372
70-1300 & 70-1300SV	120VAC	13,000	1,470	110 Sec	2.30	3.10	372
70-1800 & 70-1800SV	120VAC	18,000	2,034	110 Sec	2.50	3.10	372

\*Operating times shown are with 60 Hz power. Actuators with 50 Hz power supply will be 20% slower.

\*\* Transformer Sizing for 120V Product Based on Locked Rotor Current Draw

# Series 70 - Model Selection

**600 lb.-in.**

Model Number	Feature	24VAC/DC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
70-24-0061	●		●			●		
70-24-0061H	●		●		●	●		
70-24-0061SV	●			●		●		
70-24-0061SVH	●			●	●	●		
70-0061		●	●			●		
70-0061H		●	●		●	●		
70-0061SV		●		●		●		
70-0061SVH		●		●	●	●		
70-24-0061-BBU	●		●			●	●	
70-24-0061SV-BBU	●			●		●	●	
70-24-0061SVH-BBU	●			●	●	●	●	

**5,000 lb.-in.**

Model Number	Feature	24VAC/DC	24VAC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
70-24-0501		●		●			●		
70-24-0501H		●		●		●	●		
70-24-0501SV	●				●		●		
70-24-0501SVH	●				●	●	●		
70-0501			●	●			●		
70-0501H			●	●		●	●		
70-0501SV			●		●		●		
70-0501SVH			●		●	●	●		
70-24-0501SV-BBU	●				●		●	●	●
70-24-0501SVH-BBU	●				●	●	●	●	●

**1,200 lb.-in.**

Model Number	Feature	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
70-0121	●	●			●		
70-0121H	●	●		●	●		
70-0121SV	●		●		●		
70-0121SVH	●		●	●	●		

**6,500 lb.-in.**

Model Number	Feature	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
70-0651	●	●			●		
70-0651H	●	●		●	●		
70-0651SV	●		●		●		
70-0651SVH	●		●	●	●		

**2,000 lb.-in.**

Model Number	Feature	24VAC/DC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
70-24-0201	●		●			●		
70-24-0201H	●		●		●	●		
70-24-0201SV	●			●		●		
70-24-0201SVH	●			●	●	●		
70-0201		●	●			●		
70-0201H		●	●		●	●		
70-0201SV		●		●		●		
70-0201SVH		●		●	●	●		
70-24-0201-BBU	●		●			●	●	
70-24-0201SV-BBU	●			●		●	●	
70-24-0201SVH-BBU	●			●	●	●	●	

**13,000 lb.-in.**

Model Number	Feature	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
70-1300	●	●			●		
70-1300H	●	●		●	●		
70-1300SV	●		●		●		
70-1300SVH	●		●	●	●		

**3,000 lb.-in.**

Model Number	Feature	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
70-0301	●	●			●		
70-0301H	●	●		●	●		
70-0301SV	●		●		●		
70-0301SVH	●		●	●	●		

**18,000 lb.-in.**

Model Number	Feature	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
70-1800	●	●			●		
70-1800H	●	●		●	●		
70-1800SV	●		●		●		
70-1800SVH	●		●	●	●		

**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

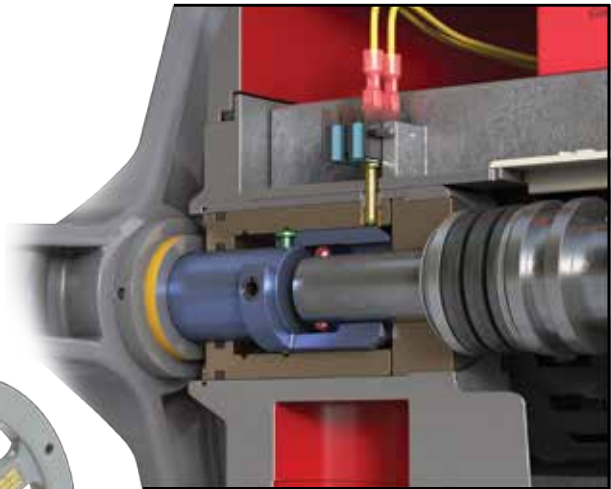
High quality polyester powder coating  
Easy to remove and re-install cover

### 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

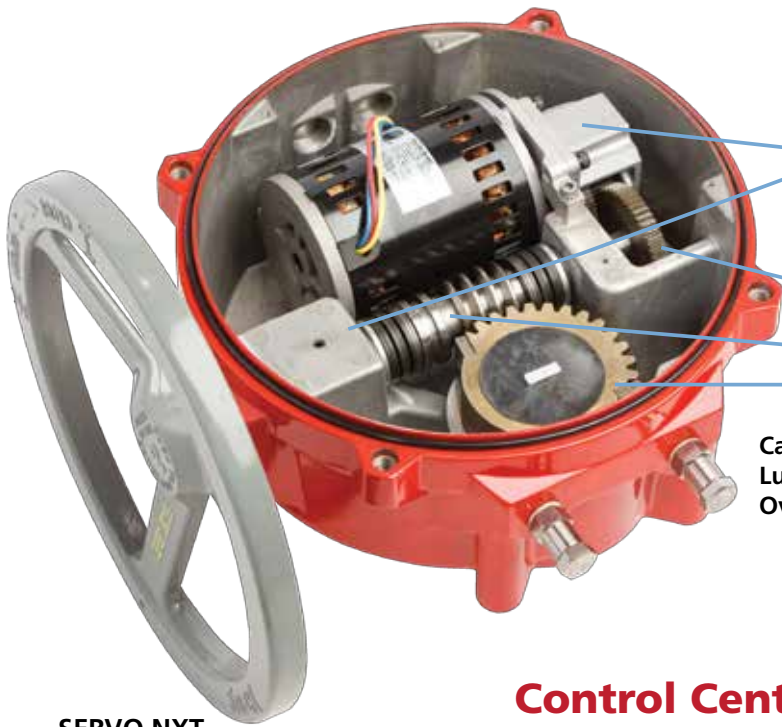
#### GEARING

**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:

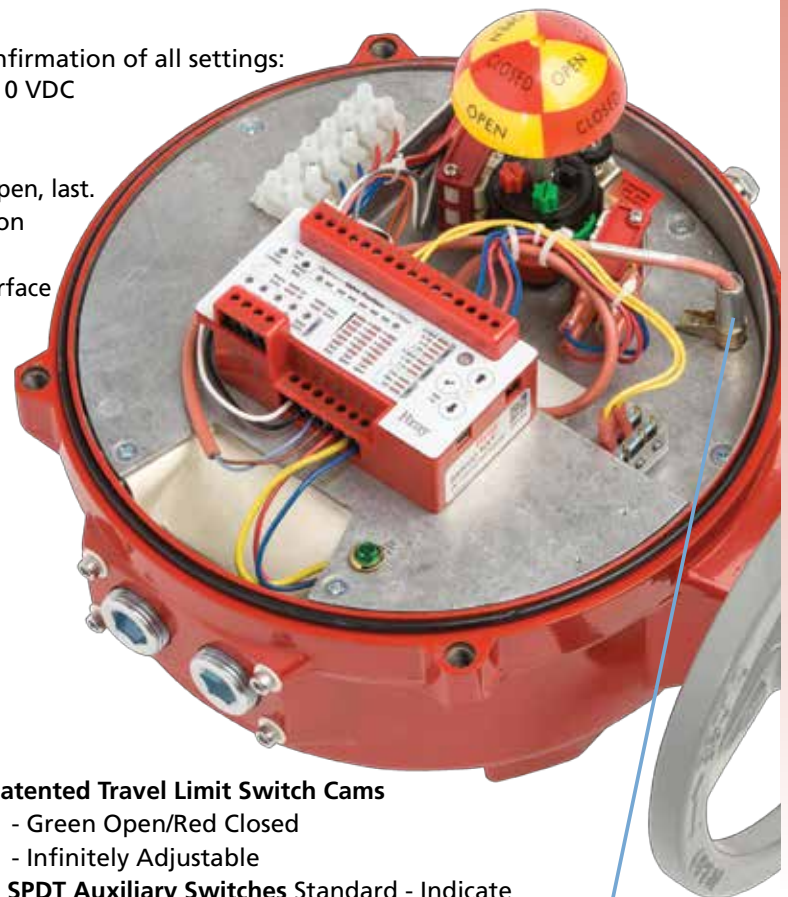
- Configurable Input Control - 4-20 mA, 0-10, 0-5 or 2-10 VDC
- Position Feedback - 4-20 mA, 0-10 or 0-5 VDC
- Auto Calibrating sequence for travel limits
- Fail Position (loss of input signal) - Configurable close, open, last.
- Speed Control - Independent for open & close direction

#### Including:

- Manual Mode - Local operation via Servo NXT user interface
- Fault display - Simplifies troubleshooting
- Stall detection - Eliminates mechanical damage incase 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

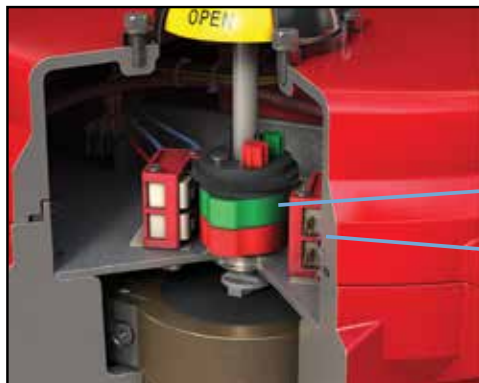


#### Patented Travel Limit Switch Cams

- Green Open/Red Closed
- Infinitely Adjustable

**2 SPDT Auxiliary Switches Standard** - Indicate travel position to remote customer control systems

**Optional Electric Heater** - Self-regulating temperature controlled



## Series 70 - Servo NXT Specifications

Specifications - Servo NXT		
Power Requirements	120VAC	+/- 10% (50/60Hz)
	24VAC	+/- 10% (50/60Hz)
	24VDC	-10%, + 30%
	5VA	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, 0-5VDC, 2-10VDC
	Input Impedance	>100 Meg Ohms (0-10V, 2-10V, 0-5V)
Output Signal	Operating Modes	4-20mA, 0-10VDC, 0-5VDC
	Required Control Panel Impedance	≤ 400 Ohms (4-20mA Output Mode) ≥ 1,000 Ohms (0-10VDC Output, 0-5VDC Output)
	NXT Loop Power	12VDC 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
	Autocalibration	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

**Actuator Open/Close Speed Chart**

Speed Setting	24VAC/VDC	120VAC	120VAC 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

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



# Series 70 - Dimensions

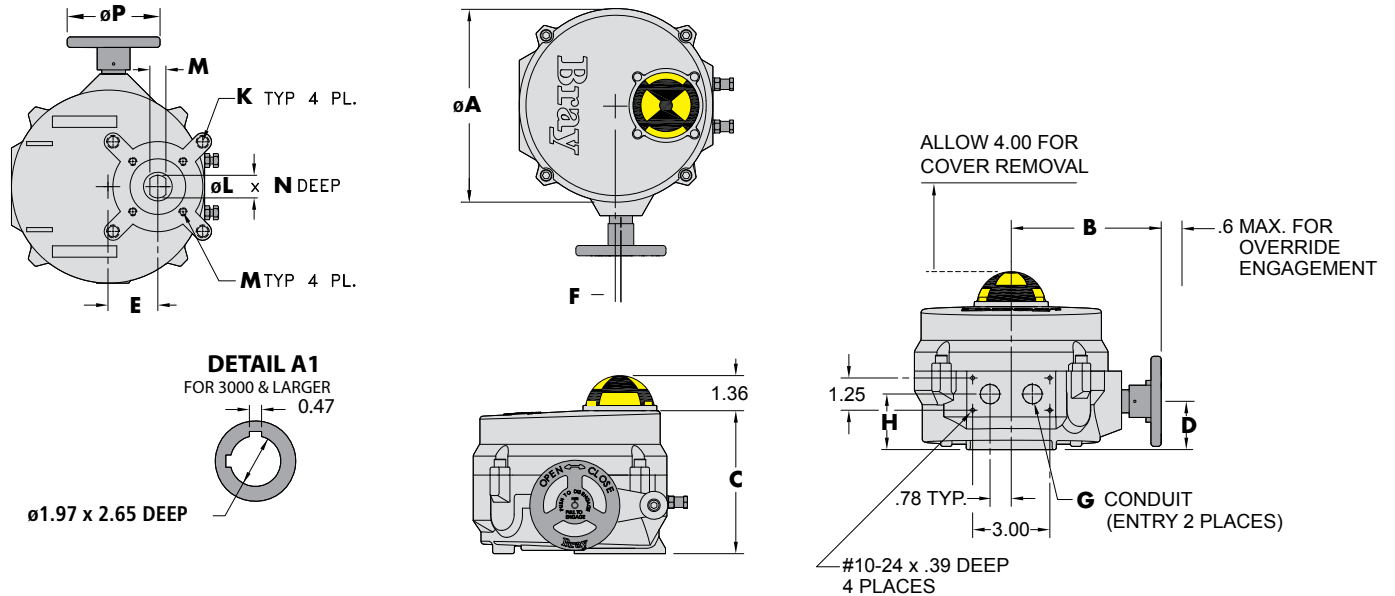
## Series 70 Actuator Dimensions

Please reference illustration below

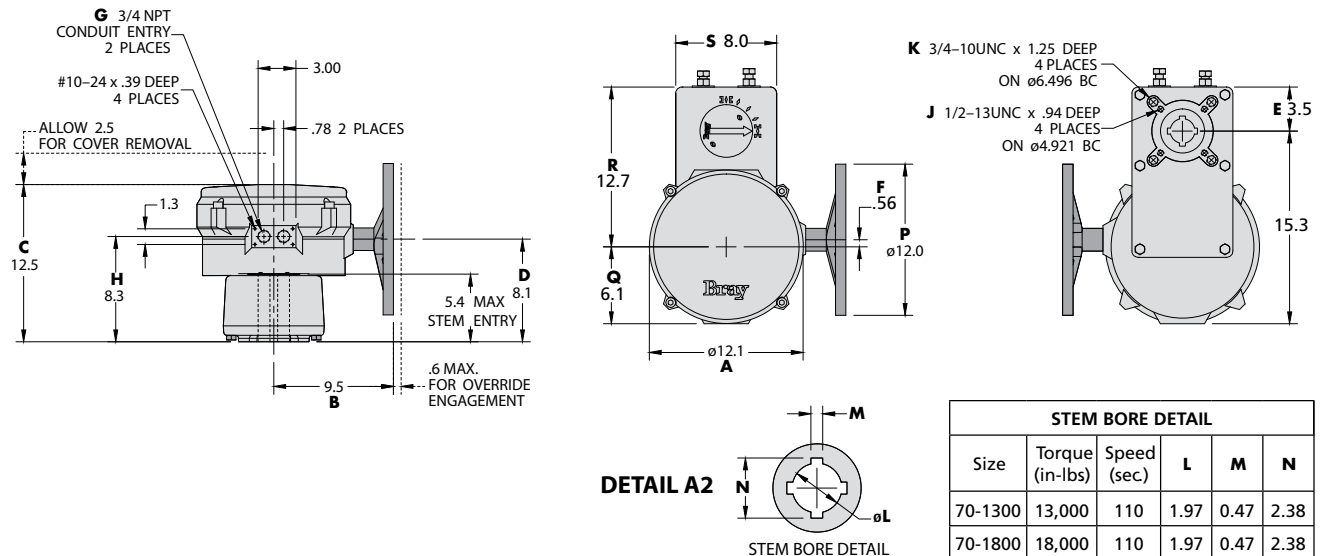
ACTUATOR MODEL NUMBER	A	B	C	D	E	F	G	H	J (UNC) x B.C.	K (UNC) x B.C.	L	M	N	øP	Q	R	S	Wt. lbs [kgs]
570-0061	7.5 [191]	5.8 [147]	5.6 [141]	1.9 [48]	1.94 [49.2]	.19 [4.7]	1/2	2.2 [55]	5/16-18 x ø2.76 (F07)	—	.75 [19]	.51 [13]	1.75 [44.5]	3.5 [89]	—	—	—	13 [6]
570-0121 570-0201	10.1 [256]	7.8 [198]	6.6 [168]	2.4 [62]	2.69 [68.3]	.56 [14.3]	3/4	2.6 [66]	5/16-18 x ø2.76 (F07)	1/2-13 x ø4.92 (F12)	1.18 [30]	.87 [22]	2.22 [56.3]	8.0 [203]	—	—	—	28 [13]
570-0301 570-0501 570-0651	12.1 [308]	8.3 [211]	7.2 [183]	2.9 [73]	3.19 [80.9]	.56 [14.3]	3/4	3.1 [78]	1/2-13 x ø4.92 (F12)	3/4-10 x ø6.50 (F16)	See Detail A1			12 [304.8]	—	—	—	48 [22]
570-1300 570-1800	12.1 [308]	9.5 [242]	12.5 [317]	8.1 [206]	9.2 [234]	.56 [14.2]	3/4	8.3 [211]	1/2-13 x ø4.92 (F12)	3/4-10 x ø6.50 (F16)	See Detail A2			12 [305]	6.1 [155]	12.7 [323]	8 [203]	118 [54]

Dimensions are in Inches [Millimeters in brackets]

### 70-0061 to 70-0651

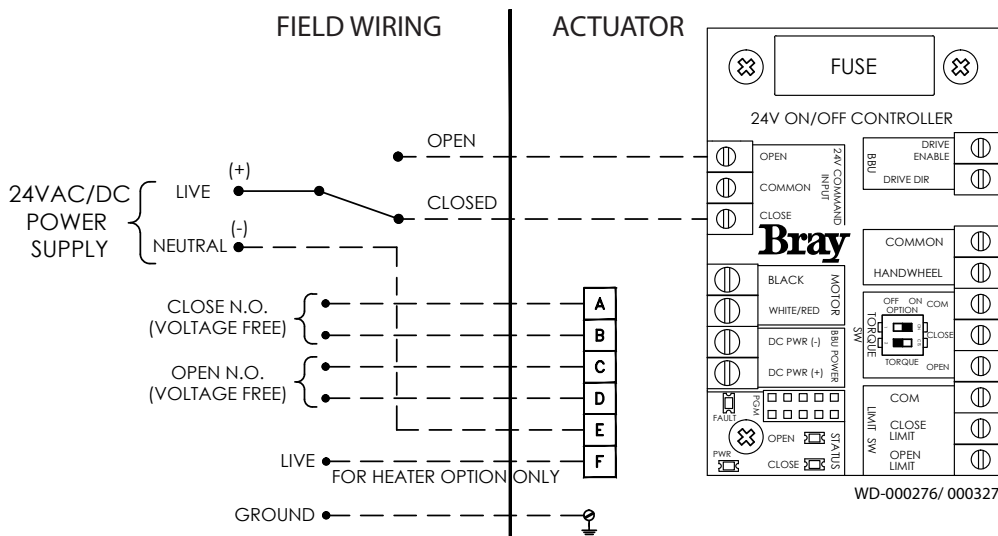


### 70-1300 to 70-1800



# Series 70 - Wiring - On/Off

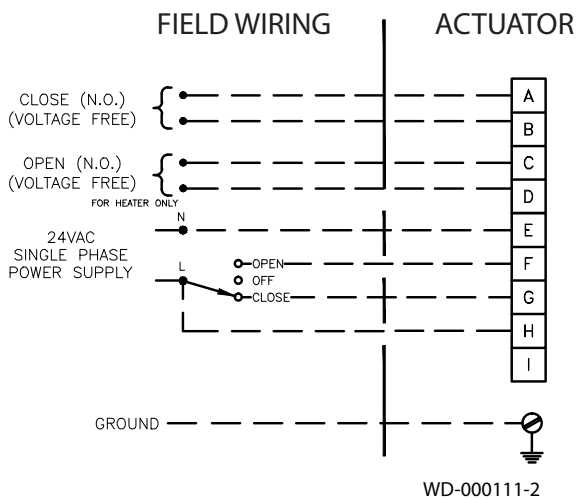
## 24VAC/DC ON/OFF WIRING 600 & 2000 LB.-IN. MODELS



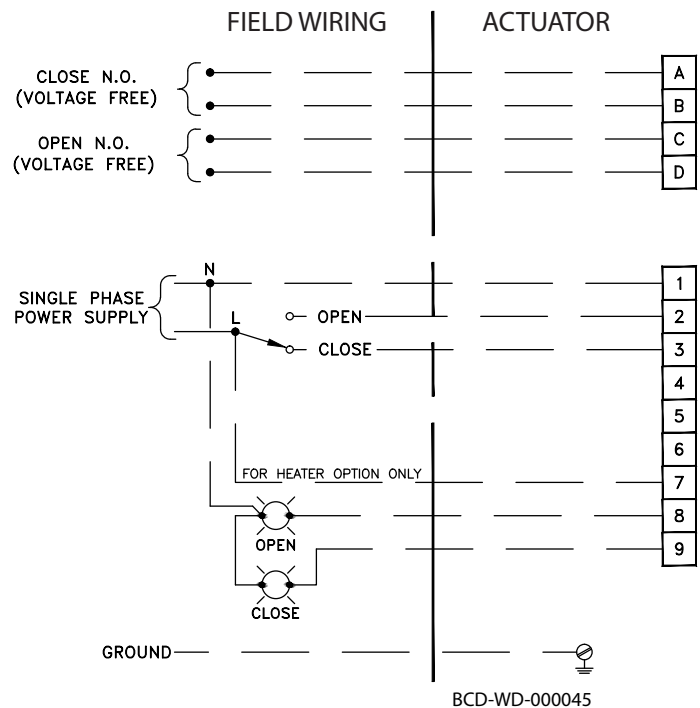
**Note:** Use this Series 70 Electric Actuator only to control equipment under normal operating conditions. Where failure or malfunction of the electric actuator could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into 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.

**Note:** 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.

## 24VAC ON/OFF WIRING 5000 LB.-IN. MODELS



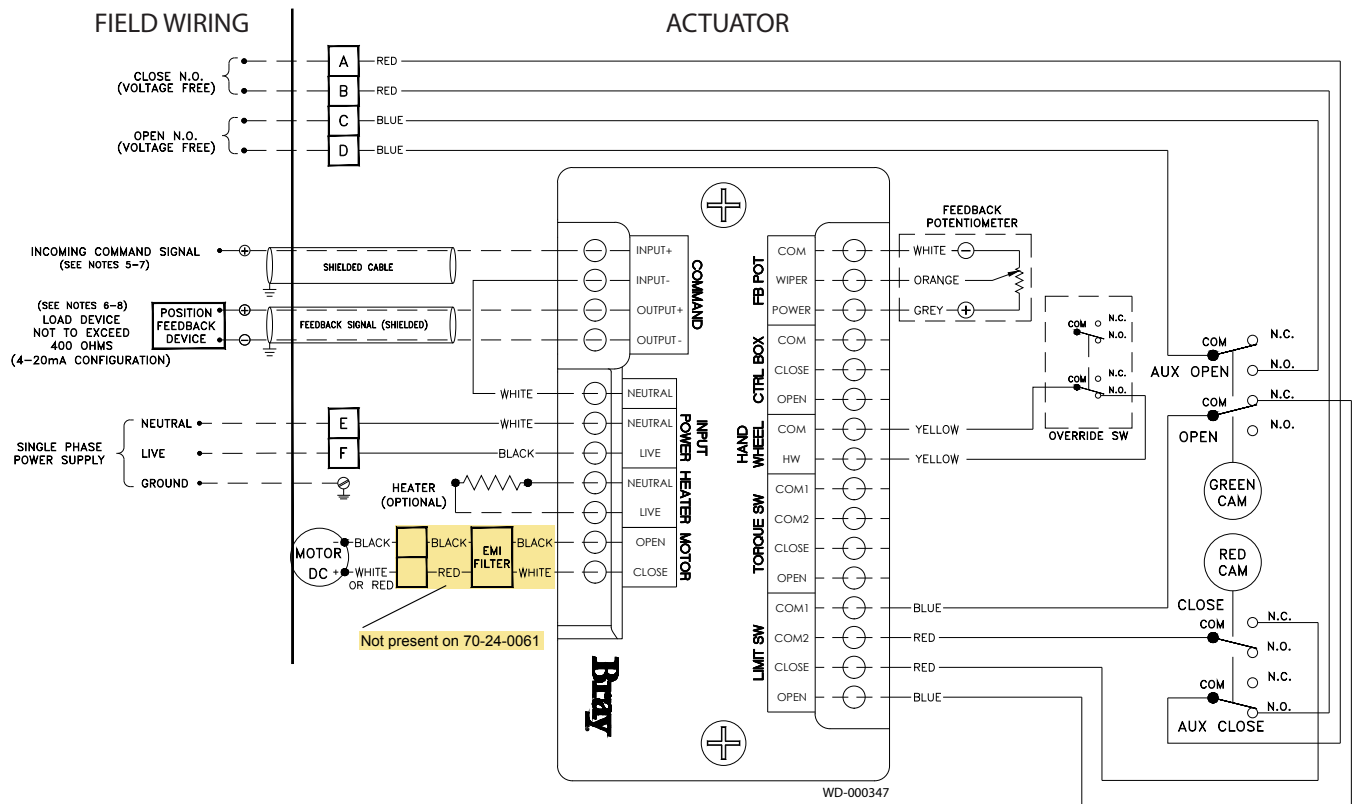
## 120VAC ON/OFF WIRING ALL MODELS





# Series 70 - Wiring - Modulating

## 24VAC/DC MODULATING WIRING

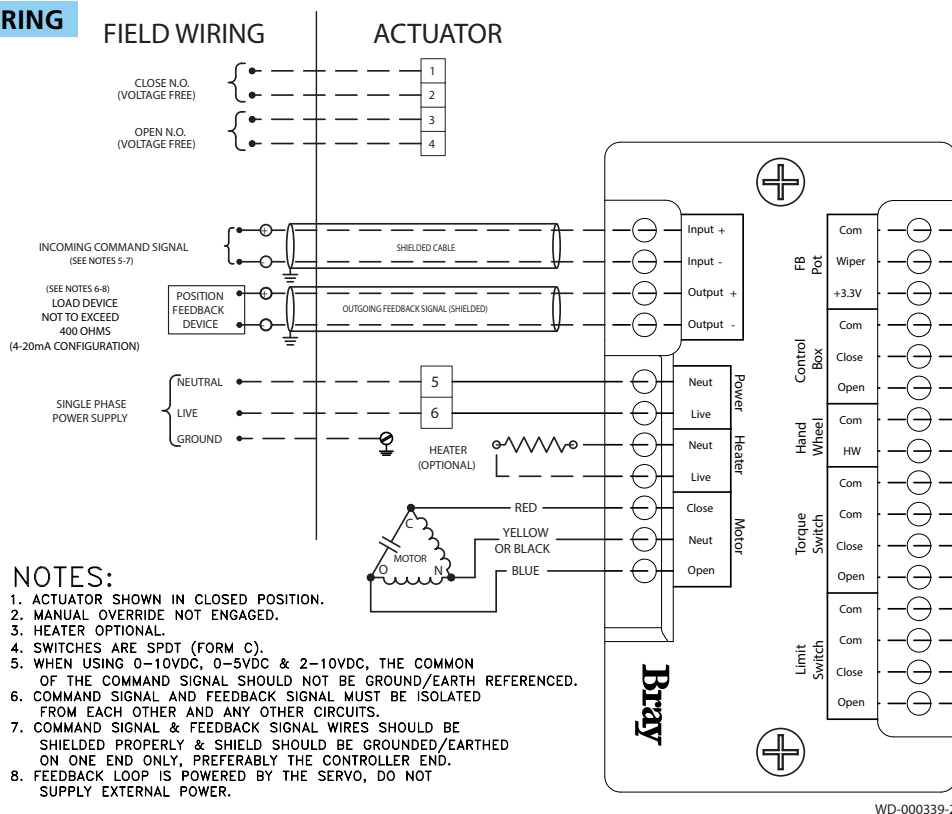


### Notes:

1. Command signal and feedback wires **MUST** be shielded and grounded for proper servo operation.
2. The command signal input (-) terminal is internally connected to the servo neutral terminal. **DO NOT** connect the live to the neutral terminal on the servo.
3. Command signal and feedback signal must be isolated from each other and any other circuits. When using 0-10VDC, 0-5VDC & 2-10VDC. The common of the command signal should NOT be ground/earth referenced.
4. Feedback loop is powered by the servo, do not supply external power.
5. Command signal & feedback signal wires should be shielded properly & shield should be grounded/earthed on one end only, preferably the controller end.
6. When providing the command signal negative field wire please remove the jumper wire between CI and PN terminals.

The 24 V Servo (NXT) can be wired 3 or 4 wire configured

## 120VAC MODULATING WIRING



### NOTES:

1. ACTUATOR SHOWN IN CLOSED POSITION.
2. MANUAL OVERRIDE NOT ENGAGED.
3. HEATER OPTIONAL.
4. SWITCHES ARE SPDT (FORM C).
5. WHEN USING 0-10VDC, 0-5VDC & 2-10VDC, THE COMMON OF THE COMMAND SIGNAL SHOULD NOT BE GROUND/EARTH REFERENCED.
6. COMMAND SIGNAL AND FEEDBACK SIGNAL MUST BE ISOLATED FROM EACH OTHER AND ANY OTHER CIRCUITS.
7. COMMAND SIGNAL & FEEDBACK SIGNAL WIRES SHOULD BE SHIELDED PROPERLY & SHIELD SHOULD BE GROUNDED/EARTHED ON ONE END ONLY, PREFERABLY THE CONTROLLER END.
8. FEEDBACK LOOP IS POWERED BY THE SERVO, DO NOT SUPPLY EXTERNAL POWER.