

#### 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!



#### Features and Benefits

- **Compact Design and Direct Mounting**  
*Fits in tight spaces for easily installation*
- **High Visibility Beacon Position Indicator**  
*Assists in field operation*
- **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*
- **UL, CSA and CE Approved**  
*Assures universal application acceptability*

## Series 70 - Specifications

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

OPERATING CONDITIONS	
Motor Insulation	<b>120VAC:</b> Class F, 311°F (155°C) thermal trip at 275°F (135°C) <b>24VAC/DC:</b> Class B, Slow 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, 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 (lb.-in) (NM)		90° Stroke Time*	Current Draw (Amps) Full Load Locked Rotor	
70-24-0061	24 VAC/DC	600	68	60 Sec. AC 40 Sec. DC	1.80	—
70-24-0061SV	24 VAC	600	68	60 Sec.	1.80	—
70-24-0201	24 VAC/DC	2000	226	60 Sec.	2.00	—
70-24-0201(SV)	24 VAC	2000	226	60 Sec.	2.00	—
70-24-0501(SV)	24 VAC	5000	565	60 Sec.	3.00	—
70-0061 & 70-0061SV	120VAC	600	68	30 Sec.	0.80	1.00
70-0121 & 70-0121SV	120VAC	1,200	135	30 Sec.	0.78	2.10
70-0201 & 70-0201SV	120VAC	2,000	226	30 Sec.	1.00	2.10
70-0301 & 70-0301SV	120VAC	3,000	339	30 Sec.	1.20	3.00
70-0501 & 70-0501SV	120VAC	5,000	565	30 Sec.	1.60	3.00
70-0651 & 70-0651SV	120VAC	6,500	734	30 Sec.	2.30	3.10
70-1300 & 70-1300SV	120VAC	13,000	1,470	110 Sec.	2.30	3.10
70-1800 & 70-1800SV	120VAC	18,000	2,034	110 Sec.	2.50	3.10

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

# Series 70 - Model Selection

600 lb.-in.		Feature	24VAC/DC	24VAC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
Model Number										
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.		Feature	24VAC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
Model Number									
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.		Feature	24VAC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
Model Number									
70-0121			●	●			●		
70-0121H			●	●		●	●		
70-0121SV			●		●		●		
70-0121SVH			●		●	●	●		

6,500 lb.-in.		Feature	24VAC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
Model Number									
70-0651			●	●			●		
70-0651H			●	●		●	●		
70-0651SV			●		●		●		
70-0651SVH			●		●	●	●		

2,000 lb.-in.		Feature	24VAC/DC	24VAC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
Model Number										
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.		Feature	24VAC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
Model Number									
70-1300			●	●			●		
70-1300H			●	●		●	●		
70-1300SV			●		●		●		
70-1300SVH			●		●	●	●		

3,000 lb.-in.		Feature	24VAC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
Model Number									
70-0301			●	●			●		
70-0301H			●	●		●	●		
70-0301SV			●		●		●		
70-0301SVH			●		●	●	●		

18,000 lb.-in.		Feature	24VAC	120VAC	On/Off	Modulating	Heater	Aux. Switches	Battery Backup
Model Number									
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

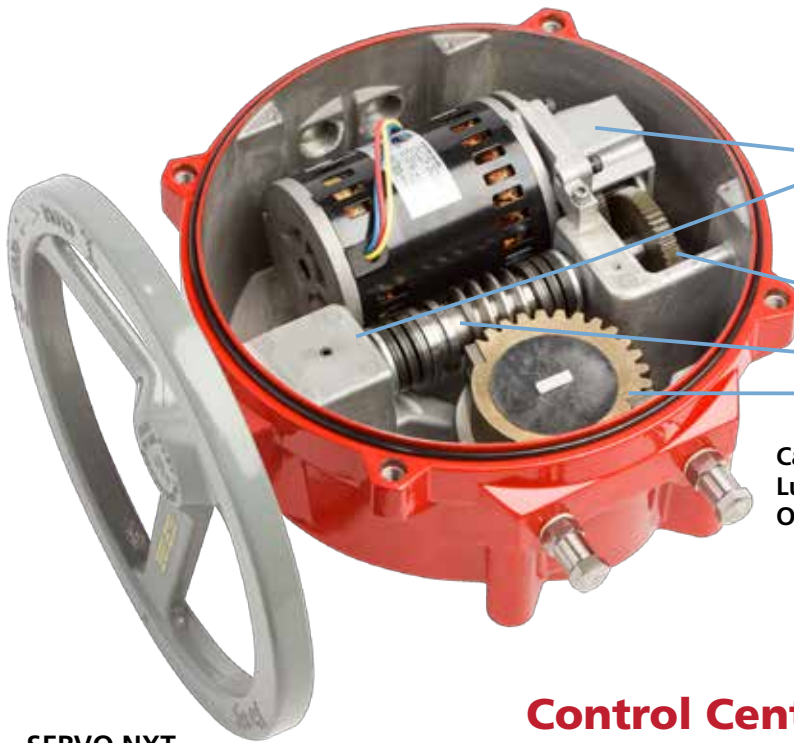
**Die-Cast Aluminum Housing**  
High quality polyester powder coating  
Easy to remove and re-install cover

**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 Programing

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

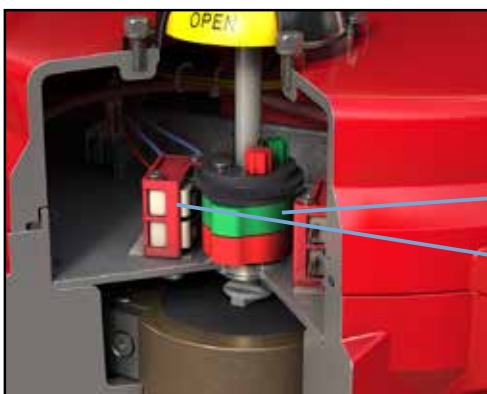
- Configurable Input Control - 4-20 mA, 0-10, 0-5 or 2-10 VDC
- Position Feedback - 4-20 mA, 0-10 or 0-5 VDC
- Auto Calibrating sequence for travel limits
- Fail Position (loss of input signal) - Configurable close, open, last.
- Speed Control - Independent for open & close direction

#### 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	
<b>Power Requirements</b>	
	120VAC 50/60Hz +/- 10%
	24VAC 50/60Hz +/- 10%
	24VDC - 10%, + 30%
	5VA Average (No Load)
	Fuse: 5A Slow Blow 5mm x 20mm
<b>Input Signal</b>	
Control Signal	4-20mA, 0-10VDC, 0-5VDC, 2-10VDC
Input impedance	>100 Meg Ohms (0-10V, 2-10V, 0-5V)
<b>Output Signal</b>	
Operating Modes	4-20mA, 0-10VDC, 0-5VDC
Output Impedance	<10 Ohms (0-5VDC Output, 0-10V Output) 200 Ohms (4-20mA Output Mode)
Loop Voltage	12VDC (4-20mA Output)
<b>Resolution</b>	
Absolute Position Accuracy	< 1%
Dead Band Adjustment	1% (+/- 0.5%) to 6% (+/- 3%) (3% default) 1% minimum increment
<b>Potentiometer Feedback Signal</b>	
Supply Voltage	3.3VDC
External Feedback Potentiometer	1K to 10K Ohms
<b>Speed Control</b>	
Open/Close Speed	0% - 100% (default). Step size: 20%. Actuator open/close speed as a percentage of full speed. (Refer to motor speed specification for max 90° run times)
<b>Operating Mode</b>	
Normal Mode	Modulating - Follow Setpoint
Loss of Signal	Settable to Open, Close, or Last
Reverse Acting Mode	Configurable for inverted input signal
Autocalibration	Automatic Endpoint Detection
Manual Operation	Keypad electrical manual operation of actuator (Open, Stop, Close)
Control Box Operation	Optional inputs available
<b>Torque Protection</b>	
Stall Detection	Motor detected stationary > 2 Seconds (600 to 6500 lb.-in. units only)
Torque Limit	Optional externally connected Open / Close Torque Limit switch
Electronic Torque Limit	Optional factory programmable current/torque limit switch
<b>Environmental</b>	
Ambient Temperature	-22°F (-30°C) to 150°F (65°C), Non condensing humidity
Compliance	120V units designed to comply with UL, cUL, CSA, and CE

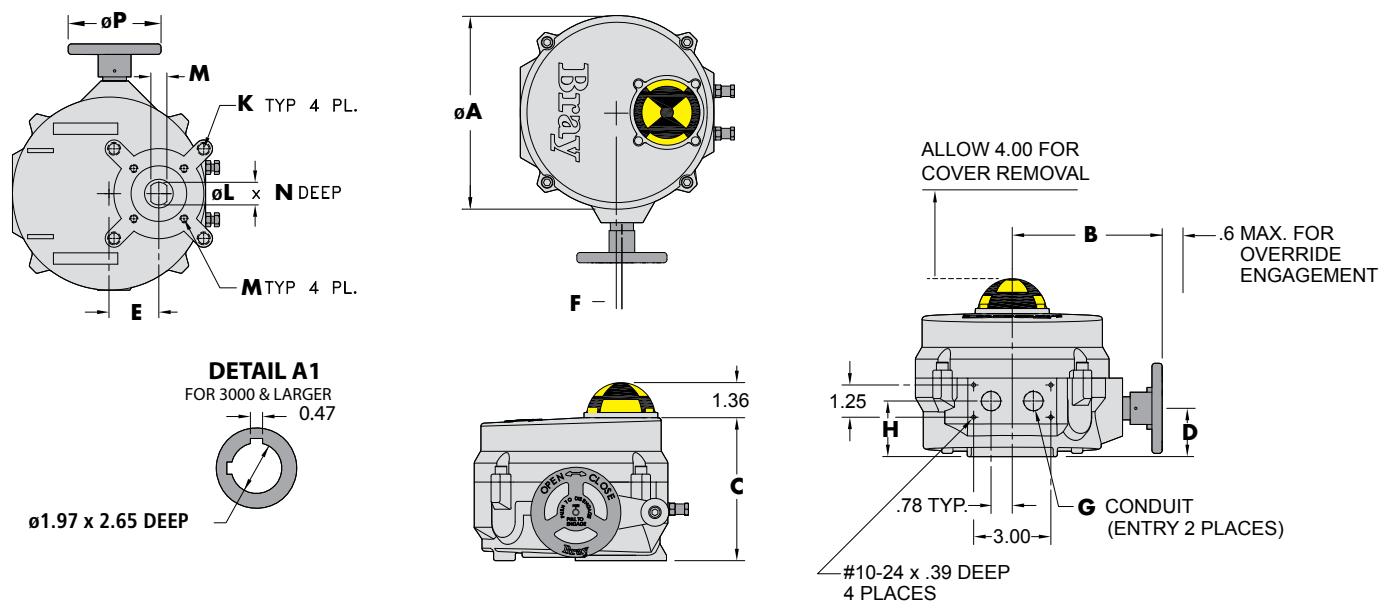
# Series 70 - Dimensions

## Series 70 Actuator Dimensions

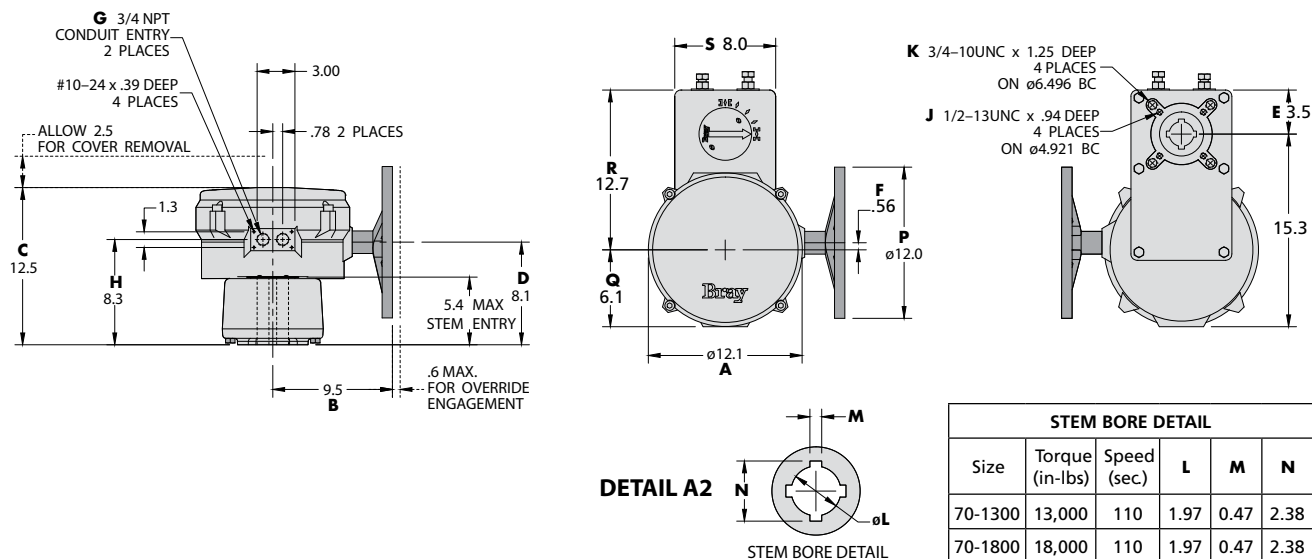
ACTUATOR MODEL NUMBER	Please reference illustration below																	Wt. lbs [kgs]
	A	B	C	D	E	F	G	H	J (UNC) x B.C.	K (UNC) x B.C.	L	M	N	øP	Q	R	S	
S70-0061	7.5 [191]	5.8 [147]	5.6 [141]	1.9 [48]	1.94 [49.2]	.19 [4.7]	1/2	2.2 [55]	5/16-18 x ø2.76 (F07)	—	.75 [19]	.51 [13]	1.75 [44.5]	3.5 [89]	—	—	—	13 [6]
S70-0121 S70-0201	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]
S70-0301 S70-0501 S70-0651	12.1 [308]	9.5 [242]	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]
S70-1300 S70-1800	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

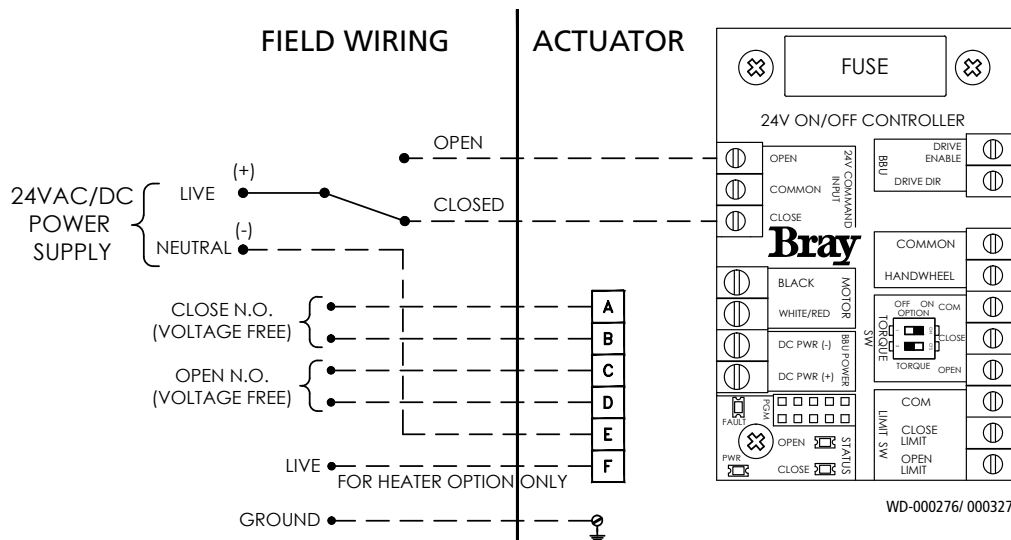


### 70-1300 to 70-1800



# Series 70 - Wiring - On/Off

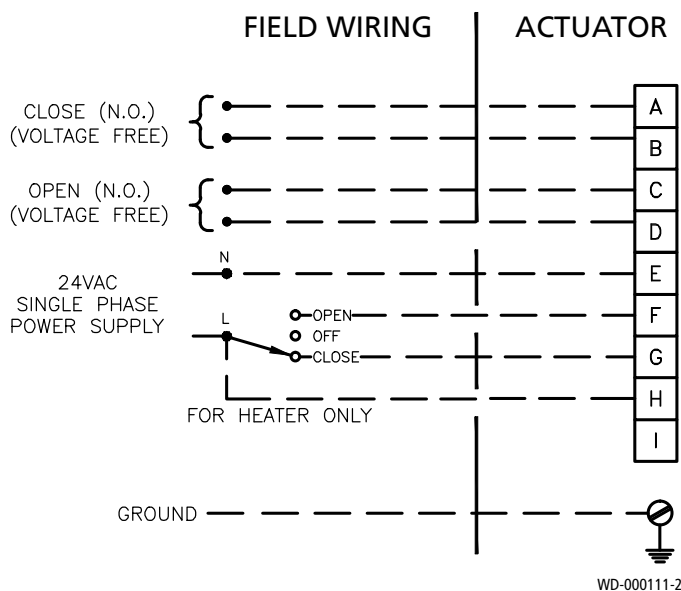
## 24VAC/DC ON/OFF WIRING 600 & 2000 LB.-IN. MODELS



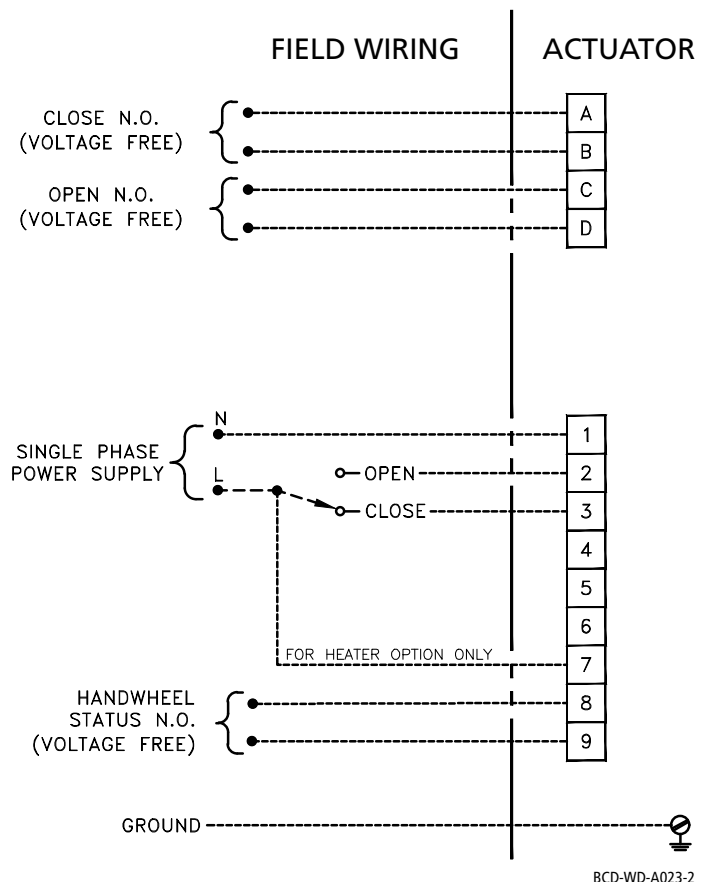
**Note:** Use this Series 70 Electric Actuator only to control equipment under normal operating conditions. Where failure or malfunction of the electric actuator could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into 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 WIRING 5000 LB.-IN. MODELS



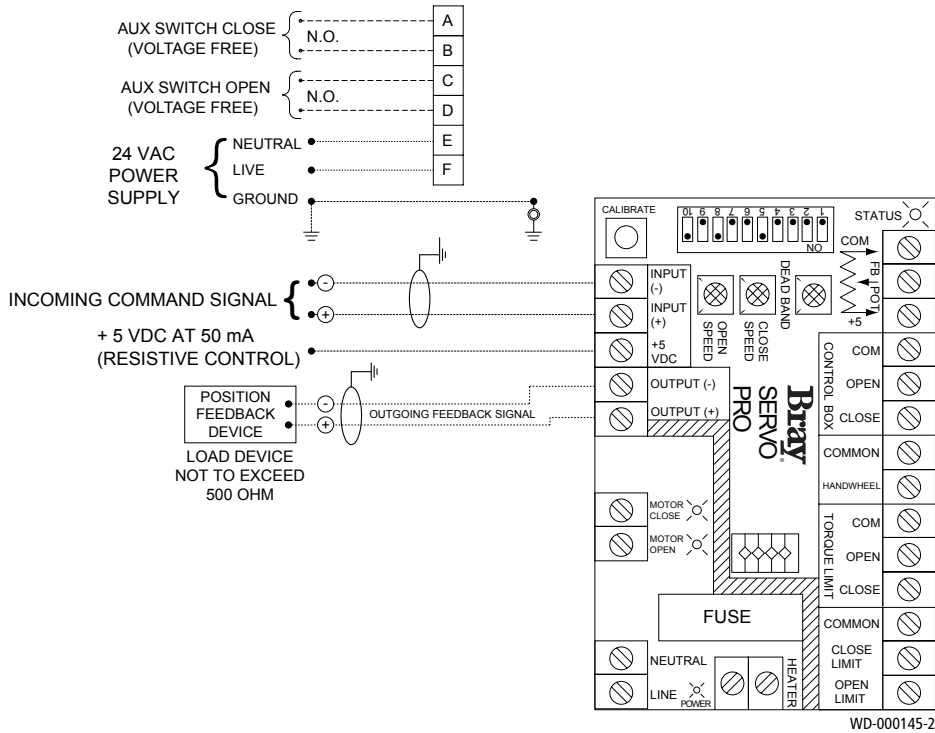
## 120VAC WIRING ALL MODELS





## Series 70 - Wiring - Modulating

## 24VAC MODULATING WIRING

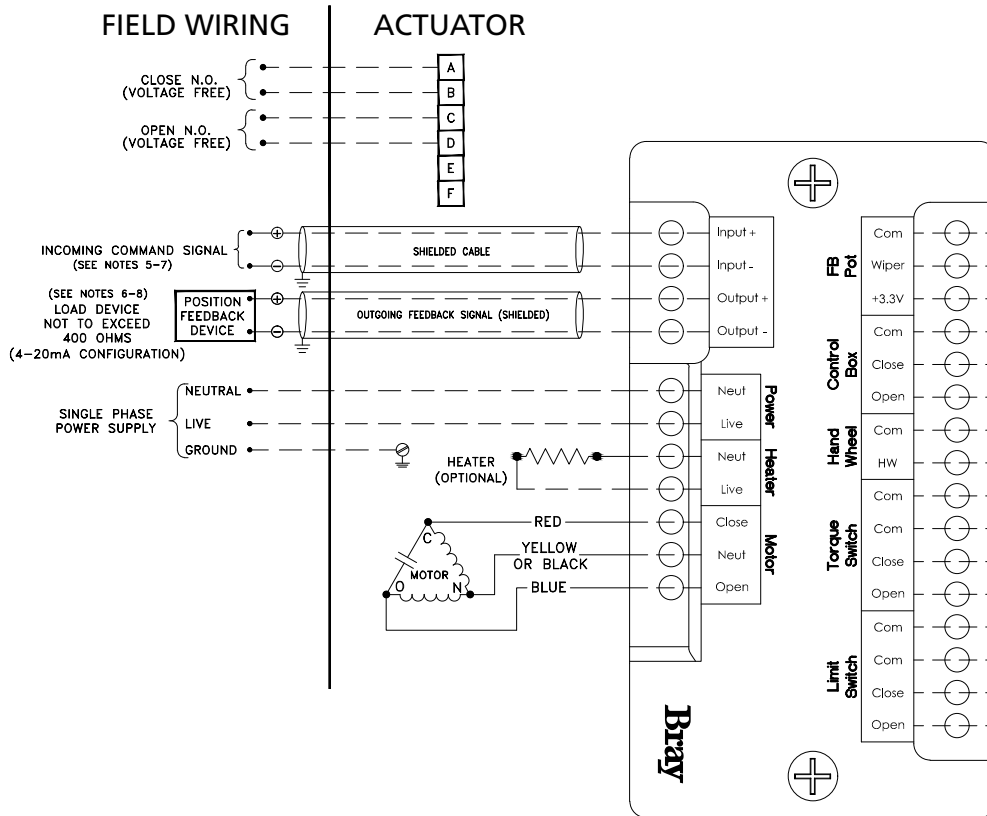


**Notes:**

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.

**The 24 V Servo Pros (Revision J) can be wired 3 or 4 wire configured**

## 120VAC MODULATING WIRING



WD-0003339-2