



EA81 Series Actuators

APPLICATION

For proportional control of valves with return to normal position on power interruption. EA81-1100X accepts 4-20 mA signals.

SPECIFICATIONS

Input Signals: 4 to 20 mA

Input Impedance: 82.5 ohms

Spring Return: Actuator or valve linkage provides return to normal position on power interruption.

Humidity: 5 to 95% RH, non-condensing.

Locations: NEMA type 1 indoor only.

Connections: Color coded 4 ft. (1.2 m) pigtail leads.

Mounting: Recommended that valve actuator be above the centerline of the valve. For steam applications, mount the actuator above the valve body at 45° from vertical.

Dimensions: 6-3/4" high x 3-1/4" dia. (171 mm x 83 mm)

PRE-INSTALLATION

Inspection

Visually inspect the carton for damage. If damaged, notify the appropriate carrier immediately. Visually inspect the device for obvious damage. Return damaged or defective products.



Required Installation Items

- Wiring diagrams
- Tools (not provided):
 - Digital volt-ohm meter (DVM)
 - Appropriate wrenches for installation and adjustment of valve linkages
- EA81 series only:*
 - TOOL-19, 1/8" 93.2 mm) dia. rod
 - TOOL -37, 1-5/8" (41 mm) ope-ended wrench
 - Two (2) 3/8" (10 mm) wrenches
 - Ruler
- Appropriate accessories
- Wire nuts (not provided)

Table 1. Specifications

Part Number	Supply Voltage 50/60 Hz (Vac)	VA Rating	Input Signal	Output Description	Timing at 70°F (21°C)		Temperature °F (°C)	
					No Load Stroke	Retract on Power Loss	Shipping & Storage	Operating*
EA81-11006	120 (+10/-15%)	18	Compatible with 4-20 mA	Proportional, 7/16" (14.3 mm) stroke for 1/2" to 2" VB-7xxx valve bodies.	60 second extend 30 second retract	15 second	-40 to 140 (-40 to 60)	-20 to 140 (-29 to 60)

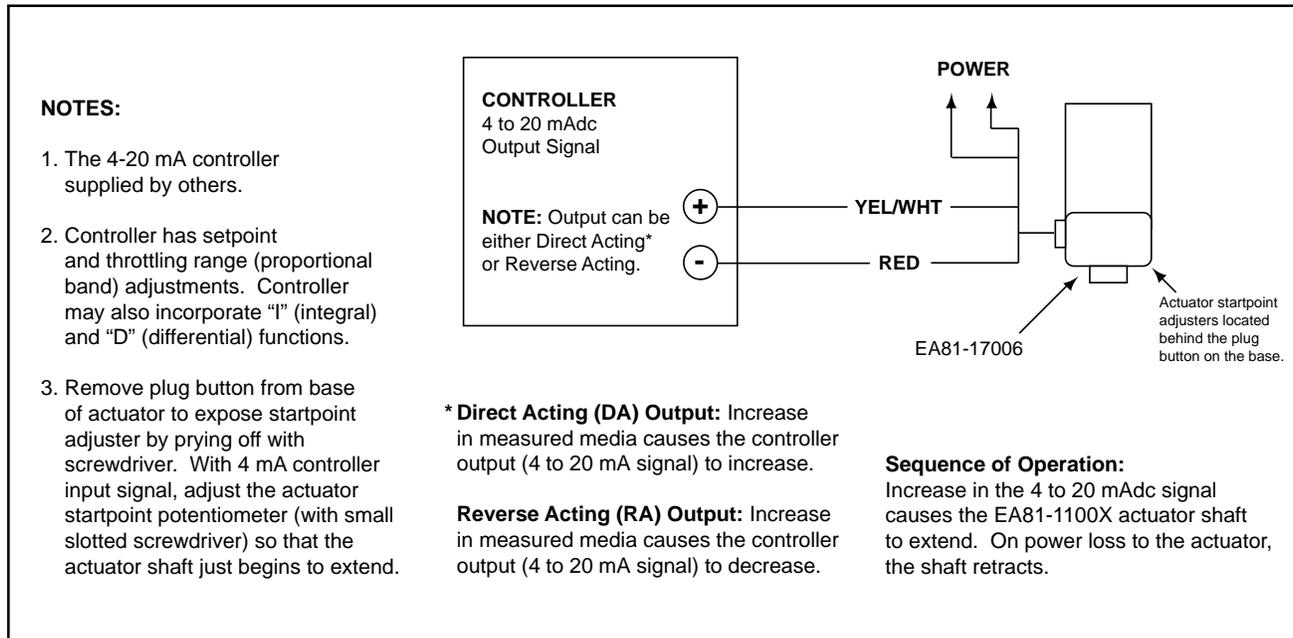
* See Table 2 for valve body fluid temperature limitations.

Table 2. Restrictions on Maximum Ambient Temperature for Valve Actuators for EA81 Series

Maximum Temperature of Media in the Valve Body (Check Ratings of the Valve)	Maximum Ambient Temperature of EA81 Series	
	AV-600 Only for Chilled Water Applications Only	AV-600 and AV-601
366°F (180°C)	Do Not Use	88°F (31°C)
340°F (171°C)		93°F (34°C)
281°F (138°C)		103°F (39°C)
181°F (83°C)		120°F (48°C)
80°F (26°C)		140°F (60°C)*

* Maximum allowable ambient temperature of the actuator, minimum -20°F (-29°C).

Figure 1. Wiring Diagram, 4 to 20 mAdc Controllers



INSTALLATION

CAUTION:

- Installer must be a qualified, experienced technician.
- Disconnect power supply before installation to prevent electrical shock and equipment damage.
- Make all connections in accordance with the wiring diagram, and in accordance with national and local electrical codes. *Use copper conductors only.*
- Do not exceed ratings of the device.
- Avoid locations where excessive moisture, corrosive fumes or vibration are present. NEMA 1 type housings are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment.

Procedure

1. Install all two-way valves so that they close against the flow. An arrow on the valve body or tag indicates the proper flow direction.
2. Always install three-way mixing valves with two (2) inlets and one (1) outlet.
3. Always install three-way diverting valves with one (1) inlet and two (2) outlets.
4. Actuators can be mounted in any upright position above the centerline of the valve body. For steam applications only, mount the actuator above the valve body at 45° from vertical.
5. Allow 3" (76 mm) above the actuator valve assembly for removal and reattachment of actuator to installed valve.

Mounting

It is recommended that valve actuators be mounted above the centerline of the valve body. When selecting a location, allow sufficient room for accessories and for service of the product.

For steam applications, mount the actuator above the valve body at 45° from vertical.

CAUTION:

Do not twist or exert any force on the actuator housing during the assembly procedure. Either turn the base by hand or, if necessary, use 1-5/8" (43 mm) open-ended wrench (TOOL-37) on flats provided on the actuator base or the valve body mounting nut.

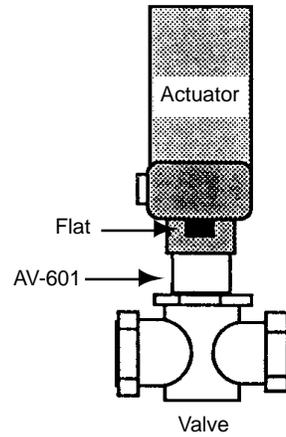
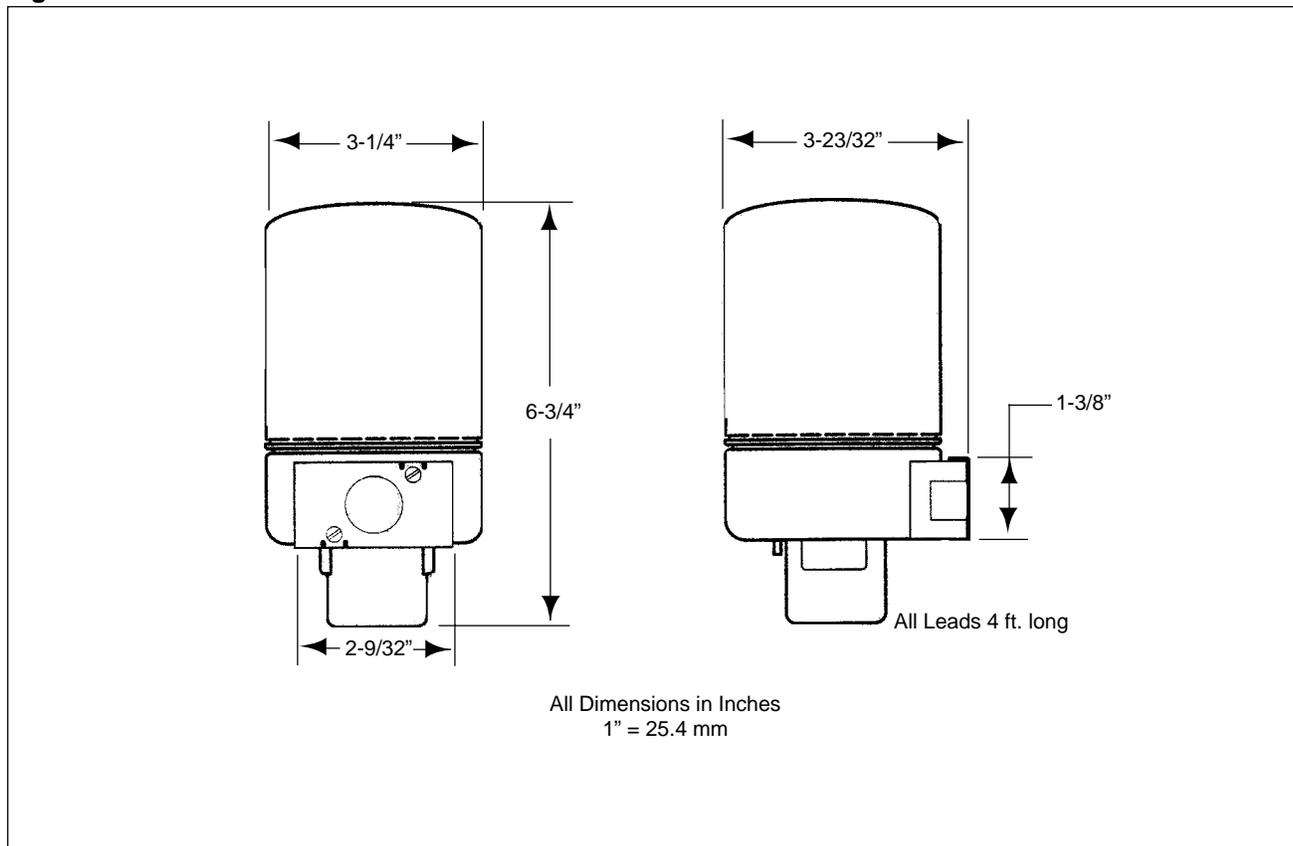


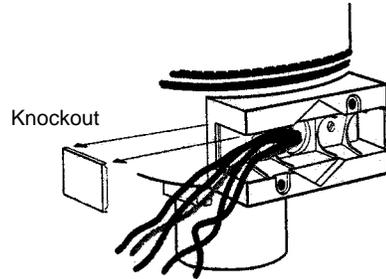
Figure 2. EA81 Dimensions



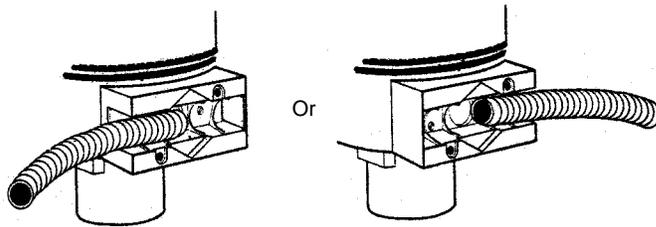
Installation using 3/8" Reduced Flexible (thin wall) Conduit to either side of the Actuator

1. Use channel-lock pliers to remove knockout from chosen side of actuator. Make wiring connections (see Figure 1).
2. Slip conduit up in place over ribs on base of actuator.
3. Install cover plate with two screws.

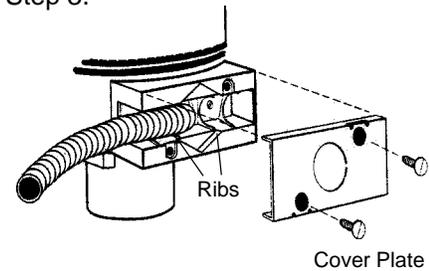
Step 1.



Step 2.



Step 3.



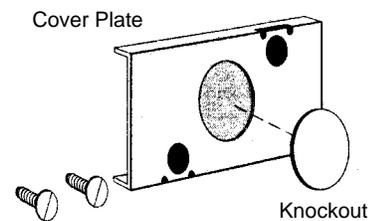
Installation using Conduit to the Front of the Actuator

1. Remove knockout from cover plate.
2. Slip the leads through standard 1/2" conduit bushing (not supplied) and the knockout hole in the cover plate.

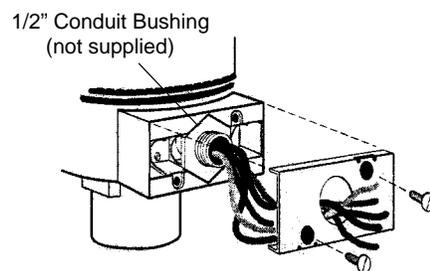
Nest the conduit bushing in base and install cover plate with two screws.

Make wiring connections (see Figure 1) and attach conduit as required.

Step 1.



Step 2.



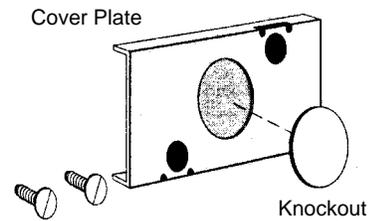
Installation using Conduit Box

1. Remove knockout from cover plate.
2. Slip the leads through standard 1/2" conduit bushing (not supplied) and the knockout hole in the cover plate.

Nest the conduit bushing in base and install cover plate with two screws.
3. Place conduit box over bushing and attach with lock nut.

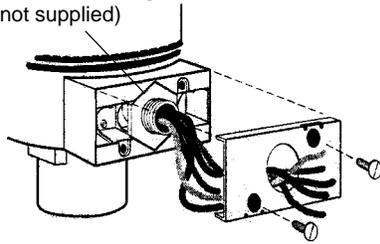
Attach conduit as required and make wiring connections (see Figure 1).

Step 1.



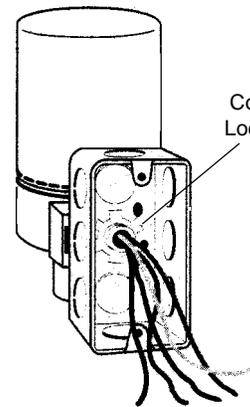
Step 2.

1/2" Conduit Bushing
(not supplied)



Step 3.

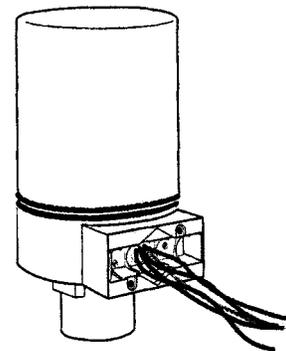
Conduit
Lock Nut



Installation using Wire Leads (No Conduit)

1. Make wiring connections (see Figure 1). Cover plate and screws are not required.

Step 1.



Assembly of AV-600 Linkage to Valve

NOTE:

If valve has AV-600 linkage already assembled, proceed to next section.

1. Select proper stem extension (see Table 3).
2. When assembling be sure to maintain the stem height "X" shown in Table 3. In Figure 3 (B), "X" is the distance from the top of the stem extension to the top of the packing nut.
3. Screw stem extension onto valve stem several turns.
4. Position valve stem up or down as indicated in Table 3.
5. Adjust the height "X" per dimensions in Table 3.
6. Using 3/8" wrenches on stem extension at points A and B, turn wrench at point A counterclockwise while holding wrench at point B stationary. See Figure 3 (B). The nut portion on the stem extension/lock nut combination will separate from the stem extension. Jam the lock nut against the stem extension to make the stem extension secure to the valve stem.
7. With stem in up position, set spring over valve stem.
8. Insert TOOL-19, a 1/8" diameter rod, through spring coil and hole in stem extension. See Figure 3 (B).
9. Hold spring to keep it from turning and "walk" the tool up the spring coil by turning counterclockwise.
10. Set the retainer over stem extension when boss on stem extension projects above the top of the spring coil.

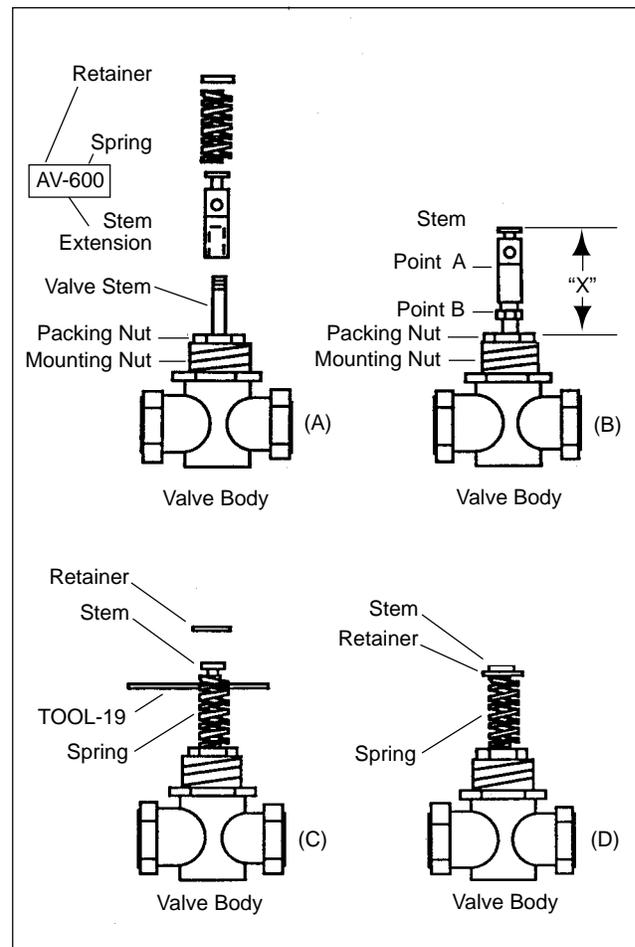


Figure 3. Assembly of AV-600 to Valve

11. Turn retainer 45° to lock in place.
12. Turn tool clockwise down spring coil to release the tension. Remove tool from assembly.
13. The valve is now ready for attachment to the AV-601 extension linkage and actuator or directly to the actuator (chilled water applications only).

Table 3. AV-600 Valve Linkage/Body Stem Height for EA81 Series

Valve Body Part Number (No Linkage)	Stem Extension In. (mm)	AV-600 Stem Height In. (mm) (Dim. "X") and Valve Stem Position for Assembly
Globe Screwed (Normally Open)		
VB-7213 VB-7253 VB-7273	1-15/32 (37) Short	1-25/32 (45) Down
Globe Screwed (Normally Closed)		
VB-7223 VB-7263 VB-7283	1-15/32 (37) Short	2-1/8 (54) Up
Globe Screwed Three-Way		
VB-7313 VB-7323	1-15/32 (37) Short	2-1/8 (54) Up

Assembly of AV-601 Linkage to Valve with Assembled AV-600

NOTE:

Actuator valve assemblies for chilled water applications do not require the AV-601 extension linkage kit.

1. Insert AV-601 bracket over spring of previously assembled valve and AV-600 linkage.
2. Screw the bracket onto the valve body mounting nut.
3. Insert the spacer into the AV-601 bracket.
4. Screw the actuator onto the AV-601 bracket.

CAUTION:

Do not twist or exert any force on the actuator housing during the assembly procedure. Either turn the base by hand or, if necessary, use 1-5/8" (43 mm) open-ended wrench (TOOL-37) on flats provided on the actuator base or the valve body mounting nut.

NOTE:

Use of the AV-601 extension kit will add 2-1/32" (52 mm) to height of valve actuator assembly.

Wiring

See Figure 1.

Control Leads

Use 18 gauge two-conductor twisted leads for runs up to 500 feet (152 meters) between the 4 to 20 mA dc signal generating source (controller) and the actuator. Use larger gauge wires for longer runs.

CAUTION:

Use 18 gauge two-conductor twisted shielded wire when it becomes necessary to install the control leads in the same conduit with power wiring or when high RFI/EMI generating devices are near. *The shield should not be earth grounded at any point or connected to any wires or terminals.*

Power Leads

Wire line voltage to NEC codes. See Table 4 for selection of proper gauge wire versus voltage and length of wire run.

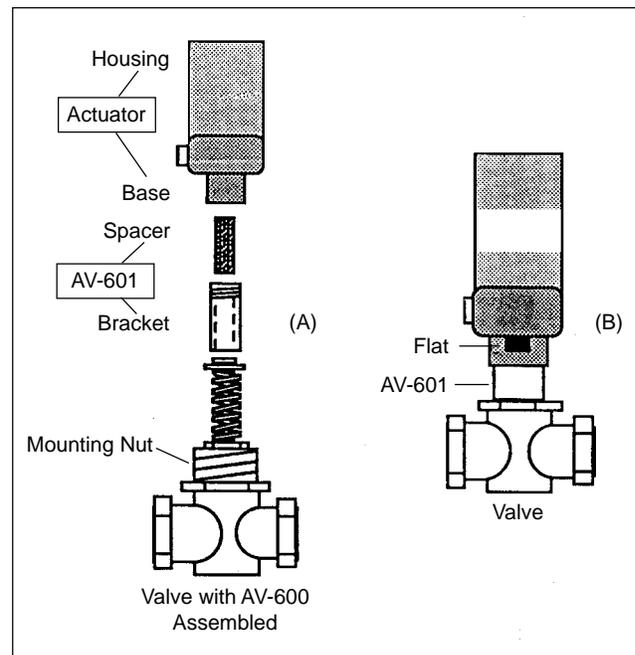


Figure 4. Assembly of Actuator to AV-601 and Valve with AV-600

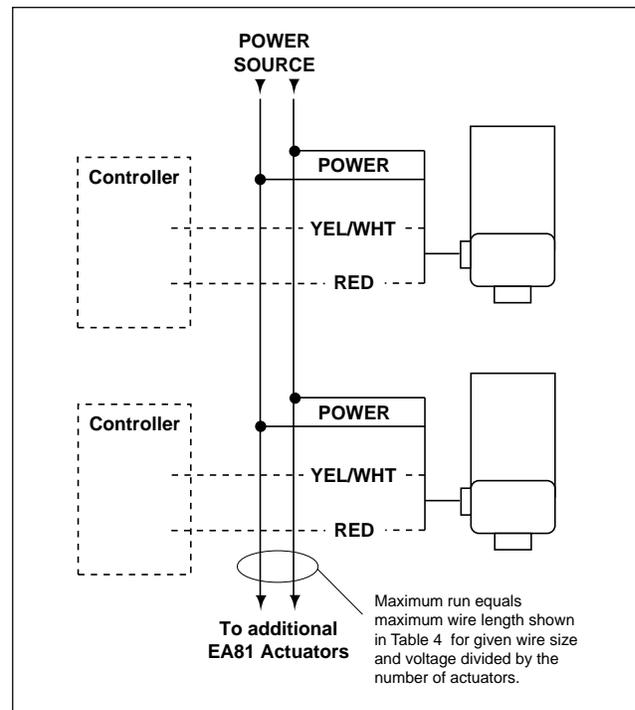


Figure 5. Wiring of Multiple EA81 Actuators to Single Power Source

Table 4. Power Wiring Data for the EA81

Actuator Voltage (Vac)	Actuator Model Number	Power Lead Colors	Wire Size (Gauge)	Maximum Two-Wire Run in ft. (m)
120	EA81-11006	WHT, BLK	14	3500 (1067)

Table 5. Valve Position Versus Input Signal

Valve Body Series	Normal Position	4 to 20 mA Input Signal	
		Decrease mA Signal	Increase mA Signal
VB-7213 VB-7253 VB-7273	Normally Open	Opens Valve	Closes Valve
VB-7223 VB-7263 VB-7283	Normally Closed	Closes Valve	Opens Valve
VB-7313	Flow B to AB	Flow B to AB	Flow A to AB
VB-7323	Flow B to AB	Flow B to AB	Flow B to A

CHECKOUT

Positioning the Actuator with the Controller

If the sensed media is within the controller’s setpoint range, the actuator can be positioned by adjusting the controller setpoint up or down. Check for correct operation of the actuator (valve) while the actuator is being stroked.

MAINTENANCE

Regular maintenance of the total system is recommended to assure sustained optimum performance.

FIELD REPAIR

None. Replace with functional motor.

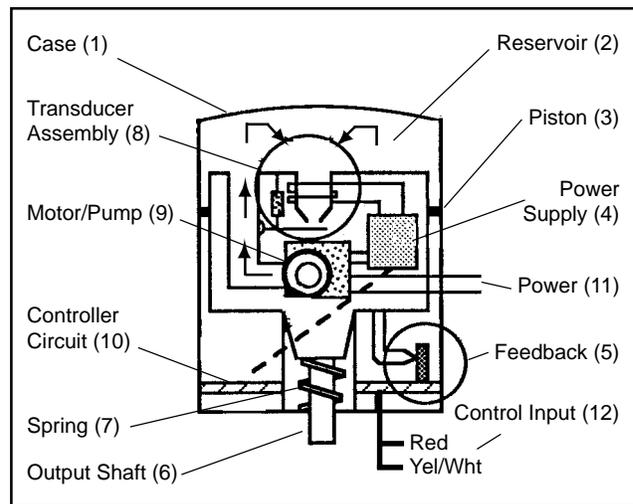


Figure 6. EA81 Actuator Operation

THEORY OF OPERATION

The permanently sealed oil-filled case (1 in Figure 6) contains a movable hydraulic piston (3) and a motor/ electric pump (9) for the hydraulic system. The pump generates a fluid pressure which is transmitted to the top of the piston. Opposing the hydraulic force is the spring (7) of the damper or valve linkage. The motor/ electric pump is powered by the input supply voltage (11) and runs continuously. A regulated Vdc power supply (4) is powered by a transformer winding from the motor/electric pump. The control signal (4 to 20 mA) input (12) is compared through the actuator controller circuit (10) to shaft position (5). The output of the actuator controller circuit positions the transducer flapper (8) for proportional positioning of the shaft (6).



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