

Bear BAQ 24VDC Quarter Turn Actuators

Solar Ready & Power Fail Safe

Calscan's Bear BAQ Actuators are designed for the zero-emission well site by replacing fuel gas powered pneumatic actuators with electric.

No need to replace your valve, Bear actuators can be adapted to be used on most quarter turn valves requiring up to 3540 in-lbs of torque.

Low active and standby energy consumption ideally suited for remote non-grid power sites, such as solar or TEG. When combined with the Bear Fail Safe Controller (FSC) up to 9 standard DC powered electric actuators can be made power fail safe.

Features:

- Explosion Proof Class I Div1/Zone 1 Certified
- Power and RTU fail safe operation when used with the Bear FSC and Bear UPS
- Fail on Loss of Signal (Open or Closed)
- Low quiescent current for solar powered operation <30mA
- 24VDC. 120/240VAC voltage models available
- 4-20mA Modulating or Digital On/Off Control
- Single Handed Manual Override



www.calscan.net



BAQ-40G actuator mounted on a 3 inch 300# full port ball valve

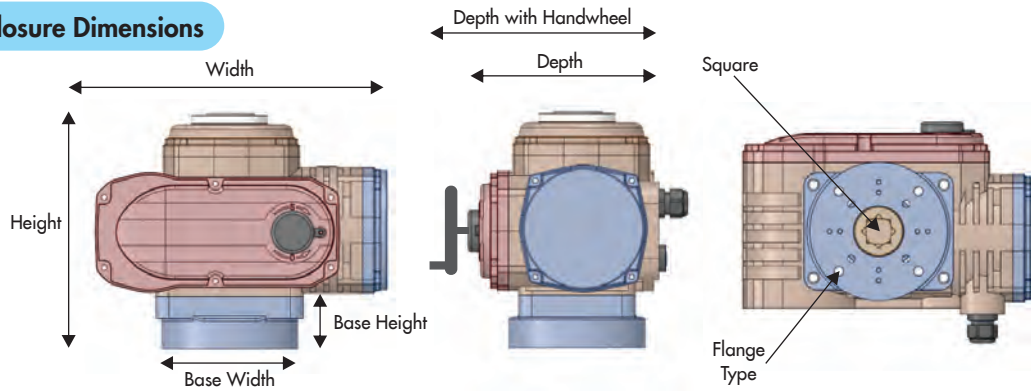
Mechanical and Motor Ratings

Actuator Torque, Speed and Currents

Model	Output Torque		Cycle Time sec/90°			Duty Cycle %	Current Amps			Fuse Size
	Nm	In-Lbs	No Load	Half Load	Full Load		No Load	Half Load	Full Load	Amps
BAQ-05G-4S/20	20	177	3.2		5	70	0.3		2.0	5
BAQ-05G-10S/30	30	265	7		9	70	0.2		1.3	5
BAQ-10Gxx-15S/50	50	442	9		10	70	0.2		1.6	7
BAQ-10Gxx-30S/100	100	885	16	17	21	70	0.2	1.1	1.8	7
BAQ-40Gxx-15S/200	200	1770	8		11	70	0.7		6.5	15
BAQ-40Gxx-30S/400	400	3540	15	17	22	70	0.6	3.4	6.4	15

Gxx = G = On/Off Control using SSR3
Gxx = GEY = 4-20mA Modulating Control

Enclosure Dimensions



Flange Type	Bolt Circle Ø	Bolt
F03	36mm	4xM5
F05	50mm	4xM6
F07	70mm	4xM8
F10	102mm	4xM10

as per ISO5211

Type	Cable Entries	Height	Width	Depth	Depth with Handwheel	Flange Type	Base Width	Base Height	Valve Stem Height	Square
BAQ-05	Two 1/2in NPT	150mm	171mm	121mm	218mm	F03 F05 F07	70mm	30mm	<= 19mm	9x9 11x11 14x14
BAQ-10	Two 1/2in NPT	182mm	218mm	139mm	236mm	F05 F07	90mm	32mm	<=19mm	9x9 14x14 17x17
BAQ-40	Two 1/2in NPT	213mm	267mm	170mm	267mm	F07 F10	125mm	48mm	<=25mm	17x17 22x22

Bold Square is the Stocked Size

Adjusting the On/Off Fully Open/Close Position

1) Turn Power Off

Opening the actuator will defeat the explosion proof protection of the actuator. Disconnect power and ensure the area is safe from hazardous gases before opening.

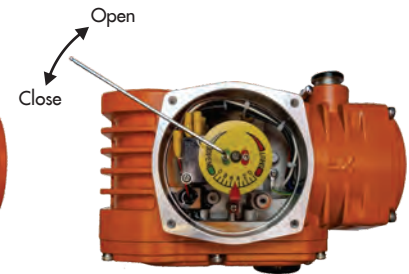
2) Open the Top Lid

Use a 4mm Allen key to remove the four Screws indicated by the green circles to the right



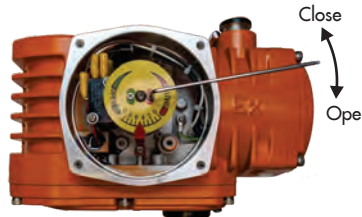
3) Set the Open Limit

Use the manual hand wheel or Allen key (the one attached to the side of the actuator) to turn the valve to the set open position required. Now use 2mm Allen key and turn the screw on the **Open (green)** indicator until you hear the click from the Open Micro Switch. The open position is now set.



4) Set the Close Limit if Required

Adjust the actuator to the close position using the hand wheel or Allen Key. Now use a 2mm Allen key and turn the screw on the **Shut (red)** indicator until you hear the click from the Close Micro Switch. The Close position is now set.



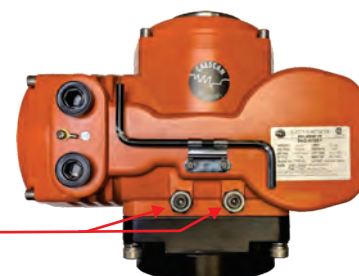
5) Close the Top Lid

Mechanical Stops

Do not adjust mechanical stops

These are factory set to -5° and 95° max rotation. Adjustment can cause the motor to stall and potentially damaging the motor and gear train.

Mechanical Stop Adjustment Nuts
Do Not Adjust !!!



Flamepath Integrity

With explosion proof enclosures, it is critical that the flamepath is not damaged. When opening the actuator enclosure the technician must be careful not to inadvertently damage the flanges on the lid or on the inside of the actuator.

Once damaged there is no guarantee the flamepath will properly cool the flame to prevent an explosion.



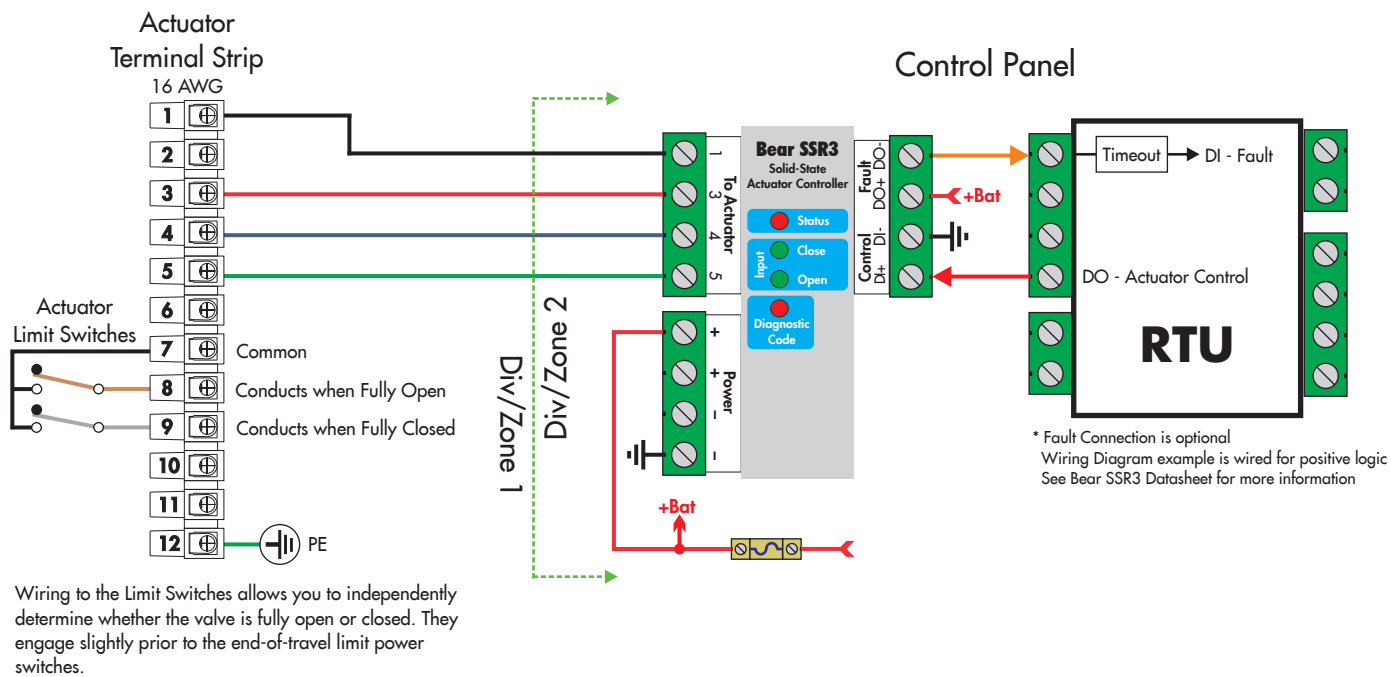
Holes, gouges or scratches on the flamepath means the actuator is no longer explosion proof

Common Electrical and Environmental Ratings

Parameter	Min	Nominal	Max	Unit
DC Supply Voltage	21	24	32	VDC
Operating Temperature	General Purpose	-40	55	°C
	Ex Div1/Zone1 T5	-25	55	
	Ex Div1/Zone1 T6	-25	50	
Enclosure Protection	IP66 (Nema 4X)			
Installation Position	Any mounting position is acceptable			
Wire Gauge	BAQ-10G = 16 AWG BAQ-10GEY = 14 AWG BAQ-40G = 14 AWG BAQ-40GEY = 14 AWG			

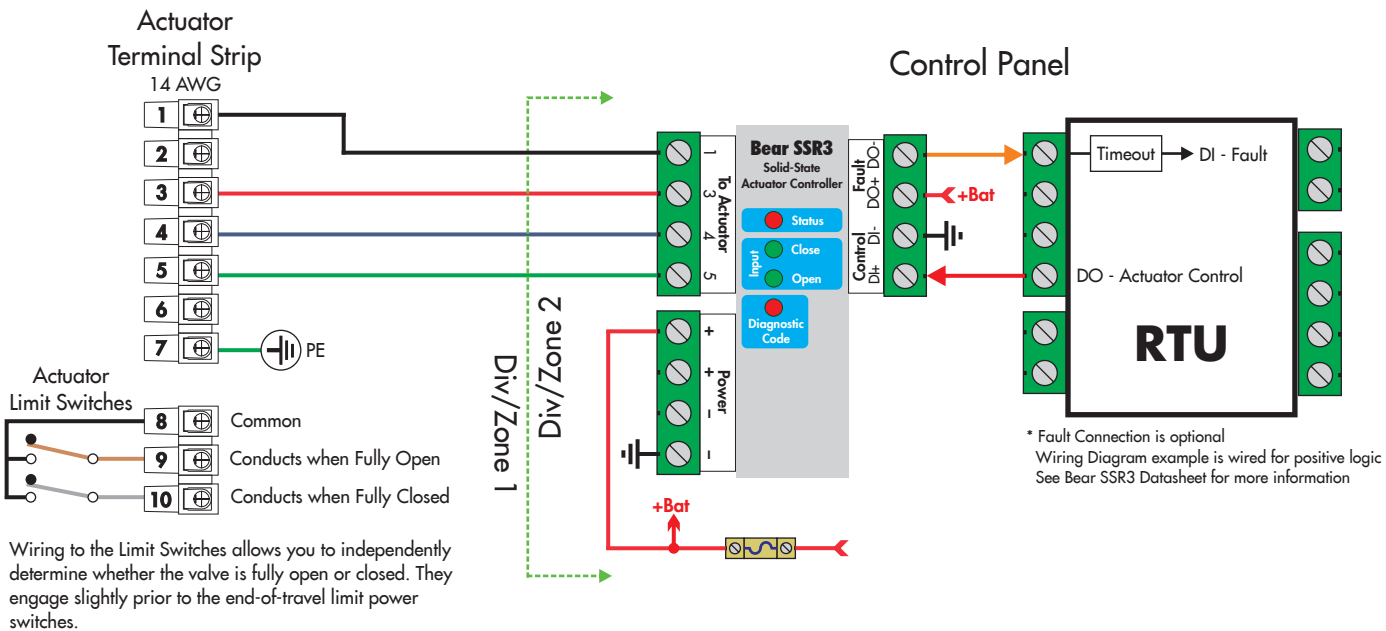
Electrical On/Off Control Wiring and Setup

BAQ-10G with SSR3 Wiring Diagram



Wiring to the Limit Switches allows you to independently determine whether the valve is fully open or closed. They engage slightly prior to the end-of-travel limit power switches.

BAQ-40G with SSR3 Wiring Diagram



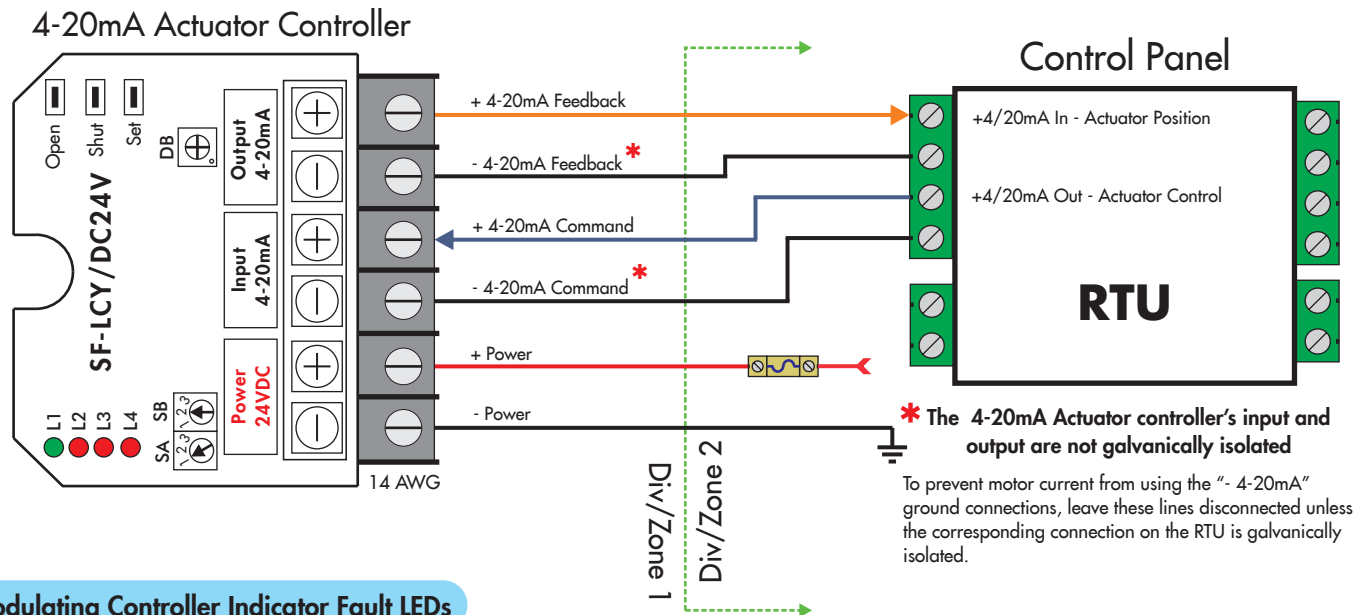
Wiring to the Limit Switches allows you to independently determine whether the valve is fully open or closed. They engage slightly prior to the end-of-travel limit power switches.

SSR3 Electrical Ratings

Electrical ratings are specified in the Bear SSR3 datasheet

Electrical 4-20 mA Modulating Control Wiring and Setup

Type GEY: Modulating Actuator Controller Wiring Diagram



Modulating Controller Indicator Fault LEDs

The Red and Green LED on the 4-20mA control board are used for visual feedback on the state of the actuator.

- L1: Power On
- L2: 4-20mA input signal fault
- L3: Rotary position potentiometer is open, shorted or damaged
- L4: The actuator is stuck in position or blocked

Modulating Controller Configuration

Select Switches



SA: Selects how the 4-20mA affects the actuator

- 1- Direct Acting (factory default)
- 2- Setstate - Used in conjunction with the Program Buttons to adjust fully open/close position
- 3- Reverse Acting

SB: Selects the actuators 4-20mA fault position:

- 1- Fail Open
- 2- Fail in Position
- 3- Fail Closed (factory default)

Adjust the 4-20mA Fully Open/Close Position

Open Shut Set

First turn **Select Switch SA** to 2 (Setstate) to allow programming of the fully open and closed position. The buttons are then used to adjust the position of the actuator and set the demarcating points. Adjust **Switch SA** to the previous position when done.

OPEN: The actuator will turn in open direction when the OPEN button is pressed. When the actuator is adjusted to the fully open position, press and hold the buttons SET followed by OPEN at the same time to set the Fully Open demarcating point. Indicator LED L2 will turn on for a few seconds indicating the position is set.

SHUT: The actuator will turn in close direction when the SHUT button is pressed. When the actuator is adjusted to the fully closed position, press and hold the buttons SET followed by SHUT at the same time to set the Fully Closed demarcating point. Indicator LED L2 will turn on for a few seconds indicating the position is set.

SET: The actuator will set the fully open/closed demarcation point when SET is pressed held followed by OPEN or SHUT at the same time. If upon setting the point LED L2 blinks rapidly, this means the demarcation point was not set correctly and needs to be set again.

Deadband

DB Deadband trimpot

The setting of 1 to 10 corresponds to a dead band percentage from 0.5% to 5% on the DB trimpot

If the actuator is hunting for position, turn the "Deadband" adjustment clockwise until hunting stops. If the actuator is not hunting for position, turn the "Deadband" adjustment counterclockwise until the actuator begins to hunt; then turn the "Deadband" adjustment slightly clockwise until hunting stops.

WARNING! Actuator failure may occur if the "Deadband" adjustment is set to allow continuous hunting. This can cause excessive wear of actuator.

Modulating Controller Electrical Ratings

Command Signal	Min	Max	Unit
4-20mA Voltage	-12	32	V
4-20mA Command Signal Fault	<2.5mA	>22mA	mA

4-20mA Controller	Min	Max	Unit
Quiescent (Idle) Current		<30	mA

Modulating Controller Digital Details

4-20mA Output

Isolation None
 4 to 20 mA high side source current
 Resolution 12 bits
 Accuracy 0.1% of full-scale output

4-20mA Input

Isolation None
 Resolution 12 bits
 Input is sampled once every 500 millisecond

Certification

Class I, Division 1, Groups C and D
 Ex db IIC Gb, Class I, Zone 1, AEx db IIC Gb.
 T5 Ambient Temp -25°C to 55°C
 T6 Ambient Temp -25°C to 50°C



Conditions of Certification

Certification is valid only if:

- Product is installed with a Division 1 Conduit Seal within 500 mm of enclosure in of the conduit entries.
- Division 1 installation requirements must be maintained for Division 2 installations.
- The flamepath has not been damaged on the flanges on the lid or on the inside of the actuator
- The entry point or branching point is higher than 60°C see table below. Installer must select the cable, cable gland and conductors in conduit with a appropriate temperature rating.

Ta	Cable Entry Temperature	Cable Branch Temperature
+50°C	61°C	72°C
+55°C	66°C	77°C

- The actuator cannot be used in an atmosphere containing these saturated vapors: Acetic Acid (Glacial), Acetone, Ammonium Hydroxide (20% by weight), ASTM reference fuel C, Diethyl Ether, Ethyl Acetate, Ethylene Dichloride, Furfural, n-Hexane, Methyl Ethyl Ketone, Methanol, 2-Nitropropane and Toluene.

Ordering Information

Bear Actuators are typically shipped with a bracket to match your valve. Calscan has a selection of standard brackets and can make custom brackets to work with almost any valve. For assistance matching your valve please contact our sales department.

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Actuator

BAQ-05

Control

G

= Digital On/Off using SSR3

Torque and Speed (No load to Full Load)

-4S/20 = 20Nm (177 in-lb) @ 3.2 to 5 Sec/90°

-10S/30 = 30Nm (265 in-lb) @ 7 to 9 Sec/90°

Typical Valve for BAQ-05

Small Ball valves such as AT Controls
88 Series 1 and 2 inch Full Port valves

BAQ-10

Control

G

= Digital On/Off using SSR3

GEY

= 4-20mA Control & Feedback

Torque and Speed (No load to Full Load)

-15S/50 = 50Nm (442 in-lb) @ 9 to 10 Sec/90°

-30S/100 = 100Nm (885 in-lb) @ 16 to 21 Sec/90°

Typical Valve for BAQ-10

Hydroplex Minimax & CSX
1 and 2 inch Full Port valves

BAQ-40

Control

G

= Digital On/Off using SSR3

GEY

= 4-20mA Control & Feedback

Torque and Speed (No load to Full Load)

-15S/200 = 200Nm (1770 in-lb) @ 8 to 11 Sec/90°

-30S/400 = 400Nm (3540 in-lb) @ 15 to 22 Sec/90°

Typical Valve for BAQ-40GEY-30S/200

Forum BTE Choke Valves
CVS BTE Choke Valves
CVS Series 9000/9100 3 piece Trunnion
CVS Series 8000/8100 Floating

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