Valvcon™ Quarterback™

QB-Series Continuous Duty, On/Off & Modulating Electric Actuators with Mechanical Spring Back-Up

Installation, maintenance and operating instructions

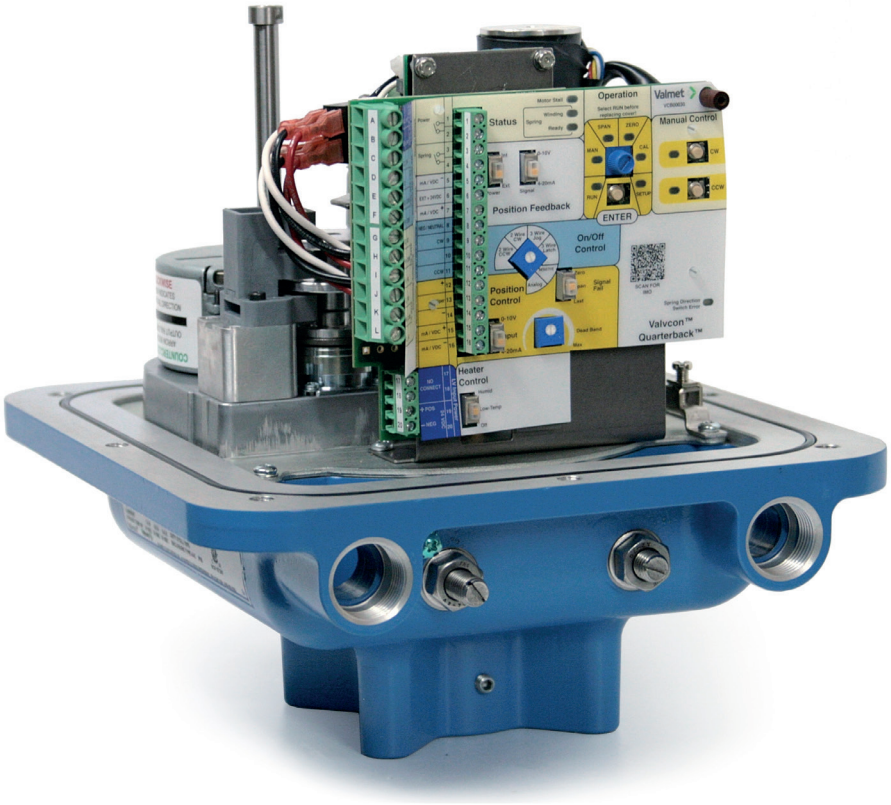


Table of contents

READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL

1.1 SCOPE OF THE MANUAL

This instruction manual contains important information regarding the installation, operation and maintenance of the Valvcon™ QB-Series electric actuator. Please read these instructions carefully and save them for future reference.

1.2 ACTUATOR MARKINGS

WARNING

AS THE USE OF THE ACTUATOR IS APPLICATION SPECIFIC, A NUMBER OF FACTORS SHOULD BE TAKEN INTO ACCOUNT WHEN SELECTING AN ACTUATOR FOR A GIVEN APPLICATION. THEREFORE, SOME OF THE SITUATIONS IN WHICH THE ACTUATORS ARE USED ARE OUTSIDE THE SCOPE OF THIS MANUAL.

IF YOU HAVE ANY QUESTIONS CONCERNING THE USE, APPLICATION OR COMPATIBILITY OF THE ACTUATOR WITH THE INTENDED SERVICE, CONTACT NELES FOR MORE INFORMATION.

The actuator has an identification nameplate label attached to the base casting (see **Figure 1**).

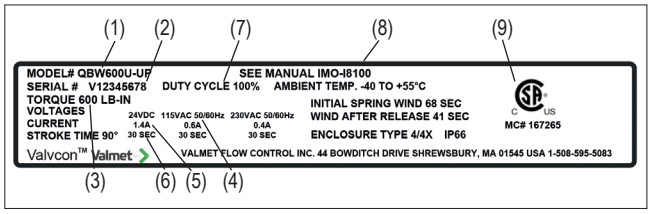


Figure 1. Identification nameplate label

Identification nameplate label markings:

1. Model number
2. Serial number
3. Maximum output torque
4. Voltage
5. Current draw (full-load running)
6. Cycle time
7. Duty cycle
8. Applicable manual
9. Certifications marking

1.3 SAFETY PRECAUTIONS

WARNING

DO NOT EXCEED THE ACTUATOR PERFORMANCE LIMITATIONS!

EXCEEDING THE TORQUE LIMITATIONS MARKED ON THE ACTUATOR IDENTIFICATION NAMEPLATE LABEL MAY CAUSE DAMAGE TO THE ACTUATOR AND/OR FINAL DRIVE ELEMENT.

WARNING

DO NOT EXCEED THE ACTUATOR ELECTRICAL LIMITATIONS!

EXCEEDING THE ELECTRICAL LIMITATIONS MARKED ON THE ACTUATOR IDENTIFICATION NAMEPLATE LABEL MAY CAUSE DAMAGE TO THE ACTUATOR AND/OR PERSONAL INJURY.

WARNING

BEWARE OF MOVEMENT OF THE FINAL DRIVE ELEMENT AND ANY LINKAGE BETWEEN IT AND THE ACTUATOR!

KEEP HANDS, OTHER PARTS OF THE BODY, TOOLS AND OTHER OBJECTS OUT OF THE WAY OF MOVING PARTS. FAILURE TO DO THIS MAY RESULT IN DAMAGE OR PERSONAL INJURY!

2. TRANSPORTATION AND STORAGE

Check the actuator and any accompanying devices for any damage that may have occurred during transport.

Store the actuator carefully. Storage indoors in a dry place is recommended.

Move the actuator to its intended location just before installation.

The actuator is usually shipped in the full clockwise, (typically closed) position.

If the actuator(s) will be stored for a period longer than 90 days, follow the recommendations in IMO-S2 to maintain the actuator's integrity.

3. GENERAL INSTALLATION INFORMATION

3.1 DESCRIPTION OF QB-SERIES UNIVERSAL CONTROL ACTUATORS (WITH MECHANICAL SPRING BACK-UP)

The QB-Series consists of one enclosure that covers different torque ranges. Model codes that start with "600" indicate the standard enclosure and a torque rating of 600 in•lbs. "1200" designates a torque rating in the range from 1200 in•lbs, in the same enclosure.

The QB-Series actuators provide mechanical spring backup, and no additional coding is required to denote this. The actuator is factory set and limited to 90° travel.

The QB-Series Actuator's base electronic package consists of two separate boards; P/N VCB00030 QB Control Board and the Switching Power Supply allowing for the choice of 115VAC, 230VAC, or 24VDC actuator power.

3.2 QB-SERIES CONTROL BOARD P/N VCB00030

The QB-series Control Board can be configured for either “Two-Wire” or “Three-Wire” On/Off control, or “4-20mA Analog”, “0-10VDC Analog”, or a “Resistive” Positioner Control. (See **Figure 5** in **Section 4.3**)

The QB Control Board used in Positioner Control mode can be configured for Loss of Signal and has an adjustable input signal Dead Band.

The QB Control Board allows independent 115VAC, 230VAC, 12VDC, 24VDC or 24VAC control signals from actuator power.

The QB Control Board can provide analog position feedback, Power and spring status indicators.

As a factory default, the actuator is preset to drive to the full clockwise position (CW) upon loss of electrical power. The unit will allow you to reconfigure for driving to the full counter-clockwise position (CCW) upon loss of power; see section 9 for further instruction.

The QB Control Board has locked rotor stall protection. The QB Control Board has manual push button control and simple digital smart set functionality for entering and saving precise end of travel positions for calibration to the application.

The QB Control Board has an easy to navigate color scheme for its input and output wiring terminal blocks, detailed below:

Dark Blue = Actuator Power

Light Blue = On/Off Control

Yellow = Modulating Control

White = Analog Feedback

Light Yellow = Status Feedback

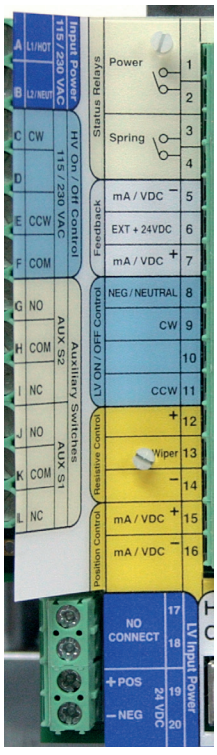


Figure 2.

WARNING

DANGEROUS VOLTAGES ARE PRESENT INSIDE THE ACTUATOR COVER UNLESS THE POWER SUPPLY TO THE ACTUATOR HAS BEEN SHUT OFF OR DISCONNECTED. USE EXTREME CAUTION WHENEVER WORKING ON THE ACTUATOR WITH THE COVER REMOVED.

WARNING

ACTUATORS SHOULD BE PROPERLY GROUNDED AND WIRED IN ACCORDANCE WITH LOCAL ELECTRICAL CODE; SEE IDENTIFICATION NAMEPLATE LABEL FOR MAXIMUM CURRENT DRAW.

WARNING

DO NOT MIS-APPLY HIGH-VOLTAGE SIGNALS TO LOW-VOLTAGE CIRCUITS. DO NOT POWER THE POSITION FEEDBACK CIRCUIT IF EXTERNAL POWER MODE IS NOT SELECTED.

SERIOUS DAMAGE TO THE CIRCUIT BOARD MAY RESULT.

WARNING

WHENEVER WORKING INSIDE THE ACTUATOR, CARE MUST BE TAKEN TO AVOID DAMAGE TO THE MACHINED FLANGE SURFACES ON THE COVER AND BASE CASTINGS. FAILURE TO DO SO CAN VOID THE ACTUATOR’S ENVIRONMENTAL CERTIFICATION.

WARNING

USE CARE WHENEVER WORKING WITH THE ACTUATOR COVER REMOVED. DAMAGE, SCRATCHES, OR DENTS ON THE MACHINED FLANGE SURFACES OF THE ENCLOSURE MAY VOID COMPLIANCE WITH NEMA, CSA, UL, AND/OR IEC SPECIFICATIONS. (SEE SECTIONS 6.3 & 7.3 FOR PROPER COVER REPLACEMENT)

FLAMEPROOF JOINTS ARE NOT INTENDED TO BE REPAIRED.

4. GENERAL INSTALLATION INFORMATION

4.1 INTERFACE

1 - SETUP – A continuous yellow LED indicates that the actuator is in SETUP mode to setup and calibrate the mechanical spring backup

2 - CAL – A continuous yellow LED indicates that the CAL (calibration) mode has been selected. A flashing yellow LED displays to the user how close they are to hitting the CAL point depending on the speed of the flashes. The CAL mode allows the user to calibrate the position tracking potentiometer without the use of an ohmmeter or other electronic instruments. In CAL mode the actuator will travel beyond the saved settings for the Zero and Span stop positions.

3 - ZERO – A continuous yellow LED indicates that the ZERO mode has been selected. ZERO mode permits the user to set the desired Zero end-of-travel stop position with a corresponding control signal value. The Zero position is typically the fully clockwise position and minimum control signal value, but Zero may be set at any position.

4 - SPAN – A continuous yellow LED indicates that the SPAN mode has been selected. SPAN mode permits the user to set the desired Span end-of-travel stop with a corresponding control signal value. Typically, the Span position is the fully counterclockwise position and maximum control signal value, but Span may be set at any position.

5 - MAN (MANUAL) – A continuous yellow LED indicates that Manual Control mode has been selected. The actuator will not respond to external control signals and the [CW] and [CCW] push buttons are enabled for manually driving the actuator in either direction. In Manual mode the actuator will not travel beyond the saved settings for the Zero and Span stop positions.

6 - RUN – A continuous green LED indicates that the normal operating mode has been selected. In RUN mode the actuator will respond external signals supplied to the Universal Control Board. This LED will turn off in Energy Save mode.

7 - ENTER – located directly below the mode selector and permits the user to activate modes and confirm settings by pressing the [ENTER] button.

8 - CW (CLOCKWISE) – A continuous yellow LED indicates that the actuator is driving in the CW direction. Located next to the Manual Control push button to drive the actuator in the CW direction.

9 - CCW (COUNTERCLOCKWISE) – A continuous yellow LED indicates the actuator is driving in the CCW direction. Located next to the Manual Control push button to drive the actuator in the CCW direction.

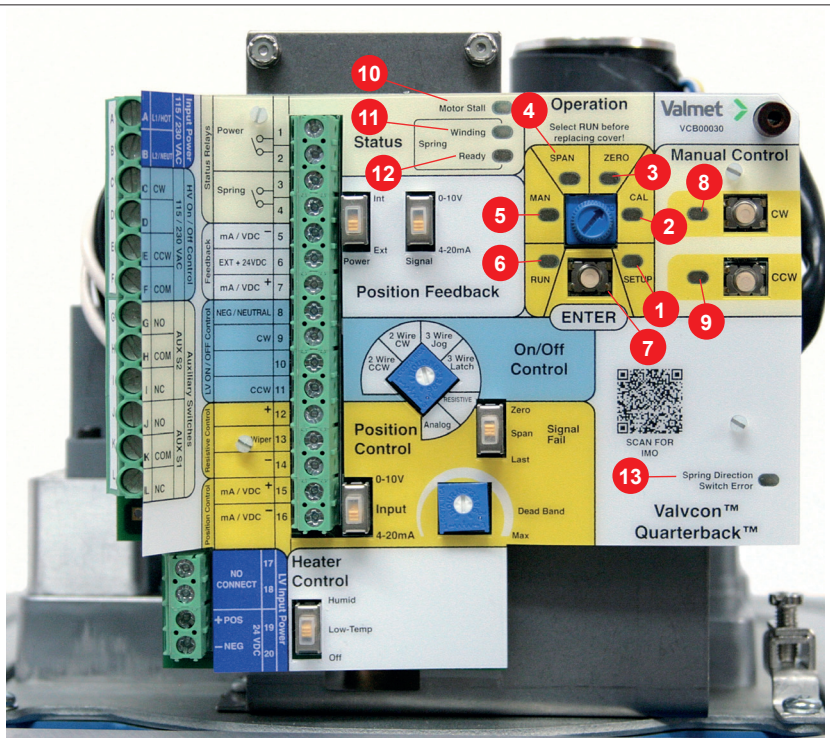


Figure 3. VCB00010 Universal Control Board (Front)

10 - Motor Stall – A continuous red LED indicates a stall condition exists and that the actuator has been prevented from reaching the position commanded by the control signal. A STALL of more than several seconds will cause power to be automatically removed from the motor circuit, placing the actuator in a safe mode. A reverse signal or a manual mode [CW] or [CCW] movement is required to clear the stall condition. A STALL condition can be initiated by a blockage in the valve or damper, cam limit settings that are inside of the electronically saved travel stop positions, or some other increase in the torque load on the actuator.

11 - Winding – A continuous yellow LED indicates that mechanical spring is being wound.

12 - Ready – A continuous green LED indicates that the springs are fully wound and capable to be used as a mechanical backup.

13 - Spring Direction Switch Error – A continuous red LED indicates that the spring fail direction and the selected spring fail direction do not match; they must agree to prevent damage to installed spring packs.

NOTE: The LED is meant to indicate that springs and/or setup should be reset and re-calibrated so they align.

4.2 OPERATION MODE SELECTOR POT

The Universal Control Board is equipped with an Operation Mode Selector Pot which allows the user to select the 6 modes of operation during calibration and set-up. LED indicators around the knob correspond to each of the modes; RUN, Manual (MAN), SPAN, ZERO, Calibrate (CAL), and SETUP. When the Universal Control Board mode dial is set to any mode, the corresponding LED turns on, indicating the mode is selected.

In MAN (Manual) and CAL mode the unit will ignore any external control signals and respond only to the on-board push buttons.

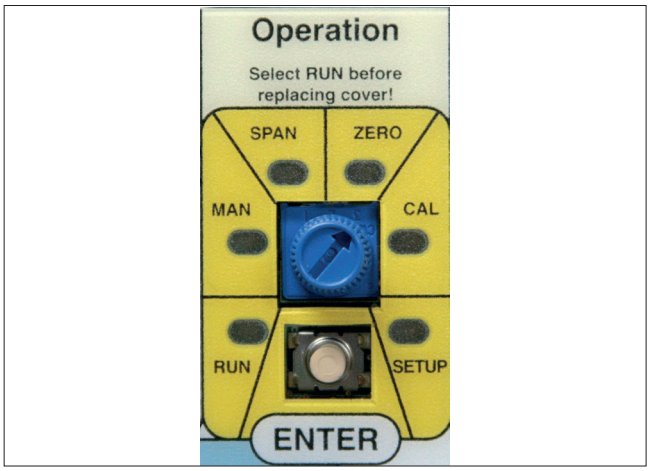


Figure 4.

4.3 CONTROL MODE SELECTOR POT

The Universal Control Board is equipped with a Control Mode Selector Pot which enables the user to select between various “On/Off Control” and “Position Control” modes.

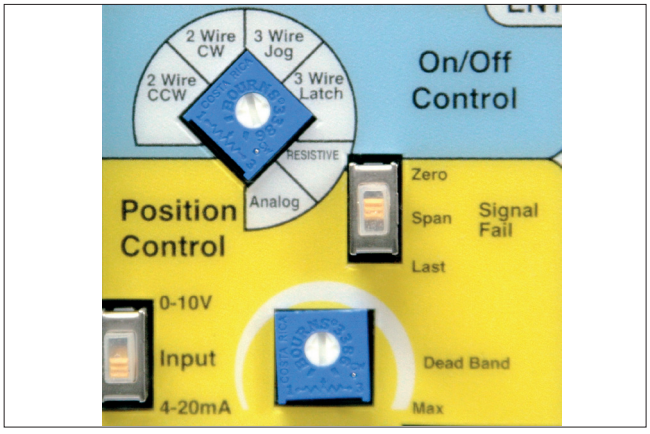


Figure 5.

4.4 SMART TRAVEL LIMIT AND AUXILIARY SWITCH OPERATION

With the Universal Control Board installed, the travel limit stops are set electronically as the Zero and Span positions.

Two auxiliary switches and the corresponding cams will be the two switches towards the top of the assembly.

To simplify the process of setting the precise travel limit position, the QB-Series provides Smart (electronic) travel limit, in addition to two mechanical hardstops to limit actuator travel.

For “2 Wire” or “3 Wire” On/Off operation, travel limits are set at the full clockwise (CW) and full counterclockwise (CCW) ends of travel.

To simplify the process of setting the precise travel limit positions, the QB-Series provides Smart On/Off travel limit types. CW, and CCW are set electronically as the Zero and Span positions.

4.5 BUILT-IN HEATER/ THERMOSTAT FEATURE

The Universal Control Board is equipped with a built-in Heater/ Thermostat Option that can be enabled for low-temperature use (environments where the temperature will drop below 32° Fahrenheit), high-humidity use (“tropical” environments), or disabled completely to conserve power, in environments where the climate is stable and/or controlled.

See graphic below for proper positioning:

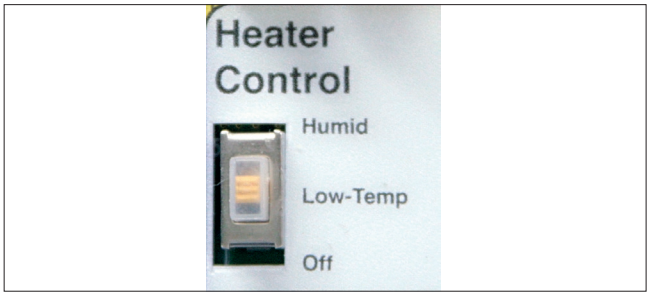


Figure 6.

5. MAIN ACTUATOR POWER

The identification label on each actuator specifies the model number, serial number, actuator power voltage and current requirements for the actuator. It is important to verify the correct actuator voltage and control voltage prior to wiring the actuator.

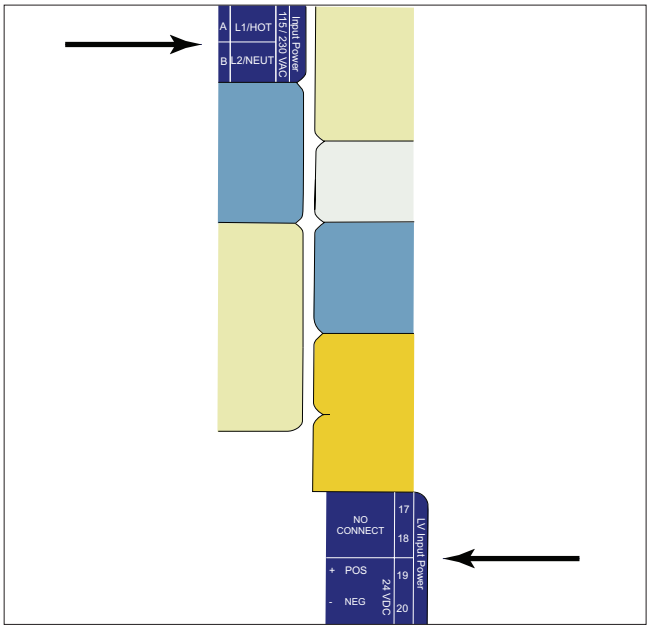


Figure 7.

5.1 115VAC OR 230VAC POWER WIRING

If using 115VAC or 230VAC as the MAIN Input Power:
115/230 VAC must be supplied constantly to the Universal Control Board as follows:

- Terminal A (AC L1/HOT)
- Terminal B (AC L2/NEUT)

5.2 24VDC POWER WIRING

If using 24VDC as the MAIN Input Power: 24 VDC must be supplied constantly to the Universal Control Board as follows:

- Terminal 19 (DC POS)
- Terminal 20 (DC NEG)

6. ON/OFF CONTROL
(See Figure 5 Mode Selector)

6.1 THE THREE METHODS OF ON/OFF CONTROL:

The On/Off Control mode allows the actuator to drive in a desired direction in response to an application of voltage to the desired inputs. The different modes are as follows:

“2 WIRE CW”

The actuator will default to the CCW position when main actuator power is present; the actuator will drive CW when the “CW” control power is energized.

“2 WIRE CCW”

The actuator will default to the CW position when main actuator power is present; the actuator will drive CCW when the “CCW” control power is energized.

“3 WIRE JOGGING” OPERATION (OPEN/STOP CLOSE)

The actuator will drive CCW when the “CCW” control power is energized and drive CW when the “CW” control power is energized; if control power is removed mid-travel, the actuator will stop in position.

“3 WIRE LATCHING” OPERATION

The actuator will “latch” and drive CCW when the “CCW” control power is momentarily energized. The actuator will “latch” and drive CW when the “CW” control power is momentarily energized. After energizing the control power can be removed, as the direction of travel is “latched” in and the unit will continue to drive to the respective travel limit.

6.2 ON/OFF CONTROL SIGNAL WIRING

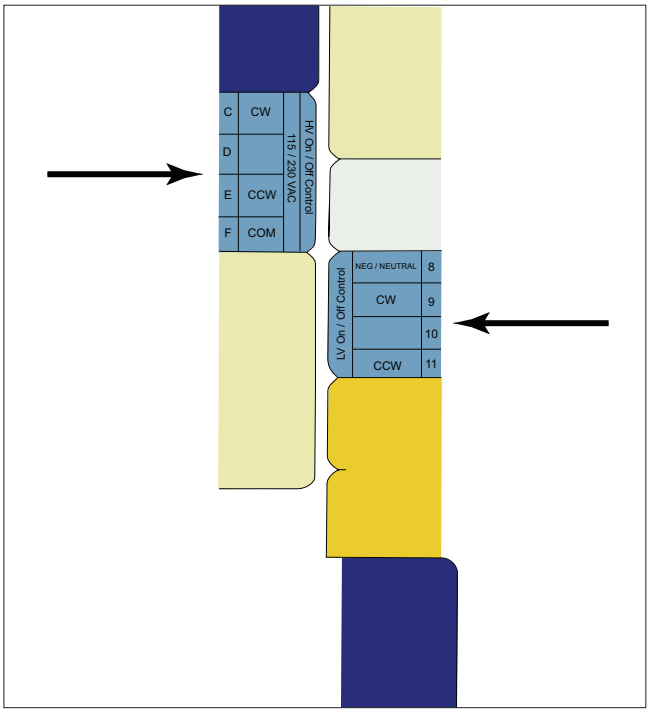


Figure 8.

HIGH VOLTAGE:

To control the actuator with a high voltage signal (115VAC or 230VAC): Connect AC L2/NEUT to terminal F on the Universal Control Board. Energize AC L1/HOT at terminal C on the Universal Control Board to drive the actuator clockwise (CW). Energize AC L1/HOT at terminal D on the Universal Control Board to drive the actuator to the “MID” position. Energize AC L1/HOT at terminal E on the Universal Control Board to drive the actuator counterclockwise (CCW).

LOW VOLTAGE:

To control the actuator with a low voltage signal (12VDC, 24VDC or 24VAC): Connect 12/24DC NEG or 24AC NEUT to terminal 8 on the Universal Control Board. Energize DC POS or 24AC HOT at terminal 9 on the Universal Control Board to drive the actuator clockwise (CW). Energize DC POS or 24AC HOT at terminal 10 on the Universal Control Board to drive the actuator to the “MID” position. Energize DC POS or 24AC HOT at terminal 11 on the Universal Control Board to drive the actuator counterclockwise (CCW).

On / Off (2 Wire and 3 Wire) Control Wiring

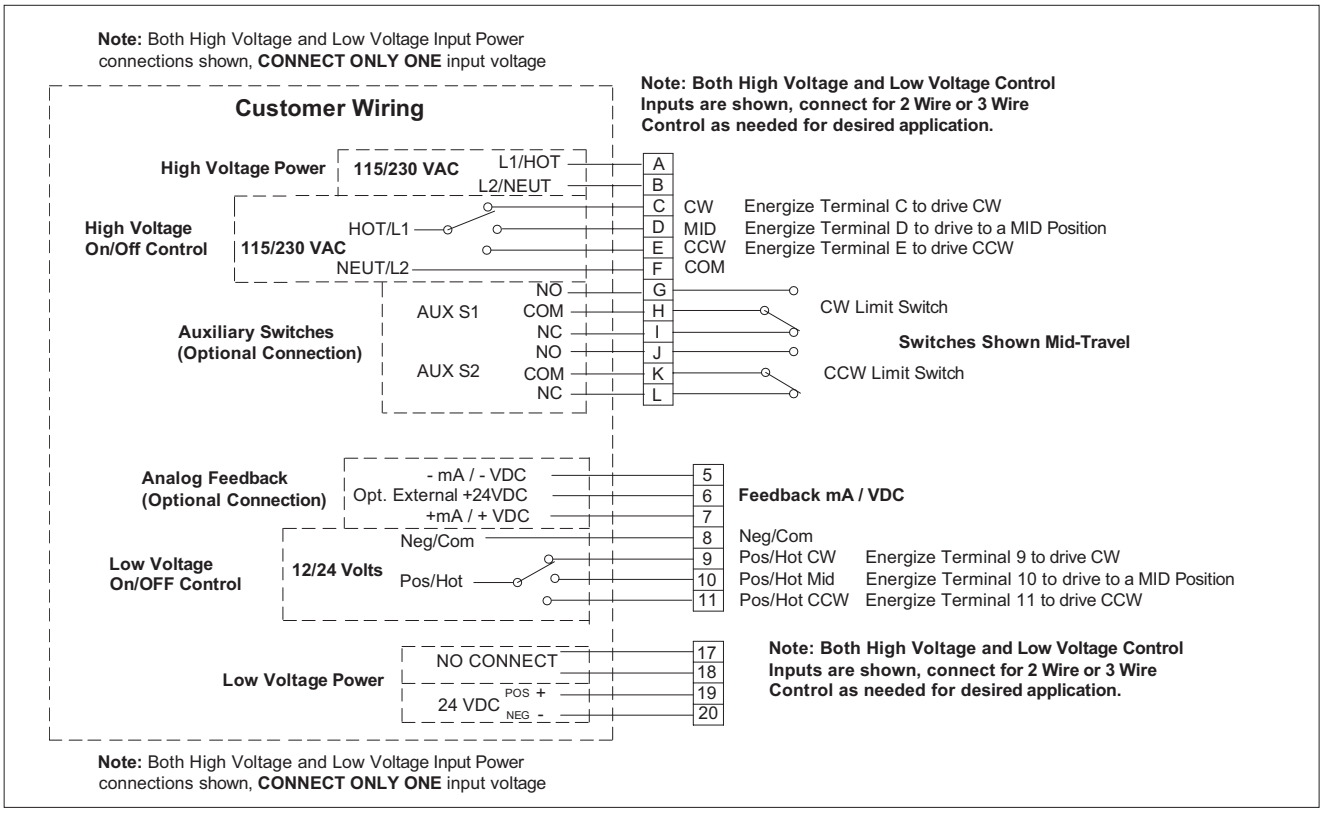


Figure 9.

6.3 SET UP AND CALIBRATION

The following procedures are for calibrating and setting up for the QB-series electric actuator. Procedures with '(CW)' are for Clockwise(CW) setup and calibration ("Fail closed"), while procedures with '(CCW)' being for Counter-Clockwise(CCW) setup and calibration ("Fail open"). Procedures with no labelling are the same for either setups.

INTIAL SET UP (CW)

1. Remove actuator cover. **NOTE:** Use caution to prevent damage to machined flange surface of cover casting; see cover replacement for additional information.
2. Verify that the Load is in its furthest CW position of travel.
3. Turn operations knob to CAL and use the push buttons to drive the actuator to the Fail CW position.
4. Using a screwdriver, drive the Right Fail Closed Hard stop into the actuator until it is gently pressed into the Gear.
5. Back off the Hard Stop 1 quarter turn then secure with nut. (Note: it is best practice to keep screwdriver in stop screw when tightening nut to prevent it from re-driving the stop screw into the actuator)

INTIAL SET UP (CCW)

1. Remove actuator cover. **NOTE:** Use caution to prevent damage to machined flange surface of cover casting; see cover replacement for additional information.
2. Verify that the Load is in its furthest CCW position of travel. To do this, drive the actuator in manual mode to the fail open mechanical hard stop till the actuator is able to easily slip over the drive of the load (The fail open hard stop may need to be adjusted in order to fit actuator over load).

Fail CCW Hard Stop

1. Remove the Overlay and verify the SW3 is in the correct position (DOWN) for the application.
2. Reinstall the Overlay and turn the operations knob to CAL.
3. Use the push buttons to drive the actuator to the Fail CCW position.
4. Using a screwdriver, drive the Right Fail Closed Hard stop into the actuator until it is gently pressed into the Gear.
5. Back off the Hard Stop 1 quarter turn then secure with nut. (Note: it is best practice to keep screwdriver in stop screw when tightening nut to prevent it from re-driving the stop screw into the actuator)

POSITION POTENTIOMETER CALIBRATION

Field installation of the Universal Control Board or replacement of the position tracking potentiometer requires calibration of the position tracking potentiometer prior to setting positions and values for ZERO and SPAN. Universal Control Boards installed at the factory are fully calibrated at the factory and should not require further calibration. To confirm proper potentiometer calibration:

1. With the operations knob still in CAL, press and hold enter for 1 second
2. The actuator will verify it is in the Fail CW/CCW Hard Stop
3. Then the actuator will blink the CAL LED if the Position Pot needs to be adjusted
4. Loosen the position pot set screw on the smaller white gear
5. Turn Position Pot until CAL LED is solid on using a small flat head screwdriver from above
6. Tighten the set screw while the CAL LED is solid
7. Press Enter

SPRING SETUP

Spring Potentiometer Calibration

1. Verify that there are no spring packs installed on the actuator. If there are, remove the spring packs.
2. Verify that the switch SW3A is in the correct position (Up for CW, Down for CCW).
3. Turn the Operation Knob to CAL mode.
4. Press the Manual CW/CCW Push Buttons to turn the output shaft to the hard stop in the fail-safe direction.
5. Drive the Set Screw in the bottom of the casting into the actuator's output
   (Do not exceed a torque of 4 ft-lbs/48 in-lbs when tightening the set screw).
6. Turn the Operation Knob to SETUP mode and press ENTER.
7. Allow the actuator to drive to the Spring Installation. (The actuator will spin the Spring shaft to calibrate the 10 turn pot.

Spring Installation

1. Press the Manual CW/CCW Push Buttons to turn the D shaft so that is easier to slide the springs onto the shaft in the correct orientation according to the spring pack label with the label pointing out. (Red Text on Top)
2. Install the springs and thrust washers and spring shaft cap.
3. Drive/back the Set Screw in the bottom of the casting out so that it is flush with the surface of the casting.

SETTING ZERO AND SPAN POSITIONS (CW)

Once (position potentiometer) calibration has been confirmed, set the desire end-of-travel positions. Make certain that the limit switch cams are set to operate the switches beyond the desired range for the ZERO and SPAN positions. ZERO and SPAN may be set at any position between 0° and 94° of travel.

Set ZERO (CW):

1. Turn the Operation Knob to ZERO Mode
2. Press and hold enter until the ZERO LED blinks
3. Apply the corresponding Input control signal
4. Use the manual push buttons to drive the actuator to the Zero position (CW)
5. Press Enter to save position and signal

Set SPAN (CW):

1. Turn the Operation Knob to SPAN Mode
2. Press and hold enter until the SPAN LED blinks
3. Apply the corresponding Input control signal
4. Use the manual push buttons to drive the actuator to the Span Position (CCW)
5. Press Enter to save position and signal

CW Hard Stop (CW):

1. Drive the Left Fail Open Hard Stop into the actuator until it is gently pressed into the Gear.
2. Back off the Hard Stop 1 quarter turn and secure with Nuts.

Spring Wind (CW):

1. Turn the Operation Knob to RUN Mode
2. Allow the Spring to Fully Wind.
3. NOTE: If you need to stop the wind cycle press any button to stop.
4. Remove the Overlay and verify the SW3 is in the correct position (DOWN) for the application.
5. Reinstall the Overlay and turn the operations knob to CAL.
6. Use the push buttons to drive the actuator to the Fail CCW position.
7. Using a screwdriver, drive the Right Fail Closed Hard stop into the actuator until it is gently pressed into the Gear.
8. Back off the Hard Stop 1 quarter turn then secure with nuts. (Note: it is best practice to keep screwdriver in stop screw when tightening nut to prevent it from re-driving the stop screw into the actuator)

SETTING ZERO AND SPAN POSITIONS (CCW)

Once (position potentiometer) calibration has been confirmed, set the desire end-of-travel positions. Make certain that the limit switch cams are set to operate the switches beyond the desired range for the ZERO and SPAN positions. ZERO and SPAN may be set at any position between 0° and 94° of travel.

Set ZERO (CCW):

1. Turn the Operation Knob to ZERO Mode
2. Press and hold enter until the ZERO LED blinks
3. Apply the corresponding Input control signal
4. Use the manual push buttons to drive the actuator to the Zero position (CCW)
5. Press Enter to save position and signal

Set SPAN (CCW):

1. Turn the Operation Knob to SPAN Mode
2. Press and hold enter until the SPAN LED blinks
3. Apply the corresponding Input control signal
4. Use the manual push buttons to drive the actuator to the Span Position (CW)
5. Press Enter to save position and signal

CCW Hard Stop (CCW):

1. Drive the Right Fail Open Hard Stop into the actuator until it is gently pressed into the Gear.
2. Back off the Hard Stop 1 quarter turn and secure with Nuts.

Spring Wind (CCW):

1. Turn the Operation Knob to RUN Mode
2. Allow the Spring to Fully Wind.
3. NOTE: If you need to stop the wind cycle press any button to stop.

VERIFY END-OF-TRAVEL SETTINGS:

1. Turn the Mode Selector Dial to [RUN]
2. Apply various control signals to verify operation.
3. Verify that the "Spring Direction Switch Error" LED is not illuminated.

PROPER ACTUATOR COVER REPLACEMENT

NOTE: For actuators including hazardous location certification. Prior to installing cover, inspect machined flange surfaces for any damage, scratches, or dents. Damage, scratches, or dents that will not fit completely in a circle having a diameter of 1/64" will void hazardous location certifications. If such imperfections are present the damaged enclosure parts(s) must be replaced. See Table 3 for captive cover screw specifications. Consult the factory for replacement parts.

1. Align cover so that the cover flange contacts the base flange and carefully push it down.

2. Once the cover is properly seated, tighten the screws to secure the cover; a cross pattern is recommended for uniform distribution of load.
3. If the position indicator is not seated to the output/cam shaft, turn until it drops into place in order to ensure accurate visual position indication.

7. POSITION CONTROL (See Figure 5 Mode Selector)

7.1 THE THREE METHODS OF POSITION CONTROL

The Position Control mode allows the actuator to modulate (change position) in response to a change in an analog or resistance control signal. The different modes are as follows:

"4-20mA CURRENT ANALOG" CONTROL

The actuator will modulate between positions in direct response to the change in the input current signal. Set 4 mA as the Zero position and 20mA as Span for normal operation or set 4mA as Span and 20mA as Zero for reverse acting.

"0-10VDC VOLTAGE ANALOG" CONTROL

The actuator will modulate between positions in direct response to the change in the input voltage signal. Set 0VDC as the Zero position and 10VDC as Span for normal operation or set 0VDC as Span and 10VDC as Zero for reverse acting.

"RESISTIVE" CONTROL (UP TO 10K OHM)

The actuator will modulate between positions in direct response to the change in the input resistive signal.

7.2 POSITION CONTROL SIGNAL WIRING

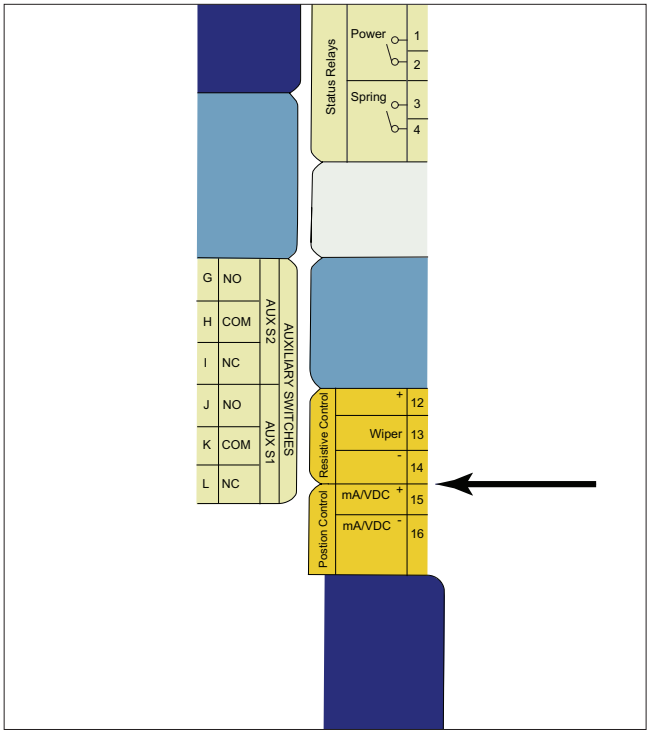


Figure 10.

ANALOG CONTROL WIRING

To control the actuator with a 4-20mA or 0-10V analog signal: Connect mA / VDC - (NEG) to terminal 16 and mA / VDC + (POS) to terminal 15 on the Universal Control Board Slide the [Input] switch up to select 0-10V or down to select 4-20mA.

RESISTIVE CONTROL WIRING

To control the actuator with a resistance signal such as 0- 135 Ohms: Connect Resistance Signal - (NEG) to terminal 14, Resistance Signal Wiper to terminal 13, and Resistance + (POS) to terminal 12 on the Universal Control Board. The board will respond to resistance signals up to 10K Ohms (minimum SPAN signal is 100 Ohms; i.e. signal = 0-100 Ohms).

NOTE: There is a current limiter on the Resistive Input circuit, if the current exceeds 50mA for more than 80 milliseconds, the input will shut off. If this happens, it can be reset by cycling Main power.

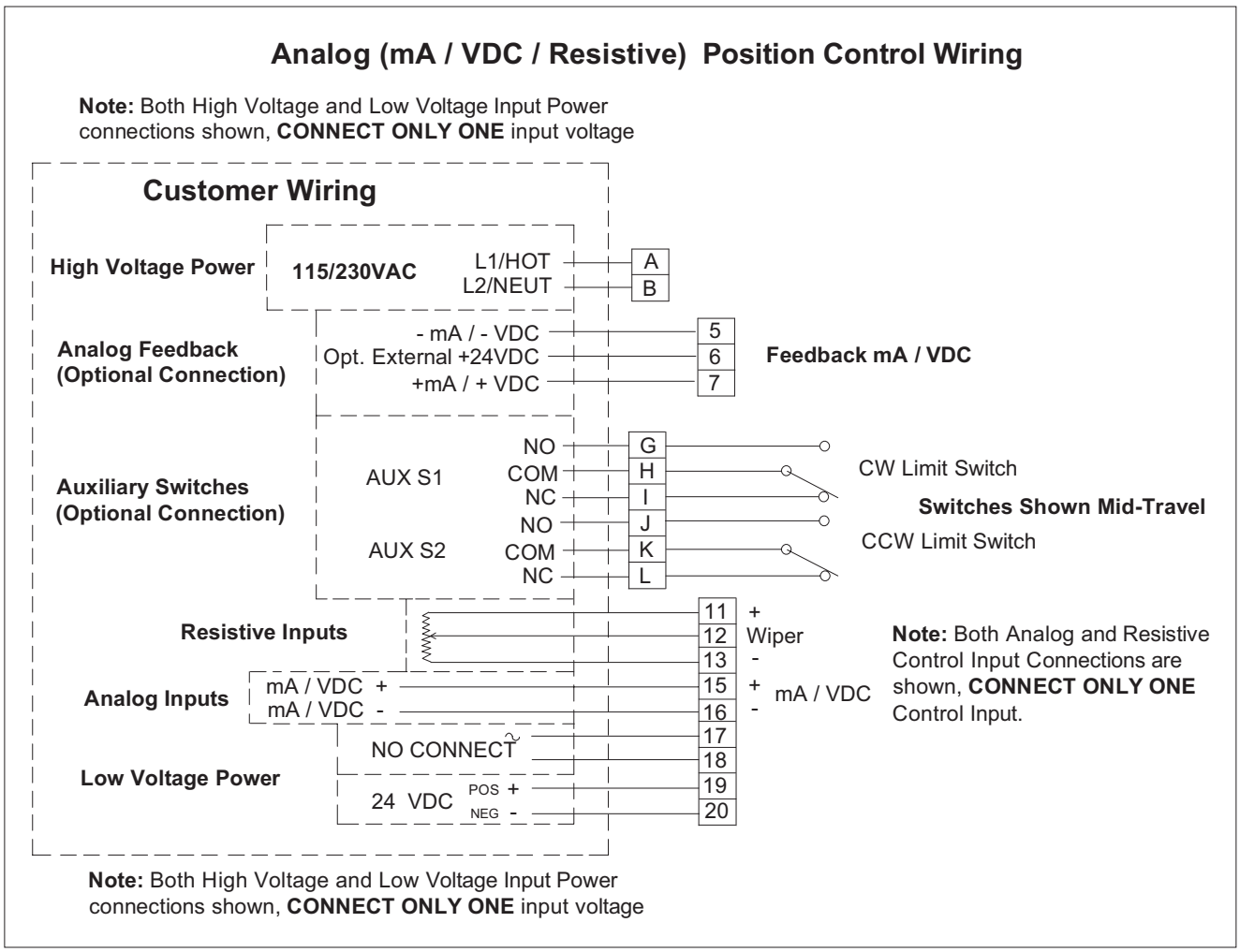


Figure 11. Positioning Control Wiring

7.3 SET UP AND CALIBRATION

The following procedures are for calibrating and setting up for the QB-series electric actuator. Procedures with '(CW)' are for Clockwise(CW) setup and calibration ("Fail closed"), while procedures with '(CCW)' being for Counter-Clockwise(CCW) setup and calibration ("Fail open"). Procedures with no labelling are the same for either setups.

INTIAL SET UP (CW)

1. Remove actuator cover. **NOTE:** Use caution to prevent damage to machined flange surface of cover casting; see cover replacement for additional information.
2. Verify that the Load is in its furthest CW position of travel.
3. Turn operations knob to CAL and use the push buttons to drive the actuator to the Fail CW position.
4. Using a screwdriver, drive the Right Fail Closed Hard stop into the actuator until it is gently pressed into the Gear.
5. Back off the Hard Stop 1 quarter turn then secure with nuts. (Note: it is best practice to keep screwdriver in stop screw when tightening nut to prevent it from re-driving the stop screw into the actuator)

INTIAL SET UP (CCW)

1. Remove actuator cover. **NOTE:** Use caution to prevent damage to machined flange surface of cover casting; see cover replacement for additional information.
2. Verify that the Load is in its furthest CCW position of travel. To do this, drive the actuator in manual mode to the fail open mechanical hard stop till the actuator is able to easily slip over the drive of the load (The fail open hard stop may need to be adjusted in order to fit actuator over load).

Fail CCW Hard Stop

1. Remove the Overlay and verify the SW3 is in the correct position (DOWN) for the application.
2. Reinstall the Overlay and turn the operations knob to CAL.
3. Use the push buttons to drive the actuator to the Fail CCW position.
4. Using a screwdriver, drive the Right Fail Closed Hard stop into the actuator until it is gently pressed into the Gear.
5. Back off the Hard Stop 1 quarter turn then secure with nuts. (Note: it is best practice to keep screwdriver in stop screw when tightening nut to prevent it from re-driving the stop screw into the actuator)

POSITION POTENTIOMETER CALIBRATION

Field installation of the Universal Control Board or replacement of the position tracking potentiometer requires calibration of the position tracking potentiometer prior to setting positions and values for ZERO and SPAN. Universal Control Boards installed at the factory are fully calibrated at the factory and should not require further calibration. To confirm proper potentiometer calibration:

1. With the operations knob still in CAL, press and hold enter for 1 second
2. The actuator will verify it is in the Fail CW/CCW Hard Stop
3. Then the actuator will blink the CAL LED if the Position Pot needs to be adjusted
4. Loosen the position pot set screw on the smaller white gear
5. Turn Position Pot until CAL LED is solid on using a small flat head screwdriver from above
6. Tighten the set screw while the CAL LED is solid
7. Press Enter

SPRING SETUP

Spring Potentiometer Calibration

1. Verify that no spring packs are installed on the actuator. If there are, remove the spring packs.
2. Verify that the switch SW3A is in the correct position (Up for CW, Down for CCW)
3. Turn the Operation Knob to SETUP mode
4. Drive the Set Screw in the bottom of the casting into the actuator's output
   (Do not exceed a torque of 4 ft-lbs/48 in-lbs when tightening the set screw).
5. Press Enter
6. Allow the actuator to drive itself to the Spring Installation Position. (The actuator will drive to the hard stop, then will spin the Spring shaft to calibrate the 10 turn pot.

Spring Installation

1. Press the Manual CW/CCW Push Buttons to turn the D shaft so that is easier to slide the springs onto the shaft in the correct orientation according to the spring pack label with the label pointing out. (Red Text on Top)
2. Install the springs and thrust washers and spring shaft cap.
3. Drive/back the Set Screw in the bottom of the casting out so that it is flush with the surface of the casting.

SETTING ZERO AND SPAN POSITIONS (CW)

Once (position potentiometer) calibration has been confirmed, set the desire end-of-travel positions. Make certain that the limit switch cams are set to operate the switches beyond the desired range for the ZERO and SPAN positions. ZERO and SPAN may be set at any position between 0° and 94° of travel.

Set ZERO (CW):

1. Turn the Operation Knob to ZERO Mode
2. Press and hold enter until the ZERO LED blinks
3. Apply the corresponding Input control signal
4. Use the manual push buttons to drive the actuator to the Zero position (CW)
5. Press Enter to save position and signal

Set SPAN (CW):

1. Turn the Operation Knob to SPAN Mode
2. Press and hold enter until the SPAN LED blinks
3. Apply the corresponding Input control signal
4. Use the manual push buttons to drive the actuator to the Span Position (CCW)
5. Press Enter to save position and signal

CCW Hard Stop (CW):

1. Drive the Left Fail Open Hard Stop into the actuator until it is gently pressed into the Gear.
2. Back off the Hard Stop 1 quarter turn and secure with Nuts.

Spring Wind (CW):

1. Turn the Operation Knob to RUN Mode
2. Allow the Spring to Fully Wind.
3. NOTE: If you need to stop the wind cycle press any button to stop.
4. Remove the Overlay and verify the SW3 is in the correct position (DOWN) for the application.
5. Reinstall the Overlay and turn the operations knob to CAL.
6. Use the push buttons to drive the actuator to the Fail CCW position.
7. Using a screwdriver, drive the Right Fail Closed Hard stop into the actuator until it is gently pressed into the Gear.
8. Back off the Hard Stop 1 quarter turn then secure with nuts. (Note: it is best practice to keep screwdriver in stop screw when tightening nut to prevent it from re-driving the stop screw into the actuator)

SETTING ZERO AND SPAN POSITIONS (CCW)

Once (position potentiometer) calibration has been confirmed, set the desire end-of-travel positions. Make certain that the limit switch cams are set to operate the switches beyond the desired range for the ZERO and SPAN positions. ZERO and SPAN may be set at any position between 0° and 94° of travel.

Set ZERO (CCW):

6. Turn the Operation Knob to ZERO Mode
7. Press and hold enter until the ZERO LED blinks
8. Apply the corresponding Input control signal
9. Use the manual push buttons to drive the actuator to the Zero position (CCW)
10. Press Enter to save position and signal

Set SPAN (CCW):

6. Turn the Operation Knob to SPAN Mode
7. Press and hold enter until the SPAN LED blinks
8. Apply the corresponding Input control signal
9. Use the manual push buttons to drive the actuator to the Span Position (CW)
10. Press Enter to save position and signal

CCW Hard Stop (CCW):

3. Drive the Right Fail Open Hard Stop into the actuator until it is gently pressed into the Gear.
4. Back off the Hard Stop 1 quarter turn and secure with Nuts.

Spring Wind (CCW):

4. Turn the Operation Knob to RUN Mode
5. Allow the Spring to Fully Wind.

6. NOTE: If you need to stop the wind cycle press any button to stop.

VERIFY END-OF-TRAVEL SETTINGS:

4. Turn the Mode Selector Dial to [RUN]
5. Apply various control signals to verify operation.
6. Verify that the “Spring Direction Switch Error” LED is not illuminated.

Replace actuator cover.

PROPER ACTUATOR COVER REPLACEMENT

NOTE: For actuators including hazardous location certification. Prior to installing cover, inspect machined flange surfaces for any damage, scratches, or dents. Damage, scratches, or dents that will not fit completely in a circle having a diameter of 1/64” will void hazardous location certifications. If such imperfections are present the damaged enclosure parts(s) must be replaced. See Table 3 for captive cover screw specifications. Consult the factory for replacement parts.

1. Align cover so that the cover flange contacts the base flange and carefully push it down.
2. Once the cover is properly seated, tighten the screws to secure the cover; a cross pattern is recommended for uniform distribution of load.
3. If the position indicator is not seated to the output/cam shaft, turn until it drops into place in order to ensure accurate visual position indication

7.4 DEADBAND ADJUSTMENT

Dead Band is the window of control signal change which the actuator will ignore. The sensitivity of the actuator to respond to changes in the control signal is adjustable.

Minimum Dead Band (1%) allows the actuator to respond to small control signal changes. Maximum Dead Band (3%) allows the actuator to ignore small control signal changes (such as noise on the control signal).

7.5 SIGNAL FAIL OPTIONS

In the event that the control signal to the actuator is lost and external power is still applied, the Signal Fail position selector switch on the Universal Control Board provides options for the actuator to drive to the Zero (minimum signal) position, the Span (maximum signal) position, or to remain at its “Last” (current) position. **NOTE:** If you use a 0-10VDC control signal, the actuator cannot differentiate between a 0VDC signal and an actual loss of signal; therefore, it will drive to the saved 0VDC position regardless of the switch setting

8. POSITION FEEDBACK AND STATUS INDICATORS

8.1 POSITION FEEDBACK

The Position Feedback provides an analog indication of the actuator output position scaled between the configured Zero and Span positions.

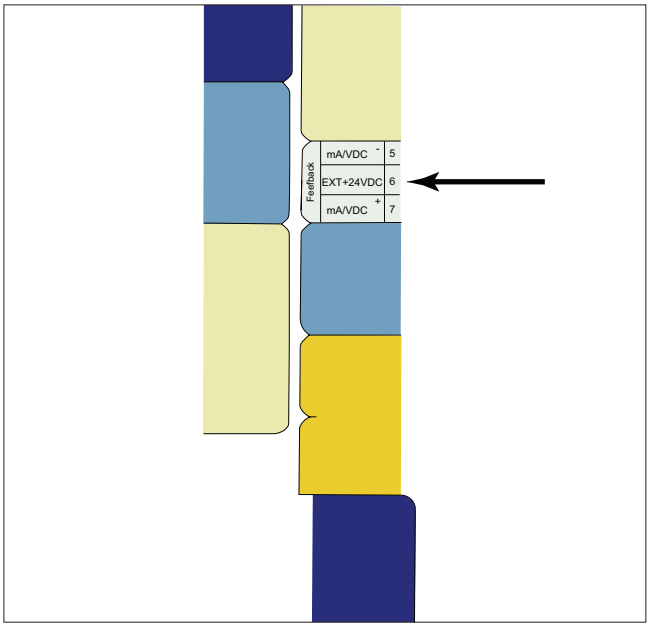


Figure 12.

4-20MA

The 4-20mA Feedback can be powered either internally (by the actuator) or externally (by the loop).

If the Position Feedback will be powered internally, connect as follows: NEG to terminal 5; POS to terminal 7.

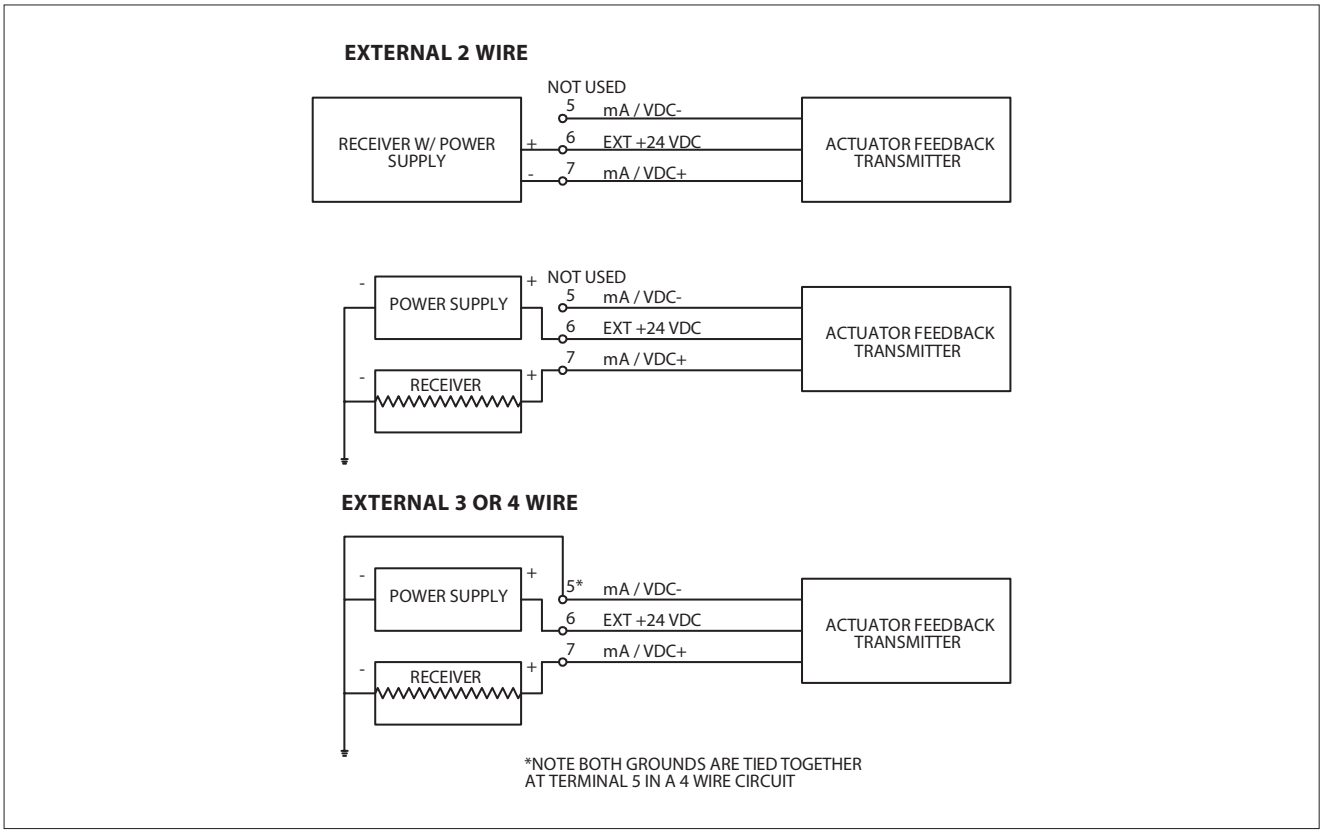


Figure 13.

If the Position Feedback will be powered externally, it is extremely important to terminate the customer supplied +24VDC to the correct terminal on the Universal Control Board. The Position Feedback switches are also important. The **Power** Switch should be down in the “Ext” position and the **Signal** Switch should be down into the “4-20mA” position. (See **Figure 13** for wiring options).

The 4-20mA Feedback circuit will power down if no impedance is measured on the output terminals in both Normal and Energy Save Mode operation. This is to stop any unnecessary power drain while the 4-20mA feedback circuit is not connected. Keep the metering circuit connected to ensure that the feedback will be available as needed. If the actuator position changes and there is a metering circuit connected, then the feedback circuit will resume operation and track the position.

0-10VDC

The 0-10V Feedback can only be used with internally (by the actuator) supplied power.

The Position Feedback switches are also important. The Power Switch should be up into the “Int” position and the Signal Switch should be up into the “0-10V” position.

STATUS INDICATORS

AUXILIARY SWITCHES

Two auxiliary limit switches will provide position indication for customer use. The switches are dry contacts that can be used to operate other devices. Switches are single pole, double throw; rated for 11A, 1/2HP, 250VAC, CSA certified. certified. (See Figures 9, 10 and 11 for wiring)

POWER STATUS RELAY

The Power Status Relay is “high” if external voltage (12-24VDC, 24VAC power inputs to the board and the output from the Switching Power Supply to the board) is greater than 12.5V. The relay is “low” if external voltage drops below 10.5V and will alternate between “high” and “low” if the motor is stalled. (See Figure 10 for wiring)

9. MECHANICAL SPRING BACKUP

With the spring backup, the actuator senses the loss of main input power to the Universal Control Board and immediately switch to the spring backup. When line power returns, the actuator will automatically resume normal operation and the board will tell the motor to begin to wind the mechanical springs back up. The “Spring Winding” LED on the control board will be illuminated when the actuator is winding the springs, and once fully wound the LED will disengage and the “Spring Ready” LED will illuminate.

The springs can provide a large amount of torque in a short amount of time, resulting in short cycle times depending on the load the actuator is mounted to. QB-Series actuators are provided with a built in speed control feature, allowing user to adjust the amount of speed control applied and being able to reduce the speed of a spring release to a desired amount.

Suggested maintenance is to not let QB-Series Actuators to sit in storage with power stored in the springs. This could result with actuator sitting with stress on the springs for extended periods of time, which could weaken then. Speed control is also recommended, especially in instances of lower torques, this is to help put less stress on the transmission that communicates between the springs, the motor, and the output shaft.

WARNING

SPRINGS SHOULD NEVER BE USED IF THE METAL CAGE THEY ARE CONTAINED IN IS DAMAGED OR MISSING. FAILURE TO FOLLOW MAY RESULT IN DAMAGE OR PERSONAL INJURY!

To decommission the spring packs, perform the following:

1. Remove actuator cover and set aside carefully so as not to damage the machined flange.
2. Turn the operation knob to CAL
3. Drive to the Fail Direction Hardstop VIA the CW and CCW Push Buttons
4. Drive the Set Screw in the bottom of the casting into the actuator’s output
   (Do not exceed a torque of 4 ft-lbs/48 in-lbs when tightening the set screw).
5. Turn the operations knob to SETUP.
6. Press Enter.
7. Allow the actuator to drive itself to a fully unwound state. The actuator will first drive to the fail direction hard stop.
8. Jiggle the spring pack about the spring shaft. If it is free and not under any tension, they are safe to be handled/removed.
9. Drive/back the Set Screw in the bottom of the casting out so that is is flush with the surface of the casting

To change the direction of spring packs, perform the following:

1. Decommission the springs (see above).
2. Allow the actuator to reach the fully unwound state.
3. Power off the actuator.
4. Flip SW3 to the opposite position (Up for CW, Down for CCW).
5. Power on the actuator.
6. Consult Sections 6.3 and 7.3 of this manual for instructions for setting up and calibrating.

10. SPEED CONTROL

All QB-Series electric actuators are equipped with speed control feature, as seen in Figure 14. Speed control can be adjusted for desired amount of speed control, allowing for user to set speed control to achieve desired failure cycle time.

To set the desired amount of speed control, user can loosen the 2 mounting screws on the gray magnet housing, and slide the housing in and out of engagement (closer to the disc provides more speed reduction, while further from the disc provides less speed reduction). User then can re-tighten the mounting screws when desired speed control position is reached.

Optional hardstop screw is shown on Figure 14, locking housing at maximum speed reduction position.

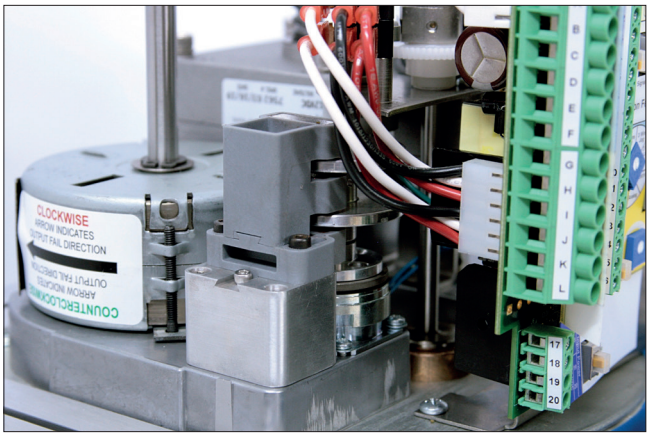


Figure 14.

11. DEFAULT SETTINGS AND MODES

Table 1.

Board Section	Function	Condition	State
Position Feedback	Power	External	Switch Down
	Signal	4-20mA	Switch Down
On/Off Control	Control Mode	2 Wire CCW	Pot Full CCW
Position Control	Input	4-20mA	Switch Down
	Signal Fail	Zero	Switch Up
	Dead Band	Min	Pot Full CCW
Operation	Mode Selector	Run	Pot Full CCW
Heater Control	Humid/Low-Temp/Off	Off	Switch Down

12. TROUBLESHOOTING

Symptom: Actuator Stall LED is illuminated in a mid-travel position.

Fix: This could be due to hunting; increase actuator Deadband or adjust controller's setpoint tolerance.

Symptom: Actuator does not respond to 4-20mA or 0-10V control signal.

Fix: Verify that Analog Position Control Mode has been selected. If the problem persists calibration is required.

13. GENERAL OPERATING INFORMATION

For enclosure specifications and dimensions, see (**Tables 1-2 and Figure 15**).

13.1 ENCLOSURE RATINGS AND PRODUCT CERTIFICATIONS

Valmet offers two versions of QB-Series actuator enclosures: the "W" enclosure is weathertight, and the "WX" enclosure which is weathertight and explosion-proof.

13.2 OPERATING TEMPERATURE LIMITS

QB-Series actuators are designed to operate in ambient environments between -40˚F (-40˚C) and 130˚F (55˚C). In outdoor applications where ambient temperatures exceed 80˚F, actuators should be shielded from direct sunlight. In applications with high media temperatures, insulating blankets, heat shields and/or extended mounting shafts should be used to maintain ambient temperatures at the actuator within normal operating limits.

Activation of the heater and thermostat option is recommended for all outdoor applications and may also be used to dry condensation in high humidity environments.

13.3 ACTUATOR MOUNTING

The actuator may be mounted in any position including upside-down. It must be firmly secured to a direct mount flange or sturdy mounting bracket. A minimum of four bolts with lock washers should be used to secure the actuator to the bracket. Flexibility in the bracket is not allowed, and backlash, or "play", in the coupling should be minimized. The actuator output shaft must be in line (centered) with the valve shaft to avoid side-loading the shaft. See (**Figure 15**) for output drive dimensions and mounting hardware specifications.

13.4 LUBRICATION

All rotating power train components are permanently lubricated with multi-purpose Lithium grease suitable for the operating temperature range of the actuator. Additional lubrication is not required in normal operation.

13.5 PROBLEM PREVENTION

Most actuator problems result from improper installation.

- **Incorrect Wiring and Set Up**: Make certain the actuator is wired correctly and travel stops are properly set before power is applied.
- **Coupling, Alignment, and Mounting**: Do not add extra torque! Make certain that the mounting arrangement is sturdy, centered, properly aligned, and that all mounting hardware is secure and properly tightened.
- **Moisture**: Replace the cover tightly and make certain conduit entry holes are sealed properly to prevent moisture infiltration.

13.6 WARRANTY

All QB-Series actuators are backed by a 2 year warranty that covers materials and workmanship. The warranty shall expire 24 months from installation or 30 months from delivery; whichever comes first.

To request a Return Authorization for an actuator within the warranty period, please consult your local Valmet distributor.

13.7 REPAIR SERVICE/ SPARE PARTS

We recommend that electric actuators be directed to our Northeast Service Center for maintenance. The Service Center is equipped to provide rapid turn-around at reasonable cost and offer new product warranty with all reconditioned electric actuators.

For electric actuators outside of the warranty period, request a Return Authorization by calling the Northeast Service Center at (508) 595-5195; or by sending an e-mail to valvconservice@valmet.com.

NOTE: When sending electric actuators to the Service Center for repair, do not disassemble them! The actuator should be relatively clean upon return. For further information on spare parts and service or assistance, visit our Web site at **www.valmet.com/flowcontrol/valve-automation/actuators/valvcon-electric-actuators/**.

NOTE: When ordering spare parts, always include the following information:

a. Actuator model number from the product nameplate
b. Serial number from the product nameplate
c. Part number and/or description

14. SPECIFICATIONS & TECHNICAL INFORMATION

QB-series data

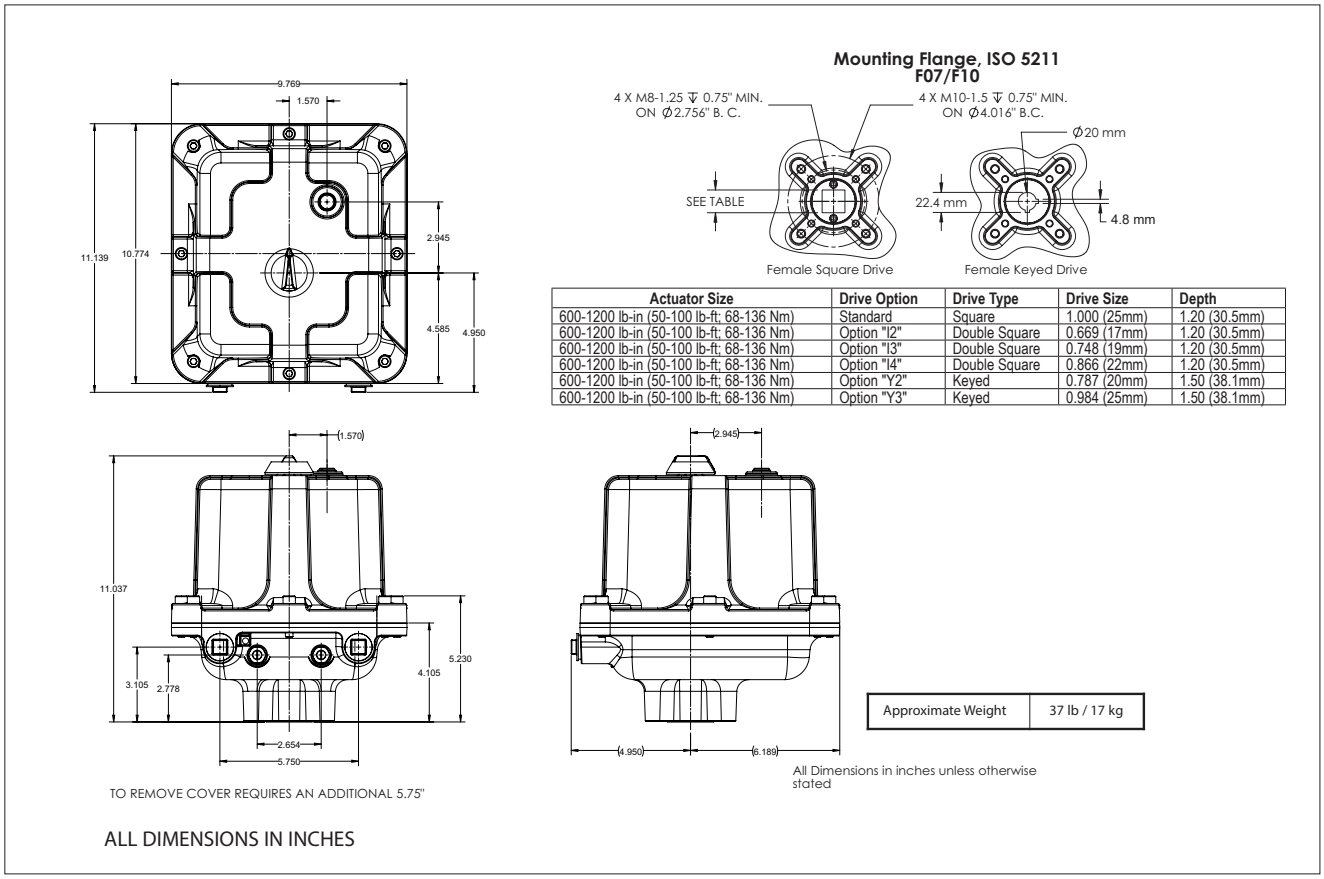
Table 2													
Torque output (full rated load; end of spring torque	24VDC				115VAC				230VAC				All voltages
	Cycle time	Current draw	Initial spring wind	Wind after release	Cycle time	Current draw	Initial spring wind	Wind after release	Cycle time	Current draw	Initial spring wind	Wind after release	Spring release cycle time
	(sec/90°)	(Amps)	secs.	secs.	(sec/90°)	(Amps)	secs.	secs.	(sec/90°)	(Amps)	secs.	secs.	(sec/90°)
600 lb-in; 50 lb-ft; 68 Nm	30	1.5	74	54	30	0.7	79	58	30	0.6	78	56	1.5
1200 lb-in; 100 lb-ft; 136 Nm	39	2.4	89	66	39	1.2	95	75	39	1.1	95	70	1.5

Table 3 Specifications	
Temperature Range	-40°F to 130°F (-40°C to 55°C)
Conduit Connections	(2) 3/4" NPT (3/4" to 1/2" reducing bushings included)
Output	600 to 1200 in-lbs: ISO 5211 F07 and F10 bolt circles, 1" female square standard; see "Dimensions" section and "How to Order" table for additional output options.
Voltage	24 VDC: 21.6 to 26.4 VDC 115 VAC: 103.5 to 126.5 VAC, 50/60 Hz 230 VAC: 207 to 253 VAC, 50/60 Hz
Limit Switches	(2) Single pole, double throw switches rated for 11A 1/2HP 250VAC CSA certified.
Motor	Brushless DC motor with Class B or better insulation; sub-fractional horsepower. Rated for 120 starts per minute.
Lubrication	Permanently lubricated gear train and bearings
Gear Train	Hardened steel, machine cut spur gears
Approximate Weight	37 lbs (17 kg)
Enclosure	Die cast aluminum; with a baked-on, super durable polyester powder coat finish
Cover Screws	Captive cover screws are Class 12.9, M8 x 1.25 x 36 mm socket head cap screw; tighten to between 10 - 12 ft•lb (for non-lubricated fasteners).

14.1 QB-SERIES UNIVERSAL CONTROL BOARD

Table 4 Control Board Specifications	
Input Impedance (Analog Control)	Voltage Input: 35K ohms Current Input: 200 ohms
Analog Control Signal	May be either 4-20mA or 0-10VDC (selectable via on-board slide swithch) Fully compatible with ISA-S50. 1 as a type 4, class L, power isolated device. Input minus (-) and transmit minus (-) are tied together and isolated from power and earth ground.
Resistive Control Signal	Board will accept a resistance control signal as low as 0-100 ohms and as high as 0-10K ohms.
Position Out Signal	May be either 4-20mA or 0-10VDC (selectable via on-board slide switch) Minimum resistive load for voltage output: 1K ohm Maximum resistive load for current output: 500 ohm
Stall Protection	If the actuator cannot achieve the position commanded by the control signal, this feature will remove all power to the motor after 5 seconds. The actuator will not restore power to the motor until the control signal commands the actuator to drive in the opposite direction.
Power Loss Position	User can set the QB-Series actuator to power loss position in the Clockwise (CW) or Counterclockwise (CCW) position. In the event of power loss, mechanical springs return actuator to designated power loss position.
Control Fail Position	In the event of a loss of control signal (with power still supplied), user can choose either the Zero, Span or the Last position via slide switch NOTE: If the the minimum control signal = 0, the fail position must be Last
Position Potentiometer	360° Rotation, 0 ohms to 1k ohms. **NOTE** that actuator travel is limited to 90° of rotation and the potentiometer is geared for maximum resolution.
Local Supervisory Control	User can select manual (MAN) to override control signal and drive actuator by pushing the CW or CCW buttons. Actuator may be manually positioned to any location between the existing Zero and Span settings. For additional range, reset the Zero and Span locations.
Split Range Control	Actuator will accept split range control signal (i.e. 4-12mA or 12-20mA; 0-5V or 5-10V) with no wiring changes.
Reverse Acting	With no wiring changes required, the actuator may be calibrated to drive clockwise upon an increasing control signal, and counterclockwise upon a decreasing signal.
Dead Band	The amount of change in control signal that the actuator will ignore before the output shaft begins to move. Adjustable from 1% to 3%.

QB-series enclosure



Actuator Size	Drive Option	Drive Type	Drive Size	Depth
600-1200 lb-in (50-100 lb-ft; 68-136 Nm)	Standard	Square	1.000 (25mm)	1.20 (30.5mm)
600-1200 lb-in (50-100 lb-ft; 68-136 Nm)	Option "I2"	Double Square	0.669 (17mm)	1.20 (30.5mm)
600-1200 lb-in (50-100 lb-ft; 68-136 Nm)	Option "I3"	Double Square	0.748 (19mm)	1.20 (30.5mm)
600-1200 lb-in (50-100 lb-ft; 68-136 Nm)	Option "I4"	Double Square	0.866 (22mm)	1.20 (30.5mm)
600-1200 lb-in (50-100 lb-ft; 68-136 Nm)	Option "Y2"	Keyed	0.787 (20mm)	1.50 (38.1mm)
600-1200 lb-in (50-100 lb-ft; 68-136 Nm)	Option "Y3"	Keyed	0.984 (25mm)	1.50 (38.1mm)

Approximate Weight	37 lb / 17 kg

Figure 15.

15. HOW TO ORDER – QB-SERIES ELECTRIC ACTUATORS (600 AND 1200 LB-IN)

Example:

Sample model code:

QBWX1200UI3-UP

Table 5

1.	2.	3.	4.	5.	6.
QB	WX	1200	U	I3	-UP

1	Series
QB	QB

2	Enclosure
W	Weathertight (NEMA 4/4X)
WX	Weathertight & Explosion proof (NEMA 4/4X/7&9)

3	Torque
600	600 lb-in (50 lb-ft; 68 Nm)
1200	1200 lb-in (100 lb-ft; 136 Nm)

4	Board Options (1)
U	Universal Control Board

5	Other Options
-	No entry if standard
I2(2)	17mm Female Square Output
I3(2)	19mm Female Square Output
I4(2)	22mm Female Square Output
MB(3)	MODBUS® Communication
Y2(2)	20mm Female Keyed Output
Y3(2)	25mm Female Keyed Output

6	Operating Voltage
-UP	115AC, 230AC, or 24DC

Notes:

1. All QB-Series actuators accept any of the following input voltages (24VDC, 115VAC and 230VAC), are rated for continuous duty cycle, inclue a holding brake, two auxiliary limit switches, 4-20mA or 0-10VDC position feedback, CSA “C US” certification, and a heater/thermostat that can be user-enabled on the option board.
2. The standrad drive output for QB-Series actuators i a 1” female square.
3. The MODBUS® Communication option allows for controlling and polling the unit for diagnostic information using MODBUS® communication signal (RS-485; Two-Wire).

16. QB-SERIES ACTUATORS BY MODEL NUMBER

- **Enclosure "W"** (weathertight) is certified by CSA to meet specifications for NEMA 4/4X; IP 66 for weathertight and dust-tight, environments. It is intended for non-hazardous locations in indoor or outdoor use.
- **Enclosure "WX"** (weathertight & explosionproof) is certified by CSA to meet specifications for NEMA 7&9, hazardous locations, (Class I, Division 1, Groups C, and D; Class II, Division 1, Groups E, F, and G; Class III) as well as to meet NEMA 4/4X and IP 66 specifications.

Table 6 - Sample Model Code: QBWX1200UI3-UP	
Actuator Series	QB
Enclosure Type	WX
Torque	1200
Board Option	U
Other Options (if applicable)	I3
Operating Voltage	-UP

(For enclosure specifications and dimensions see **Table 3** and **Figure 16**).

- **Torque = Breakaway Torque** Valvcon™ electric actuators are rated at breakaway torque. This is the torque required to move a full load immediately upon power-up.

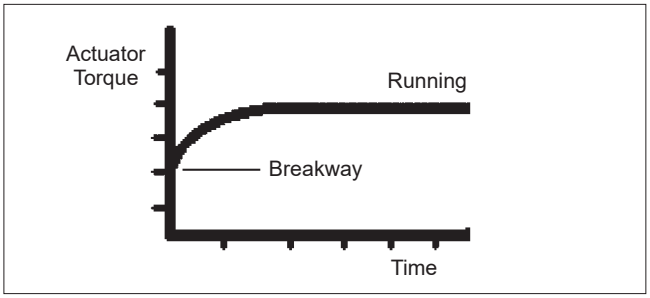


Figure 16.

17. ADDITIONAL ACTUATOR PRODUCTS AND ACCESSORIES FROM VALMET

ADC-Series

- Universal Control Board for On/Off and Modulating applications
- Up to 3000 inch pounds (250 lb•ft; 339 Nm)
- Optional Internal Battery Back-Up
- Continuous Duty Cycle
- Universal Input Power: 115VAC, 230VAC, 24VAC, 12VDC or 24VDC
- NEMA 4/4X and NEMA 4/4X/7&9 enclosures
- CSA (C US) Certified
- CE Compliant
- Certified to ATEX Directive 2014/34/EU: Ex db IIB T6 Gb, and IECEx CSA 14.0057X ("WX" models only)
- IP 66
- Standard Features: auxiliary limit switches, heater/thermostat, manual override and visual position indicator
- Available Options: metric and "keyed" female outputs, MODBUS® and handwheel override

V-Series

- Up to 3000 inch pounds (250 lb-ft; 339 Nm) for On/Off, or Automatic Cycling applications
- 115VAC and 230VAC voltages
- 75% Duty Cycle (55% on 3000 lb-in models)
- NEMA 4/4X and NEMA 4/4X/7&9 enclosures
- CSA (C US) Certified
- CE Compliant
- Certified to ATEX Directive 2014/34/EU:
- Ex db IIB T6 Gb, and IECEx CSA 14.0057X ("WX" models only)
- Standard Features: motor brake, tropical heater/thermostat, auxiliary limit switches, manual override and visual position indicator
- Available Options: Speed Control/Timer Board, metric and "keyed" female outputs and handwheel override

LCR-Series

- Up to 600 inch pounds (50 lb-ft; 68 Nm)
- Economical actuators for Reversing applications
- 25% duty cycle (80% on 12VDC or 24VDC models)
- NEMA 4/4X enclosure
- 115VAC, 230VAC, 24VAC, 12 VDC and 24VDC voltages
- Options include extra limit switches and heater/thermostats
- Male output (standard) or female output (optional)

LCU-Series

- Up to 600 inch pounds (50 lb-ft; 68 Nm)
- Economical actuators for Unidirectional applications
- 25% duty cycle (80% on 12VDC or 24VDC models)
- NEMA 4/4X enclosure
- 115VAC, 230VAC, 24VAC, 12 VDC and 24VDC voltages
- Options include extra limit switches and heater/thermostats
- Male output (standard) or female output (optional)

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