Building connections that last™

ASC Engineered Solutions

Series ESR

Installation, Operation and Maintenance Manual

ABZ VALVE
An ASC Engineered Solution

ASC Engineered Solutions

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ESR Shown with LCU Option

1. Caution

Electrical Shock Hazard

To avoid serious personal injury, property damage or death, turn off all power to the actuator before removing the cover.

Before installation or use, verify the nameplate information to insure the correct model number, torque, voltage and enclosure type.

Be sure to completely review the actuator manual prior to operation.

Final limit switch adjustment must be done after mounting the actuator to the valve. Incorrect adjustment may cause actuator or valve failure.

Actuator MUST be properly grounded. Use the grounding lugs provided on the inside or outside of the actuator body.

To minimize the possible damage caused by condensation, be sure to energize the heater and seal the inside of the conduit entries after wires are run.

Care should be taken when wiring 3-phase actuators. Confirm proper rotation and limit switch shutoff function during the initial operation. If the actuator rotates in the reverse direction, then the phasing needs to be corrected by switching two of the 3-phase wires on the terminal block.

Explosion-proof products must be used when the actuator installation is located in a hazardous area.

2. Storage

The actuator must be stored in a clean, dry, temperature controlled location, off the floor and covered.

The actuator shall be stored with the cover installed and all conduit openings sealed.

Care must be taken to protect the actuator from condensation in extreme temperature variations.

Heaters should be energized as soon as actuators are installed.

Improper storage of the actuator will VOID WARRANTY.

Storage Location	Indoor
Storage Temperaure	13°C ~ 18°C (55°F ~ 65°F)

3. Actuator Specification

3–1 The Series ESR Actuator has been designed for the automation of 90° rotating equipment. The actuator is well suited for ball valves and butterfly valves as well as dampers.

3–2 Environment and Temperature

Temperature	20°C 55°C
	-4°F to 131°F
Enclosure	Standard and (X) Explosion Proof -Type 4/4x - IP67 Water Tight (W) -Type 4/4x/6 - IP68

The Series ESR enclosure is manufactured using an anodized aluminum alloy material and is coated with a dry powder epoxy paint to protect from oxidation.

3–3 Manual Overide

During a power loss, the manual override can be engaged to allow for manual positioning of the valve.

3–4 Self Locking

The self-locking worm gear prevents the valve from drifting and back driving the actuator gears.

3–5 Heater

The 20 watt internal heater helps to minimize condensation due to temperature and humidity changes.

3–6 Limit Switch

The mechanical, cam actuated limit switches are included to accurately calibrate the valve position.

3–7 Motor

The actuator motor is protected with an embedded 150°C (300°F) thermal protector designed to protect the motor from overheating.

3–8 Indicator

The visual indicator is directly connected to the actuator output shaft and is designed for visual indication from a distance.

3–9 Mechanical Travel Stops

Travel stops are set to limit the actuator travel when utilizing the manual override or in the event of a power loss, spring failsafe cycle.

3–10 Adaptation

Mounting is standardized to the ABZ inch based mounting specification as well as ISO5211 and the removable drive bushing can be machined to match the valve stem.

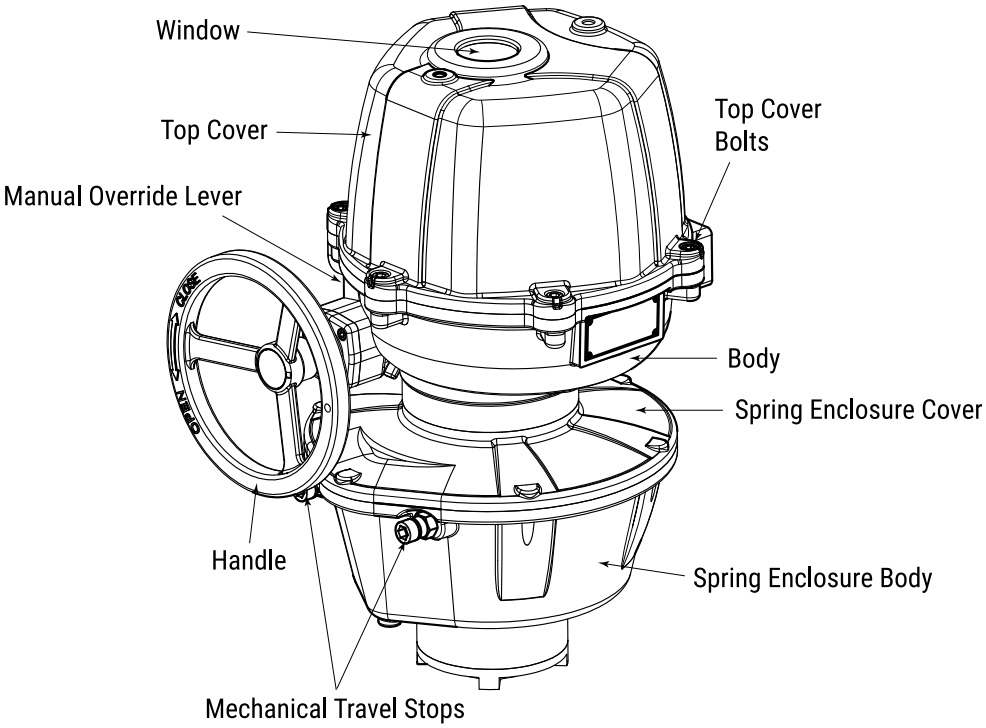
4. Performance

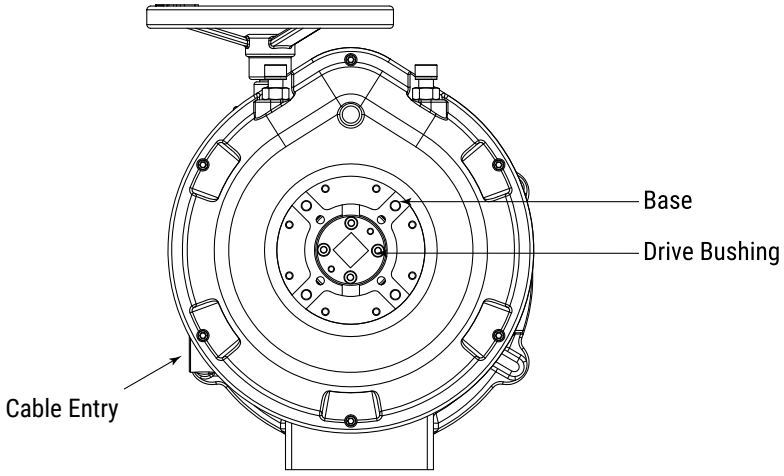
			Model:	E-SR430	E-SR860	E-SR1730	E-SR2600	E-SR4340
Maximum Torque	lbf-in			430	860	1730	2600	4340
	Nm			50	100	200	300	500
Voltage & Rated Current AMPs	110V	50Hz		2.8	2.8	2.8	2.8	2.8
		60Hz		3.6	3.6	3.6	3.7	3.7
	120V	60Hz		3.6	3.6	3.6	3.7	3.7
	220V	50Hz		1.6	1.6	1.7	1.6	1.6
		60Hz		2	2	2.1	2	2.1
	230V	50Hz		1.6	1.6	1.7	1.6	1.6
	380V	50Hz		0.24	0.4	0.38	0.35	0.37
		60Hz		0.25	0.4	0.35	0.29	0.31
	440V	50Hz		0.28	0.5	0.5	0.62	0.62
		60Hz		0.24	0.4	0.36	0.31	0.31
	24Vdc			12	12	13	15	15
Duty Cycle (S2)	minutes			15	15	15	15	15
Motor – Watts	Vac			90	90	90	90	90
	Vdc			120	120	120	120	120
Motor Operating Time in seconds **Open / Close (90°)**	110V	50Hz		17 / 16	20 / 19	60 /56	85 / 81	116 / 110
		60Hz		15 / 14	17 / 16	51/46	72 / 68	99 / 93
	120V	60Hz		15 / 14	17 / 16	51/46	72 / 68	99 / 93
	220V	50Hz		17 / 16	20 / 19	59 / 55	87 / 83	116 / 110
		60Hz		14 / 13	17 /15	50 /44	75 / 70	99 / 87
	230V	50Hz		17 / 16	20 / 19	59 / 55	87 / 83	116 / 110
	380V	50Hz		17 / 15	21 / 19	62 / 57	87 / 82	122 / 110
		60Hz		15 / 13	19 / 16	52 /47	74 / 68	110 / 93
	440V	50Hz		17/ 15	21 / 19	62 / 57	86 / 82	122 / 110
		60Hz		15 / 13	17 / 16	52 / 42	73 / 67	99 / 93
	24Vdc			14 / 10	23 / 13	55 / 35	100 / 56	133 / 75
Spring Return Time (90°) Seconds				1 - Second	1 - Second	1 - 2 Seconds	2 ± 1 Seconds	2 ± 1 Seconds
				Optional Governer*	Optional Governer*	Standard Governer	Standard Governer	Standard Governer
Mounting Dual Drilling	ABZ			3.25"	3.25" / 5.0"	3.25" / 5.0"	3.25" / 5.0"	3.25" / 5.0"
	ISO 5211			F07	F07 / F10	F10 / F12	F10 / F12	F10 / F12
Number of Handle Turns				25	25	75	113	145
Weight	Lbs			69.5	88.2	112.5	148	181
	Kg			31.5	40	51	67	82

* Contact Factory

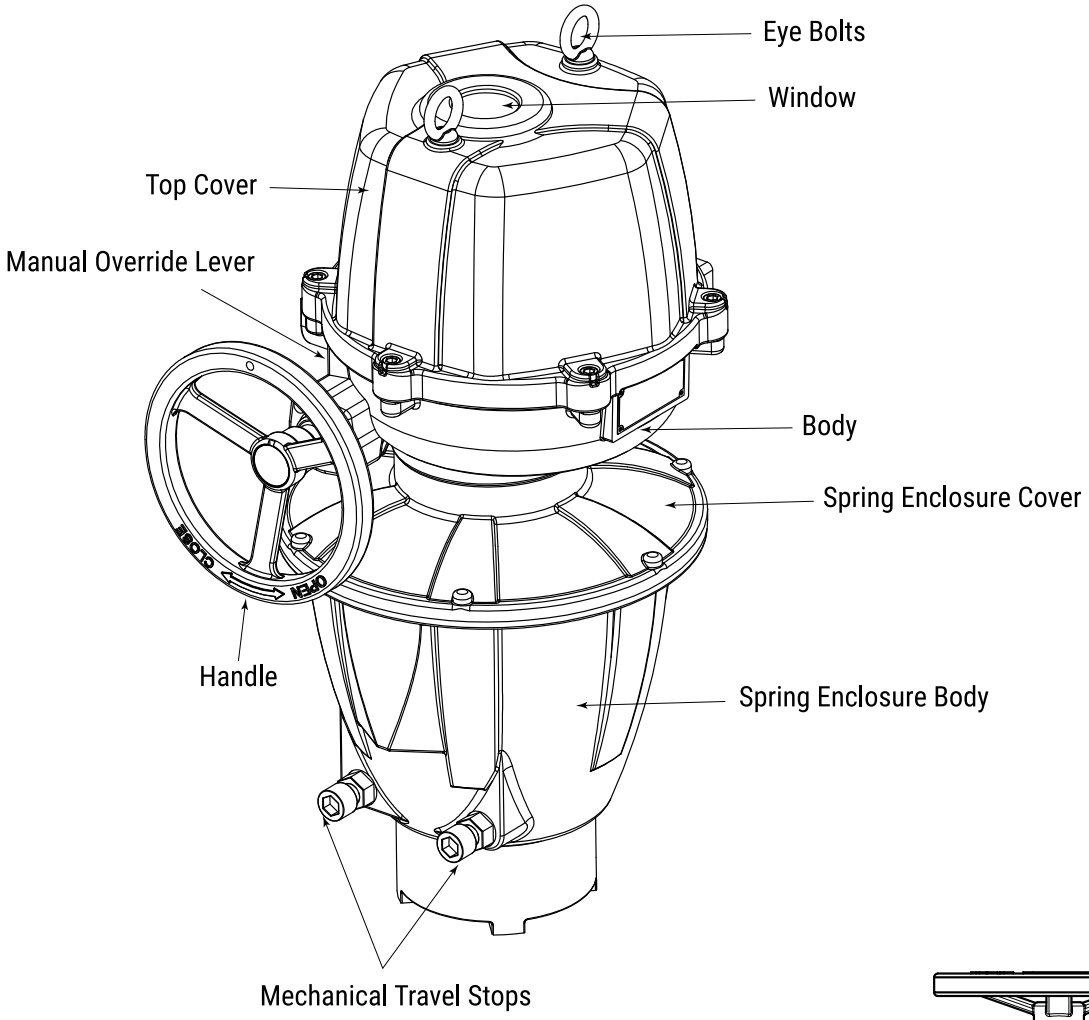
5. Exterior Parts Identification

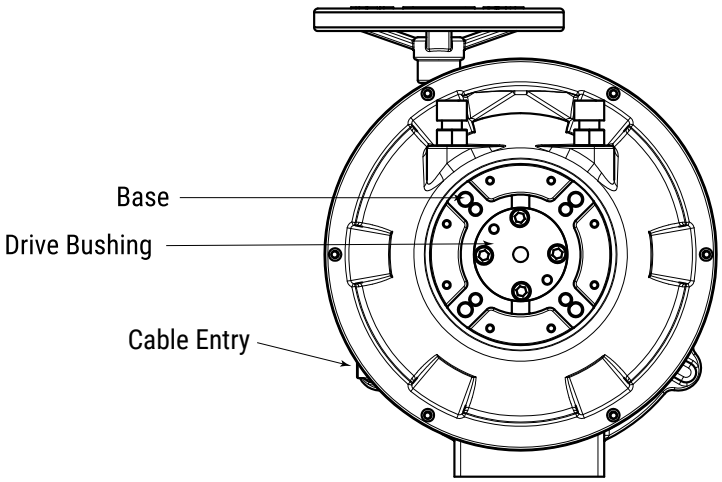
5.1 ESR430, ESR860



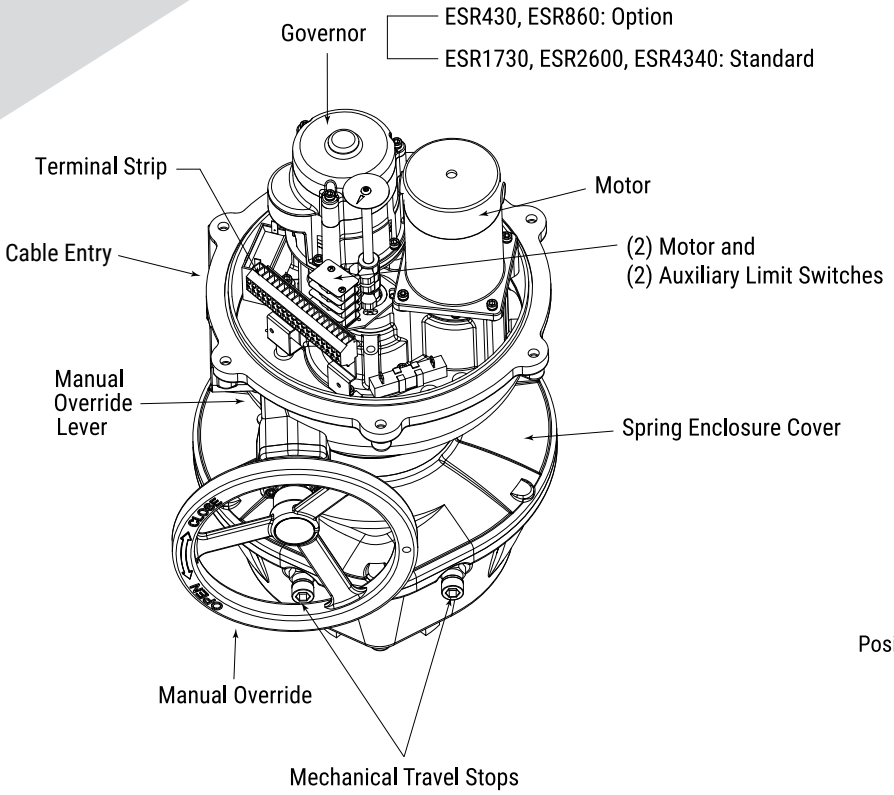


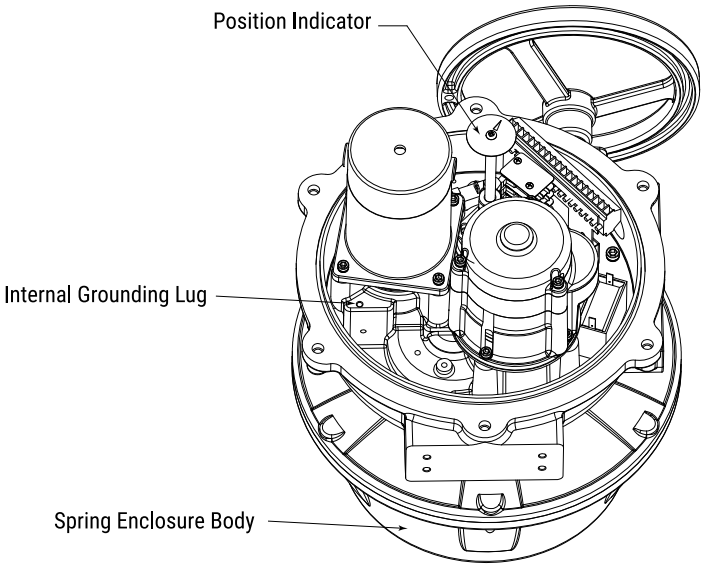
5.1 ESR1730, ESR2600, ESR4340





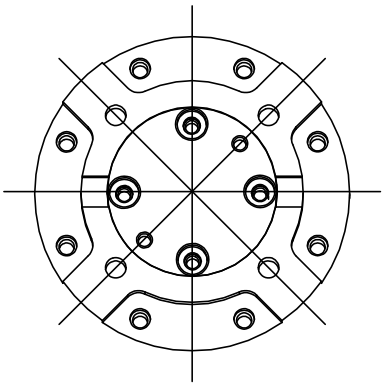
6. Interior Parts Identification



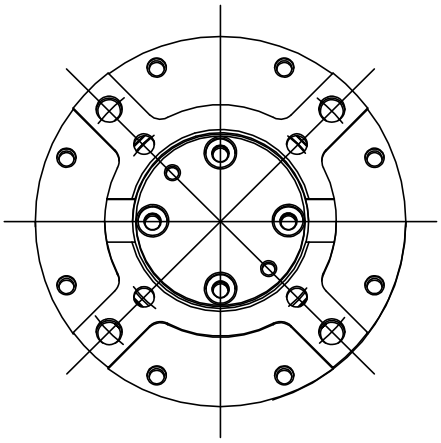


7. Actuator Mounting Flange

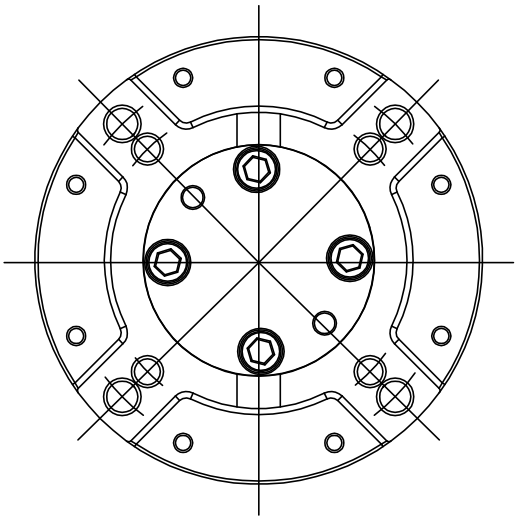
The Series ESR mounting flange is manufactured to both ABZ (inch based) and ISO5211 standards. If the actuator does not mount directly to the valve, then a mounting kit will need to be manufactured.



Model ESR430



Model ESR860



Model ESR1730, ESR2600, ESR4340

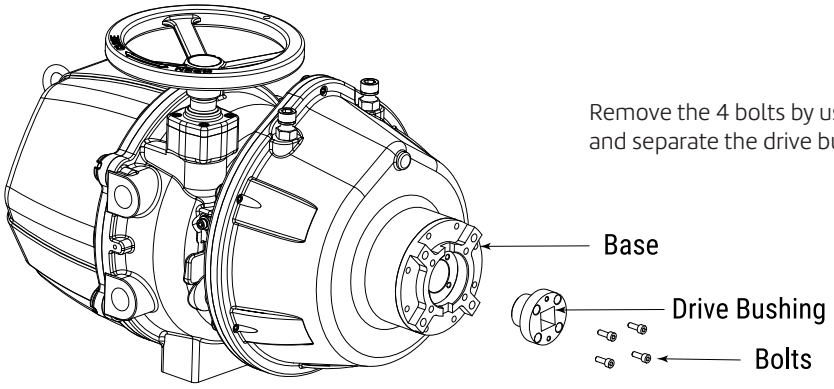
Model:	ESR430	ESR860	ESR1730 ~ESR4340
ABZ FLANGE	3.25"	3.25" 5.00"	5.00"
ABZ TAP	3/8"-16 (.47 dp)	3/8"-16 (.47 dp) 1/2"-13 (.59 dp)	1/2"-13 (.59 dp)
ISO FLANGE	F07 / 2.76"	F07 / 2.76" F10 / 4.02"	F10 / 4.02" F12 / 4.92"
ISO TAP Metric	M8-1.25 (12 dp)	M8-1.25 (12 dp) M10-1.50 (15 dp)	M10-1.50 (15 dp) M12-1.75 (22 dp)

NOTE: The actuator mounting flange can be rotated to line up to the desired valve mounting pattern. Simply remove the (8) mounting flange body bolts, index to the appropriate valve mounting pattern, reinstall and re-tighten the body bolts.

8. Actuator Drive Bushing

A removable drive bushing is supplied with each actuator that can be machined to match the valve stem for direct applications.

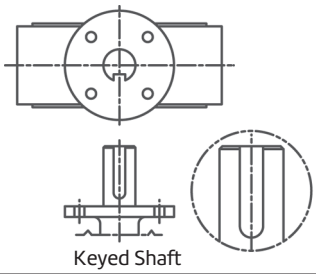
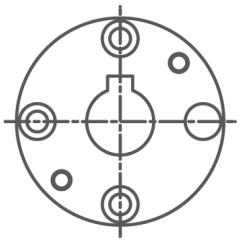
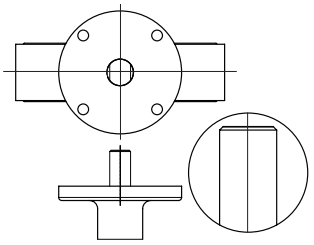
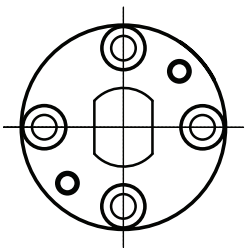
8–1 Drive Bushing Separation

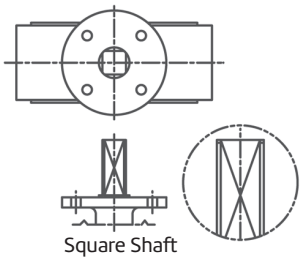
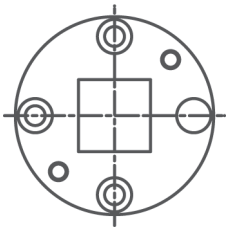
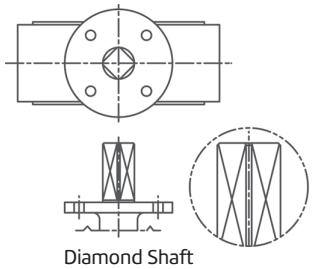
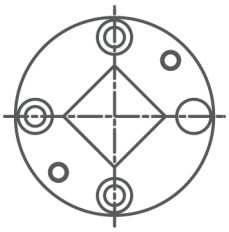


Remove the 4 bolts by using a metric Allen-wrench and separate the drive bushing from the actuator.

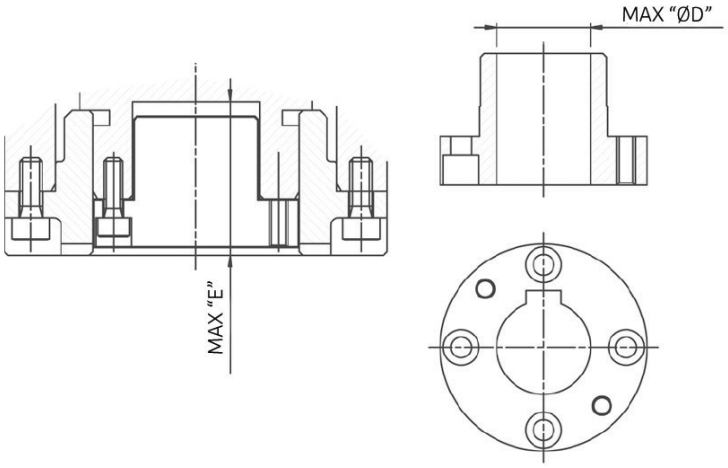
8–2 Drive Bushing Adaptation

For direct mount applications, the drive bushing should be machined to match the valve stem dimensions when the valve is in the full open or full closed position.

Shaft Orientation when Butterfly Valve is in Full Open	Machined Drive Bushing Orientation and Type
 Keyed Shaft	
 Doube “D” Shaft	

Shaft Orientation when Butterfly Valve is in Full Open	Machined Drive Bushing Orientation and Type
 Square Shaft	
 Diamond Shaft	

8–3 Drive Bushing Information



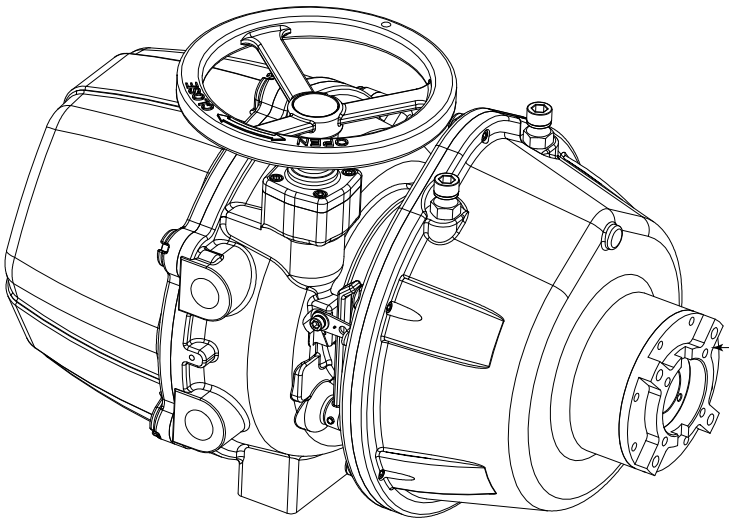
Model ESR430 ~ ESR4340

Model	Max "ØD"	Max Square	Max Depth "E"	Standard Bore*
	mm	mm	mm	in
ESR430 ~ ESR860	Ø22	20	43	¾" x ½" Double D
ESR1730 ~ ESR4340	Ø32	26	52	1 ⅛" with ¼" key

* Standard actuator bore is supplied with unmounted actuators.
If an alternate bore is required, please contact customer service.

9. Actuator and Valve Assembly

Butterfly Valve Assembly



9–1 Direct Mount Assembly

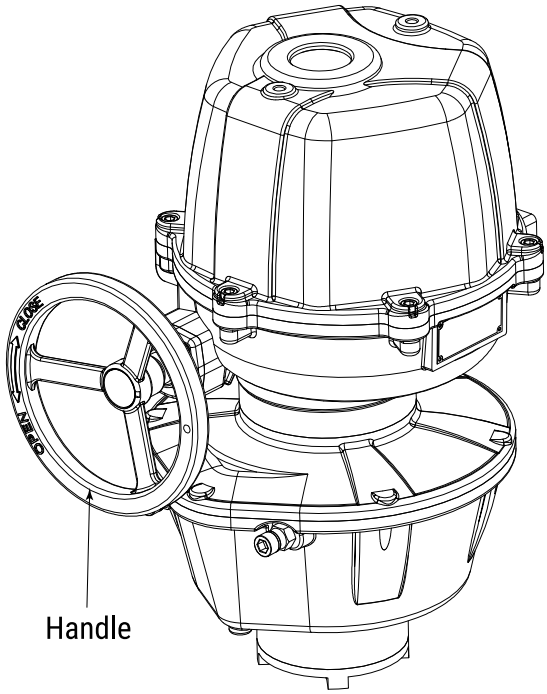
9-1-1 Confirm that the valve mounting dimensions match the actuator base and machined bushing dimensions.

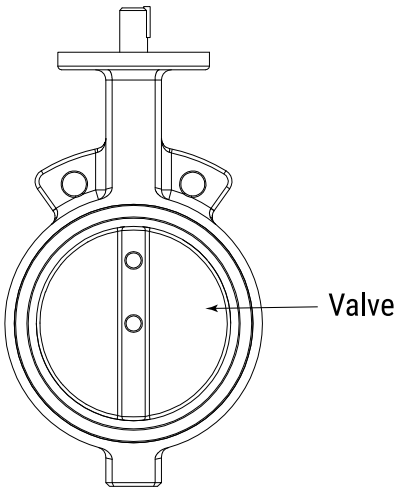
9-1-2 Confirm that the power is off.

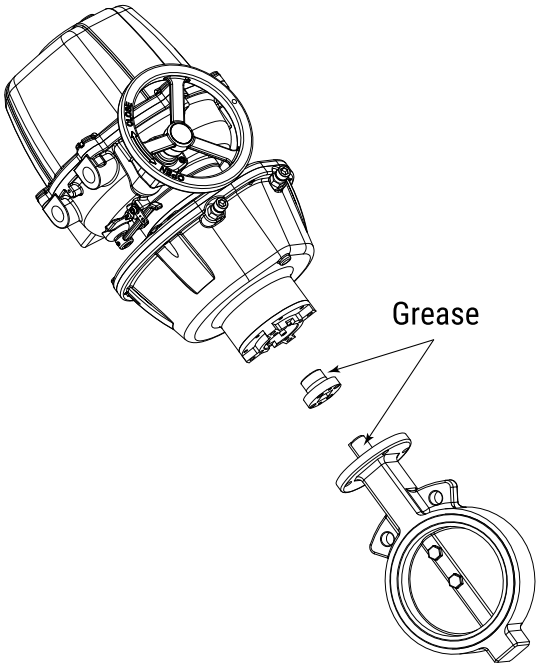
Pull lever to engage the hand-wheel.

Rotate the actuator hand-wheel clockwise to the full clockwise/close position.

Put the valve in the full closed position.

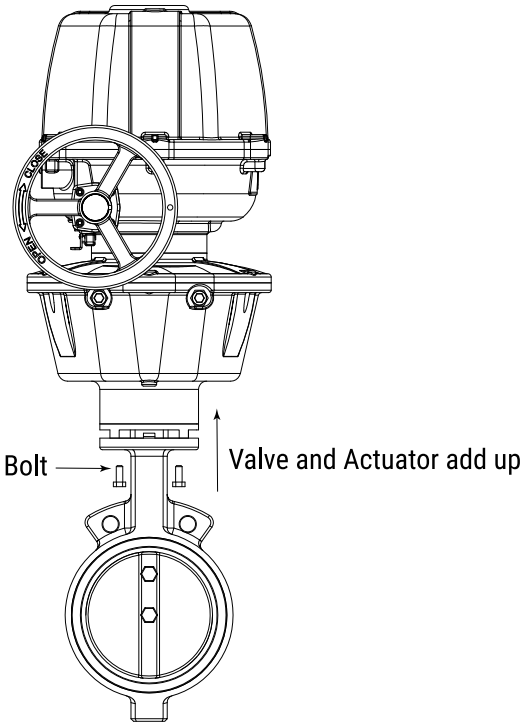






9-1-3 Apply a thin coat of grease to the drive bushing and secure it into the actuator using the the (4) socket head bolts.

Apply a thin coat of grease to the valve stem and insert it into the machined drive bushing.



9-1-4 Assemble the actuator and valve as shown using bolts and lock-washers.

Confirm component alignment, then cross tighten the mounting bolts for a firm fit.

Check that there are no gaps between the valve and actuator mounting pads.

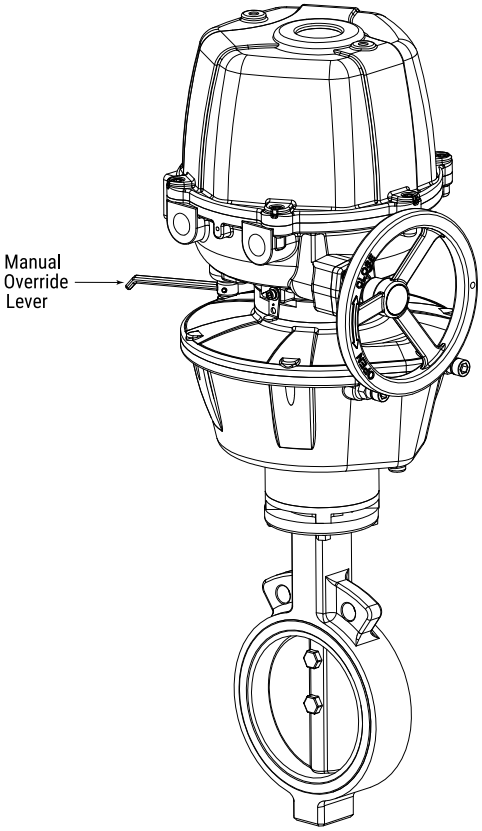
NOTE: Mounting the actuator is easiest with the valve shaft pointing up vertically and lowering the actuator on to the valve, however in cases where the valve shaft is horizontal, additional care must be taken to ensure that the actuator and valve shafts are properly aligned and supported. Misalignment between the actuator and valve shaft can cause increased wear or failure while also increasing the torque required to operate the valve.

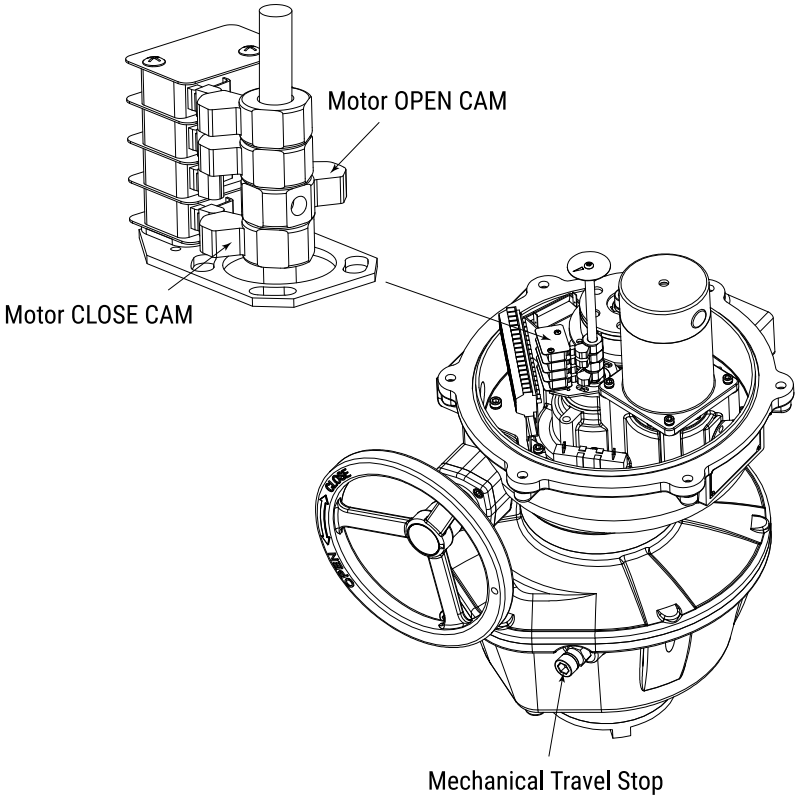
9-1-5 Confirm that the power is off.

Pull lever to engage the hand-wheel.

Rotate the actuator hand-wheel counter-clockwise to the full counter-clockwise/open position.

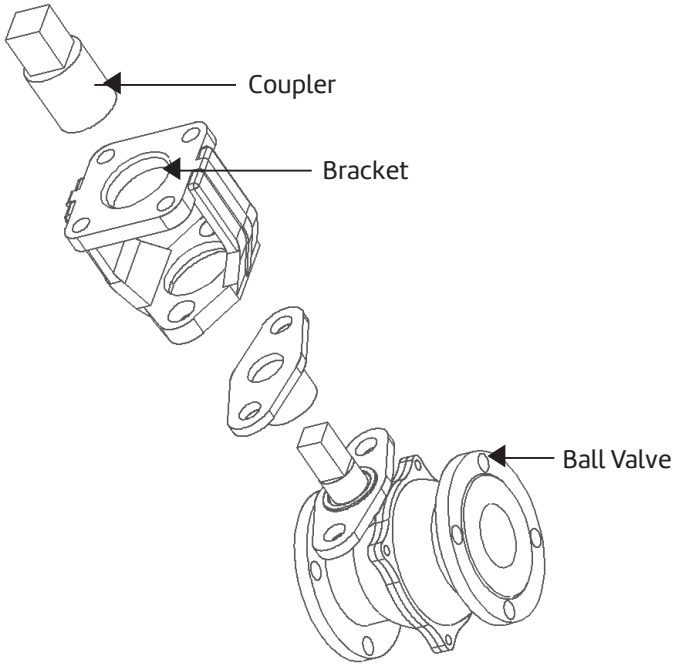
Confirm correct rotation.





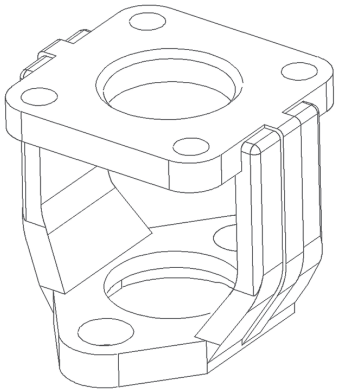
9-1-6 Remove the top cover and set the actuator limit switches. (Refer to section 12. Limit Switch Setting).

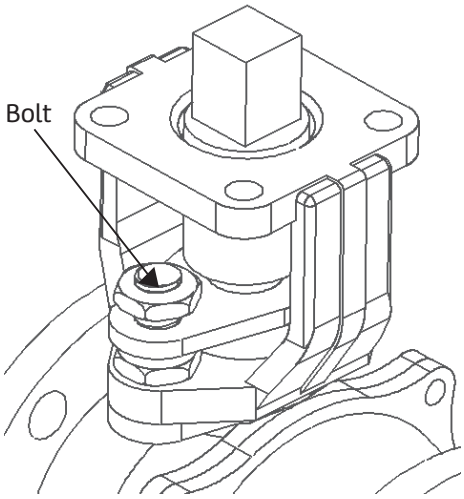
9-1-7 Adjust the length of the mechanical limit stops. (Refer to section 13 Mechanical Limit stop Bolt setting)



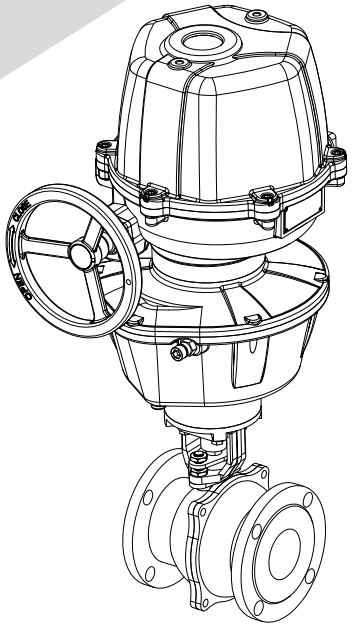
9–2 Bracket/Coupler Assembly

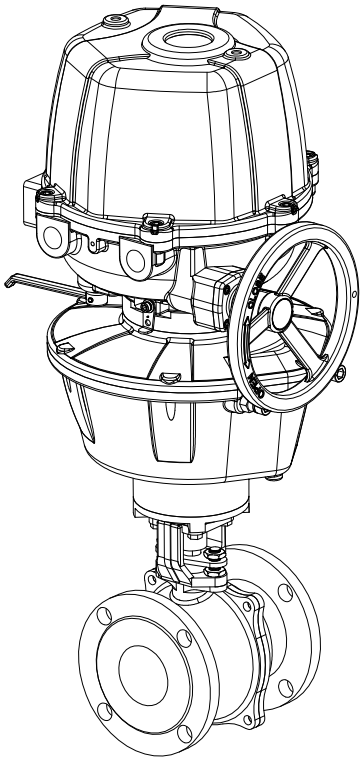
9-2-1 When a direct mount is not appropriate or possible, a bracket and coupler will need to be manufactured to join the actuator and valve together.





9-2-2 Extended bracket and coupler mounting may be necessary in cases where excessive heat transfer from the valve could effect the actuator function or when pipe insulation prevents direct mounting.





9-2-3 Apply a thin coat of grease to the drive bushing and secure it into the actuator using the (4) socket head bolts. Apply a thin coat of grease to the valve stem coupling and insert it into the machined drive bushing.

9-2-4 Assemble the actuator, valve and mounting kit as shown using bolts and lock-washers.

Confirm component alignment, then cross tighten the mounting bolts for a firm fit. Check that there no gaps between the mounting pads.

NOTE: Mounting the actuator is easiest with the valve shaft pointing up vertically and lowering the actuator on to the valve, however in cases where the valve shaft is horizontal, additional care must be taken to ensure that the actuator and valve shafts are properly aligned and supported. Misalignment between the actuator and valve shaft can cause increased wear or failure while also increasing the torque required to operate the valve.

9-2-5 Confirm that the power is off.

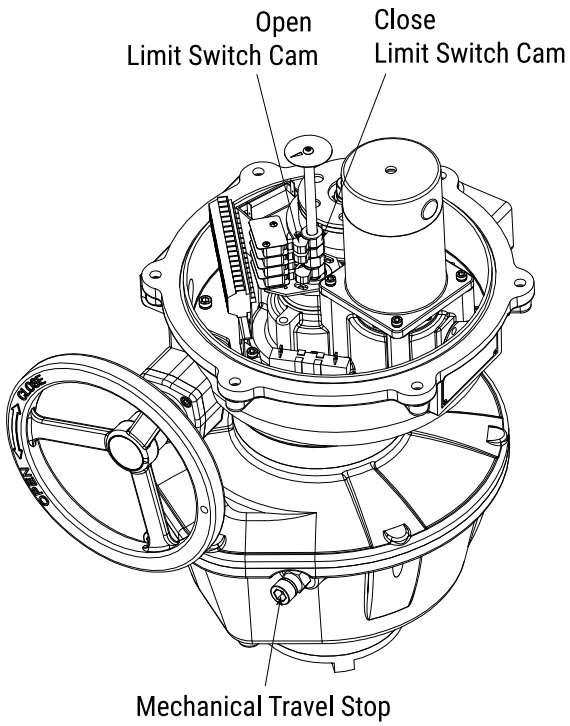
Pull lever to engage the hand-wheel.

Rotate the actuator hand-wheel counter-clockwise to the full counter-clockwise/open position.

Confirm correct rotation.

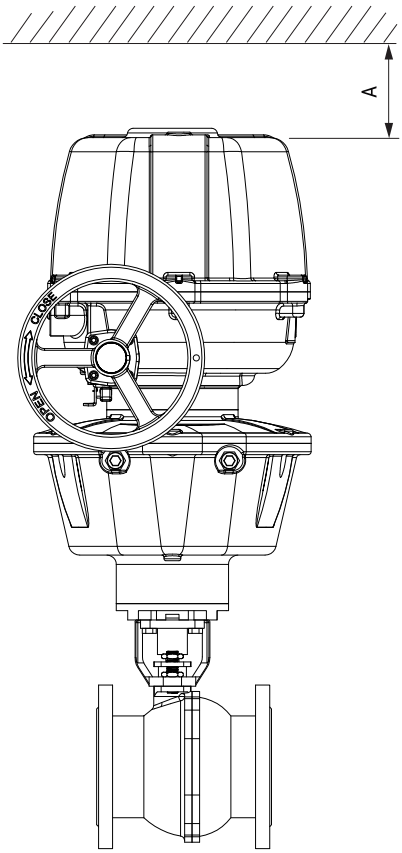
9-2-6 Remove the top cover and set the actuator limit switches. (Refer to section 12. Limit Switch Setting).

9-2-7 Adjust the length of the Mechanical Travel Stops. (Refer to section 13. Mechanical Limit Stop Setting).

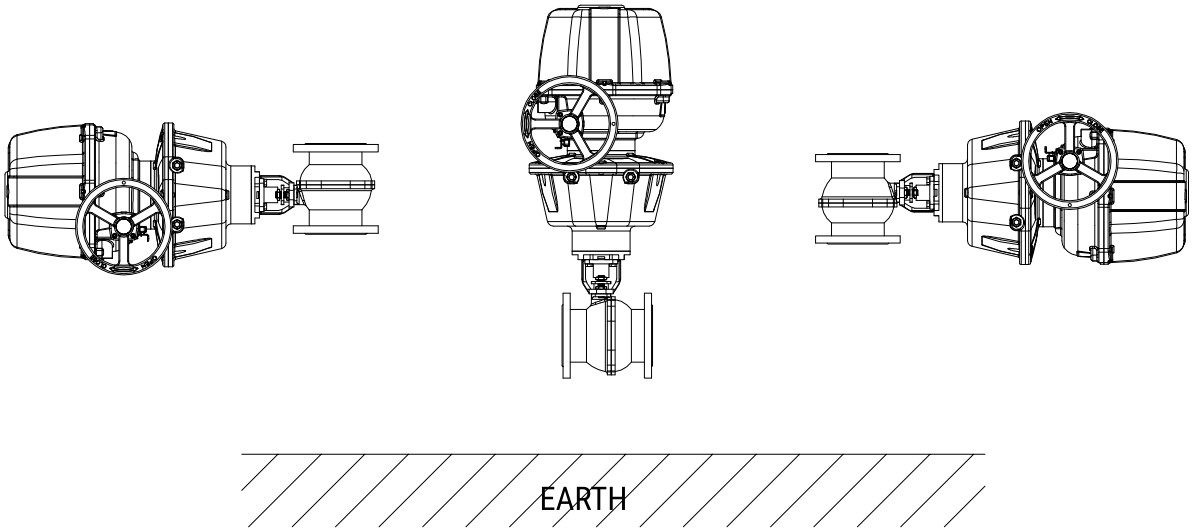


10. Actuator Installation

When installing an actuator, proper clearance around the actuator is required to ensure that the cover can be removed to allow for maintenance.



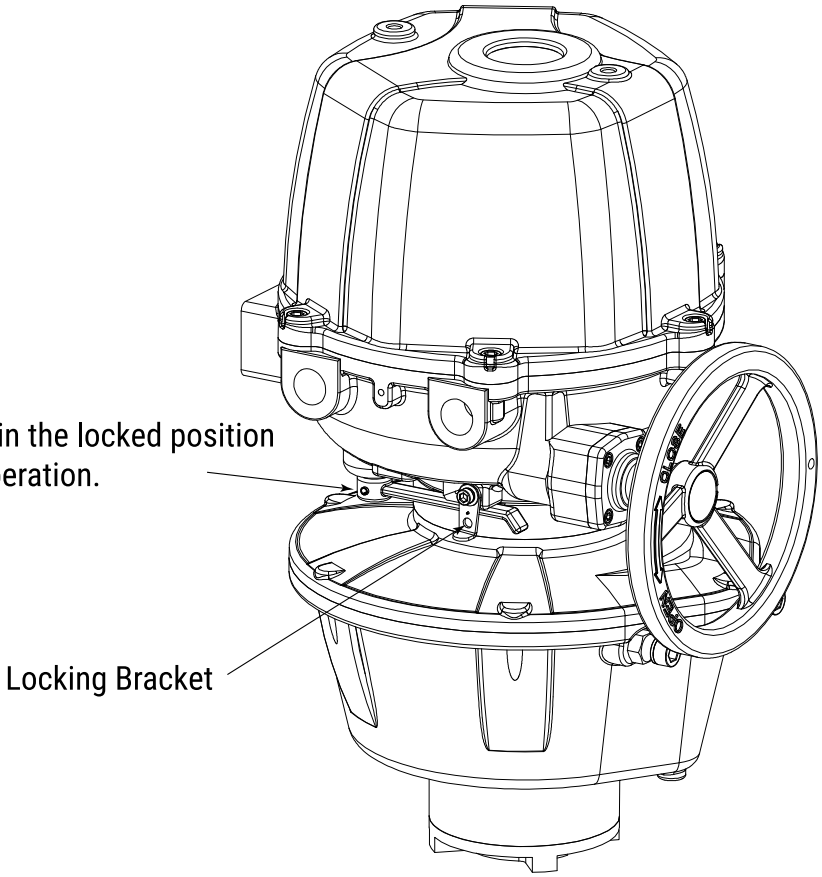
Model	A
ESR-430	155mm / 6.25 in
ESR-860	212mm / 8.5 in
ESR-1730 to ESR-4340	265mm / 10.5 in



11. Manual Operation Upon Power Loss

11-1 Upon loss of power, rotate/lift the locking bracket and fully rotate the lever located on the left behind the hand wheel to engage the override.

11-2 If hand wheel does not "engage", confirm that the lever has been fully rotated.



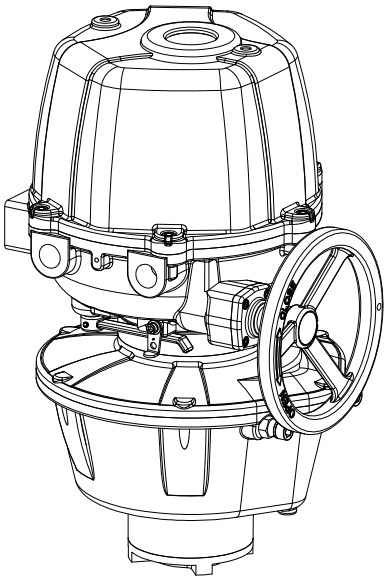
-Turn the handwheel clockwise to CLOSE valve (CW)

-Turn the handwheel counter clockwise to OPEN valve (CCW)

11-3 After the manual override operation has been completed, the lever must be rotated back to the start position with locking bracket lifted and lever put in the dis-engage position.

12. Limit Switch Setting

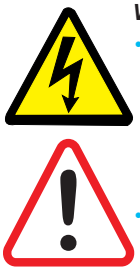
12-1 Close / Open Limit Switch Cam Setting



12-1-1 Confirm that the power is off. Engage the manual override (see Manual override section). Rotate hand wheel CW to fully close the actuator / valve. **Note:** If unit is set for spring CW, then the spring action has already put it in the CW position.

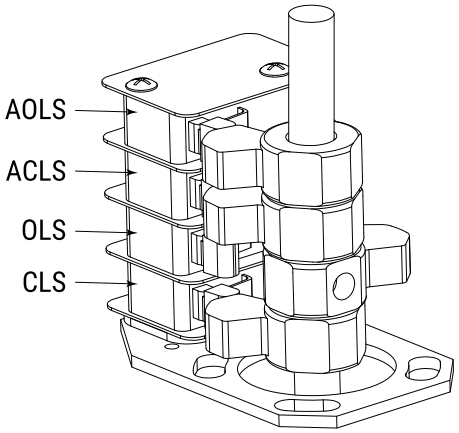
12-1-2 Loosen the closed limit switch cam set screw as shown. Rotate cam in the close / clockwise direction and engage the switch lever to actuate the switch. If auxiliary limit switches are included in the actuator, then set the corresponding auxiliary switch at this time.

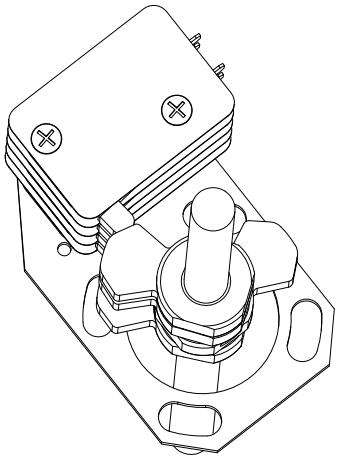
AOLS	Dry Contact Open Limit Switch
ACLS	Dry Contact Close Limit Switch
OLS	Open Limit Switch
CLS	Close Limit Switch



WARNING:

- Hazardous voltage. Turn off all power and lock out service panel before installing or modifying any electrical wiring. Use caution whenn energizing inputs.
- All work on the electrical system of equipment must be performed by qualified personnel under strict observation of all applicable codes, standards and safety regulations.
- The actuator generates a large mechanical force during normal operation.





12-1-3 Firmly retighten the cam set screw.

12-1-4 To set the open limit switch, follow the same procedure as above except that the rotation will be counter clockwise using the open limit switch cam.

13. Mechanical Limit Stop Setting

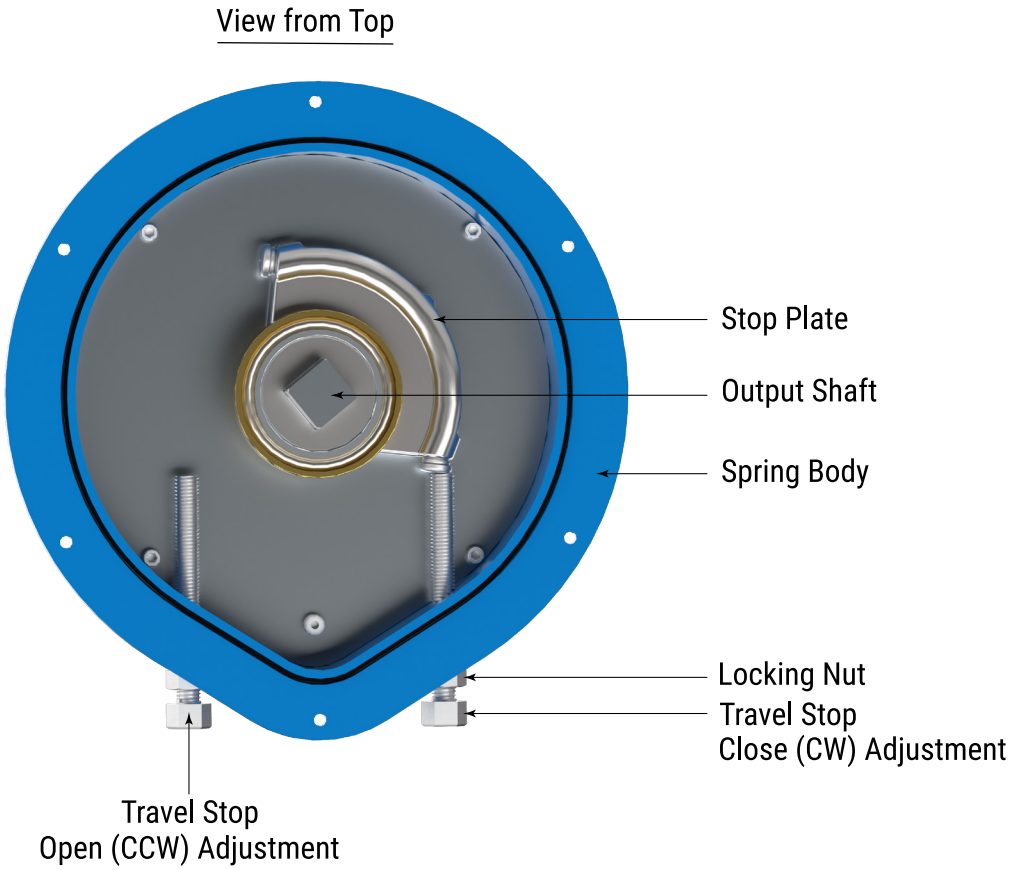
During an actuator power loss /spring event, the stop plate rotates and comes in contact with the Mechanical Travel Stop and fail position over travel. The stops are factory set to stop the actuator at the exact fail position.

13-1 With power disconnected on a fail clockwise/close actuator, engage the manual override and turn the hand wheel counter clockwise to rotate the valve open.

With the valve fully open, loosen the open travel stop locking nut on the open travel stop bolt, turn the bolt inward (CW) until contact is made between the travel stop bolt and stop plate. Rotate stop bolt CCW two turns then tighten the lock nut in place.

13-2 With the actuator in the full open position, set the OLS and AOLS switches at this time.

Note: Confirm that the AOLS switch trips prior to the OLS switch.



13-3 With manual override still engaged, rotate the hand wheel clockwise to fully close the valve. With valve closed, loosen the closed locking nut on the close Travel Stop bolt, turn the bolt inward (CW) until contact is made between the Travel Stop and stop plate. Rotate stop bolt CCW two turns and then tighten the lock nut in place.

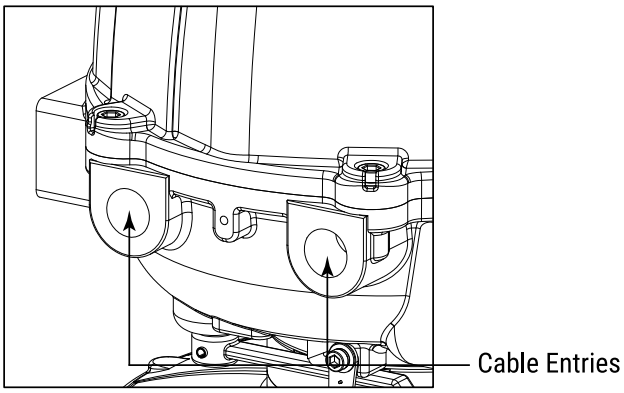
13-4 With the actuator in the full close position, set the CLS and ACLS at this time.

Note: Confirm that the ACLS switch trips prior to the CLS switch.

Do not rotate factory set limit Travel Stop bolts more that 5 turns from set point.
If mechanical Travel Stops are improperly set, motor and gear damage may occur.
After setting the Mechanical Travel Stops and switches, check for proper function by operating the actuator both manually and electrically.
Confirm that the end of travel limit switches shut off power to the motor in both the open and close positions, and that the motor is not put into a stalled condition.

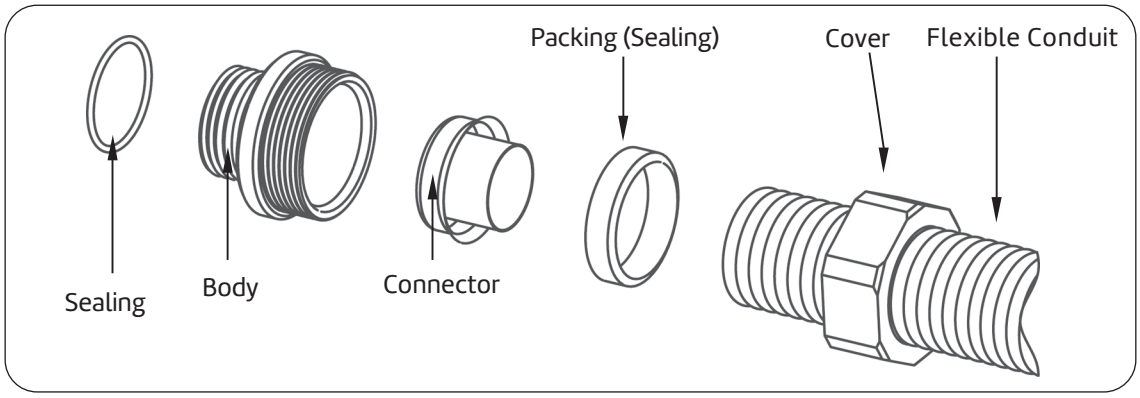
14. Wire Connection

14-1 Any unused conduit entry must remain plugged with the pipe plug supplied in the actuator.
Do not remove as the unit is already sealed.
An unused cable entry must be sealed with the appropriate seal plug. For hazardous location models a certified plug is to be used (Ex db IIB or IIC)



Cable Entry
3/4" NPT (2)

14-2 Standard conduit and conduit fittings may be used. It is recommended that a seal fitting be fitted to the actuator cable entry and sealed with a resin compound after all wiring has been installed as this will help minimize humidity and water from entering the actuator enclosure.



Conduit Example

Conduit fittings used on explosion proof applications must be certified for the proper explosion proof application class (Ex d IIB or d IIC) and properly sealed. Failure to use the correct components may result in the failure of the actuator enclosure.

ASC Engineered Solutions is not responsible for the improper installation of the actuator.

14-4 It is highly recommended that a seal fitting with setting compound be used to keep moisture from entering the enclosure through the conduit entry.

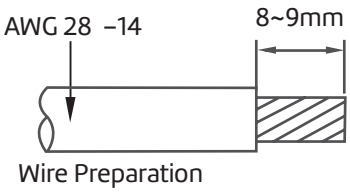
15. Electrical Wiring

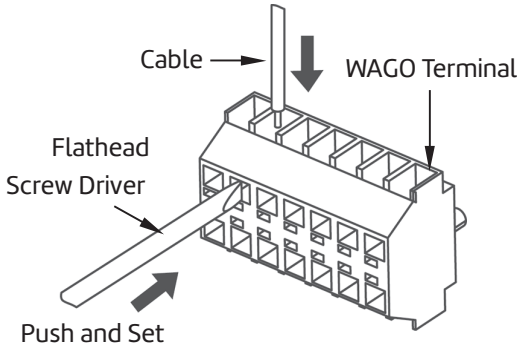
15-1 Separate the cover of the actuator by loosening the cover bolts.

15-2 Confirm that the wiring diagram located in the actuator matches the wiring diagram number affixed to the actuator body and inside on the motor.

15-3 Confirm that the main power and power supply described on the name plate of the actuator match with each other

15-4 SR Series uses a WAGO brand terminal strip to allow for easy wiring and to protect against vibration.



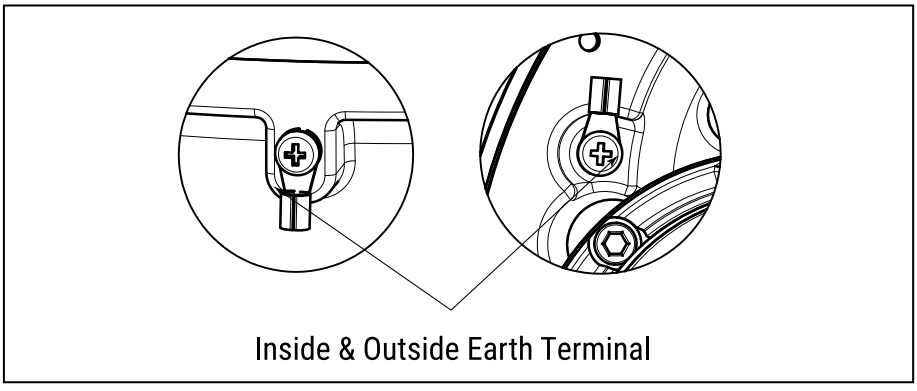


15-5 Insert a small flathead screwdriver as shown to open the terminal point, then insert the wire as shown.

15-6 Be sure to properly ground the actuator wiring to the grounding terminals provided on the inside and outisde of the actuator body.

The internal grounding wire gauge shall be at least the same as the conductor used.

The external grounding wire gauge shall be at least 14 gauge.



15-7 Be sure to wire and energize the heater that is provided.

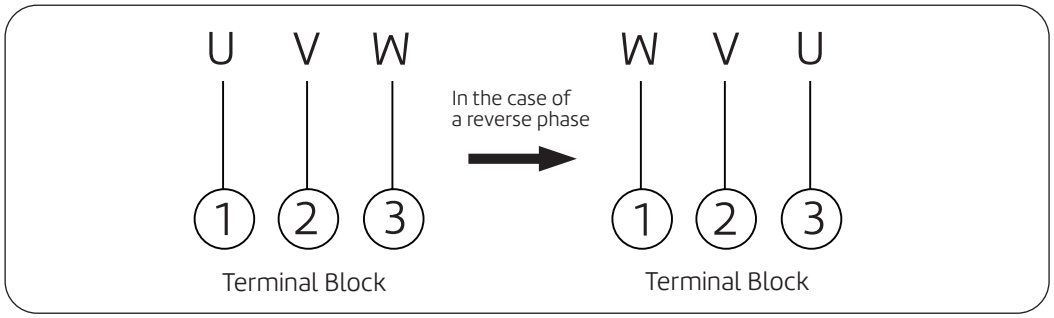
15-8 Each actuator must be powered by their own individual relays to prevent voltage feedback and actuator damage.

15-9 With a 3 Phase (380, 440V) powered actuator, care must be taken to confirm the proper motor rotation when the power and signal are applied. If the actuator rotates in the reverse direction than what is expected, the limit switches will not function correctly and a mis-wire has occured. Corrective action needs to be taken.

15-9-1 With power disconnected, manually operate the actuator to a mid position.

15-9-2 Apply power / signal to rotate the actuator open or closed and confirm the rotation is correct.

15-9-3 If the rotation is incorrect, then shut off the actuator and rewire two of the three wires as shown.



15-10 After the wiring is completed in the actuator, use wire ties to clean up and group wires together, and be certain that the wires are secured away from any moving parts, and remove any loose debris.

15-11 When all the work is completed, replace the top cover and secure it using the cover screws.

15-12 Apply the power and do a final check to confirm proper operation.

Main power must only be applied when the top cover is reinstalled on the actuator body.
If the main power is on while wiring the actuator stop working immediately and
turn the power off. Only then is it safe to proceed.

16. Maintenance

16–1 Lubrication

Under normal conditions, no additional grease needs to be added to the actuator. However if the ambient temperature is greater than 40°C and if the humidity is less than 15%, periodic re-greasing is recommended. Contact ASC for additional information.

The recommended grease used in the SR Series actuator is Shell Gadus S2 V220 2.

16–2 Regular Check Up

It is recommended that the actuator be cycled every two weeks after purchase. To minimize the effects of condensation in the actuator it is recommended that the conduit entries are sealed at the actuator and that the heater is energized.

17. Warranty Information

The warranty will be void under the following conditions:

17-1 Failure or damage caused by misuse or abuse.

17-2 Failure or damage caused by unauthorized modifications or repairs done to the actuator.

17-3 Failure caused by the unauthorized modification / change of the wiring.

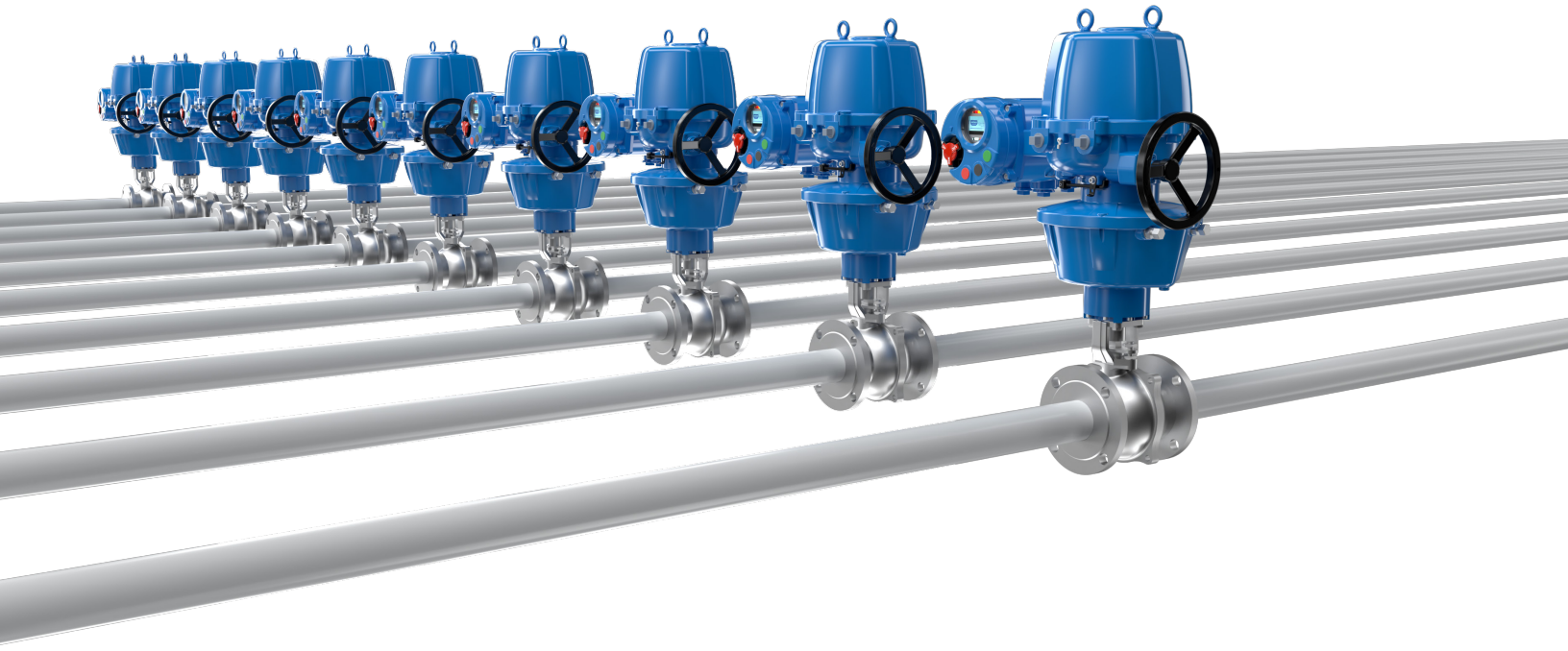
17-4 Failure caused by a reverse phase mis-wire when using three phase power.

17-5 Failure caused by water leakage due to the improper sealing of the actuator conduit entries or by failure to install the cover properly.

17-6 Failure caused by improperly set limit switches.

17-7 Failure caused by fire, flood damaged, or other "acts of God."

17-8 Failure occuring 1 year after the shipment date.



About ASC Engineered Solutions

ASC Engineered Solutions is defined by quality—in its products, services and support. With nearly 2,000 employees, the company's portfolio of precision-engineered piping support, valves and connections provides products to more than 4,000 customers across industries, such as mechanical, industrial, fire protection, oil and gas, and commercial and residential construction. Its portfolio of leading brands includes ABZ Valve®, AFCON®, Anvil®, Anvil EPS, Anvil Services, Basic-PSA, Beck®, Catawissa, Cooplet®, FlexHead®, FPPI®, Gruvlok®, J.B. Smith, Merit®, North Alabama Pipe, Quadrant®, SCI®, Sharpe®, SlideLOK®, SPF®, SprinkFLEX®, Trenton Pipe and VEP. With headquarters in Oak Brook, IL, ASC also has ISO 9001:2015 certified production facilities in PA, TN, IL, TX, AL, LA, KS, and RI.

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