



Serviceable Series User Manual

Pneumatically, Electrically and Manually Actuated Ball Valves



This User Manual covers Gemini's Models; A500 Pneumatic Actuators, 600 Electric Actuators, and 89 Model Ball Valves. The publication of these instructions are intended as a guide only. Installation should only be performed by qualified personnel. **Additional support is also available by contacting Gemini Valve @ Telephone: 603 244-7931, Email: service@geminivalve.com.**

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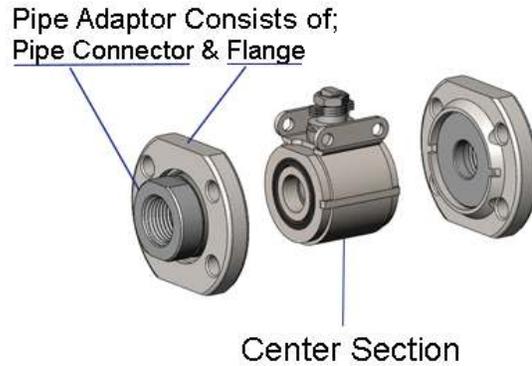
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Model 89 Ball Valves

Installation

Note: If the ball valve you are installing is equipped with an actuator, the actuator can be dismantled from the ball valve if desired to facilitate ease of installation. For further instructions see associated Pneumatic Actuator Models A500, Installation, Page 10 Actuator Removal for Ball Valve Installation or, Electric Actuator Models 600, Installation, Page 17, Actuator Removal for Ball Valve Installation.

A complete valve consists of three sub-assemblies; two Pipe Adaptor assemblies and a Center Section assembly comprising functional elements such as the ball, seats, seals, and stem.



Threaded

1. Ensure that both the male pipe and female valve threads are free from dirt, debris and corrosion. Wire brushing of the male pipe threads is recommended to ensure a good metal-to-metal joint.

2. Apply a good quality thread lubricant on the male threads. Lubricant reduces friction when making up the pipe joint. Note: thread lubricant is not intended to seal the joint and will not compensate for poor quality male pipe or fitting threads.

3. Turn the ball valve (female threads) onto the male pipe threads (or fitting) by hand. Continue to turn the valve as far up as it will go by hand. With the use of a wrench continue to tighten the valve onto the pipe. The pipe joint seal should occur within 1-3 turns after wrenching begins. Care should be taken not to exceed 3 turns in which damage to the threads can occur.

4. The pipe joint should be tested for leakage to ensure the pipe joint has been achieved.

5. Proceed; To Complete Installation.

Socket Weld

To avoid damaging seats and seals by exposure to welding temperature, the Center Section must be removed while the Pipe Adaptors are welded separately into line. Valves may be tack welded in place assembled, as long as the Center Section is removed while the welds are completed. (Seal temperature must never exceed 400°F). It is good practice to provide a gap of approximately 1/16" between the end of the pipe and the bottom of the socket, before welding.

To Complete Installation

1. Complete installation of the ball valve by securely and uniformly tightening the assembly bolts. Begin by tightening each bolt in succession, following diagonal pattern (Figure 1), until even contact is achieved between the Center Section and the Pipe Connectors. Tighten to Initial Torque value, Figure 2.

Figure 1



Model 89 Ball Valves

Installation (continued)

2. Continue tightening each bolt, a small amount at a time following the diagonal pattern, until each is brought to the Final Torque value, Figure 2.

Figure 2

Valve Port Size	Bolt		Initial Torque	Final Torque
	Thread	Hex Size	Inch - Pounds	Inch - Pounds
0.5	5/16-24	1/2	30	75
0.6	5/16-24	1/2	30	75
0.8	5/16-24	1/2	40	75
1.0	3/8 - 24	9/16	80	110
1.2	3/8 - 24	9/16	80	110
1.5	7/16 - 20	5/8	80	150

NOTES:

If the valve is in a long unsupported horizontal run, support the valve while hand-tightening the upper two assembly bolts until an even contact is achieved between the Pipe Connectors and Center Section seals. Finish the installation procedure by gradually bringing the bolts to the torque levels given in the chart.

Although an experienced fitter or mechanic will find no need to rely on a chart or torque wrench to ensure successful installation, the maximum torque value shown in Figure 2 must not be exceeded. Failure to do so may result in bolts yielding (twisting). For this reason, even experienced personnel are advised to employ a torque wrench.

Specifications

TEMPERATURE*: -20°F to 400°F

VALVE BODY PRESSURE RATING*: 1,000 P.S.I.**. C.W.P.***

MAXIMUM PRESSURE DIFFERENTIAL: 400 P.S.I.**

VACUUM: 20 Micron

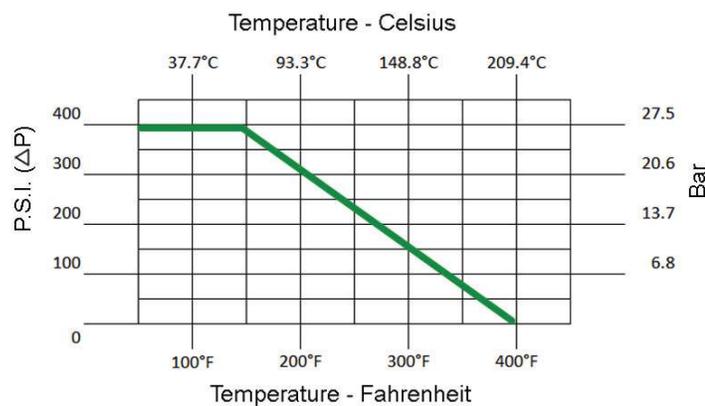
SATURATED STEAM: 150 P.S.I.

*also see Differential Pressure - Temperature Chart

** P.S.I. = Pounds Per Square Inch

*** C.W.P. = Cold Working Pressure to 150°F

DIFFERENTIAL PRESSURE - TEMPERATURE CHART



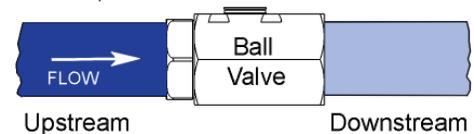
— P.T.F.E. Glass Filled Reinforced Teflon®
Viton® Body Seals

To Use the Pressure - Temperature Chart

Draw an imaginary line from your media Differential Pressure to your media Temperature to confirm it falls within the valve rating based upon the type of seal materials to be used.

To Calculate Pressure Differential

Compare the Upstream media pressure to the Downstream. The pressure differential should not exceed 400 P.S.I. See examples below;



Examples:

Upstream Pressure of 1000 P.S.I. less Downstream of 625 P.S.I. equals 375 P.S.I. which is below 400 P.S.I. differential i.e. OK

Upstream Pressure of 600 P.S.I. Less Downstream of 0 P.S.I. equals 600 P.S.I. which is above 400 P.S.I. differential - outside of ratings not recommended.

Model 89 Ball Valves

Specifications (continued)

CONNECTION - STYLE:

Pipe / N.P.T.F. (Dryseal National Pipe Taper)
B.S.P.T. (British Standard Pipe Taper) Consult Gemini Valve for Availability
SW - Socket Weld
TSW - Tube Socket Weld

BODY DESIGN / SIZE RANGE

Three-Piece / Standard Port 1/4" - 2"
/ Full Port 1/2" - 1-1/2"

MATERIALS:

BODY & CONNECTORS; 316 / 316L Stainless Steel
BALL AND STEM; 316 Stainless Steel
FLANGES; CF8M Stainless Steel
SEATS AND STEM SEAL; Glass Reinforced P.T.F.E. (Teflon®)
BODY SEALS; Viton® (optional Teflon® Encapsulated Viton® available)

The approximate flow rate through a valve can be calculated as follows:

$$Q = C_v \sqrt{\frac{\Delta P}{G}}$$

where;

Q = flow rate in gallons (U.S. Std.) per minute

C_v = valve constant

P = pressure drop across the valve in pounds per square inch (P.S.I.)

G = specific gravity of the media relative to water

Size	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2
Cv Value- Standard	-	-	8	12	32	46	82	120
Cv Value- Full Port	8	8	12	32	46	82	120	-

Model 89 Ball Valves

Maintenance

Typical ball valve designs will first show signs of wear via media leakage at the stem seal. Gemini's Serviceable Series Ball Valves feature a self compensating stem seal design which use a pair of Belleville Spring Washers that when energized (flattened) maintains a preload (squeeze) of the stem seal to stem providing an extended period of leak-tight service without any maintenance required.

Depending on the application media, temperature, pressure and cycles, the stem seal may eventually wear to the point that the Belleville Spring Washers no longer can compensate for stem seal wear i.e. loosen (de-energize). Evidence of this can be seen by media seepage and eventually leakage from between the top of the valve body and the bottom of the actuator bracket. Depending on the corrosive nature of the valve media, if left, damage to the valve and or actuator materials may require replacement of the complete assembly vs. simple maintenance or replacement of the worn valve.

In many cases, readjustment of the stem nut may enable the valve to remain in service. The following outlines the procedure to readjust the stem nut. If adjustment does not stop media leakage from the stem seal, and or ball seat leakage is noted, this would primarily indicate the ball valve seals are worn out and in need of replacement. Valve Repair Kits (VRKs), replacement Center Sections as well as ball and stems can be purchased economically, see Repair, Page 6.

Caution: Before attempting any adjustment, isolate the valve media from the valve being adjusted i.e. no media pressure should be present. Protective clothing and eye wear is recommended.

1. Prevent the stem from turning as the nut is tightened by inserting a wooden or plastic dowel through the valve, or if the valve is in-line (service), hold the 'flats' of the stem then tighten the stem nut until the Belleville Spring Washers have just become fully compressed (flattened).

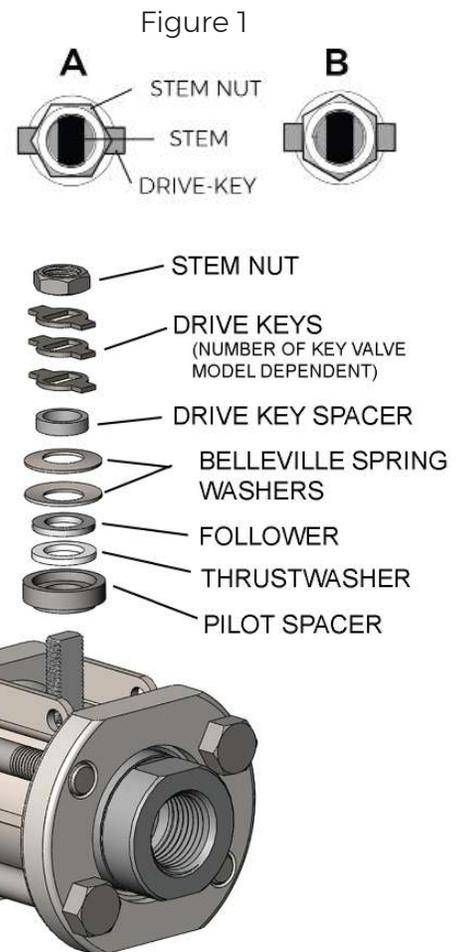
Although the stem nut may spin freely when first tightened, the torque needed to continue tightening will increase progressively after the stem nut contacts the drive key and the Belleville Spring Washers begin to deflect.

The torque required to tighten further will increase sharply once the Belleville Spring Washers have become fully flattened. Tightening beyond this point should not be attempted as damage to the stem seal will result. If a torque wrench is available refer to the Stem Nut Torque Table.

2. The correct orientation of the stem nut to the drive key is shown in Figure 1; this orientation is necessary to permit engagement with the twelve-point socket in the actuator pinion driver.

In order to achieve the desired orientation, loosen the stem nut until the nut / drive key relationship corresponds to either 'A' or 'B' in Figure 1. This adjustment should require less than one-twelfth (1/12) turn of the nut.

Port Size	Stem Nut Torque Inch - Pounds
0.5	40
0.6	50
0.8	50
1.0	80
1.2	80
1.5	80



Model 89 Ball Valves

Repair Instructions

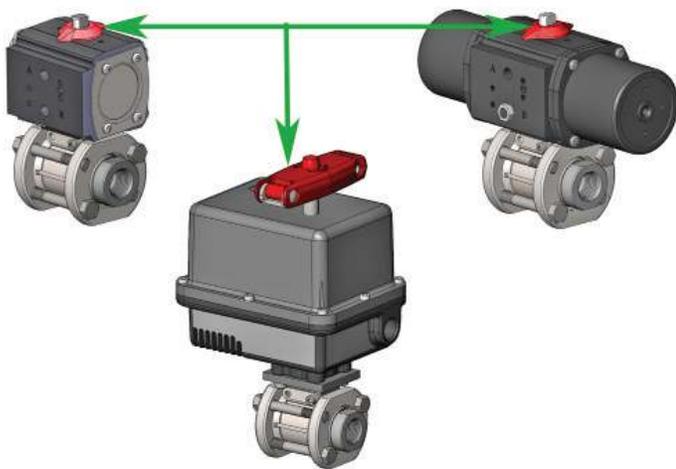
Gemini's Serviceable Series are ideal for those applications where ease of serviceability, and low, long term maintenance cost is desired. If stem seal leakage has occurred and cannot be resolved following Maintenance instructions, Page 5, and / or seat leakage has occurred, replacement of the valve seals should enable the valve to be returned to service. In some cases replacement of the ball or stem may also be required.

Model 89 Ball Valves can be readily removed from service for inspection or repair. Repairs may be made on site and the repaired valve quickly returned to service, or a spare center section may be substituted to minimize downtime.

A few precautions should be observed before removing the valve center section: 1.) Be certain that the system is not under pressure. 2.) If spillage of media at the site of the valve would prove undesirable or dangerous, drain the system before beginning to repair. 3.) Make sure that the pipe is supported on both sides of the valve before the center section is removed.

Removal of Center Section

1. Note actuator position, i.e. opened / closed, on installed valve.



2. Remove the screws which secure the actuator bracket to the valve bracket and remove the actuator from the valve.



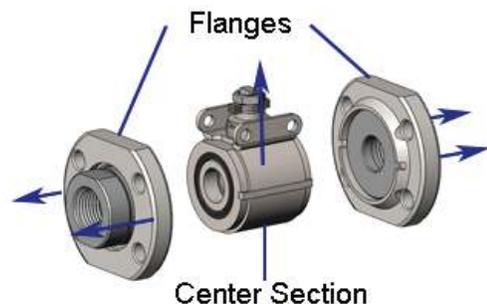
If using a new replacement center section ensure that the drive key is in the same position, i.e. opened / closed, as that of the center section being replaced.



3. First loosen each assembly bolt (4) one-half (1/2) turn. Then run bolts from flange threads and remove bolts. Set bolts aside.



4. Grasp center section by handle or bracket, push back each flange and lift center section clear.



Model 89 Ball Valves

Repair Instructions (continued)

Disassembly of Center Section (Figure 1.)

1. Turn valve to open position using a wrench on the 'flats' of the stem. Insert a wooden or plastic dowel through the Center Section (port) to prevent rotation of the Ball. Remove Stem Nut, Drive key(s), Drive key(s) Spacer, Belleville Spring Washers, Follower and Pilot Spacer with Thrustwasher.
2. Remove the Viton® Body Seals.
3. Remove the wooden or plastic dowel from Center Section and turn the Ball to closed position using 'flats' of the Stem. Hold the Center Section so that the Flange Alignment Key is at the 9:00 o'clock position with the Stem at 12:00 o'clock. With thumb pressure on the face of the ball, or by use of a soft dowel (wood, plastic, etc.) force the Ball and Insert from the Center Section.
4. Remove the Stem by pushing it into the Center Section (body). Remove the Stem. Remove the Stem Seal, which may have remained in the back recess of the Center Section (body) or which may have been carried from the Center Section by the Stem.
5. Remove the Seat from the Center Section (body). Remove the remaining Seat from the Insert.
6. Discard the Stem Seal, Ball Seats (2), Thrustwasher and Viton® Body Seals these are all included in the VRK89 (Valve Repair Kit).
7. Inspect all other internal parts for damaged sealing surfaces and wear. Special attention should be given to the ball, Figure 2. If the ball has noticeable scoring that can be felt with your fingernail it should be replaced.
8. Clean if necessary and set aside those components which are not to be replaced.

Figure 1.

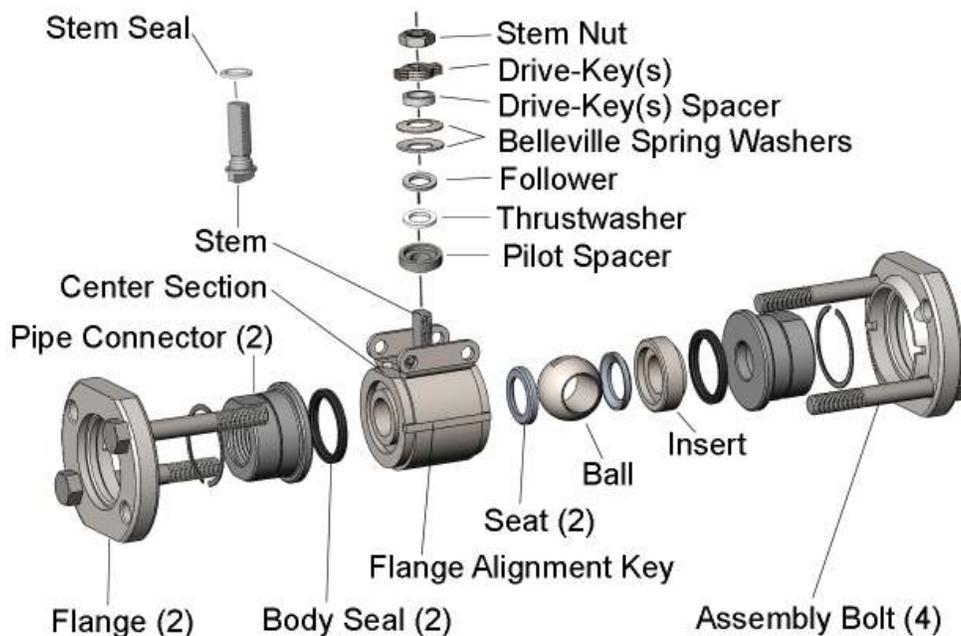


Figure 2.



NOTE: Prior to disassembly of the Center Section for repair a Valve Repair Kit (VRK89) is required. Kits are supplied based upon valve port size. Each kit contains: (2) Body Seals, (2) Ball Seats, (1) Stem Seal and, (1) Thrustwasher. These are all of the seals contained within the valve. In some cases replacement of the ball may also be required, see Instruction 7.

Model 89 Ball Valves

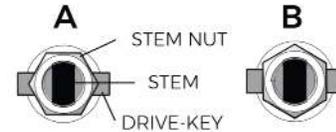
Repair Instructions (continued)

Reassembly of Center Section (Figure 1.)

1. Position new Seat squarely in Center Section (body) recess. Press carefully into place, install second Seat in insert.
2. Place new Stem Seal on Stem, insert Stem in Center Section and up through stem hole. Turn Stem so that the Stem 'flats' are perpendicular to Center Section.
3. Insert Ball into Center Section so that the slot in the Ball engages the head of the Stem. Put the Insert with Seat installed into the Center Section. The Insert should be flush with the Center Section. Install the Center Section body seals.
4. Place Thrustwasher in Pilot Spacer counter-bore. Place Pilot Spacer in position on Stem with the Thrustwasher facing up.
5. Place the Follower in position atop the Thrustwasher.
6. Place the Belleville Spring Washers on the Follower. The Belleville Spring Washers must be installed with their concave (cupped) surfaces facing each other.
7. Place the Drive key(s) spacer on the Belleville Spring Washers.
8. Place the Drive Key(s) in position on the Drive Key(s) Spacer and assemble the Stem Nut.
10. Install a wooden or plastic dowel through the Center Section to prevent the Stem from turning as the Stem Nut is tightened. Tighten the Stem Nut to the torque listed below based upon the Center Section (valve) Port Size which can be found on the side of the Center Section.

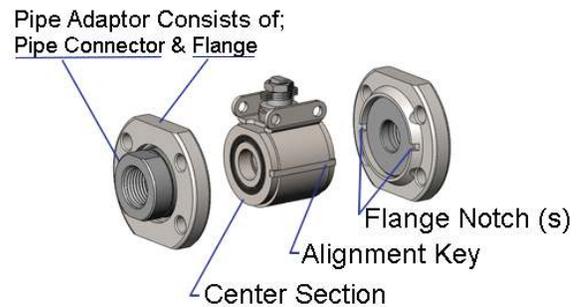
Port Size	Stem Nut Torque Inch - Pounds
0.5	40
0.6	50
0.8	50
1.0	80
1.2	80
1.5	80

12. Check the orientation of the stem nut to the drive key. In order to achieve desired orientation, loosen the nut until the nut / drive key relationship corresponds to Illustration A or B below. This should not require more than one-twelfth (1/12) turn of the nut.



Re-installation of Center Section

1. Place center section in position between pipe adaptors. Slide flanges over ends of body. Enter and engage tie-bolts.



2. Snug tie-bolts evenly. As bolts are tightened, be sure that the alignment key (fixed to the center section) is engaged in the pipe connector flange notches.
3. Rotate center section to intended final position.
4. Complete installation of the ball valve by securely and uniformly tightening the assembly bolts. Begin by tightening each bolt in succession, following diagonal pattern until even contact is achieved between the Center Section and the Pipe Connectors. Tighten to Initial Torque value.
5. Continue tightening each bolt, a small amount at a time following the diagonal pattern, until each is brought to the Final Torque value.

Valve Port Size	Bolt		Initial Torque Inch - Pounds	Final Torque Inch - Pounds
	Thread	Hex Size		
0.5	5/16-24	1/2	30	75
0.6	5/16-24	1/2	30	75
0.8	5/16-24	1/2	40	75
1.0	3/8 - 24	9/16	80	110
1.2	3/8 - 24	9/16	80	110
1.5	7/16 - 20	5/8	80	150

Pneumatic Actuator Models A500

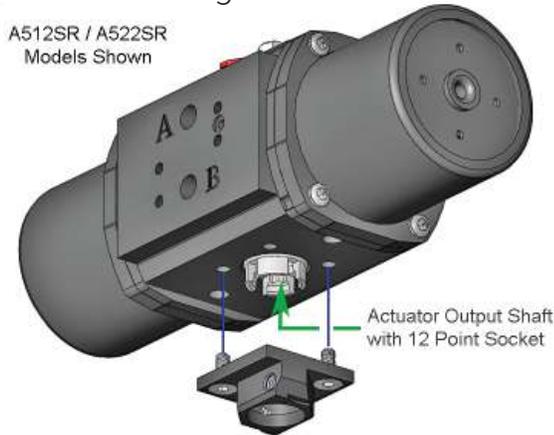
Installation

These instructions detail the procedure for installing a Gemini Model A500 Pneumatic Actuator on a drive-key equipped Gemini Valve Model 89 Ball Valve.

Assemble Bracket to Actuator

1. Position the actuator upright with A & B ports oriented as shown in Figure 1.

Figure 1.



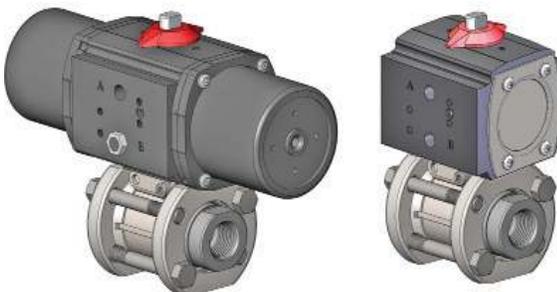
2a. Standard Mounting: Inline

With the counter sunk holes exposed, position the bracket as shown. The bracket should be oriented parallel to the actuator body. Once the ball valve is affixed, the actuator body will be parallel to the piping.

2b. Optional Mounting: Cross Mounted

With the counter sunk holes exposed, position the bracket perpendicular to the actuator body. Once the ball valve is affixed the actuator body will be perpendicular to the piping.

3. Install the 2 hex flat socket head mounting screws to secure bracket to the actuator body. For A512D / A512SR models torque to 60 inch lbs. For A522D / A522SR models torque to 75 inch lbs. Important: To ensure positive fastening, mounting screws and bracket counter sunk holes must be clean and dry. Figure 2.

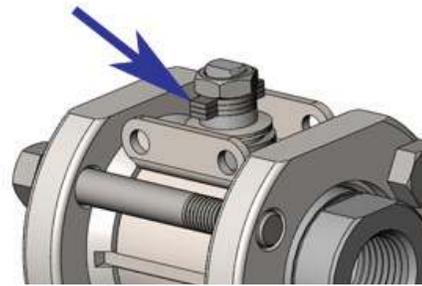


Assemble Valve Actuator

Standard Mounting: Inline, Figure 2.

1. Confirm the ball valve to be mounted has the drive-key(s) perpendicular to the valve body, meaning the ball valve is in the closed position, Figure 3.

Figure 3.



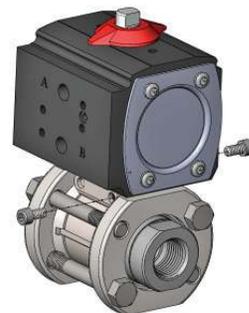
If it is not, rotate the ball valve stem using a wrench on the 'flats' of the stem.

2. Confirm the red Actuator Position Indicator atop the actuator is perpendicular to Actuator Body, Figure 2. If it is not, rotate the actuator shaft using a wrench on the 'flats' of the top output shaft.

3. Place the actuator with the bracket attached, atop the valve so that the 12 point socket of the actuator output shaft engages the ball valve stem and drive-key.

4. Install the (2) socket head cap screws to secure the actuator to the ball valve, Figure 4.

Figure 4.



Pneumatic Actuator Models A500

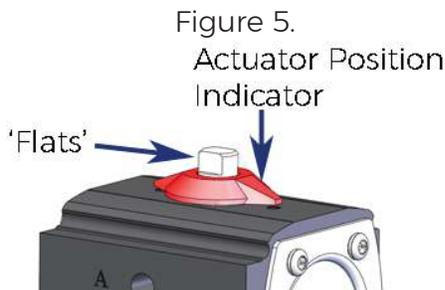
Installation (continued)

Optional: Cross Mounting

Standard build Double-Acting models can be cross mounted for both Normally Closed and Normally Open operation. Standard build Spring-Return Actuators can be cross mounted for Normally Open operation only. If cross mounted Normally Closed is desirable, purchase of model A512NOSR / A522NOSR is required.

Normally Closed Operation (Double-Acting only)

1. Confirm the ball valve to be mounted has drive-key perpendicular to valve body meaning the ball valve is in closed position, Figure 3. If it is not, rotate the ball valve stem using a wrench on the 'flats' of the stem.
2. Confirm the red Actuator Position Indicator atop the actuator is parallel to Actuator Body. If it is not, rotate the actuator shaft using a wrench on the 'flats' of the top output shaft, Figure 5.



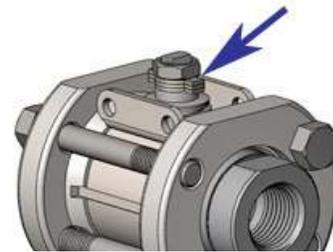
3. Place the actuator with the bracket attached, atop the valve so that the 12 point socket of the actuator output shaft engages the ball valve stem and drive-key.
4. Install the (2) socket head cap screws to secure the actuator to the ball valve, Figure 4.

Normally Open Operation

1. Confirm the ball valve to be mounted has drive-key parallel to valve body meaning the ball valve is in open position. If it is not, rotate the ball valve stem using a wrench on the 'flats' of the stem, Figure 6.
2. Confirm the red Actuator Position Indicator atop the actuator is perpendicular to Actuator Body. If

it is not, rotate the actuator shaft using a wrench on the 'flats' of the top output shaft, Figure 4.

Figure 6.



3. Place the actuator with the bracket attached, atop the valve so that the 12 point socket of the actuator output shaft engages the ball valve stem and drive-key. The locator screws should straddle the valve body hex. Some valve models may require the valve body be rotated 180°.
4. Install the (2) socket head cap screws to secure the actuator to the ball valve, Figure 4.

Actuator Removal for Ball Valve Installation

In many cases it may be desirable to dismount the actuator from the ball valve for ease of ball valve installation. To do so, simply loosen and remove the two hex head cap screws (Figure 4) and re affix following Instruction 4.

Pneumatic Actuator Models A500

Specifications

TEMPERATURE: -20° F to 350° F

CYCLE (INDEX) TIME: Approximately 1/2-1 Second (Load Dependent)

AIR SUPPLY: 60 - 125 P.S.I. Sufficient air delivery must be available at the actuator to ensure dependable operation. The following precautions should be observed: Air supply should be clean and free of moisture. When dirty or wet air is a problem; a filter / separator should be specified; these units are most effective when installed as close as possible to the actuator. A filter, when used, should permit a minimum flow of 4 scfm at an upstream pressure of 60 P.S.I. Eliminate severe restrictions to air flow (certain solenoid valves & fittings). The most restricted passage must have an area no smaller than .012 inches square, the area of 1/8" diameter orifice. If more than a single actuator is to be supplied by an individual pilot, the minimum passage requirement applies per actuator. All actuator models are permanently lubricated and are not recommended to be used with any other air supply lubricants.

TUBING: For short runs up to 5 feet 5/32" I.D. is suitable, 1/4" I.D. will serve up to 30 feet. For longer runs, use 3/8" I.D. or larger.

AIR CONNECTIONS: Female 1/8" NPT / NAMUR Interface

MATERIALS:

BODY - Aluminum with Teflon® Impregnated Hard Anodized (PolyLube®) Surfaces

EXTERNAL HARDWARE - (Pinion Shaft, Driver, End Caps) 300 Series Stainless Steel

SPRING MODULES-Aluminum with Teflon® Impregnated Hard Anodized (PolyLube®) Surfaces,
300 Series Stainless Hardware

EXTERNAL TRIM - 300 Series Stainless Steel

Operation

Double-Acting Models A512D / A522D

Use air to move the internal pistons in two directions which rotates the actuator pinion 90° which is attached to the ball valve stem. Air supplied to port 'A' causes counter clockwise rotation, which with a normally closed assembly, opens the ball valve. Air supplied to port 'B' causes clockwise rotation which in turn closes the ball valve. For most applications a four-way solenoid valve like the Gemini model 4GP is used to pilot the air. Remote piloting can also be achieved utilizing the 'A' & "B' air supply ports. In summary the solenoid (pilot) valve uses an electric signal to cycle air in and out of the pneumatic actuator subsequently opening / closing the ball valve.

Spring-Return Models A512SR / A522SR

Use air to move the internal pistons in one direction and springs in the others which rotates the actuator pinion 90°. Air supplied to port 'A' causes counter clockwise rotation which on a normally closed assembly opens the ball valve. Upon release of air springs cause clockwise rotation which closes the ball valve. For most applications a three-way solenoid valve like the Gemini model 3GP is used to pilot the air. Remote piloting can also be achieved utilizing the 'A' air supply port. In summary the solenoid (pilot) valve uses an electric signal to cycle air in and out of the pneumatic actuator, subsequently opening / closing the ball valve.

Maintenance

Gemini's pneumatic actuators are engineered to be maintenance free. No adjustments or maintenance is required to achieve maximum service life. Care must be taken to ensure a clean / dry air supply is provided per the above AIR SUPPLY Specifications.

Pneumatic Actuator Accessory - Solenoid Model GP

Installation

These instructions describe the operation and installation of the 3-way (3GP) and 4-way (4GP) Gemini pilot (solenoid) valves. The 3GP pilot valve is used with spring-return actuators. The 4GP pilot valve is used with double acting actuators.

Our GP Solenoid Valve is commonly referred to as a pilot valve in that it controls the air supply via means of an electrical signal. With a normally closed assembly, when the coil on the GP is energized, air is supplied into the actuator causing it to cycle / open the ball valve. When the coil is de-energized the actuator cycles again to close the ball valve.

3GP - Spring Return Models

Installation Normally Closed Operation. Valve is in closed position when coil is de-energized. Figure 1.

1. If equipped, remove the 1/8" exhaust filter from actuator port marked 'B'.

2. Fit the two o-ring seals into the pockets on the underside of the pilot valve body.

3. Position the pilot valve so that the Exhaust Ports are located on the same side as the Position Indicator.

4. Insert the mounting screws (M5X32) through the mounting holes in the pilot body valve and tighten until secure.

5. Connect the air supply (50 - 125 P.S.I) to the 1/8" NPT inlet port and wire for the voltage marked on the coil.

6. GP coil is usually equipped with a 'DS' DIN x Strain (Figure 2.) or 'DC' DIN x Conduit electrical connector. To wire the connector, remove the center mounting screw, and, with a small screwdriver, pry the inner element from the body of the connector to expose the terminal blocks inside. Route the wire through the hub of the

connector. For the 'DS' loosen the sealing nut and ensure the wire insulation passes through the rubber grommet inside the hub. Affix the wires to the appropriate terminal block. Retighten sealing nut to secure the wire and provide a seal.

Installation - Normally Open Operation Valve in open position when coil is de-energized.

For Normally Open operation, the purchase of a normally open actuator is suggested i.e.

A512NOSR & A522NOSR. These models have the internal components assembled so that the actuator position indicator reflects the correct position of the valve. Field retrofit is not suggested and will void warranty.

For those applications where the actuator position indication is not required, remove the red position indicator and install the ball valve in the open position and mount the pilot valve as per Normally Closed Operation.

Figure 1

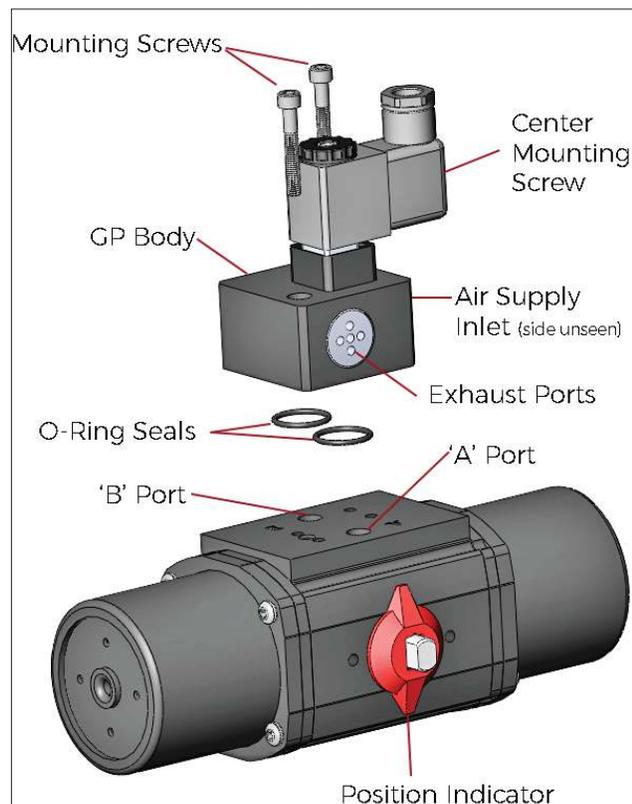


Figure 2



Pneumatic Actuator Accessory - Solenoid Model GP

Installation (continued)

4GP - Double Acting Models

Installation - Normally Closed Operation. Valve in closed position when coil is de-energized. Figure 3.

1. Fit the two o-ring seals into the pockets on the underside of the pilot valve body.

2. Install the orientation screw (M5X10) into the hole on the actuator mounting pad directly beneath the letter 'A' (identified as 'Normally Closed' in figure 2), leaving 1/16" - 1/8" of the screw protruding above the surface of the mounting face.

3. Position the pilot valve so that actuator orientation screw fits into the shallow drilled hole in the GP body. Nameplate on Pilot Valve Body should face op-

posite Position Indicator.

4. Insert the mounting screws (M5X35) through the mounting holes in the pilot body valve and tighten until secure.

5. Connect the air supply (60 - 125 P.S.I.) to the 1/8" NPT inlet port and wire for the voltage marked on the coil.

6. GP coil is usually equipped with a 'DS' DIN x Strain, Figure 4., or 'DC' DIN x Conduit electrical connector. To wire the connector, remove the center mounting screw, and with a small screwdriver, pry the inner element from the body of the connector to expose the terminal blocks inside. Route the wire through the hub of the connector. For the 'DS' loosen the sealing nut and ensure the

wire insulation passes through the rubber grommet inside the hub. Affix the wires to the appropriate terminal block. Retighten sealing nut to secure the wire and provide a seal.

Installation - Normally Open Operation. Valve in open position when coil is de-energized.

Follow the same instructions for Normally Closed substituting item 2 as follows;

2. Install the orientation screw (M5X10) into the actuator mounting pad directly beneath the letter 'B' hole identified as 'Normally Open' in figure 1. Leave 1/16" - 1/8" of the screw protruding above the surface of the end cap.

Figure 3

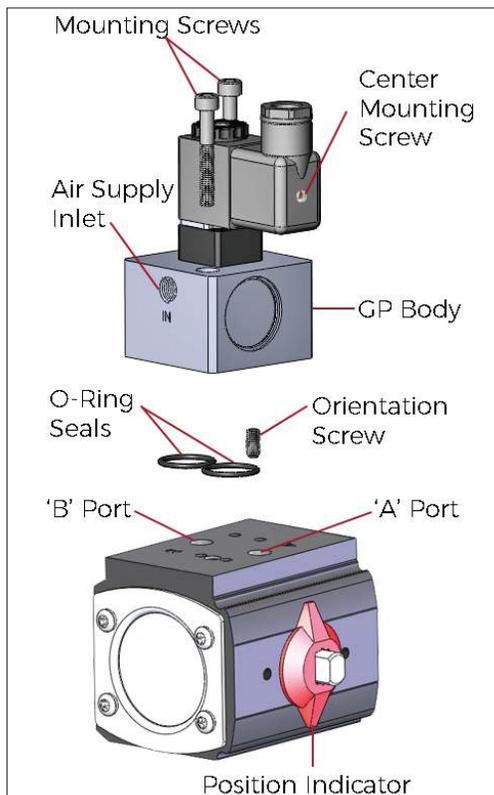


Figure 4



Pneumatic Actuator Accessory - Solenoid Model GP

Specifications

TEMPERATURE: -20° F to 350° F

AIR SUPPLY: 60 - 125 P.S.I. air. Sufficient air delivery must be available at the actuator to ensure dependable operation. The following precautions should be observed: Air supply should be clean and free of moisture. When dirty or wet air is a problem; a filter / separator should be specified; these units are most effective when installed as close as possible to the actuator. A filter, when used, should permit a minimum flow of 4 scfm at an upstream pressure of 60 psi. Eliminate severe restrictions to air flow (certain solenoid valves & fittings). The most restricted passage must have an area no smaller than .012 inches square, the area of 1/8" diameter orifice. If more than a single actuator is to be supplied by an individual pilot, the minimum passage requirement applies per actuator. All actuator models are permanently lubricated and are not recommended to be used with any other air supply lubricants.

TUBING: For short runs up to 5 feet 5/32" I.D. is suitable, 1/4" I.D. will serve up to 30 feet. For longer runs, use 3/8" I.D. or larger.

AIR CONNECTION: Female 1/8" NPT for Model 4GP, 1/4" NPT for Model 3GP

OPERATING COIL: Operating coil technical data is dependent on the specific model selected, however, all standard coils as designated by the 'SC' code and conform to the following:

Wattage: 5 Watts

Class: F, continuous duty

Protection: IP65 (with connector) dusttight, water resistant, Connection: Mini-DIN Standard

MATERIALS:

BODY - PTFE / Anodized Aluminum

SPOOL - 18-8 Stainless Steel

SEALS - Nitrile / Viton®

HARDWARE - 18-8 Stainless Steel

COIL / BODY - GF Nylon / GF Zytel

Maintenance

Gemini's model GP Solenoid Valves are engineered to be maintenance free. No adjustments or maintenance is required to achieve maximum service life. Care must be taken to ensure a clean / dry air supply is provided per the above AIR SUPPLY Specifications.

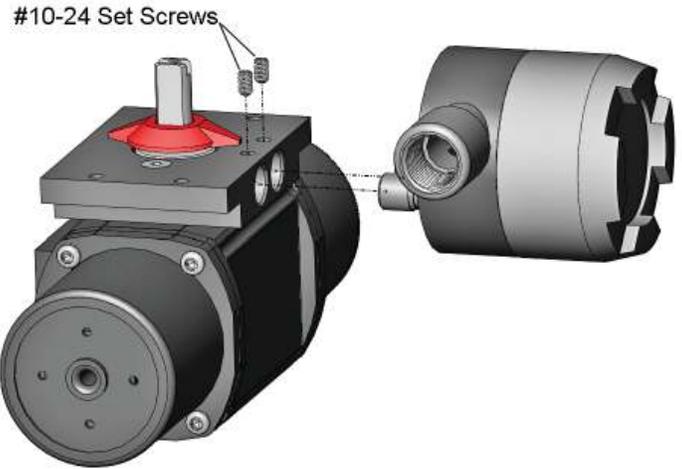
Installation

Attachment of Limit Switch NAMUR Mounting Bracket

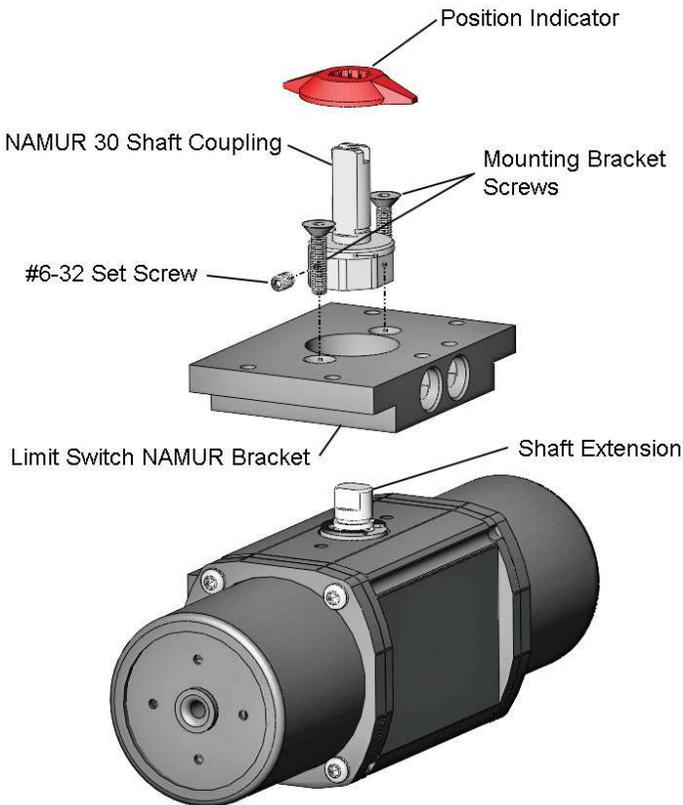
1. Remove the position indicator from atop the actuator and secure the NAMUR 30 Shaft Coupling to the model A500 Actuator Shaft Extension with the #6-32 Set Screw using a medium strength, non-permanent thread locker user supplied.
2. Place the Limit Switch NAMUR Mounting Bracket on top of the actuator.
3. Fasten the Limit Switch NAMUR Mounting Bracket to the actuator using (2) #10-24 Mounting Bracket Screws.
4. Slide the position indicator over the NAMUR 30 Shaft Coupling until it 'snaps' into place just above the bracket.

Attachment of Limit Switch

1. Fit the bushings, which extend from the Limit Switch housing, into the matching holes in the mounting pad. Push switch housing against pad and verify that switch body touches pad. Secure switch body to pad with (2) #10-24 setscrews using a medium strength, non-permanent thread locker user supplied.



Note: Hex wrench supplied with Gemini Limit Switch Mounting Kits, LSM-A510-K and LSM-A520-K.



(Spring-Return Actuator Model Shown)

Pneumatic Actuator Accessory - Limit Switch Model LS-1

Wiring

Wiring Specifications

Wire Size
#12 AWG Maximum
#24 AWG Minimum

Wiring

1. Route the wire to be terminated through the conduit hub and up through the access space to the terminal block.

2. Strip insulation back 1/4", insert the stripped ends directly into the proper terminal clamps and tighten screws.

3. Internal interconnections between terminal-block and switches, Figure 1. A copy is also inside the Limit Switch Cover.

NOTE: If the Switch is installed in a hazardous location i.e. where flammable vapors or dust are present in the atmosphere, replace the cover and tighten securely before connecting the electrical supply circuit. If necessary, a screwdriver shank or similar tool may be engaged in the cover wrenching lugs to assist removal and replacement.

Specifications

MATERIALS:
Body / Cover - Aluminum with Teflon® Impregnated Hard Anodized (PolyLube®) Surfaces
Probes - 316 Stainless Steel
Cover Seal / Probes - Buna N

TEMPERATURE: 10° F to 180° F

CONDUIT CONNECTION: 1/2" NPT

ELECTRICAL RATING: 10 amp. 250VAC maximum; 1/2 amp. 125VDC; 1/4 amp. 250VDC; 5 amp. 125VAC lamp load. Note: each pole must be the same polarity to utilize these ratings.

MICROSWITCHES: Mechanical S.P.D.T. (Single Pole Double Throw)

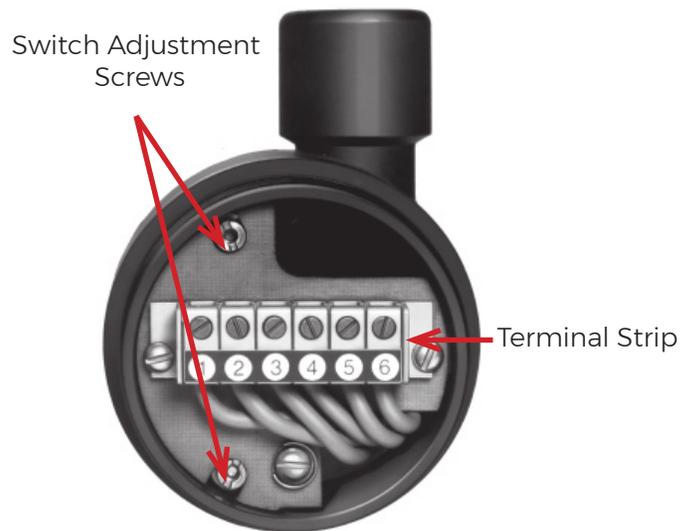
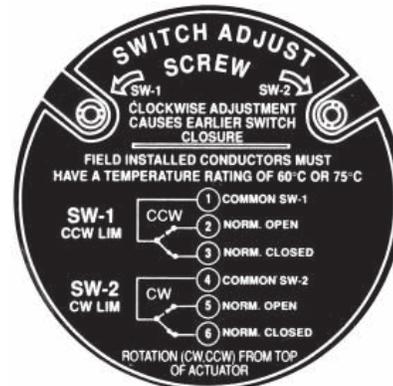


Figure 1



INTERNAL WIRING CONNECTORS: Screw Clamp

NEMA STANDARDS: NEMA 1 (General Purpose); NEMA 4 (Watertight & Dusttight); NEMA 7 (Hazardous Locations, Class I Groups B, C, & D); NEMA 9 (Hazardous Locations, Class II, Groups E, F, & G); NEMA 12 (Oiltight and Driptight); and NEMA 13 (Oiltight and Dusttight).

UL® LISTINGS: Industrial Control Equipment for use in Hazardous Locations, Class I, Groups B,C, & D and Class II, Groups E, F, & G

Maintenance

Gemini's model LS-1 Limit Switch is engineered to be maintenance free.

Electric Actuator Models 600

Installation

These instructions detail the procedure for installing a Gemini Model 600 Electric Actuator on a drive-key equipped Gemini Valve Model 76, 86 or 96 Ball Valve.

1. Install locator screws in bottom of the electric actuator and tighten with 4mm hex drive torqued to 30-40 inch lbs. (Figure 1)

2. Place the mounting bracket on actuator so that locator screws fit into blind holes on bottom of bracket.

3. Check to make sure the bracket is seated flush against bottom of electric actuator mounting pad. Install bracket mounting screws with 5mm hex drive torqued to 65-75 inch lbs. .

4. Check to make sure that valve is in the closed position and that the stem nut is in the proper orientation with respect to the drive key (Figure 2). Note: Valve will not engage driver unless stem nut is in proper orientation.

5. Verify that the actuator is in the closed position. The override handle should be parallel to the short side of the unit as illustrated.

6. Install the valve into the mounting bracket as shown in Figure 3. Engagement of the valve and drive mechanism should require little effort. Install valve mounting screws. Your Gemini actuated valve is now ready for service.

Actuator Removal for Ball Valve Installation

In many cases it may be desirable to dismount the actuator from the ball valve for ease of ball valve installation. To do so simply loosen and remove the (2) Valve Mounting Screws, Figure 3. Subsequently pull actuator up / off valve.

Figure 1

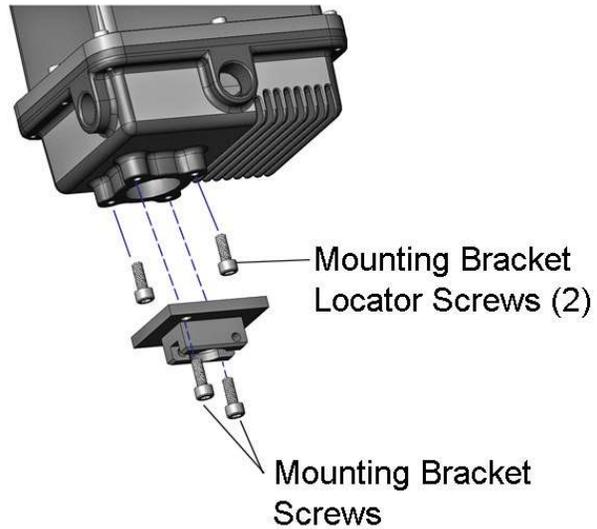


Figure 2

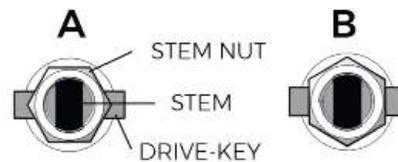
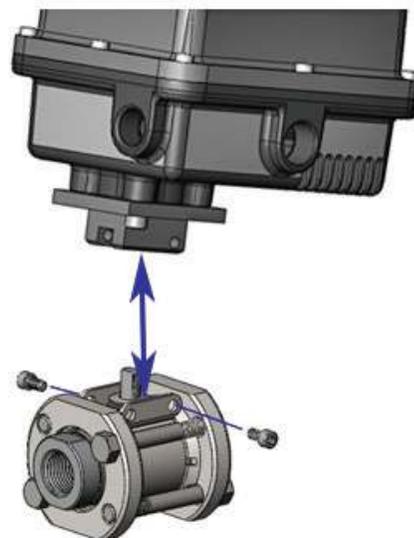


Figure 3



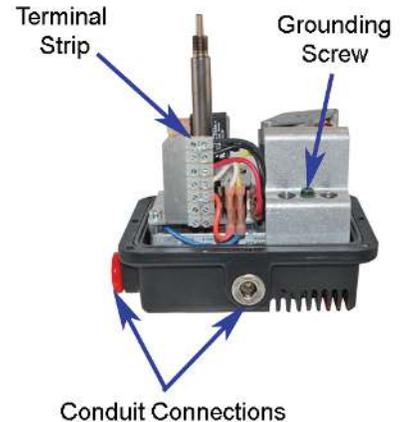
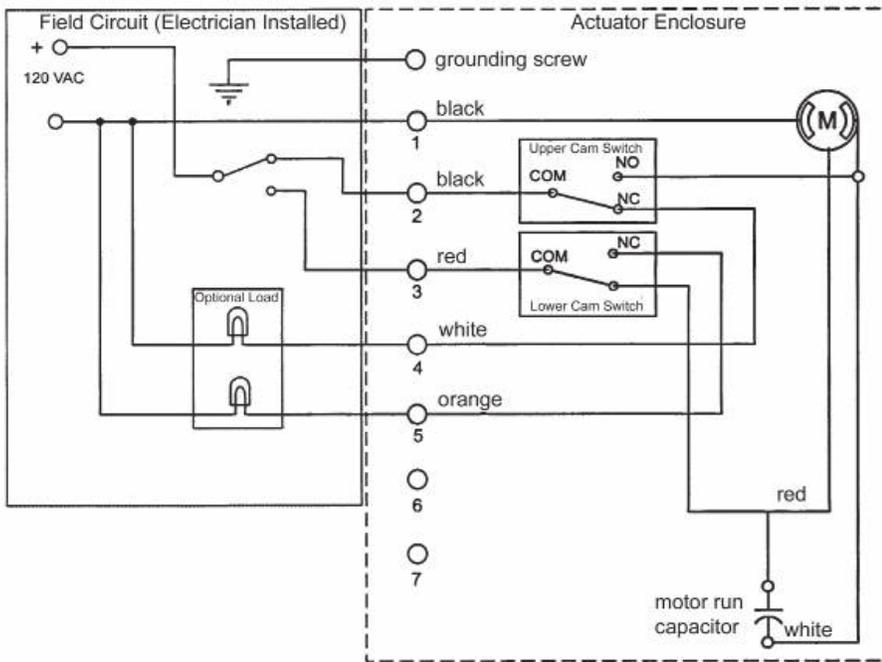
Electric Actuator Models 600

Wiring - AC Models

These instructions detail the procedure for wiring Gemini Models 615-120AC and 630-120AC.

1. Unlatch and open the override handle to access the handle nut. Remove nut with 3/4" wrench.
2. Remove two (2) socket head screws with 4mm hex wrench. The other (6) screws used to secure the cover are located inside enclosed in a plastic bag. If actuator was previously in service all (8) screws would need to be removed. Remove cover by pulling straight up.
3. Route the wire to be terminated through conduit hub and up through the access space to the terminal block. Strip insulation back 1/4", insert the stripped ends directly into the proper terminal clamps and tighten screws. All internal connections are labeled in the diagram below.
4. Attach grounding wire to green screw that is located on top of conduction bar.
5. Verify that cover o-ring is properly seated in groove. Replace cover and screws.

120 AC Wiring Schematic



Neutral to Terminal 1 and Hot (+) to Terminal 2 Ball Valve / Actuator will Open.
Neutral to Terminal 1 and Hot (+) to Terminal 3 Ball Valve / Actuator will Close.

Terminals 4 & 5 can be used for position feedback using motor voltage.

NOTES:

AC models require a SPDT (Single Pole Double Throw) switch or device.

A copy of the above Wiring Schematic can also be found on the inside of the actuator cover.

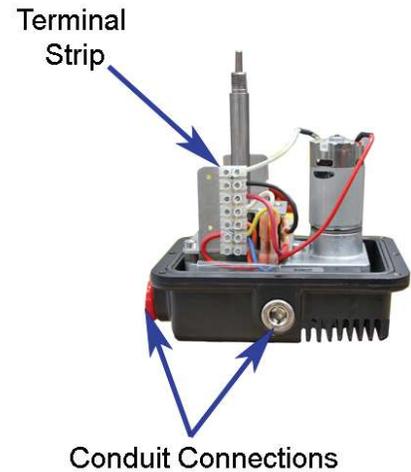
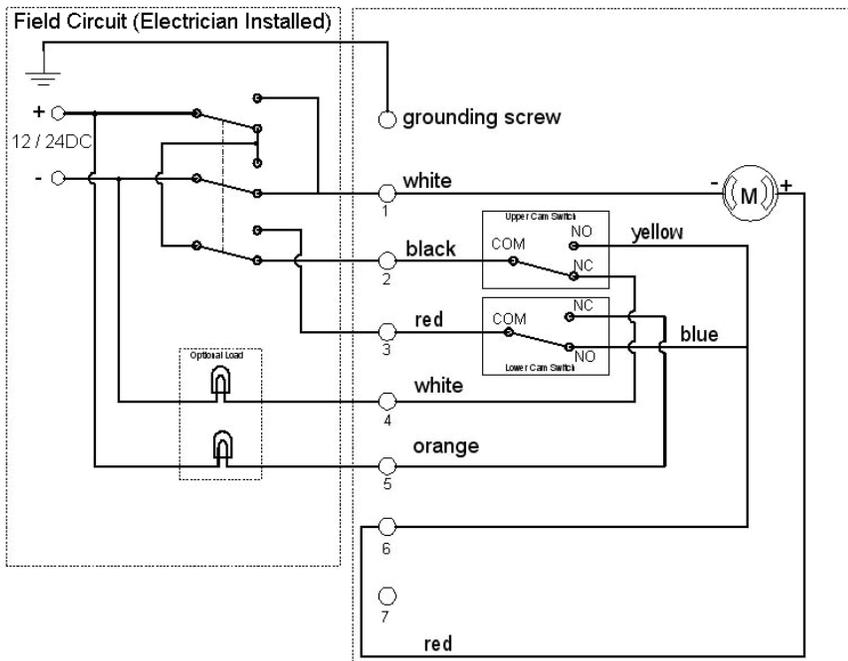
Electric Actuator Models 600

Wiring - DC Models

These instructions detail the procedure for wiring Gemini Models 615-12DC, 615-24DC, 630-12DC and 630-24DC.

1. Unlatch and open the override handle to access the handle nut. Remove nut with 3/4" wrench.
2. Remove two (2) socket head screws with 4mm hex wrench. The other (6) screws used to secure the cover are located inside enclosed in a plastic bag. If actuator was previously in service all (8) screws would need to be removed. Remove cover by pulling straight up.
3. Route the wire to be terminated through conduit hub and up through the access space to the terminal block. Strip insulation back 1/4", insert the stripped ends directly into the proper terminal clamps and tighten screws. All internal connections are labeled in the diagram below.
4. Verify that cover o-ring is properly seated in groove. Replace cover and screws.

12 & 24 DC Wiring Schematic



Negative (-) to Terminal 1 and Positive (+) to Terminal 2 Ball Valve / Actuator will Open.
Positive (+) to Terminal 1 and Negative (-) to Terminal 3 Ball Valve / Actuator will Close.

Terminals 4 & 5 can be used for position feedback using motor voltage.

NOTES:

AC models require a SPDT (Single Pole Double Throw) switch or device.

A copy of the above Wiring Schematic can also be found on the inside of the actuator cover.

Manual Override Handle Operation

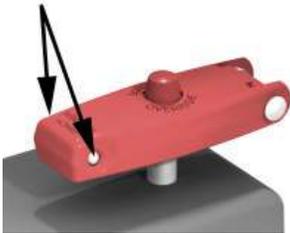
The actuator features a simple push-button operated override with exclusive fold-out lever handle.

The push-button manual override system allows the user to easily disengage the electric drive gear train for manual operation of the actuator / ball valve.

All external power must be off prior to using the manual override feature. The actuator manual override handle can be used in the closed or open (lever extended) position to provide additional leverage.

To open the handle, pinch the Lever Release Buttons and pull up.

Lever Release Buttons



Press down the manual override button (atop the center) and turn the handle to manually open or close the actuated valve assembly.

Manual Override Button



To reengage the drive train, release the override button and turn the handle until the manual override button 'clicks' signaling the re-engagement of the drive train. The manual override lever handle can then be closed.

Electric Actuator Models 600

Specifications

TEMPERATURE: 40° F to 150° F

MOTOR: Reversing, Brushless, Capacitor-Run with Auto-Reset Thermal Overload Protection.

GEAR TRAIN: Permanently Lubricated, Maintenance Free

POWER: 120VAC 50/60 Hz Single Phase, 12&24VDC

OVERRIDE: Manual - Fold Out Lever Handle

PORTS: (2) 1/2" N.P.T. Conduit

CYCLE (INDEX) TIME: 6 Seconds

DUTY CYCLE /AMPS:

Model	DUTY CYCLE:	AMPS: (Full Load)
615-120AC	78%	0.3
630-120AC	78%	0.5
615-12VDC	100%	1.0
630-12VDC	75%	1.0
615-24VDC	100%	0.5
630-24VDC	75%	0.5

MATERIALS:

Enclosure - Dupont® FR50 Cover, Teflon® Coated Cast Aluminum Base

Shaft - 18-8 Stainless Steel

External Trim - 300 Series Stainless Steel

Maintenance

Gemini's model 600 Electric Actuators are engineered to be maintenance free. No adjustments or maintenance is required to achieve maximum service life.

Performance Engineered Automated Ball Valves

Designed and Tested, Manufactured and Assembled, Supplied
and Supported, Direct from USA Headquarters



All specifications herein are subject to change without notice or obligation.

Seller warrants its products for a period of one (1) year, to be manufactured in accordance with our written specifications and free from material defects in material and/or workmanship. Seller, at its option, will promptly repair or replace any products returned intact to the factory, transportation charges prepaid, which Seller determines to be defective in material and/or workmanship. The foregoing shall constitute the sole remedy for any breach of Seller's warranty. Care must be taken to assure that the internal media and external environment are compatible with the materials of the ball valve. For a complete copy of our Warranty please see our Standard Terms and Conditions at www.geminivalve.com

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