





SERIES 1000-X

INSTALLATION, OPERATION & MAINTENANCE MANUAL

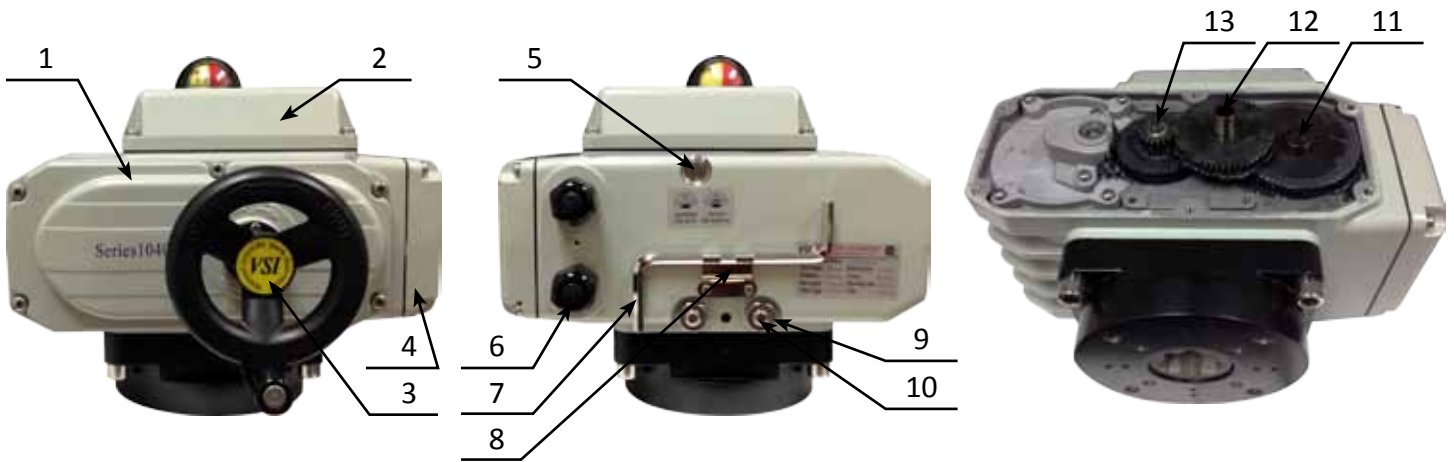
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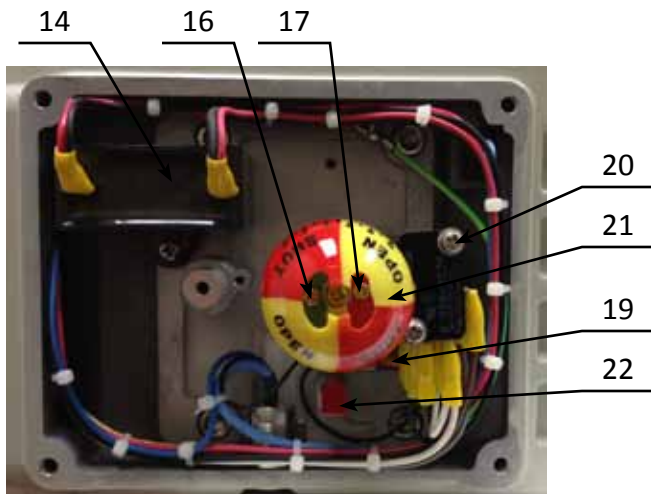
NOTES

1.  No manual operation of the actuator while the device is energized.
2. The actuator is equipped with an over heating protection device. When the motor exceeds the temperature of 257° F (125°C) , the overheat protection device will automatically switch off the motor.
3. It is necessary to take additional leakage protection steps when installing the actuator and putting it into service. See page 11 for more information on proper conduit installation precautions.
4. It is necessary to provide the proper sealing of the waterproof cable ends on the inlet side of the actuator. This will help to prevent the actuator from becoming damage by water or dirt coming into the actuator from outside sources.
5. Be sure to double check the input voltages and all other connections.
6. Do not wire two or more actuators in either series or parallel. Otherwise, it can cause movement to become out of control, or the motor temperatures to rise due to the interference they can correct with each other.
7. A minimum of 18 gauge wire needs to be used for all wiring connections.
8.  The servo controller must be wired and adjusted according to the instruction manual to prevent any damage from occurring.
9. Service personnel for the installation and adjustment of the actuator need to be qualified for these operations.
10. Do not operate the actuator purposely under overloaded conditions.
11. Valve Solutions, Inc. will not be responsible in the improper modification or lack of proper maintenance of the actuators.
12. All actuators have the proper wiring diagram affixed to the inside cover. All wiring should follow these diagrams.

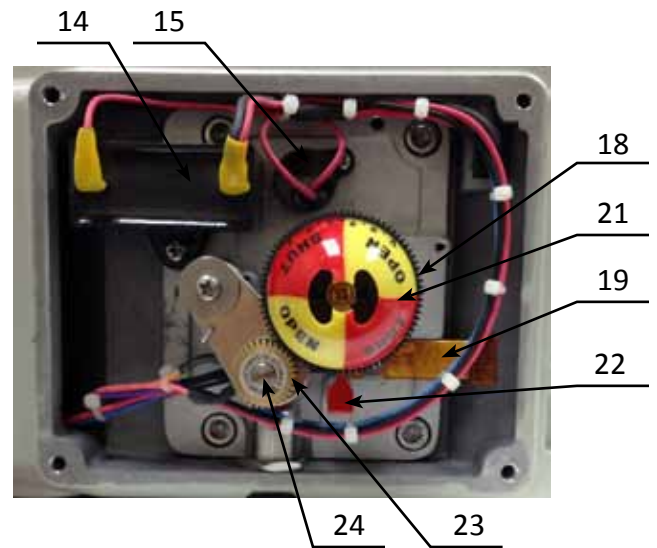
NAMES OF COMPONENTS



2 POSITION



MODULATING

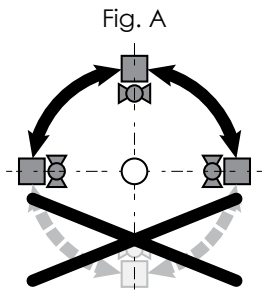
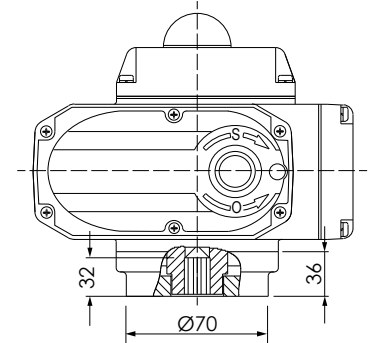
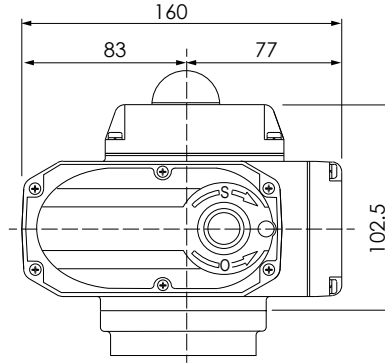
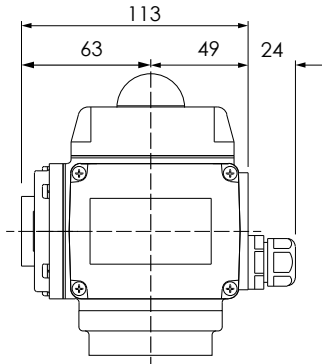


1	Gear Cover	2	Electric Cover	3	Handwheel
4	Junction Box Cover	5	Push Button	6	Conduit Plug
7	Hex Handle	8	Handle Snap Holder	9	Travel Stop Nut
10	Travel Stop	11	Worm Shaft	12	Handle Socket
13	Reducing Gear Group	14	Capacitor	15	Inductor
16	Open Cam Lock Screw	17	Close Cam Lock Screw	18	Opening Gear
19	Heater	20	SPDT Limit Switch	21	Position Indicator
22	Position Pointer	23	Potentiometer Gear	24	Potentiometer

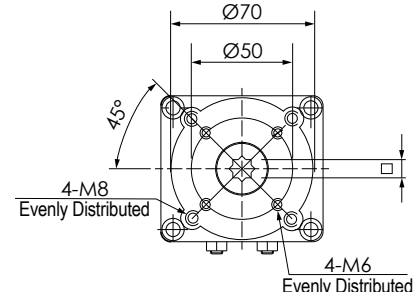
S (SHUT) Direction of arrow (clockwise) represents close.

O (OPEN) Direction of arrow (counter-clockwise) represents open.

OVERALL DIMENSIONS AND SPECIFICATIONS FOR 1005-X



Direct Mount Parameters	
Square Shaft	□ 14 x 14
Mounting Flanges	F05 F07
Stem Height	Height ≤ 32mm



1005-X SPECIFICATIONS			
Power Supply	AC24V	AC110V	AC220V
Motor Power	10W	10W	10W
Rated Current	1.50A	0.24A	0.16A
Max. Current	2.08A	0.34A	0.17A
Standard Torque / Run Time	50Nm/20s - 30Nm/10s		
Turning Angle	0° - 90° Adjustable		
Total Weight	4.41lbs (2.0kg)		
Insulating Resistance	AC24V: 100Ω/250VDC AC110V/AC220V: 100Ω/500VDC		
Withstand Voltage Class	AC24V: 500VAC - 1 Minute AC110V/AC220V: 1500VAC - 1 Minute		
Protection Class	IP67 NEMA 4X		
Installation Angle	At or above the center line of the pipe. See Fig. A		
Ambient Temperature	-22°F - +140°F (-30°C - +60°C)		
Ambient Humidity	≤ 95% Relative Humidity		
Duty Cycle	80%		
Options	Handwheel		

OVERALL DIMENSIONS AND SPECIFICATIONS FOR 1010-X

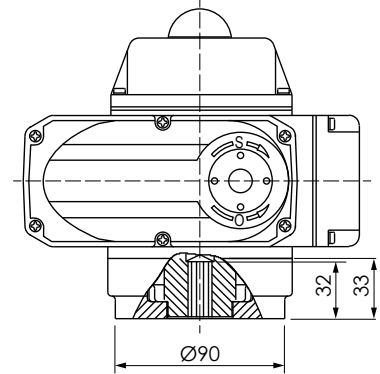
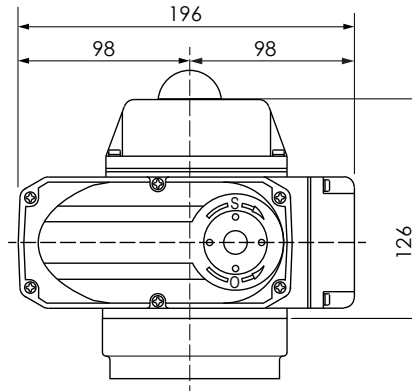
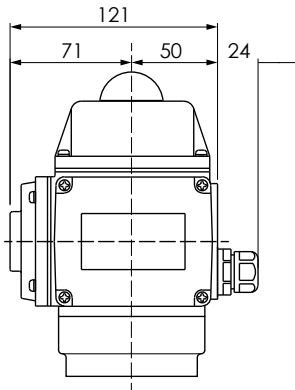
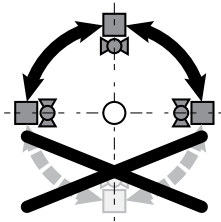
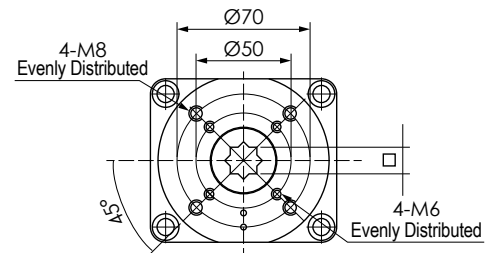


Fig. A

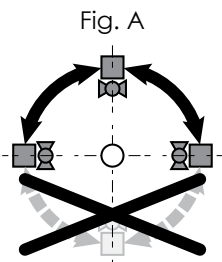
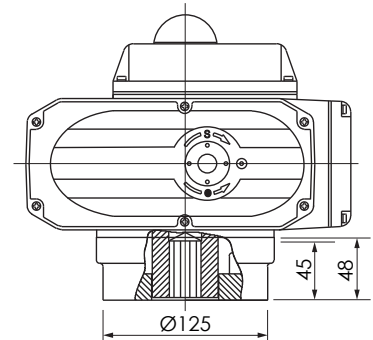
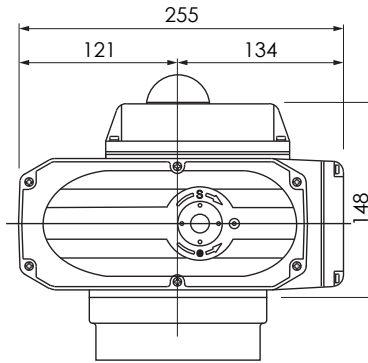
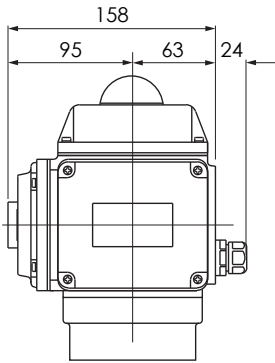


Direct Mount Parameters	
Square Shaft	□17 x 17
Mounting Flanges	F05 F07
Stem Height	Height ≤ 32mm

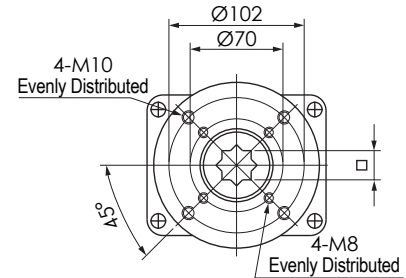


1010-X SPECIFICATIONS			
Power Supply	AC24V	AC110V	AC220V
Motor Power	25W	25W	25W
Rated Current	2.12A	0.57A	0.30A
Max. Current	3.12A	0.81A	0.47A
Standard Torque / Run Time	100Nm / 30s		
Turning Angle	0° - 90° Adjustable		
Total Weight	6.61lbs (3.0kg)		
Insulating Resistance	AC24V: 100MΩ/250VDC AC110V/AC220V: 100MΩ/500VDC		
Withstand Voltage Class	AC24V: 500VAC - 1 Minute AC110V/AC220V: 1500VAC - 1 Minute		
Protection Class	IP67 NEMA 4X		
Installation Angle	At or above the center line of the pipe. See Fig. A		
Ambient Temperature	-22°F - +140°F (-30°C - +60°C)		
Ambient Humidity	≤ 95% Relative Humidity		
Duty Cycle	80%		
Options	Handwheel		

OVERALL DIMENSIONS AND SPECIFICATIONS FOR 1020-X THRU 1060-X

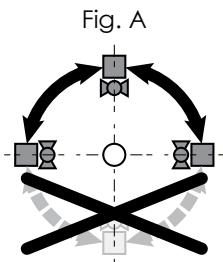
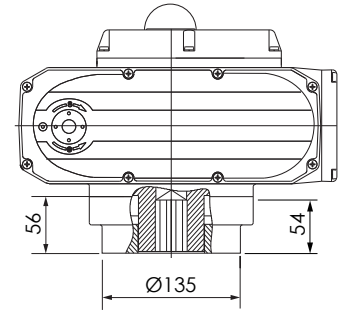
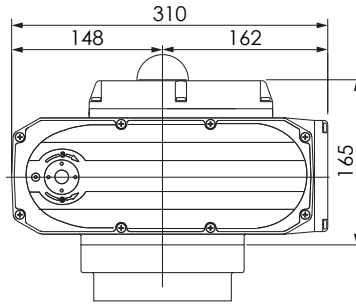
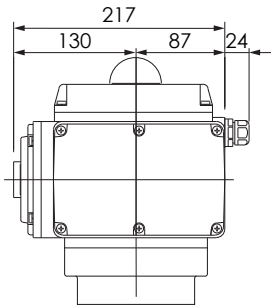


Direct Mount Parameters	
Square Shaft	□27 x 27
Mounting Flanges	F07 F10
Stem Height	Height ≤ 45mm

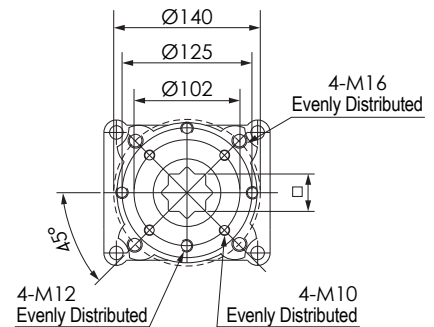


1020-X / 1040-X / 1060-X SPECIFICATIONS								
Model	1020-X			1040-X			1060-X	
Power	AC24V	AC110V	AC220V	AC24V	AC110V	AC220V	AC110V	AC220V
Motor Power	40W	40W	40W	40W	90W	90W	90W	90W
Rated Current	3.15A	0.65A	0.37A	2.42A	1.12A	0.57A	1.18A	0.60A
Max. Current	5.30A	1.68A	0.78A	4.38A	3.41A	1.78A	3.60A	1.87A
Standard Torque / Run Time	300Nm / 45s	200Nm / 30s		400Nm/ 100s	400Nm / 30s		600Nm / 30s	
Turning Angle	0° - 90° Adjustable							
Total Weight	17.63lbs (8.0kg)			18.74lbs (8.5kg)			19.41lbs (9.0kg)	
Insulating Resistance	AC24V: 100MΩ/250VDC AC110V/AC220V: 100Ω/500VDC							
Withstand Voltage Class	AC24V: 500VAC - 1 Minute AC110V/AC220V: 1500VAC - 1 Minute							
Protection Class	IP67 NEMA 4X							
Installation Angle	At or above the center line of the pipe. See Fig. A							
Ambient Temperature	-22°F - +140°F (-30°C - +60°C)							
Ambient Humidity	≤ 95% Relative Humidity							
Duty Cycle	80%							
Options	Handwheel							

OVERALL DIMENSIONS AND SPECIFICATIONS FOR 1100-X THRU 1250-X



Direct Mount Parameters	
Square Shaft	□36 x 36
Mounting Flanges	F12 F14 F10
Stem Height	Height ≤ 54mm



1100-X / 1160-X / 1250-X SPECIFICATIONS						
Model	1100-X		1160-X		1250-X	
Power	AC110V	AC220V	AC110V	AC220V	AC110V	AC220V
Motor Power	120W	120W	140W	140W	140W	140W
Rated Current	1.93A	0.94A	1.75A	0.96A	1.75A	0.98A
Max. Current	3.80A	2.12A	3.93A	2.16A	3.95A	2.20A
Standard Torque / Time	1000Nm/30s		1600Nm/48s		2500Nm/75s	
Turning Angle	0° - 90° Adjustable					
Total Weight	37.48lbs (17.0kg)		43.0lbs (19.5kg)		43.0lbs (19.5kg)	
Insulating Resistance	AC110V/AC220V: 100MΩ/500VDC					
Withstand Voltage Class	AC110V/AC220V: 1500VAC - 1 Minute					
Protection Class	IP67 NEMA 4X					
Installation Angle	At or above the center line of the pipe. See Fig. A					
Ambient Temperature	-22°F - +140°F (-30°C - +60°C)					
Ambient Humidity	≤ 95% Relative Humidity					
Duty Cycle	70%					
Options	Handwheel					

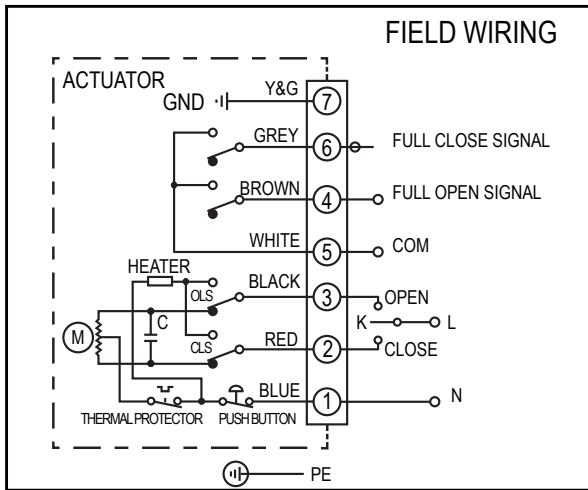
SPECIFICATIONS FOR MODULATING ACTUATORS

SERIES 1000-X MODULATING ACTUATOR SPECIFICATIONS								
Model	1005/S-X	1010/S-X	1020/S-X	1040/S-X	1060/S-X	1100/S-X	1160/S-X	1250/S-X
Power	AC110/220	AC110/220	AC110/220	AC110/220	AC110/220	AC110/220	AC110/220	AC110/220
Output Torque	50Nm	100Nm	200Nm	400Nm	600Nm	1000Nm	1600Nm	2500Nm
Acting Time	20s	30s	30s	30s	45s	30s	48s	75s
Turning Angle	0° - 90° Adjustable							
Motor Power	10W	25W	40W	90W	90W	120W	140W	140W
Rated Current	0.24A/0.16A	0.57A/0.35A	0.65A/0.37A	1.12A/0.57A	1.18A/0.60A	1.93A/0.94A	1.75A/0.96A	1.75A/0.98A
Total Weight	4.41lb(2kg)	6.61lb(3kg)	17.64lb(8kg)	18.74lb(8.5kg)	19.84lb(9kg)	37.48lb(17kg)	43.0lb(19.5kg)	43.0lb(19.5kg)
Input Signal	4-20mA or 2-10VDC							
Output Signal	4-20mA							
Basic Error	$\leq \pm 1\%$							
Reciprocating Error	$\leq 1\%$							
Dead Band	0.5% - 5.0% Adjustable							
Repeating Error	$0 \leq 2.5\%$							
Insulating Resistance	100M Ω / 500VDC							
Withstand Voltage Class	1500VAC - 1 Minute							
Protection Class	IP67 NEMA 4X							
Installation Angle	At or above the center line of the pipe. See Fig. A							
Ambient Temperature	-22°F - +140°F (-30°C - +60°C)							
Ambient Humidity	$\leq 95\%$ Relative Humidity							
Duty Cycle	80%					70%		
Options	Handwheel							

ELECTRICAL WIRING

2 POSITION UNITS

The opening and closing operation of the actuator is regulated with the travel limit switches which open the power circuit to the motor. Two power legs and a common are needed in order to drive the actuator open and closed. Auxiliary switches are for status of valve (open/closed). **The 1005-X units are not equipped with the manual override push ON/OFF button. In order to operate the 1005-X units with the manual override, power must be turned off or disconnected from the unit.** All other units are equipped with the manual override push ON/OFF button which disconnects power to the motor so that the actuator can be manually operated using the hand crank or hand wheel



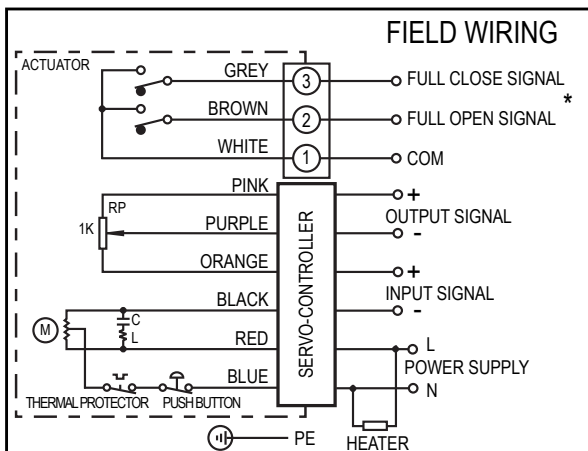
Terminal wiring as follows:

1. Power common
2. Close operation (Power Hot)
3. Open operation (Power Hot)
4. Auxiliary contact common
5. Auxiliary contact open status
6. Auxiliary contact closed status
7. Chassis ground

MODULATING WITH SERVO CONTROL PACK (110/220VAC)

The modulating of the actuator is software driven based on the input signal to the Servo Control Pack. Input Signal is 4-20mA or 2-10VDC and Output (Feedback) is 4-20mA. **The 1005/S-X units are not equipped with the manual override push ON/OFF button. In order to operate the 1005/S-X units with the manual override, power must be turned off or disconnected from the unit.**

1005S-X Units use the SF-ZB Servo Control Pack – All other units use the SF-LB Servo Control Pack



Terminal wiring as follows:

1. "N" is for power neutral
2. "L" is for line power
3. Input "-" is for the negative input signal
4. Input "+" is for the positive input signal
5. Output "-" is for the negative output signal
6. Output "+" is for the positive output signal

* Optional auxiliary contacts will be wired on a separate terminal strip (1- Common, 2- Open, 3-Closed)

APPLICATION REQUIREMENTS

Installation Conditions

- Series 1000-X Units can be installed outdoors and indoors – NEMA 4X or IP67.
- Series 1000-X Units are not explosion proof and caution should be taken to avoid inflammable and explosive environments.
- Installation consideration should be taken into account to allow for manual operation of the units as well as any maintenance.
- Ambient temperature should be within -30°C - +60°C.

Medium Working Temperature

- Care should be taken to prevent the heat of the working medium from exceeding the actuator ambient temperature limits.
- When the temperature of the working medium exceeds the actuator limit a thermal coupling shall be installed to reduce the heat transfer between the medium and the actuator.
- **Standard bracket may be used when the working medium is below 80°C.**
- **A higher temperature bracket may be need for temperatures exceeding 80°C.**

Conduit and Cable Installation

- Refer to figure 1 when for installation of conduit
- Conduit should be ½” NPT and all fittings should be sealed water tight
- Actuator shall be installed above the conduit so that any water in the conduit will not make its way inside the unit.
- If actuator must be installed below conduit, a drip loop or drain should be provided to allow any water to exit the piping
- Refer to figure 2 for installation of cable directly into unit (No Conduit).
- The outer diameter of the cable shall be $\varnothing 9\text{mm}-\varnothing 11\text{mm}$.
- Cable smaller than specified above may allow water to enter the unit and cannot be used.
- When possible power wiring and signal wiring should be routed through separate conduits
- All units have two conduit entries. One for power, one for control.

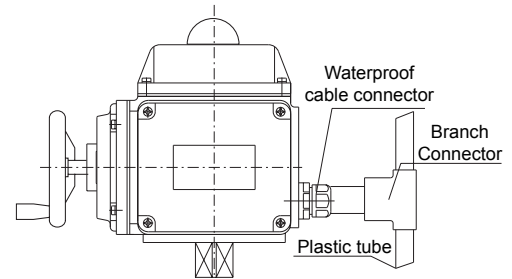


Figure 1

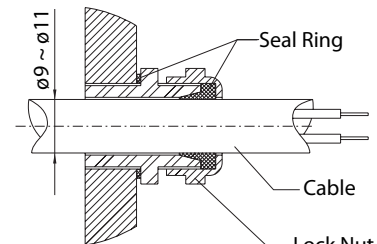


Figure 2

Power Supply Requirement

- Power supply for the corresponding unit must meet the electrical requirements for voltage and current ratings.
- The power supply shall be as follows:
AC 24V $\pm 10\%$ AC 110V $\pm 10\%$ AC 220V $\pm 10\%$

Selection of Fuses for Circuit Breaker

	AC24V	AC110C	AC220V
1005-X	5A	3A	2A
1010-X	7A	5A	3A
1020-X/1040-X/1060-X	N/A	7A	5A
1100-X/1160-X/1250-X	N/A	10A	7A

MOUNTING ON A VALVE

INSTALLATION OF ACTUATOR TO VALVE (FIG. 3)

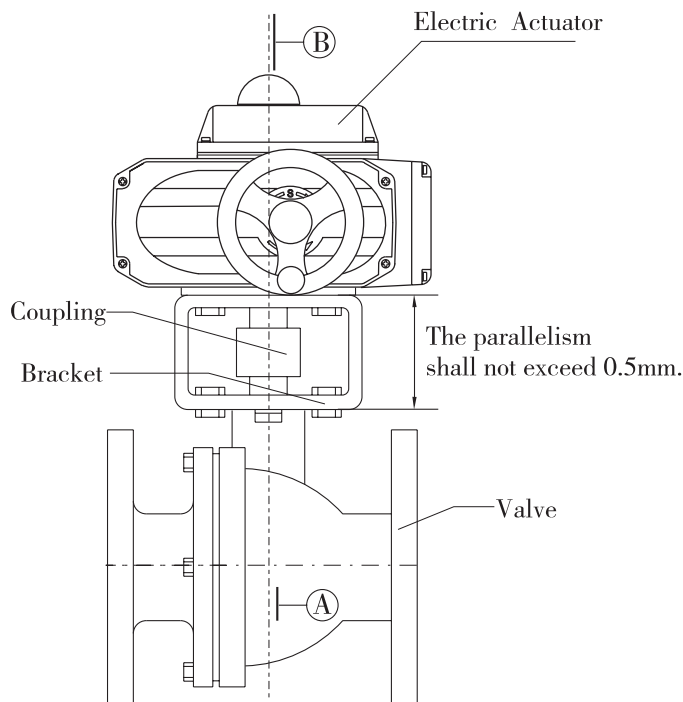
Note: Direct mounting the actuator removes the bracket and coupling from the mounting process, but the remainder remains the same.

1. Rotate valve to full closed position. Ensure that the valve rotates freely with no obstruction.
2. Using the proper bolts attach the bracket to the valve – tighten loosely.
3. Place the coupling onto the stem of the valve
4. Using the manual override handle, rotate the actuator to the full closed position so that the pointer indicator points to “SHUT” (stating position of the scale).
5. Insert the output drive shaft of the actuator into the coupling.
6. Attach bracket to actuator and tighten all bolts.
7. Drive the actuator using the manual crank handle and confirm that the valve rotates without obstruction. Ensure the valve is fully open as the actuator rotates to full open position.

Mounting Tips:

NOTE: This is not for direct mounting the actuator to the valve.

- If providing own bracket, ensure that the materials provided are manufactured professionally and meet the requirements in Fig. 4.
- The precision of the coupling holes is crucial to prevent any backlash or damage to the actuator.
- It is necessary to ensure the positional angles of the coupling holes to prevent exceeding the actuator’s working range.
- Only tighten bolts after the actuator, bracket and valve have been properly aligned.



The coaxiality between axes **A** and **B** shall not exceed $\phi 0.2\text{mm}$.

Figure 4

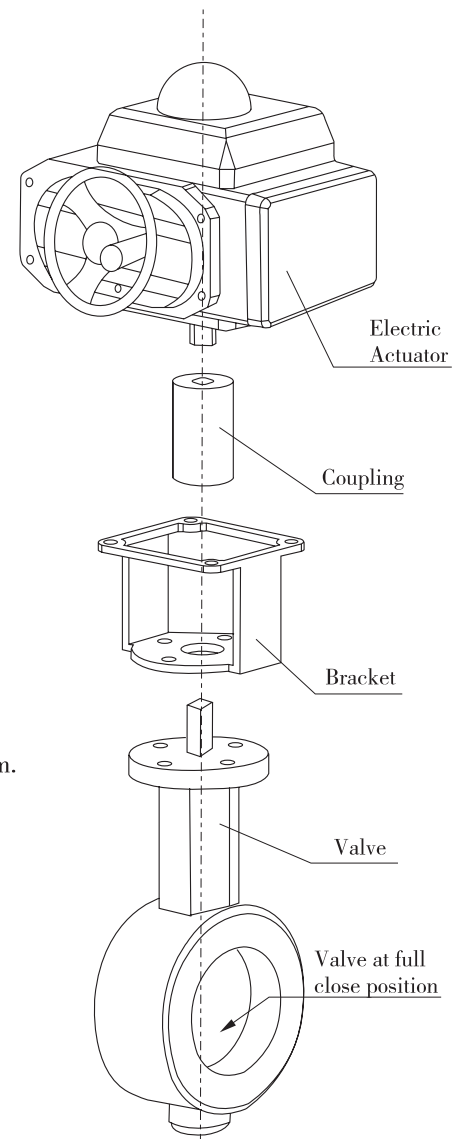


Figure 3

ADJUSTMENT OF ACTUATOR - 2 POSITION

Units are calibrated at the factory to rotate 90° - if any adjustment is needed please use the following procedure.

1. Adjustment of electric limits for 2 position valves (Fig 5.)

- a. Full Closed position adjustment: Using the manual hand wheel or hand crank, drive the valve to the full closed position. Ensure the pointer on the dome lid is pointing red zero “shut”. If not, remove lid and loosen dome indicator and re-position to red zero “shut”. To adjust the closed limit switch, loosen shut position regulating shaft (S) using 2mm Allen wrench and rotate the stroke dog D1 (lower) clockwise until the K1 switch makes click. Tighten shut position regulating shaft (S).
- b. Full Open position adjustment: Using the manual hand wheel or hand crank, drive the valve to the full open position. Ensure the pointer on the dome lid is pointing yellow zero “open”. To adjust the open limit switch, loosen open position regulating shaft (O) using 2mm Allen wrench and rotate the stroke dog D2 (upper) counter-clockwise until the K3 switch makes click. Tighten open position regulating shaft (O).

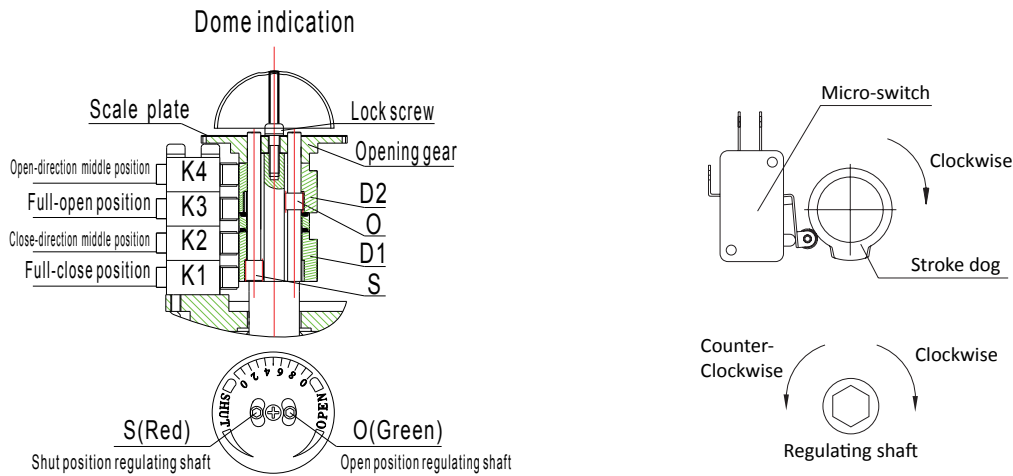


Figure 5

2. Adjustment of mechanical stops (Fig 6 & 7) PLEASE SEE WARNING BELOW BEFORE PROCEEDING!

⚠ To prevent damage, the electrical limit switches need to be set to make contact prior to the shaft reaching the mechanical stops.

- a. Using the manual override handle or hand wheel, rotate the valve to the full closed position until the switch K1 clicks.
- b. Loosen the lock-nut on the left side of the unit and rotate the adjusting screw clockwise using Allen wrench until the screw comes into contact with the stopper – then back off ½ of a turn (counterclockwise). Tighten lock nut.
- c. Repeat step above for open direction of operation.

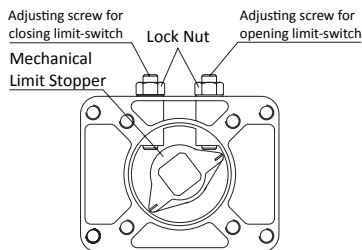


Figure 6

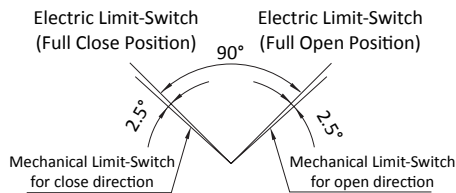


Figure 7

3. Electric Test

- a. Connect wiring per the control circuit diagram – located in the terminal cover lid.
- b. Verify that the valve rotates to the closed position by observing the dome indicator points to red zero “shut”.
- c. Verify that the valve rotates to the open position by observing the dome indicator points to yellow zero “open”.
- d. After all adjustments mentioned above, check the alignment of the dome indicator scale and pointer. If the pointer is not aligned properly on open and closed position – adjust as needed by loosening the dome lock screw and then retightening.

ADJUSTMENT OF ACTUATOR - MODULATING

- Following procedures in section “INSTALLATION OF ACTUATOR TO VALVE” install the actuator onto the valve and ensure proper movement of unit by utilizing the manual crank handle.
- Drive the valve to the full closed position using the manual crank handle and ensure that the mechanical stops are not making contact with the housing or screws. If there is contact, back off the mechanical limit screws until there is no contact. Loosen the lock screw on the dome indicator and position the scale to the full closed position “0” (SHUT POSITION) – tighten the lock screw on the dome indicator.
- Drive the valve to the full open position by using the crank handle and ensure that the mechanical stops are not making contact with the housing or screws. If there is contact, back off the mechanical limit screws until there is no contact. For 90° rotation, the dome scale indicator should now be pointing to “0” (OPEN POSITION).

PLEASE NOTE: ALL ACTUATORS ARE PRE-SET AND TESTED FROM THE FACTORY AND SHOULD NOT NEED ANY ADJUSTMENT. IF ANY FIELD ADJUSTMENT IS NEEDED, MECHANICAL LIMITS MUST BE ADJUSTED TO MATCH FIGURE 8.

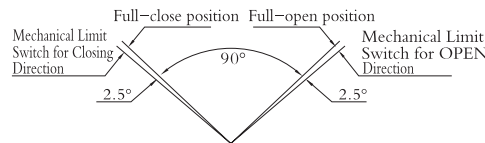


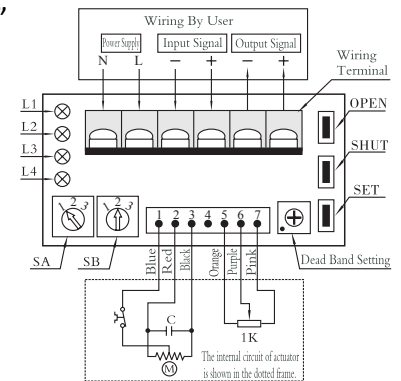
Figure 8

⚠ WARNING: ANY MOVEMENT OF THE POTENTIOMETER GEAR WILL ALTER THE FUNCTIONALITY OF THE ACTUATOR AND IT MUST BE RETURNED TO THE FACTORY FOR RE-CALIBRATION.

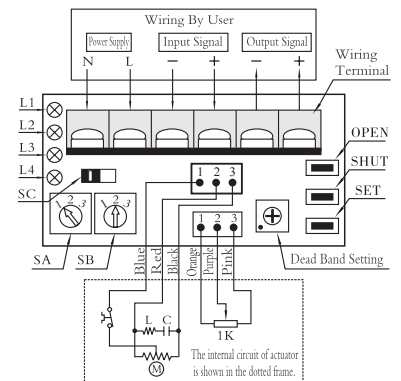
⚠ WARNING: CONNECT WIRING AS SHOWN IN FIGURE 9. IF POWER LEADS ARE CONNECTED TO CONTROL SIGNAL INPUT TERMINALS, DAMAGE WILL OCCUR TO THE SERVO CONTROL PACK.

4. Description of Servo-Control Pack (SF-ZB and SF-LB)

- OPEN BUTTON** – In “Set Mode” (Switch SA Points to 2) the open button can be used to rotate the actuator in the open direction by pressing down and stopping when released. The open button is also used to establish the open limits when pressed at the same time as the “set button”.
 - SHUT BUTTON** - In “Set Mode” (Switch SA Points to 2) the shut button can be used to rotate the actuator in the closed direction by pressing down and stopping when released. The shut button is also used to establish the closed limits when pressed at the same time as the “set button”.
 - SET BUTTON** – In “Set Mode” (Switch SA Points to 2) the set button is used in coordination with the open or closed buttons to set the position limits.
 - SA SWITCH** – SA switch is the mode switch. 1 is for direct acting control mode, 2 is for the set mode, 3 is for reverse acting control mode. Factory set at 1.
 - SB SWITCH** – SB switch is for loss of control signal. 1 – Actuator will rotate to the open position upon loss of control signal, 2 – actuator will stay in place upon loss of signal, 3 -actuator will rotate to the closed position upon loss of control signal. Factory set at 2.
 - SC SWITCH** – The SF-LB Servo-Control Pack can allow for 2-10VDC* control or 4-20mA control. The SC switch selects the applicable control signal. The SF-ZB Servo-Control Pack (used only in the 1005S Models) does not have this functionality.
- *The factory default control signal is 2-10VDC.



SF-ZB Servo-Controller (1005/S-X)



SF-LB Servo-Controller (All other models)

Figure 9

ADJUSTMENT OF ACTUATOR - MODULATING


- DB SWITCH – Allows for the selection of dead band on the potentiometer. Settings are 1-10 which correspond to 0.5% to 5.0%.
- L1 LAMP – Green LED is the power indicator and illuminates when power is applied to terminals “N” and “L” of the Servo-Control Pack.
- L2 LAMP – Red LED shows a malfunction of the control signal input and illuminates when the control signal is lost or weak.
- L3 LAMP – Red LED shows a malfunction of the positioning circuit and illuminates when the potentiometer lead is open, shorted or damaged.
- L4 LAMP – Red LED shows an over-torque condition illuminates if the valve is jammed or binding and the actuator’s torque is exceeded.

5. Setting of Servo-Control Pack (SF-ZB and SF-LB)

- **SERVO-CONTROL PACK POSITION LIMITS ARE FACTORY SET – UNLESS A CHANGE IN LIMIT SETTING IS DESIRED – NO ADJUSTMENT SHOULD BE NECESSARY.**

1. For the SF-ZB (1005S-X Models Only) Servo-Control Pack, there are two models – SF-ZB2 (2-10VDC) and SF-ZB4 (4-20mA). The SF-LB Servo-Control Pack has a switch setting SC SWITCH which allows the user to select the control signal. For the following procedure, select the proper control signal for the unit being adjusted.

2. Using a small screwdriver, rotate the Switch SA to “2” – this is the set mode. All settings of the actuator can be adjusted in the set mode.

3.  **FULL CLOSED POSITION LIMIT SETTING** – Perform steps 1-2 above - Adjust the position of the valve to the full closed position using the OPEN and/or SHUT buttons. While pressing and holding the SET button, press the SHUT button and hold both buttons down for 4 seconds L2 LAMP will illuminate and then extinguish – release both buttons at the same time. Closed position of the valve is now set.

4. **FULL OPEN POSITION LIMIT SETTING** – Perform steps 1-2 above - **For Full Open limit setting the control signal must be applied – 20mA or 10VDC depending on SC SWITCH setting.** Adjust the position of the valve to the full open position using the OPEN and/or SHUT buttons. While pressing and holding the SET button, press the SHUT button and hold both buttons down for 4 seconds L2 LAMP will illuminate and then extinguish – release both buttons at the same time. Open position of the valve is now set.

- **CONTROL SIGNAL LOSS FAILURE MODE** – If the control signal is lost, the actuator can be set to rotate the valve to a predetermined state – FAIL OPEN, FAIL IN PLACE, FAIL CLOSED. Set SWITCH SB to 1 for open, 2 for in place and 3 for closed. Factory set to 2. Note: Varying the selection on SWITCH SB will be effective even when the actuator is in full automatic mode.

- **DIRECT ACTING vs. REVERSE ACTING OPERATION** – SWITCH SA is used for controlling the travel direction of the actuator. Actuators are factory set for direct acting (2-10V, 2V is closed and 10V is open and for 4-20mA, 4mA is closed and 20mA is open) set SW A to 1 (direct acting). If reverse acting is desired (2-10V, 10V is closed and 2V is open and for 4-20mA, 20mA is closed and 4mA is open) set SW A to 3 (reverse acting).

- **DEAD BAND SETTING** – The dead band setting is used to adjust the actuators sensitivity to the input control signal. The lower the dead band setting, the more movement will occur in the actuator based on the resolution of the control signal. Servo Control packs are factory set to a midrange sensitivity of around 3%. If less sensitivity is desired, the DB SWITCH can be rotated clockwise up to 5%. If more sensitivity is desired, the DB SWITCH can be rotated counter-clockwise down to 0.5%.

5. **TESTING** – Set SW SA to 1 or 3 depending on the direct or reverse acting designation. Apply the input signal to the Servo Control Pack – verify the output signal corresponds to the input signal per the chart below.

TEST POINT	INPUT SIGNAL				
	4mA or 2V	8mA or 4V	12mA or 6V	16mA or 8V	20mA or 10V
SCALE POINTER	CLOSED “0”	2.5	5	7.5	OPEN “0”
VALVE POSITION	0% OPEN	25% OPEN	50% OPEN	75% OPEN	100% OPEN
OUTPUT CURRENT	4mA	8mA	12mA	16mA	20mA

Note: When SW SA is pointing towards position 3 (reverse acting), the input signal of 2V or 4mA corresponds to the valve being 100% open. The feedback reading will correspond to 100% open – 20mA.

OPERATION AND MAINTENANCE

MAINTENANCE AND SERVICE

- All actuators utilize a high grade molybdenum based grease is used for the gears. No lubrication and periodical maintenance is needed.
- If actuators are rarely cycled, periodic rotation should be scheduled to check if abnormal conditions are present.

TROUBLE SHOOTING

PROBLEM	CAUSE	REMEDY
Actuator does not operate	Power is not connected	Connect Power
	Manual/Auto button is not engaged	Press manual/auto button on unit to engage power
	Voltage is too low	Check voltage - correct
	The actuator is in thermal protection mode due to over torque situation, or ambient temperature is too high	Remove over torque condition by freeing up valve movement. Check valve to ensure manual movement and valve is not stuck. Cool down ambient temperature. Ensure that mechanical limits are not engaged with actuator output shaft.
	Defective micro-switch	Replace the micro-switch
	Defective capacitor	Contact Manufacturer
	Open diode	Contact Manufacturer
Indicator lamp for open/closed operations does not illuminate	Indicator lamp malfunction	Contact Manufacturer
	Improper micro-switch operation	Contact Manufacturer
Motor continues to operate after reaching limit	Defective micro-switch	Contact Manufacturer
	Power is not connected correctly	Re-check power connections
	Limit switch needs adjustment	Follow instructions and re-set limits
	Mechanical limit is out of adjustment	Re-adjust the mechanical limits according to the instructions
	Open diode	Contact Manufacturer
Water present inside of actuator	Inlet power cables are not properly installed per instructions	Re-check conduit connections
	The dome indicator lens is broken	Contact Manufacturer
	Housing screws are not tightened and sealed	Tighten housing screws
	Heater not working or not connected	Check heater connections contact manufacturer