

ACTUATORS AND CONTROLS

Pneumatic Actuators – **New AD and AS** (Sizes 0025 to 0350)

APOLLO RACK & PINION

Designed and manufactured for the ultimate in durability and reliability, the new Apollo® Pneumatic Rack & Pinion Actuators provide outstanding service life.

Apollo Rack & Pinion actuators have replaceable insert drive adapters in all but the largest models, and many units have dual “F” series bolt patterns. The numerous actuator drive and bolt pattern combinations allow direct mounting of several valve styles.



FEATURES

- 1. Cast Aluminum Body**
Yellow Chromate Powder Coat Finish
- 2. Die Cast Aluminum End Caps**
Yellow Chromate Powder Coat Finish
- 3. Die Cast Aluminum Pistons**
Yellow Chromate Coated
- 4. Aluminum Alloy Pinion**
Hard-coat Anodized Finish
- 5. Drive Inserts**
Extruded Aluminum
Hard-coat Anodized Finish
- 6. Preloaded Concentric Springs**
Delta-Tone® Coated
- 7. Bushings**
Polyoxymethylene (POM)
- 8. O-Ring Seals**
Standard Temp. (-4°F to 180°F): Buna-N
High Temp. (-4°F to 250°F): Fluorocarbon
Low Temp. (-40°F to 180°F): Silicone
- 9. Capscrews, Nuts & Other Hardware**
Stainless Steel or Delta-Tone® Coated

BENEFITS

- Compact Rack & Pinion Design
- Quarter-Turn Operation
- Designed for use on a variety of Valve Types:
Ball Valves, Butterfly Valves, Plug Valves
- Applicable to Damper and Door Openers
- Both Double-Acting and Spring-Return Units
- Double-Acting Torque Outputs from 220 in-lbs to 3547 in-lbs with an 80 psi Air Supply
- Removable/Replaceable Drive Inserts*
- Pre-loaded Spring Assemblies
- ISO 5211 Valve Mounting
- NAMUR (VDI/VDE 3845) Accessory Mounts
- ATEC Classification II, 2 GD, Zones 1 or 2 (Gases) and 21 or 22 (Dust)
- Anti Blow-Out Pinion Design
- Maximum Pressure Rating: 116 psig (8 bar)
- Compatible Media: Clean, Dry Air, Filtered Non-corrosive Gas or Light Hydraulic Oil
- Pre-lubricated for the life of the Actuator
- Chromate Corrosion Protection on all Aluminum Components
- Each Unit is Serialized
- 5 Year Apollo Warranty**

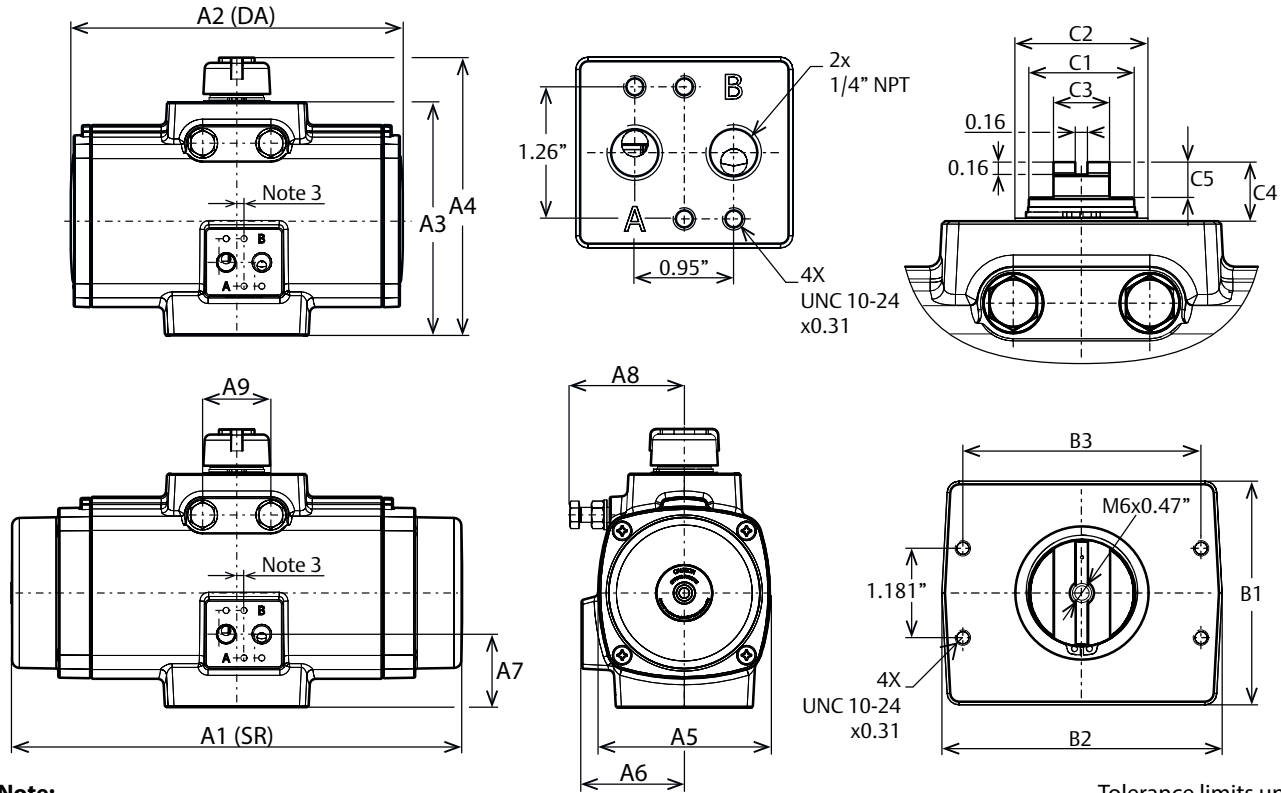
Notes:

* A wide selection of standard inserts is available for Square, DIN and Double-D drives.

ACTUATORS AND CONTROLS

Dimensional Data – **New AD and AS** (Sizes 0025 to 0350)

ENVELOPE DIMENSIONS - SOLENOID INTERFACE - TOP MOUNTING INTERFACE



Note:

1. DA = Double-Acting, SR = Spring-Return
2. Solenoid interface and top mounting interface according to VDI/VDE3845 (NAMUR)
3. The solenoid drilling pattern is shifted 0.16" for size 0025 and 0.08" for size 0040 vs. the centerline of the actuator.

Tolerance limits unless otherwise specified:
 X.X = ± 0.02"
 X.XX = ± 0.01"

Dim in Inches	Actuator Size						
	0025	0040	0065	0100	0150	0200	0350
A1	6.54	7.55	8.53	9.72	11.97	14.23	15.15
A2	6.54	7.55	8.53	9.72	8.80	10.07	10.58
A3	3.59	4.39	4.86	5.14	6.19	6.42	7.92
A4	4.69	5.47	5.94	6.22	7.28	7.52	9.06
A5	3.23	3.74	4.09	4.53	5.00	5.28	6.50
A6	1.91	2.15	2.28	2.50	2.72	2.83	3.35
A7	1.16	1.34	1.48	1.50	1.93	1.92	1.65
A8	1.89	2.28	2.72	2.72	2.95	3.43	4.29
A9	0.71	0.98	1.06	1.10	1.81	1.81	1.81
B1	1.69	1.77	1.97	2.36	2.95	2.95	3.35
B2	3.70	3.70	3.70	3.82	3.70	3.70	3.94
B3	3.15	3.15	3.15	3.15	3.15	3.15	3.15
C1	0.63	0.87	0.87	0.87	1.34	1.42	1.42
C2	0.91	1.18	1.18	1.18	1.77	1.77	1.77
C3	0.39	0.55	0.55	0.55	0.75	0.75	0.75
C4	0.79	0.79	0.79	0.79	0.79	0.79	0.79
C5	0.47	0.47	0.47	0.47	0.47	0.47	0.47

ACTUATORS AND CONTROLS

Pneumatic Actuators – AD and AS (Sizes 0600 to 4000)

APOLLO RACK & PINION

Designed and manufactured for the ultimate in durability and reliability, the new Apollo® Pneumatic Rack & Pinion Actuators provide outstanding service life.

Apollo Rack & Pinion actuators have replaceable insert drive adapters in all but the largest models, and many units have dual “F” series bolt patterns. The numerous actuator drive and bolt pattern combinations allow direct mounting of several valve styles.



FEATURES

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Yellow Chromate Powder Coat Finish
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- 3. Die Cast Aluminum Pistons**
Yellow Chromate Coated
- 4. Aluminum Alloy Pinion**
7075-T6
Hard-coat Anodized Finish
- 5. Drive Inserts**
Extruded Aluminum
Hard-coat Anodized Finish
- 6. Preloaded Concentric Springs**
Deltatone® Coated
- 7. Piston Guides**
Molybdenum Disulfide filled Polyamide
- 8. Bushings**
Polyoxymethylene (POM)
- 9. O-Ring Seals**
Standard Temp. (-4°F to 180°F): Buna-N
High Temp. (-4°F to 250°F): Fluorocarbon
Low Temp. (-40°F to 180°F): Silicone
- 10. Capscrews, Nuts & Other Hardware**
304 Stainless Steel

BENEFITS

- Compact Rack & Pinion Design
- Quarter-Turn Operation
- Designed for use on a variety of Valve Types:
Ball Valves, Butterfly Valves, Plug Valves
- Applicable to Damper and Door Openers
- Both Single Stop and Double Stop Versions**
- Both Double-Acting and Spring-Return Units
- Double-Acting Torque Outputs from 6028 in-lbs to 40293 in-lbs with an 80 psi Air Supply
- Removable/Replaceable Drive Inserts*



- Pre-loaded Spring Assemblies
- ISO 5211 Valve Mounting
- NAMUR (VDI/VDE) Accessory Mounts
- ATEC Classification II, 2 GD, Zones 1 or 2 (Gases) and 21 or 22 (Dust)
- Anti Blow-Out Pinion Design
- Maximum Pressure Rating: 116 psig (8 bar)
- Compatible Media: Clean, Dry Air, Filtered Non-corrosive Gas or Light Hydraulic Oil
- Pre-lubricated for the life of the Actuator
- Chromate Corrosion Protection on all Aluminum Components
- Each Unit is Serialized
- 5 Year Apollo Warranty**

Notes:

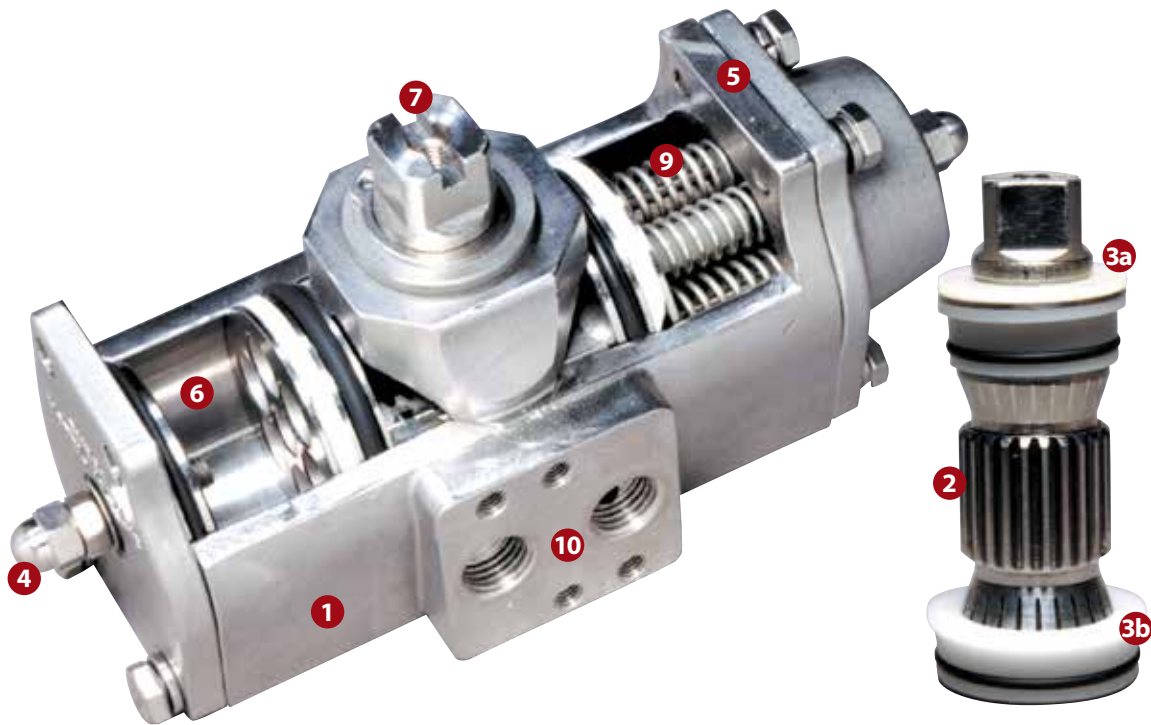
* A wide selection of standard inserts is available for Square, DIN and Double-D drives.

** Single Stop units are used where the open position of the valve requires precise adjustment. These are standard on all actuators with the exception of the two larger sizes where single stops are optional. Actuators with dual adjustable stops are also available for those applications on butterfly valves, for example, to allow precise adjustment of both the open and closed positions.

ACTUATORS AND CONTROLS

"Acutorque" Stainless Steel Actuator

DESIGN AND CONSTRUCTION



1. INVESTMENT CAST BODY

Assures manufacturing of other special alloys, such as Monel

2. UNIQUE DRIVE PINION

One piece stainless steel alloy shaft, precision machined gear and teeth for precise control

3. BEARINGS

Replaceable top and bottom TFE Pinion Bearings to ensure low friction, stability above 400°F, and chemical resistance

4. TRAVEL STOPS

Provides +/-4° travel adjustment in outboard direction

5. ACCESSORY MOUNTING

Manufactured to NAMUR to provide international standardized mounting

6. STAINLESS STEEL PISTONS

Precision cast pistons are guided through full face engagement with the pinion and piston guide

7. NAMUR SLOTTED SHAFT

Standard to provide a self-centering positive drive for positioners, a variety of switches

8. ACTUATOR MOUNTING

Manufactured in accordance with ISO 5211 to ensure mounting the actuator directly on valves

9. PRE-LOADED CARTRIDGES

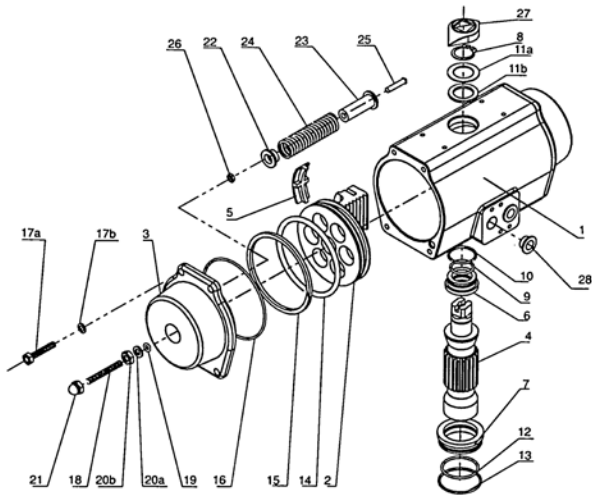
Converts a standard double acting actuator to a spring return unit by simply removing the end caps and adding the spring cartridges

10. NAMUR SOLENOID MOUNTING

International standard for direct mounting of solenoid valves

ACTUATORS AND CONTROLS

Features – “Acutorque” Stainless Steel Actuator



CORROSION RESISTANCE

All metal components are cast or machined from Stainless Steel or Monel, which offers excellent resistance to most corrosive chemicals as well as industrial atmospheres.

NO LUBRICATION

All actuators are factory lubricated for the optimum life of the actuator under normal conditions. Teflon® piston bearings are used because of their self-lubricating properties.

SIMPLE MAINTENANCE

Each actuator is designed for ease of maintenance. Should you wish to change a spring rating or completely rebuild a unit, total disassembly and reassembly is easily performed in just minutes with standard shop tools.

ISO/NAMUR MOUNTING

By using ISO/Namur standards, our actuators lend themselves to a host of various manufacturers' direct mount accessories. Solenoid valves, limit switches, positioners, etc. bolt directly to the actuator and in turn reduces the cost of assembly and installation of automated packages. Flexibility for future system modifications is greatly enhanced.

QUALITY

Each part of the actuator must pass a stringent quality test before it can be incorporated into an assembly. All materials used in construction must be certified and tested to prove their proper composition. Every cast part must pass an X-ray test before proceeding to the machining process. After machining, every part is dimensionally evaluated to assure it meets acceptable tolerance.

SAFETY

All actuator bodies and end caps are investment cast stainless steel, rugged and built to last. It may be argued that the mechanical properties of stainless steel permit the ability to use this wall tubing in the construction of an actuator. However, that is not the case with our actuator. Thick wall castings mean protection for actuator internal porting and components as well as maintenance and operating personnel. Our unique drive pinion design ensures blowout proof protection. Spring retainers are incorporated to allow safe removal of end caps during spring torque rating change or rebuild process.

GRADE OF STAINLESS STEEL

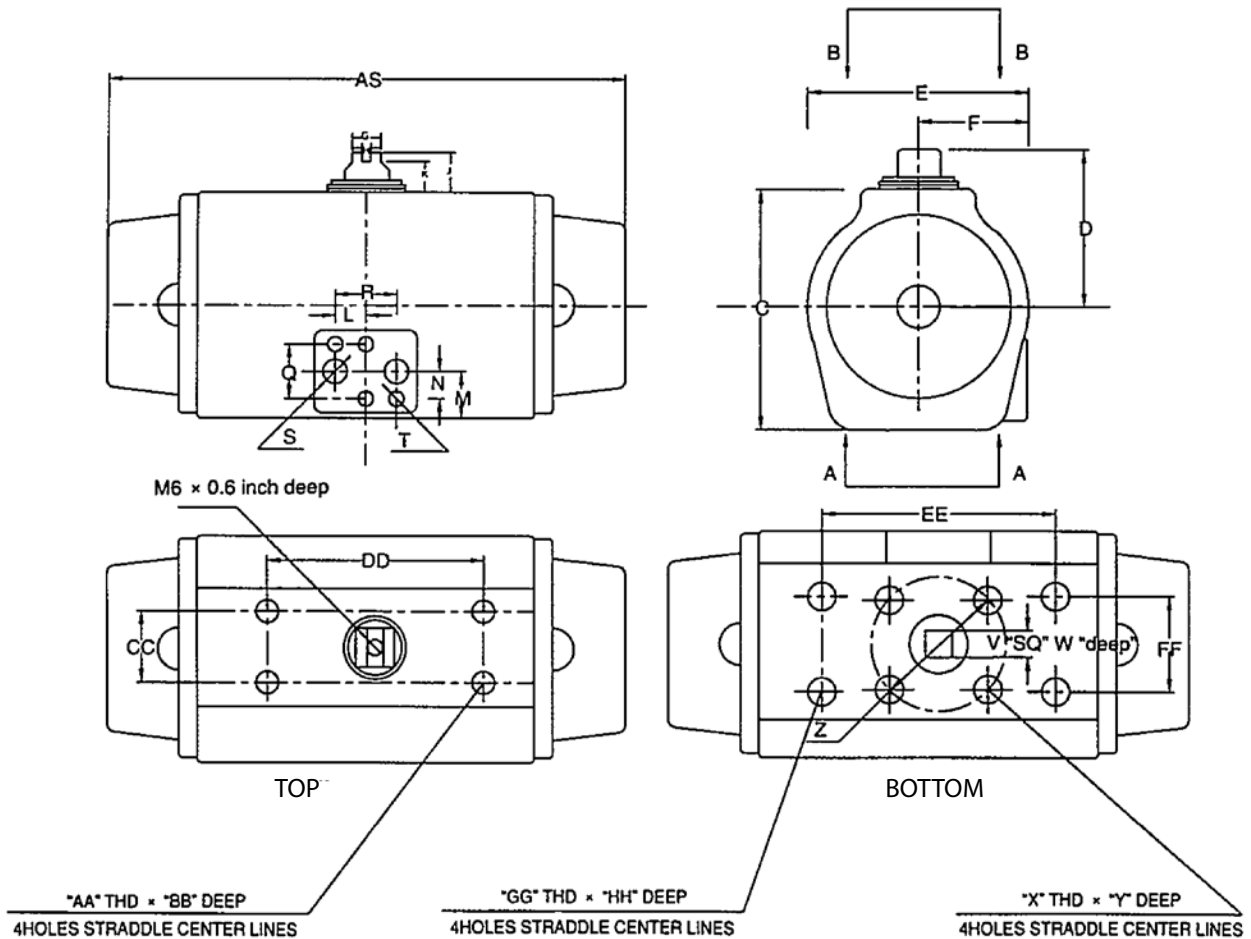
Body & End Caps	304
Shaft	17-4 ph
Piston	303
Bolts	18-8

Part	Qty	Material
1 Body	1	304 Stainless Steel
2 Piston	2	303 Stainless Steel
3 End Caps-Double Acting	2	Stainless Steel
4 Drive Pinion	1	17-4 Stainless Steel
5 Guide Bearing Plate	2	Nylon 6
6 Pinion Bearing Top	1	Teflon
7 Pinion Bearing Bottom	1	Teflon
8 Snap Ring	1	Stainless Steel
9 O-Ring-Inner Top	1	Viton
10 O-Ring-Outer Top	1	Viton
11a Washer	1	Stainless Steel
11b Bearing	1	Nylon 6
12 O-Ring-Inner Bottom	1	Viton
13 O-Ringer-Outer Bottom	1	Viton
14 O-Ring-Piston	2	Viton
15 Bearing-Piston	2	Nylon 6

Part	Qty	Material
16 O-Ring-End Cap	2	Nitrile
17a Bolts-End Cap	8	Stainless Steel
17b Spring Bearing	8	Stainless Steel
18 Adjusting Travel Stop	2	Stainless Steel
19 O-Ring-Travel Stop	2	Nitrile
20a Washer	2	Stainless Steel
20b Nut-Travel Stop	2	Stainless Steel
21 End Nut-Travel	2	Stainless Steel
22 Spring Retainer (S)	*	Nylon 6
23 Spring Retainer (L)	*	Nylon 6
24 Spring	*	Plated CS
25 Spring Screw	*	Stainless Steel
26 Spring Nut	*	Stainless Steel
27 Positioner Indicator	1	Nylon
28 Plug	2	Nylon 6

ACTUATORS AND CONTROLS

Dimensional Data – “Acutorque” Stainless Steel Actuator



MOUNTING DIMENSIONS

Model		R	S	T	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH
3SD04500	mm	24	1/4"NPT	M5	11	15	M5	8	42	M5	6	30	80	88.9	31.75	M5	8
3SS04560	in	0.95	1/4"NPT	M5	0.4	0.59	M5	0.31	1.65	M5	0.24	1.18	3.15	3.5	1.25	M5	0.31
3SD06000	mm	24	1/4"NPT	M5	14	15	M6	8	50	M5	6	30	80	88.9	31.75	M6	8
3SS06060	in	0.95	1/4"NPT	M5	0.55	0.59	M6	0.31	1.97	M5	0.24	1.18	3.15	3.5	1.25	M6	0.31
3SD08500	mm	24	1/4"NPT	M5	19	17	M8	12	70	M5	6	30	80	114	38	M8	12
3SS08560	in	0.95	1/4"NPT	M5	0.75	0.68	M8	0.47	2.75	M5	0.24	1.18	3.15	4.5	1.5	M8	0.47
3SD10500	mm	24	1/4"NPT	M5	19	20	M8	12	70	M5	6	30	80	114	38	M8	12
3SS10560	in	0.95	1/4"NPT	M5	0.75	0.79	M8	0.47	2.75	M5	0.24	1.18	3.15	4.5	1.5	M8	0.47
3SD12500	mm	24	1/4"NPT	M5	22	30	M8	18	102	M5	8	30	130	NA	50.8	NA	NA
3SS12560	in	0.95	1/4"NPT	M5	0.87	1.2	M8	0.71	4.02	M5	0.31	1.18	5.12	NA	2	NA	NA
3SD14000	mm	24	1/4"NPT	M5	22	27	M10	18	102	M5	8	30	130	NA	50.8	NA	NA
3SS14060	in	0.95	1/4"NPT	M5	0.87	1.06	M10	0.71	4.02	M5	0.31	1.18	5.12	NA	2	NA	NA
3SD17000	mm	24	1/4"NPT	M5	32	36	M12	24	125	M5	8	30	130	NA	76	NA	NA
3SS17060	in	0.95	1/4"NPT	M5	1.26	1.42	M12	0.95	4.92	M5	0.31	1.18	5.12	NA	3	NA	NA
3SD21000	mm	24	1/4"NPT	M5	36	43	M20	28	140	M5	8	30	130	NA	76	NA	NA
3SS21060	in	0.95	1/4"NPT	M5	1.42	1.69	M20	1.1	5.51	M5	0.31	1.18	5.12	NA	3	NA	NA

ACTUATORS AND CONTROLS

Scotch-Yoke Actuator

G SERIES



NAMUR

The shaft driven accessory interface conforms to the NAMUR standard and is identical on all G-Series actuators, allowing for standardization of accessory mounting hardware and installation practices

- Pneumatic and hydraulic scotch-yoke actuators
- Automates ball, butterfly, plug valves and any other 90° rotating mechanisms
- Salt Spray Testing per ASTM B117 criteria. Construction features prevent water ingress, allowing G-Series actuators to meet IP 66 and IP 67M specifications and severe high pressure water deluge test

OPERATING RANGES

G-Series double acting actuators produce guaranteed minimum torque outputs from 10,000 lb-in. up to 6,000,000 lb-in. The spring return units produce spring torques from 2,500 lb-in. to 3,000,000 lb-in.

- Standard operating pressures:
Pneumatic — to 200 psig (14 BAR)
- Standard operating temperature is -20°F to +200°F (-29°C to +93°C)
Optional trims available:
0°F to +350°F (-18°C to +177°C)
-50°F to +180°F (-46°C to +82°C)
- Mechanical and hydraulic manual overrides are available
- MSS and ISO Valve Mounting
The G-Series valve interface meets the dimensional requirements of MSS SP-101 or ISO 5211 defined for each torque range

DOUBLE ACTING G1 PNEUMATIC ACTUATOR TORQUE CHART

Apollo Model No.	Reference Number	Stroke Position	Operating Pressure (psig)											
			40	50	60	70	80	90	100	110	120	150	175	200
			Output Torque (In-Lbs)											
3TG100800	G01008	Start/End	12465	14543	16620	18698	20775	22853	24930	31163	36356	41550		
		Minimum			6579	7675	8772	9868	10965	12061	13158	16447	19188	21929
3TG100900	G01009	Start/End	10593	13241	15890	18538	21186	23835	26483	29131	31779	39724		
		Minimum	5591	6989	8386	9784	11182	12579	13977	15375	16772	20966		
3TG101000	G01010	Start/End	14046	17557	21069	24580	28092	31603	35115	38626				
		Minimum	7413	9266	11120	1973	14826	16680	18533	20386				
3TG101200	G01012	Start/End	20133	25166	30199	35232								
		Minimum	10626	13282	15938	18595								
3TG101400	G01014	Start/End	24482	30603	36723									
		Minimum	12921	16152	19382									

ACTUATORS AND CONTROLS

AE Series Actuators

AE SERIES



Ruggedly built and designed for easy installation, new Apollo® AE Series electric actuators deliver the most standard features and performance in their class. **Now CSA listed all sizes as standard.**

FIVE OUTPUT TORQUES, ONE HOUSING

- 200, 400, 600, 800 and 1,000 inch-pounds
- Long Service Life
- Anodized die cast aluminum housing
- Fiberglass reinforced nylon cover resists corrosion
- Nitrile gasket and seals cover all penetration points in housing and cover
- Precision cut and heat treated alloy spur gears
- Permanently lubricated enclosed gear train
- NEMA 4, 4X

EASY TO USE

- Two separate 1/2" NPT conduit entrances for easier wiring and signal separation
- 12-position pre-wired terminal strip includes standard connections for remote open/closed position indicators; lots of room for wiring options
- Unrestricted mounting orientation
- Built-in thermal overload protection in all AC motor actuators
- Limit switches have an 11 amp rating at 115 VAC
- High visibility valve position indicator standard on all models

MANY STANDARD FEATURES

- Stainless steel push-and-turn manual override shaft, position indicator shaft and female output
- ISO 5211 F07 drive output reduces inventory of mounting kits
- 115 AC & 220 AC models feature a 25% duty cycle below 100°F (24AC — 20% duty cycle below 100°F)
- 12 and 24 DC — all DC voltage models provide 100% duty cycle for 1 hour after which DC motor is reduced to 80% duty cycle.
- Reversible rotation

BROAD TEMPERATURE RANGE

- Operates from -40°F (when equipped with 15 watt heater and thermostat) to 150°F

AVAILABLE OPTIONS

- Actuators can be ordered with one, two or three additional limit switches
- For low temperatures: actuators can be equipped with a thermostatically controlled heater element
- Motor brake is necessary when mounting actuator to a butterfly valve

4-20MA POSITIONER FEATURES (P - OPTION)

Advanced Protection Features

- A) Stall Detection - Motor will not burn out from stalling
- B) Fault Signal
 - Fault LED on DHC-100 front panel
- C) Duty Cycle Protection
 - Allows actuators rated for 25% duty, or more, to be safely modulated
 - Activates prior to tripping of thermal overload protector, which prevents long shut down periods due to tripping thermal overload protector; allows the actuator to continue to move to set-point at a 25% duty cycle speed

Performance Features

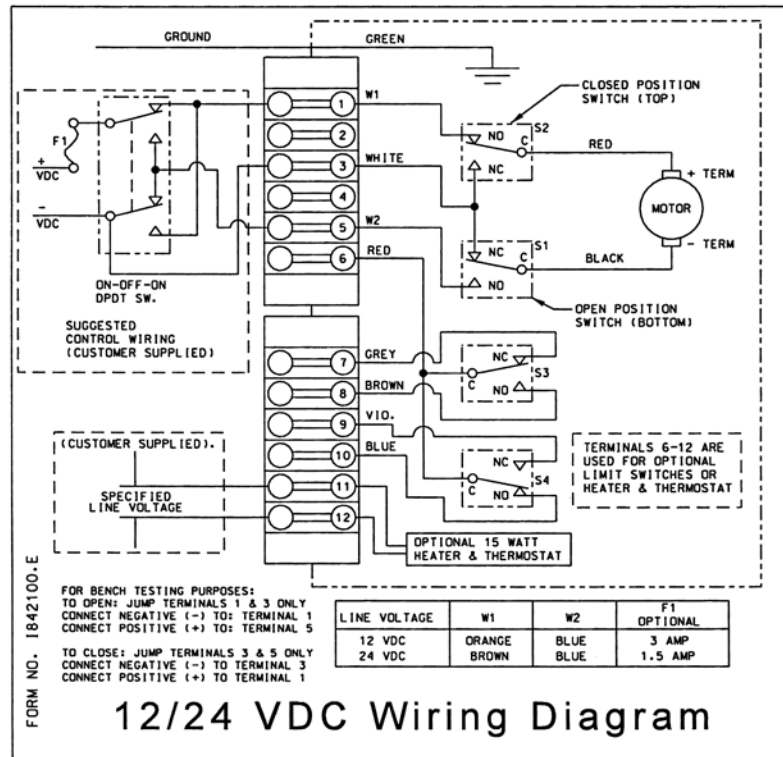
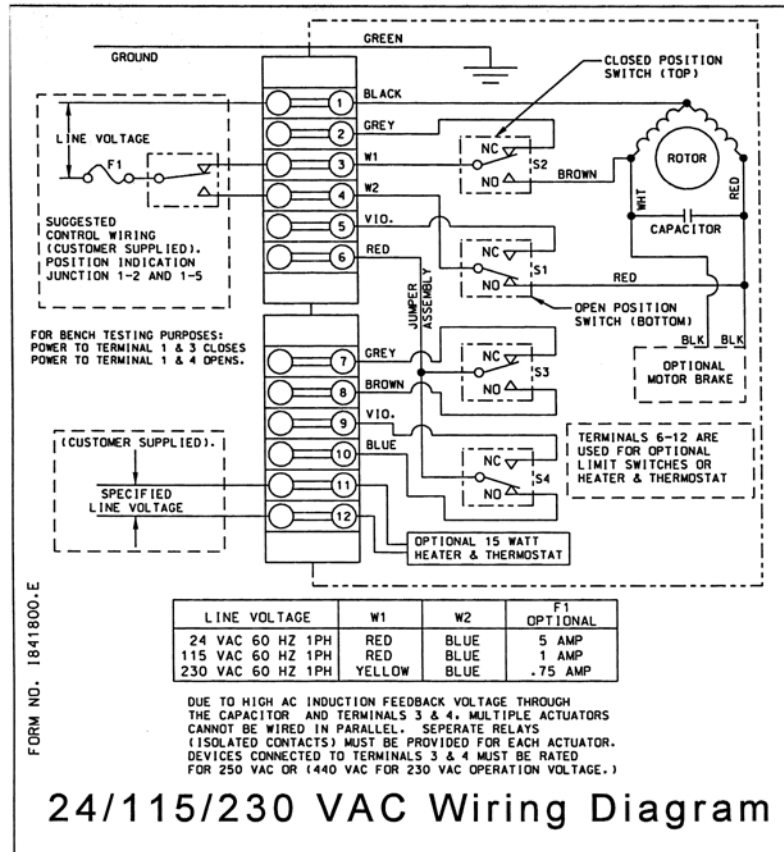
- A) High Resolution ($\pm 0.1^\circ$)
 - 450 points of resolution on a 1/4 turn valve
- B) Dynamic Braking
 - Stops motor before changing actuator direction
 - Stops motor before mechanical brake engages, which reduces break wear
- C) Adaptive Control - Designed to maintain high resolution and accuracy by continuously monitoring and compensating for actuator backlash, motor coast, and load changes to eliminate positioner deadband

4-20MA POSITIONER FEATURES (T - OPTION)

- A) High Resolution Feedback Transmitter
 - Provides voltage or mA output that can be set for any range (0 to 10 VDC in 0.0016 V steps or 0 to 20 mA in 0.0031 mA steps)
- B) Auto/Manual Station (Local Control Unit - LCU)
- C) Polarity Detection

ACTUATORS AND CONTROLS

AE Series Actuators



ACTUATORS AND CONTROLS

AE Actuator



How to Order AE Series Electric Actuators

AE -	400 -	3	BF
PREFIX	TORQUE (LB - IN)	VOLTAGE	OPTIONS
AE	200	1 = 115 vac	0 = Standard
	400	2 = 24 vac	A = One extra switch & cam*
	600	3 = 220 vac	B = Two extra switches & cams*
	800		C = Three extra switches and cams*
	1000	4 = 12 vdc	D = Heater and Thermostat (15 watt)
	Enter all digits of Torque Value	5 = 24 vdc	F = Motor Brake (115 VAC & 24 VAC Only)
			H = Tropical Heater (15 watts)
			P = Positioner 4-20 mA
			T = Transmitter 4-20 mA

Note: AE will always be the first two characters of the part number, all digits from torque value must be entered into part number (i.e. 400, 1000 etc.) Only use one digit for voltage depiction (i.e. 1-5). For the options listing you may use more than one character, up to three, (i.e. O, AD or BD etc.)

Example:

AE-400-3BF :

400 lb. in.; 220 VAC; 2 extra switches and cams, motor brake

AE-1000-1D :

1000 lb. in.; 115 VAC; Heater and thermostat

- 1 Year warranty on positioner & positioner with transmitter
- Transmitter available with (P) positioner option only
- **Positioner & Transmitter are not CSA listed**
- * Not available with "P" option



For additional information, submittal sheets and manuals, visit www.apollovalves.com

Customer Service (704) 841-6000

ACTUATORS AND CONTROLS

Electric Actuators

CS & CL SERIES



Conbraco's CS and CL electric actuators are split phase reversing AC motors for standard duty or brushless DC Motors for continuous duty. Eight sizes are available which produce breakaway torques between 150 and 3000 lb-in. They are excellent industrial quality units capable of on/off, fail safe, and modulating applications. The efficient spur gear drive train is supported by permanently-lubricated bearings making it very secure while eliminating the potential for side loading of the output shaft.

Conbraco offers as standard a 75% duty cycle AC motor. Continuous-duty brushless DC motors are also available for a range of input voltages. All units are rated for use in ambient environments from -40°F (with optional heater & thermostat) to 150°F (note that units equipped with an internal battery are rated to 130°F).

HAZARDOUS LOCATION ENCLOSURES

The standard enclosures (CS and CL) are rated for NEMA 4/4X (weather tight and corrosion resistant). The Hazardous Location enclosures are rated for NEMA 4/4X/7 & 9, Class I, Div 1, Groups C&D; Class II, Div. 2, Groups E, F, & G; Class III.

(CSA) CERTIFICATIONS

Certification by the Canadian Standards Association of either hazardous or weatherproof locations is standard on all CS & CL models with 75% duty cycles.

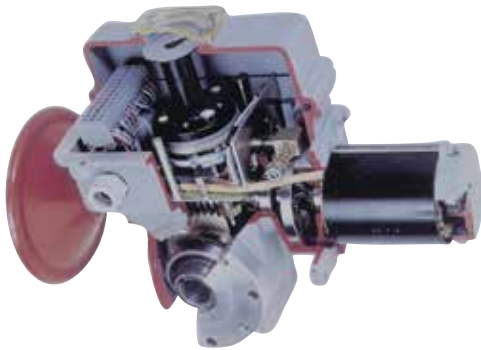
FEATURES

- Plug-in connectors for the motor, the brake option and the heater/ thermostat option
- All connectors are coded to prevent mis-wiring.
- Limit switch wires are soldered to the board - no more loose connections.
- A six position terminal strip clearly labeled so it can be wired up in the field without an instruction manual.
- Thermal overload protection (AC motors)
- Dual conduit openings; 3/4" (1/2" with supplied bushings)
- Visual position indication
- All aluminum enclosure
- Captive cover bolts on CS Series
- Manual override shaft (optional handwheel override with declutchable shaft)

ACTUATORS AND CONTROLS

Electric Actuators

LB SERIES



The LB-Series is available in several basic designs with a wide variety of configurations from which to select torque and speeds to meet specific application requirements. These rugged and uncomplicated actuators provide a practical and reliable method for turning any mechanism 90°. Torques range from 540 inch-pounds to 54,000 inch-pounds (6.25 to 625 kilogram-meters). Electrical models are available in 115 VAC-50/60 Hz single phase, 200 VAC-50/60 single phase; and 220/440 VAC-50/60 Hz three phase. Models are available for on/off modulating control.

Listed below are performance specifications for a limited sampling of LB-Series electric actuators. This product family is available with a such a variety of options and features that they can not be represented in this catalog. Options such as positioners, transmitters, special enclosure ratings, extra switches, or motor voltages are optionally available. Contact Conbraco's Actuator Engineering Department for the proper actuator to fit non standard or unique requirements.

LB SERIES ELECTRIC ACTUATOR PERFORMANCE DATA

L-B Series Model Number	Torque Output Lb-In	Rotating Speed (Sec/90 degree)		Power Requirements 30% Duty Cycle			
				115VAC 1 Ph 60Hz		460 VAC 3 Ph 60 HZ	
		Std	Opt	RATED	START	RATED	START
OA8	885	5		1.95	3.3	0.63	1.15
OA8	885	25		1.25	2	0.39	0.78
OA15	1350	15	25	1.95	3.3	0.39	0.78
AT25	2250	15		1.95	3.3	0.63	1.15
AT25	2250	25	50	1.95	3.3	0.39	0.78
AT50	4500	25		4.6	12	0.63	1.15
AT100	8850	24	12	4	17	0.6	1.2

Contact factory for part numbers of actuators with options & other voltages

Notes:

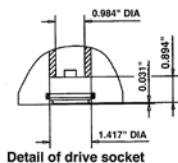
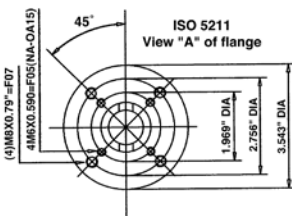
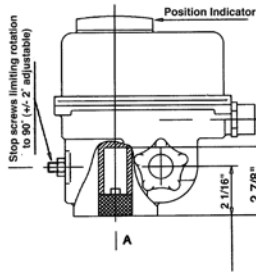
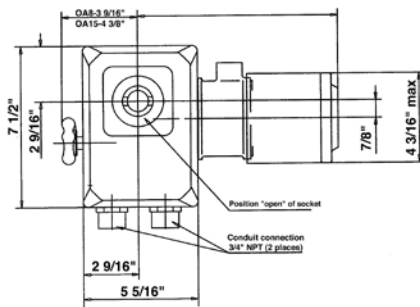
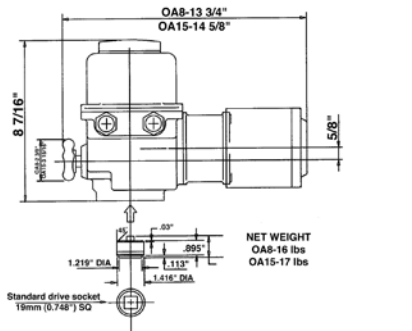
- Operating speed is based on an actuator operating at rated output torque. Actual operating speed will vary depending on actual output torque.
- All torque and speed ratings are based on a plus or minus 10% motor voltage variation.
- All torque ratings represent the maximum torque available during both breakaway (start) and run (dynamic) conditions.
- Each actuator is supplied, as standard, with a 30% duty cycle, F insulation, TENV design motor rated for 360 starts per hour at 104°F.
- All actuators are NEMA 4 rated as standard. Many are optionally available with additional ratings, such as, explosion proof or submersible, etc., to meet special service requirements.
- All actuators utilize a self-locking gear train design and have provision for manual override.
- All actuators have both electrical and mechanical travel stop provisions.
- FQ Series are Spring Return Failsafe models. Contact factory for model number and price (not listed above).

ACTUATORS AND CONTROLS

LB Series Actuator Dimensions

TYPES OA8 AND OA15

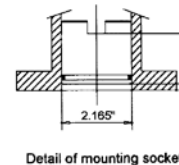
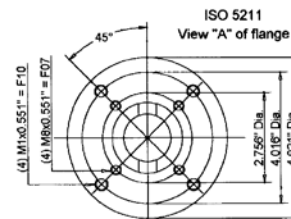
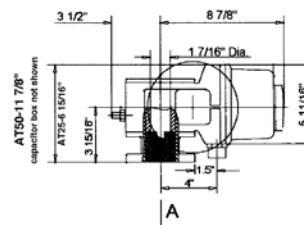
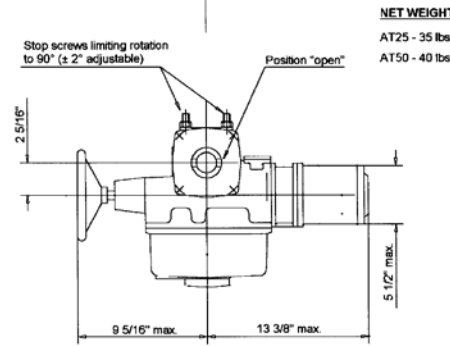
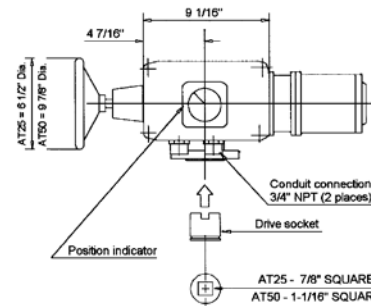
Standard specification: Weatherproof NEMA 4, with two adjustable SPDT limit switches; with built-in motor thermal cutouts, with handwheel for manual operation. Duty rating 30%.



TYPES AT25 AND AT50

Standard specification: Weatherproof to NEMA 4, fitted with two adjustable SPDT travel limit switches (one for each extreme position); two SPDT torque limit switches (one for each direction of rotation) and with handwheel for manual operation.

Duty rating 30%. Net weight: 40 lbs.
AT25 female socket dimension = .866 square
AT50 female socket dimension = 1.063 square

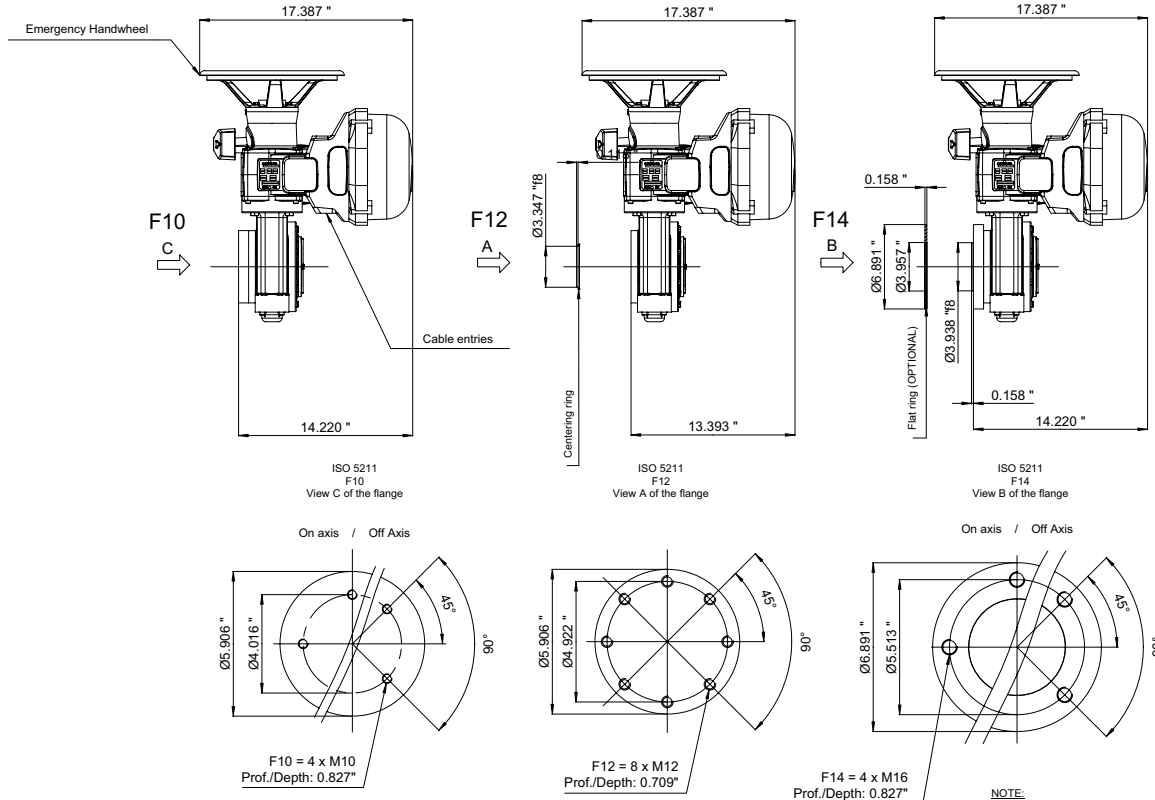
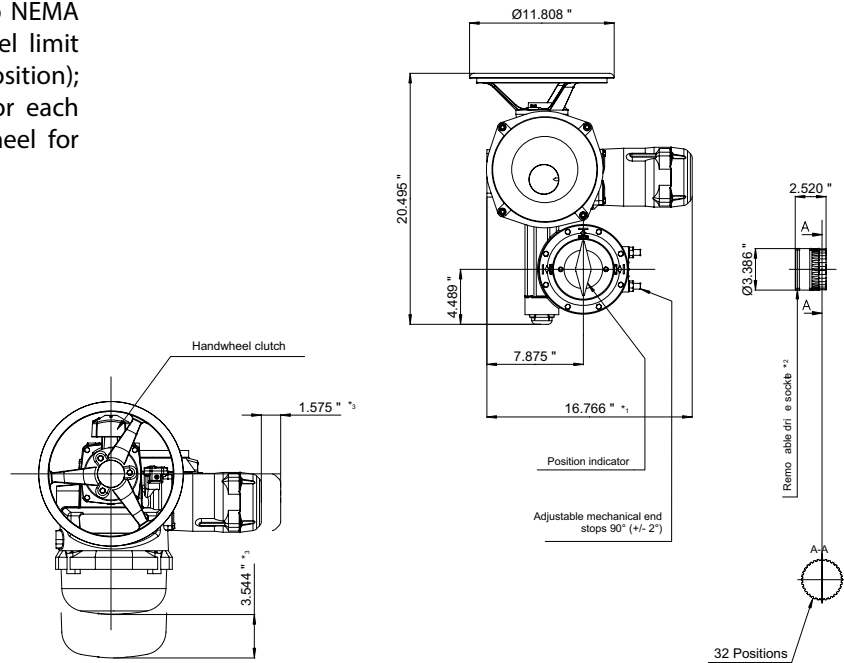


ACTUATORS AND CONTROLS

LB Series Actuator Dimensions

TYPE AT100

Standard specification: Weatherproof to NEMA 4, fitted with two adjustable SPDT travel limit switches (one for each extreme position); two SPDT torque limit switches (one for each direction of rotation) and with handwheel for manual operation. Duty rating 30%.



- NOTE:**
- ¹ The actuator is represented in its maximum size.
 - ² Representation of the socket in closed position.
 - ³ Dimension to allow for disassembly

ACTUATORS AND CONTROLS

Solenoids

DIRECT MOUNTED NAMUR SOLENOID VALVES

SOLENOID GENERAL SPECIFICATIONS

TEMPERATURE LIMITS:

Media: 0°F to +180°F.

Ambient:

1: NEMA 4, 4X 0°F to +180°F.

2: NEMA 4-4X-7-9, 0°F to +125°F.

COIL RATINGS:

1: NEMA 4, 4X: Continuous duty molded Class H insulation.

2: NEMA 4-4X-7-9: Continuous duty molded Class F

COIL VOLTAGES AVAILABLE:

Coil Voltage Variation: +/-10% of Nominal

1: 120 VAC-60 Hz/110 VAC-50 Hz.

2: 240 VAC-60 Hz/220 VAC-50 Hz/120 VDC.

3: 48 VAC-60 Hz/44 VAC-50 Hz/24 VDC.

4: 24 VAC-60 Hz/22 VAC-50 Hz/12 VDC.

POWER CONSUMPTION:

6 Watts

MATERIALS:

Valve Body=Aluminum, anodized.

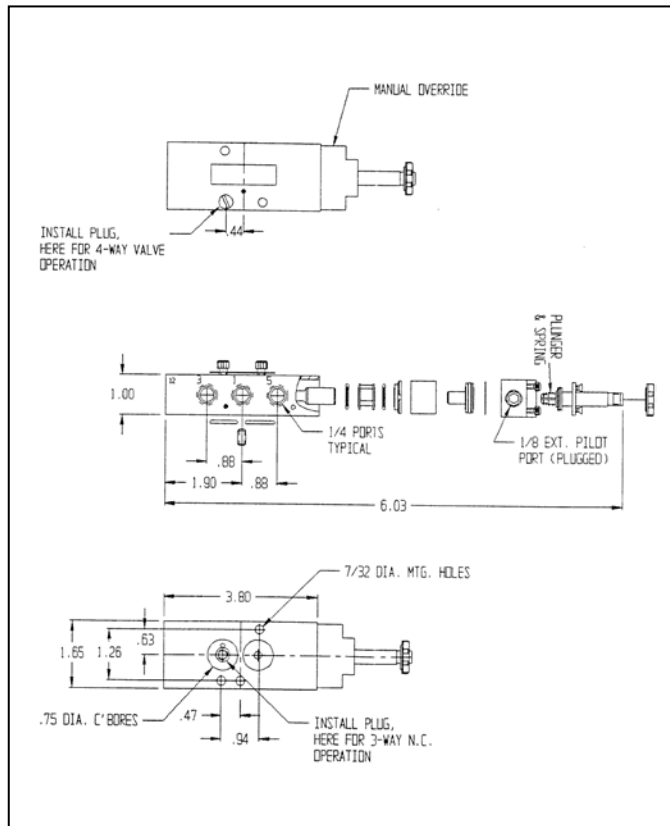
Fasteners=Stainless Steel

Seals & O-Rings=Nitrile.

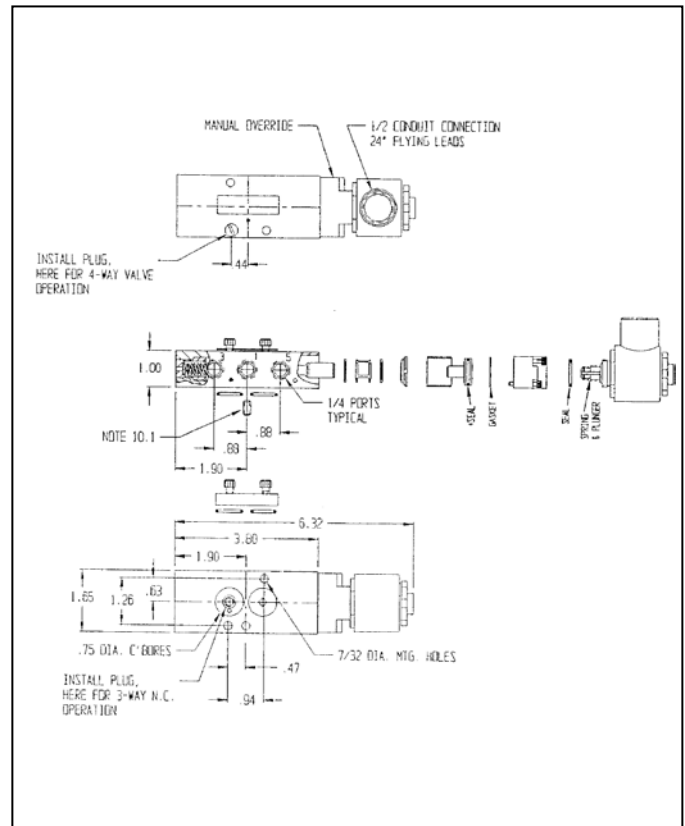
CV FLOW RATE:

1.8

NEMA 4-4X UL, CSA, PTB&CE

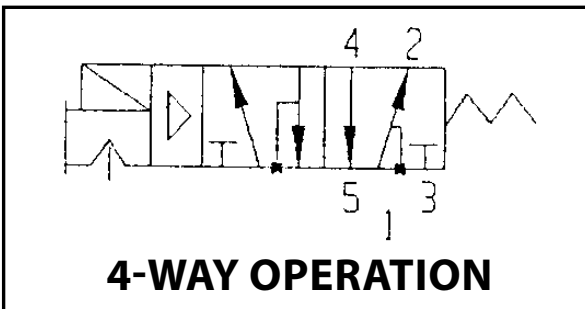
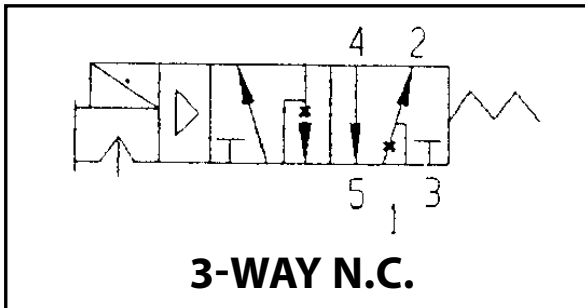
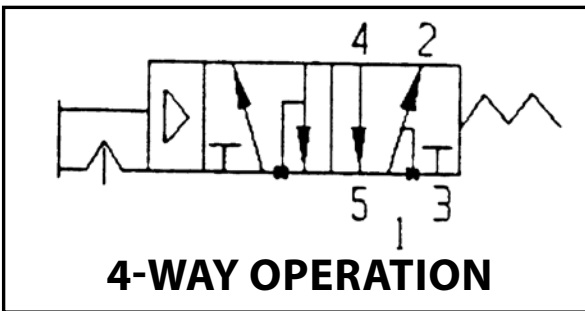
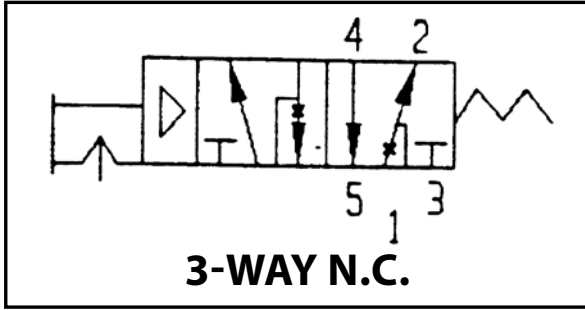


NEMA 4, 4X, 7 & 9 UL, CSA, PTB&CE



ACTUATORS AND CONTROLS

Solenoids



SOLENOID VALVES

AVC NAMUR *Three & Four-way, end mounted coil

Solenoids: Cv=1.8

For NAMUR Direct Mount

Part No.		
3T8-411-40A	115 VAC NEMA 4	0025 thru 4000
3T8-421-40A	12 VDC/24 VAC NEMA4	0025 thru 4000
3T8-431-40A	24 VDC/48 VAC NEMA4	0025 thru 4000
3T8-441-40A	220 VAC NEMA4	0025 thru 4000
3T8-711-40A	115 VAC NEMA7	0025 thru 4000
3T8-721-40A	12 VDC/24 VAC NEMA7	0025 thru 4000
3T8-731-40A	24 VDC/48 VAC NEMA7	0025 thru 4000
3T8-741-40A	220 VAC NEMA7	0025 thru 4000

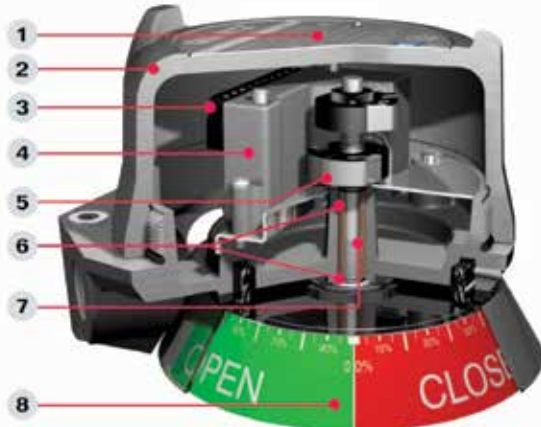
Part No.		
3T8-411-32A	115 VAC NEMA 4	032, 200 & 270
3T8-421-32A	12 VDC/24 VAC NEMA4	032, 200 & 270
3T8-431-32A	24 VDC/48 VAC NEMA4	032, 200 & 270
3T8-441-32A	220 VAC NEMA4	032, 200 & 270
3T8-711-32A	115 VAC NEMA7	032, 200 & 270
3T8-721-32A	12 VDC/24 VAC NEMA7	032, 200 & 270
3T8-731-32A	24 VDC/48 VAC NEMA7	032, 200 & 270
3T8-741-32A	220 VAC NEMA7	032, 200 & 270

All above include adapters to turn "NAMUR 90°"

Part No.		
3T8-000-32B	Adapter	032, 200 & 270
3T8-000-32A	Adapter	0025-4000

ACTUATORS AND CONTROLS

Stonel Quartz Limit Switch



The Quartz is available in explosion proof (QX), nonincendive and intrinsically safe (QN) and general purpose (QG) versions. The robust epoxy coated anodized aluminum construction makes this platform extremely durable and well suited for use in corrosive, heavy wash down environments. A broad range of switching, position transmitter and communication options may be selected to accommodate most applications.

This versatile platform adapts to a wide variety of valve systems. Attach the Quartz to quarter-turn actuators, manual operators, linear operators and positioners using readily available stainless steel mounting systems.

1. Enclosures Optimized for Environment

QX: Explosion proof, water tight and corrosion-proof enclosure is approved for use in div. 1/zone 1 hazardous areas.

QN: Nonincendive is approved for all div.2/zone 2 hazardous environments with proximity sensors using a clear cover. Intrinsically safe Namur sensors or passive switches are available for div. 1/zone 0 applications.

QG: General purpose features a clear Lexan cover with mechanical switches. All enclosures are rated NEMA 4, 4x, and 6.



2. Rapid Enclosure Access

Screw-on cover allows quick enclosure access, saving you valuable maintenance and set-up time. The cover provides a vapor tight seal and allows entry to internal components in less than five seconds.

3. Faster Wiring

Pre-wired and labeled terminal strip enables quick, convenient attachment of field wires.

4. Wide Variety of Switching & Communication

Switching options include dual module sensors and communication, Maxx-Guard proximity switches and mechanical switches. Continuous signal output is available in a 4 to 20 mA position transmitter.

5. Quick Set Cams are Easy to Adjust

Touch and Tune switch settings allow you to make adjustments in seconds without the use of tools.

6. Dual Shaft O-ring Seals Eliminate Corrosion

Top inner and bottom outer shaft o-rings seal the drive bushing from both external corrosives and internal contaminants that enter the enclosure.

7. Special Drive Bushing Assures Long CycleLife

The oil impregnated bronze bushing maintains smooth operation and eliminates the potential for shaft seizure due to actuator shaft eccentricity.

8. Space Saving Visual Indication

Visual indicator offers excellent viewability without sacrificing accessibility or adding to space requirements. Indicators are also available with continuous percentage or three-way indication.



Eliminate Seal Fittings in Division 2 and 2 Areas

FMus ratings certify the Quartz QX series with proximity switches for use without seal fittings in all hazardous areas. By passing special pressure piling tests, the all aluminum enclosure was certified for this elite distinction. Now, a time-consuming procedure can be safely eliminated in division 1 and division 2 areas.

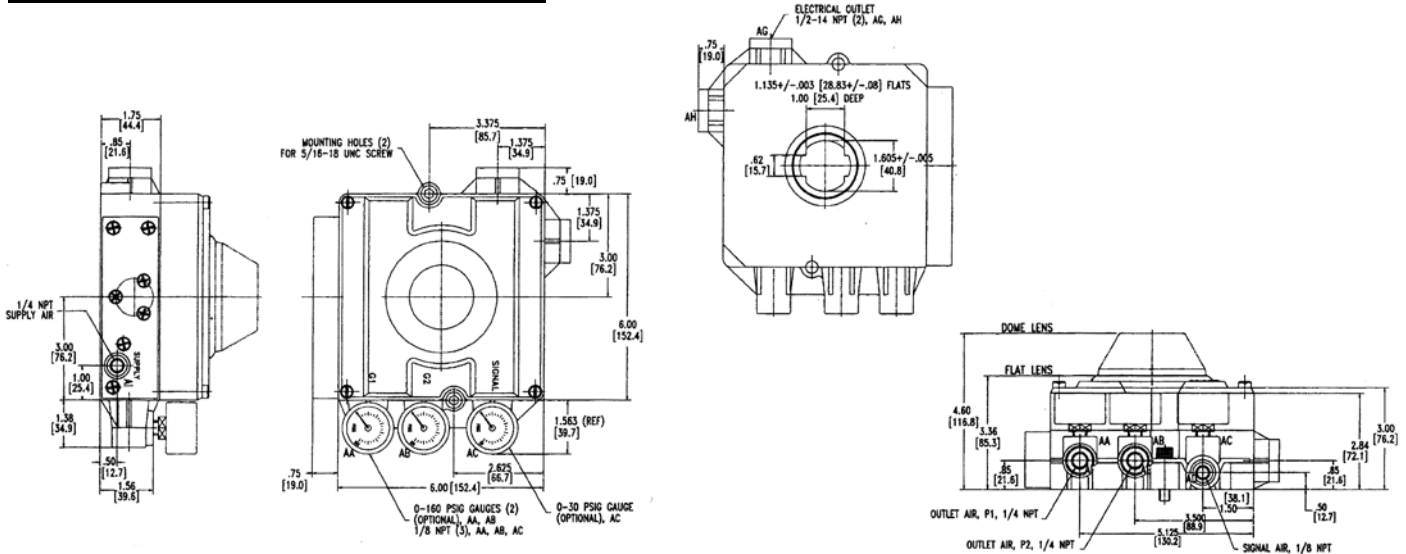
Consolidate Your Components & Minimize Costs

The Quartz design offers up to three conduit entries with extra wire terminations. By terminating solenoid valves in the switch enclosure, significant savings are realized by eliminating a junction box, wiring, conduit materials and labor.

ACTUATORS AND CONTROLS

VRC Positioners

DIMENSIONAL DIAGRAMS



CONSTRUCTION

Part	Materials
Enclosure	PPA Composite, 300 Stainless Steel Port Rings, Cover and Mounting Bolts
Indicator Lens	LEXAN™
Internals	PPA, PPS and PEEK Composites 300 Series Stainless Steel
Nickel Plated Brass Spool Valve	Carpenter 70 Grade Stainless Steel
I/P Converter (VK02) VE Model	PPA Composite, TEFLON™ Coated Carbon Steel, Nickel Plated Carbon Steel, High Density Polyethylene DELRIN™
Signal Diaphragm/ O-Rings	BUNA N

PERFORMANCE

Parameter	Specification
Resolution	1.25% Maximum 0.10% Typical
Repeatability	99.75% Minimum 99.90% Typical
Hysteresis	0.50% Maximum 0.25% Typical
Linearity	1.0% Maximum
Gain @80 psig	250 Single Acting 500 Double Acting
Air Consumption @80 psig	0.25 SCFM – Standard Flow Spool Valve 0.45 SCFM – Maximum Flow Spool Valve
Temp. Range	-40 to 150° F/-40 to 65° C

How to Order VRC Positioners

3PV - PREFIX	POSITION INDICATOR & TYPE	SPOOL VALVE	PORT GAUGES	POSITION TRANSMITTER	LIMIT SWITCH
3PV	0 = Flat Pneumatic 1 = Flat Electro-Pneumatic 5 = Dome Pneumatic 6 = Dome Electro-Pneumatic	7 = Standard Flow 8 = Max Flow	3 = No Gauges 4 = Brass Gauges 5 = SS Gauges	0 = No Transmitter F = 4-20MA Current Output 2-Wire	0 = No Switch K = Mechanical Switch M = Proximity Switch

Note: See Price List for Apollo Part Numbers



For additional information, submittal sheets and manuals, visit www.apollovalves.com

Customer Service (704) 841-6000

ACTUATORS AND CONTROLS

PMV Positioners

FEATURES & BENEFITS



Simple design makes this product easy to understand, calibrate and repair. Rugged construction provides operation in a variety of tough applications. Compact size minimizes space requirements. A complete package means the user can select the right positioner for his application.

A bright indicator makes it easy for operators to visually check valve position. Spool valve design requires very little maintenance. Electro-pneumatic unit eliminates the need for an extra product and additional connections. Recognized product name means a proven product with many years of service.

PRODUCT SPECIFICATIONS

	P2000/20	P5/EP5*
Connections:	1/4"	1/4"
Supply Pressure:	120 psig	145 psig
Hysteresis:	0.5%	0.5%
Linearity:	2.0%	0.5%
Repeatability:	0.5%	0.5%
Sensitivity:	0.5%	0.25%
Input Signal:	4-20 mA	3-15, 4-20mA
Temperature - Standard:	+5 - 175°F	+5 - 185°F
Temperature - Optional:	+5 - 230°F	+5 - 230°F
Weight:	5.9 lbs.	2.9/4.1 lbs.
Air Consumption @ 85 psig:	35/.71 scfm-----	.75 scfm
Air Delivery @ 57 psig:	12/15.7 scfm	12.6 scfm
Gain Factor:	50/400	10,000

*PMV New Modular Unit P5-Pneumatic; EP5 Electropneumatic

Valve positioners are an excellent tool for increasing the gain of your valve package, often reducing your actuator size due to your increased ability to accurately control higher air deliveries, and the flexibility to add options and accessories to complete your control package's performance.

Our standard positioners include both pneumatic and electropneumatic positioners. Electropneumatic Positioners may be used on either double acting or spring return actuators. The anodized aluminum housing provides excellent product integrity and good corrosion resistance. Options including special coatings, stainless steel housings, and a variety of accessory items which provide the flexibility to meet your most demanding control applications.

PMV MOUNTING KITS FOR APOLLO ACTUATORS

3T 10 & 20	63-002-01	Stainless Steel
3T 30-60	63-001-89	Stainless Steel
3T 65-90	63-001-91	Stainless Steel

PART NUMBERS

Apollo Part #'s	PMV Model #'s	Description
3T-200-01	P-2000	Double Acting, Electro-Pneumatic, 1
3T-202-01	P-2020	Double Acting, Electro-Pneumatic, 2
3T-200-02	P-2000EX	Double Acting, Electro-Pneumatic, Intrinsically Safe, 1
3T-202-02	P-2020EX	Double Acting, Electro-Pneumatic, Intrinsically Safe, 2
3T-500-01	P5	Double Acting, Hi Capacity & Gain
3T-250-01	EP5	Electro Pneumatic, Hi Capacity & Gain
3T-250-02	EP5-EX	Double Acting, Hi Capacity & Gain, Explosion Proof

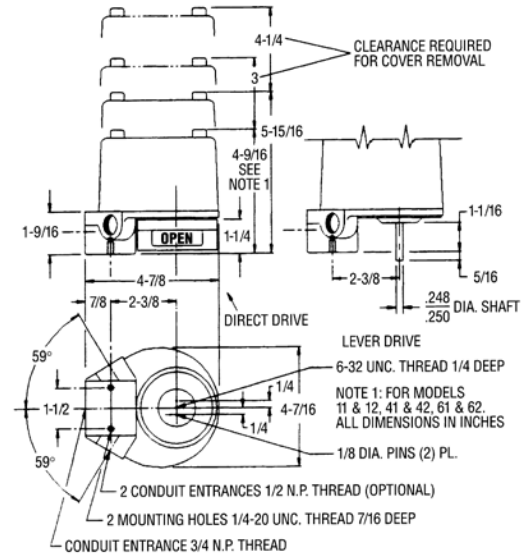
1. Normal Capacity
2. High Capacity
3. Accessories such as pressure gauges, limit switches, transmitters, and potentiometers are available. Please consult the factory for pricing.

ACTUATORS AND CONTROLS

Proximity Valve Position Monitoring Systems

VALVE POSITION MONITORING SYSTEMS

Proximity Controls' flexible Valve Position Monitoring Systems give users the ability to reliably monitor both manual and actuated valves. The durable position monitoring system features mounting hardware available in zinc plated steel, stainless steel, and Namur standards for all Proximity indicator models.



Proximity Model #	NEMA	Model Description	Switch/Transmitter Specifications
42ADM	4,4X	2 SPDT MECH, Clear Plastic Cover	15 amps ac, 5 amps dc
42ADO	4,4X,7,9	2 SPDT MECH, Anodized Aluminum Housing	15 amps ac, 5 amps dc
42DDO	4,4X,7,9	2 DPDT MECH, Anodized Aluminum Housing	10 amps ac, 10 amps dc
42RDO	4,4X,7,9	2 SPDT PROX, Herm Sealed Reed, Anodized Al.	3 amps ac, 2 amps dc
42VDOJ1	4,4X,7,9	2 SPDT MECH, 3/4" & 1/2" NPT Entry, Anodized Al.	10 amps ac, 10 amps dc
42RDOJ1	4,4X,7,9	2 SPDT PROX, 3/4" & 1/2" NPT Entry, Anodized Al.	3 amps ac, 2 amps dc
44ADO	4,4X,7,9	4 SPDT MECH, Anodized Aluminum Housing	15 amps ac, 5 amps dc
45VDO	4,4X,7,9	2 SPDT MECH, & Transmitter, Anodized Aluminum	10 amps / 4-20 mA out
45RDO	4,4X,7,9	2 SPDT PROX, & Transmitter, Anodized Aluminum	3 amps / 4-20 mA out
62PDO	4,4X,7,9	2 SPST PROX, Anodized Aluminum Housing	Herm Sealed Reed (mA)
62QDO	4,4X,7,9	2 SPDT PROX, Anodized Aluminum Housing	Herm Sealed Reed (mA)
35OD0*	Mag Coupling	MULTI-TURN Transmitter, Anodized Aluminum	No Switch / 4-20 mA
12AD0**	Mag Coupling	2 SPDT MECH, Anodized Aluminum Housing	15 amps ac, 5 amps dc
15VDO	Mag Coupling	2 SPDT MECH, & Transmitter, Anodized Aluminum	10 amps / 4-20 mA out
12VDOJ1	Mag Coupling	2 SPDT MECH, 3/4" & 1/2" NPT Entry, Anodized Al.	10 amps ac, 10 amps dc
12AD6	Mag Coupling - ST STL	2 SPDT MECH, 304 Stainless Steel Housing	15 amps ac, 5 amps dc
15VD6	Mag Coupling - ST STL	2 SPDT MECH, & Transmitter, 304 Stainless Steel	10 amps / 4-20 mA out

*No Visual Indicator Mag (Magnetic) Coupling - Maximum hazard protection and submersible. Prox (Proximity) sensors are all Herm (Hermetically) Sealed Reeds. Anodized aluminum housing is standard. 316 Stainless Steel is optional.

When ordering, please specify requirements for explosion proof certifications (US, CSA OR CENELEC), or Intrinsic Safety. Standard temperature (180°F) switches are available. White epoxy is optional. When you need a junction package, specify your solenoid valve requirement(s). For factory sealed lead orders, please specify number of leads and desired length (36" standard). Let us know if you need special cables or connectors, and specify your mounting hardware requirements.



For additional information, submittal sheets and manuals, visit www.apollovalves.com

Customer Service (704) 841-6000

ACTUATORS AND CONTROLS

OSHA Lockout Device



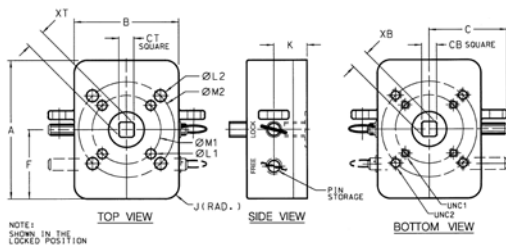
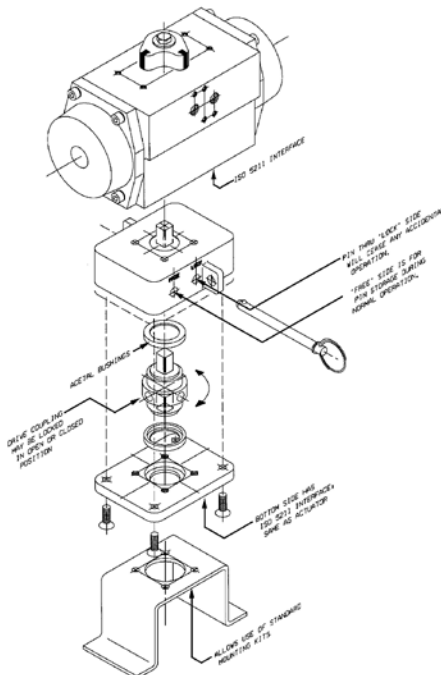
The Apollo® Lockout Tagout accessory for actuators complies with OSHA 1910.147 guidelines. It insures complete lockout capability in both the fully open or the fully closed position. Its design prevents accidental or malicious tampering of an automated valve's orientation.

The housing is constructed in investment cast 316SS, the fasteners, the lock pin, and the coupling are made of 300 Series stainless steel. This rugged construction, plus two acetal bushings located above and below the coupling, assures the strength and support necessary to withstand the torque and torsion generated by the actuator mounted above.

The top and bottom of the housing feature ISO 5211 mounting patterns. This design allows the accessory to be fitted between existing actuators and stainless steel bracketry that also comply with the ISO 5211 standard.

Available in six sizes, it is the perfect compliment to the Apollo® Rack and Pinion Actuator and Apollo® Ball Valve. The design results in a safe automated package that will satisfy the concerns of the most discriminating safety engineer.

The lockout device may be used with electric actuators. However, caution should be exercised due to the possibility of motor burnout in an energized and locked position.



DIMENSION	3TL3000	3TL4000	3TL5060	3TL6570	3TL8000	3TL9000
A	4.00	4.00	6.00	6.00	8.00	8.00
B	3.00	3.00	4.25	4.25	6.00	6.00
C	2.25	2.25	3.12	3.12	4.25	4.25
D	1.75	1.75	2.37	2.37	3.50	3.50
E	0.06	0.06	0.10	0.10	0.18	0.18
F	2.00	2.00	3.00	3.00	4.00	4.00
G	0.50	0.70	0.87	0.87	1.38	1.38
H	1.02	1.02	1.75	1.75	2.50	2.50
I	0.62	0.70	1.17	1.17	2.00	2.00
J(RAD.)	0.37	0.37	0.50	0.50	0.75	0.75
K	0.96	0.96	1.50	1.50	2.50	2.50
L1	0.265	0.265	0.328	0.328	0.515	0.640
L2	NA	NA	0.390	0.390	NA	NA
UNC1	1/4-20UNC	1/4-20UNC	5/16-18UNC	5/16-18UNC	1/2-20UNC	5/8-11UNC
UNC2	NA	NA	0.390	0.390	NA	NA
M1 B.C.	1.970 (F05)	1.970 (F05)	2.756 (F07)*	2.756 (F07)	4.920 (F12)	5.510 (F14)
M2 B.C.	NA	NA	4.016 (F10)	4.016 (F10)*	NA	NA
XT (MAX.)	0.540	0.690	0.955	1.080	1.325	1.780
XB (MIN.)	0.551	0.710	0.985	1.105	1.420	1.890
CT	.430/.432	.547/.550	.744/.747	.862/.865	1.056/1.059	1.413/1.416
CB	.433/.435	.551/.553	.748/.750	.866/.868	1.060/1.063	1.419/1.422
WEIGHT	3.65	3.75	9.90	10.40	28.90	29.50

*F Patterns Designated are Conbraco's Standard Mounting Arrangement

