

Valvcon™ V-series electric actuators 115 VAC and 230 VAC with control board installed (Option C)

Installation, maintenance and operating instructions

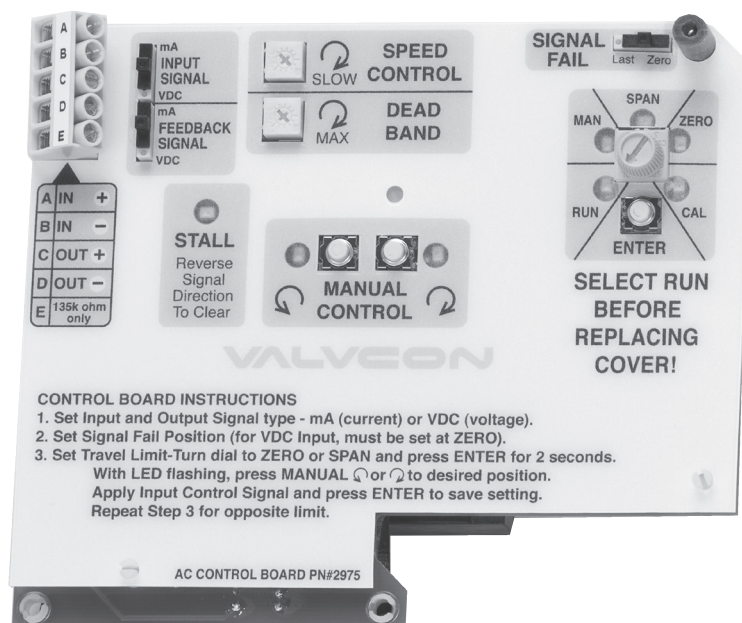


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READ THESE INSTRUCTIONS FIRST!

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™ V-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**).

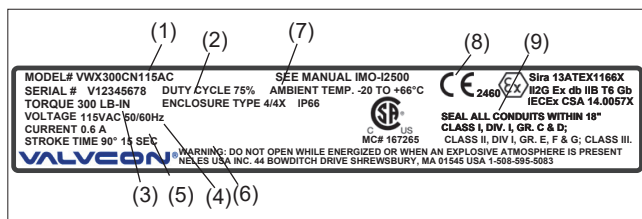


Figure 1. Identification nameplate label

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

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

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

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 CONTROL BOARD P/N VC002975 FOR MODULATING APPLICATIONS

The Control Board connects to the Motor Board with a 10 position plug-in connector and 3 mounting screws that are captured in the board. The Control Board allows the actuator to modulate (change position) in response to a change in an analog control signal. The input control signal may be either current, such as 4-20 mA, or voltage such as 0-10 VDC, or 2-10 VDC. The control board also features analog position feedback, signal fail options, speed control, locked rotor/stall protection, simple push button set-up, and auto calibration.

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

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 SECTION 3.4)

FLAMEPROOF JOINTS ARE NOT INTENDED TO BE REPAIRED.

3.2 OPERATING MODES

The Control Board has five operating modes. **Run, Manual, Set Span, Set Zero** and **CAL** (calibrate). A rotary "Mode Selector Dial" on the Control Board allows the user to change the operating mode. To change mode, turn the rotary selector knob with fingers or a small screwdriver. Five LED indicators around the knob correspond to one of the five modes. When the Control Board mode dial is set to any mode, the corresponding LED turns on, indicating the mode is selected.

- **Run** mode is the basic operating mode. The actuator will respond to a command control signal which is supplied to terminal A and terminal B on the Control Board.
- **Manual** mode permits the user to override the control signal and drive the actuator by using the **[CW]** and **[CCW]** push buttons. In Manual mode the actuator will not travel beyond the saved settings for the Zero and Span stop positions.

- **Set Span** mode permits the user to precisely correlate the end of span travel stop with a corresponding control signal value. Typically, the Span position is the fully counter-clockwise position and maximum control signal value, but Span may be set at any position or signal value.
- **Set Zero** mode permits the user to precisely correlate the opposite 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 or signal value.
- **CAL** mode allows the user to automatically calibrate the position tracking potentiometer without the use of an ohmmeter or other electronic instruments.

FEATURES, SETTINGS AND CONTROLS

The control board is designed to be easy to use and hard to break. Set Up is push button simple and takes one minute! See (Figure 2) for callouts.

- **Enter** is located directly below the mode selector and permits the user to activate modes and confirm settings by pressing the **[ENTER]** button.
- **Control Signal Selection** The board can accept either current or voltage control signals. Make sure the Input Signal Select switch is correctly positioned for the input control signal.
- **Feedback Signal Selection** The board provides a feedback signal indicating actuator output position. This signal can be either current or voltage. Make sure the Feedback Signal Select switch is correctly positioned for the desired feedback signal. If the feedback signal is not used, the switch may be left in either position.
- **Control Fail Position** In the event that the control signal to the actuator is lost and power is still applied, the Signal Fail Position Selector Switch on the Control Board provides for the actuator to remain at its LAST (current) position or drive the actuator to the "ZERO" position. The actuator will maintain the LAST position or Zero position until a control signal returns to

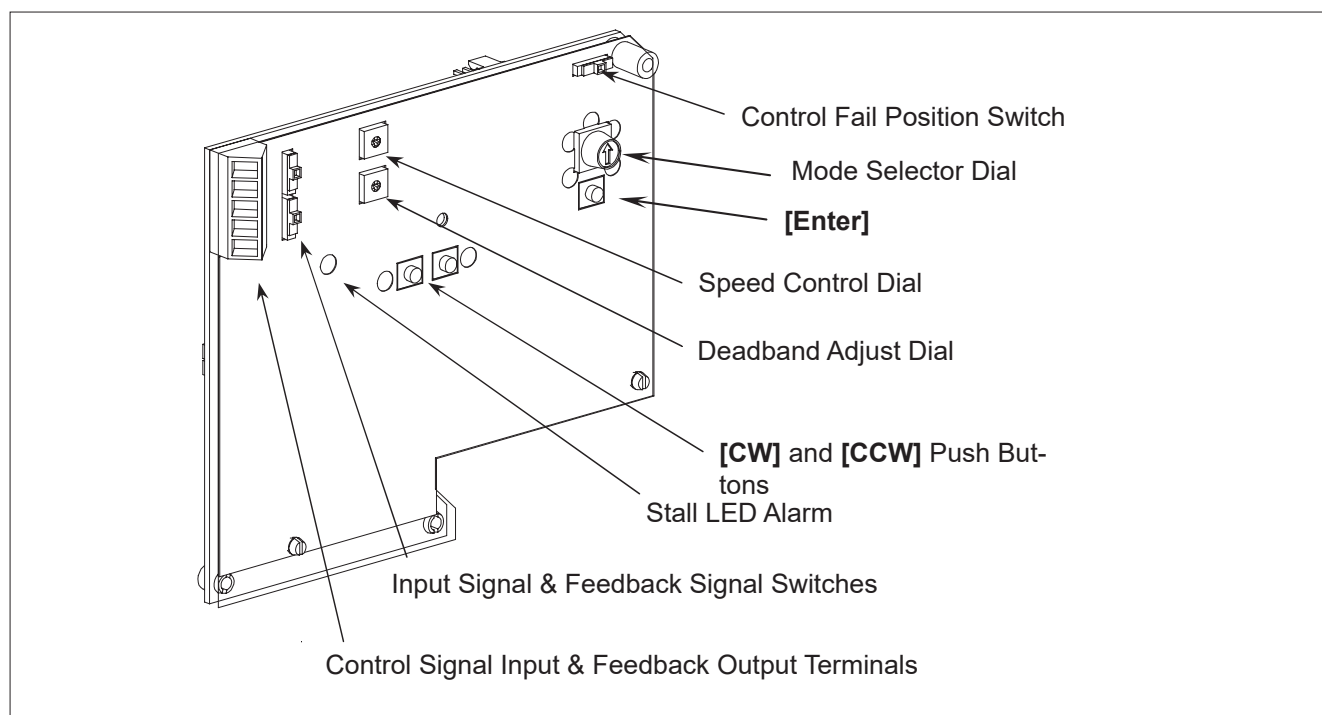


Figure 2.

terminal A and terminal B. **NOTE:** If you use a 0-10 VDC control signal, the actuator will drive to the zero position regardless of the switch setting.

- **Manual Supervisory Control** Selecting Manual (Man) Mode will override the connected control signal and allow driving the actuator to any position between Zero and Span, using the CW and CCW push buttons. There is no need to disconnect or handle live wires.
- **Deadband** Deadband 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 deadband allows the actuator to respond to small control signal changes. Maximum deadband allows the actuator to ignore small control signal changes (such as noise on the control signal). Deadband adjustment from Minimum to Maximum varies the dead band from small (1%) to large (3%) of input signal. The deadband should be set to the maximum amount which the process will allow.
- **Speed Control** The Control Board will slow the actuator by pulsing the motor if the Speed Control feature is utilized. The speed of the actuator can be regulated from 1:1 (normal) to 20:1 (1/20th of the normal cycle time) by adjusting the "Speed Control" dial on the Control Board.
- **Stall (Locked Rotor Protection)** Locked rotor protection prevents the overheating of the motor and possible premature failure. The Control Board provides locked rotor protection and Stall LED Alarm in the event of a stall condition such as a jammed valve or damper. Should the actuator stall before reaching the position commanded by the control signal, the actuator will remove power to the motor within 2-5 seconds. The Stall LED on the Control Board will continue to flash until a reverse control signal clears the stall condition. **NOTE:** If the process does not allow for controller signal reversal; the stall can be cleared by selecting MAN mode and driving the actuator manually using the CW or CCW push buttons. Be sure to select RUN before replacing cover.

3.3 CONTROL BOARD WIRING

NOTE: Assumes option is installed; if installing kit, see section 3.5 of this manual.

To operate the actuator with the Control Board installed, the user must supply power to terminal 1 and terminal 2, **only!** Power to terminal 3 and terminal 4 can cause damage to the Motor Board. See (Figure 3) for Diagram. Control signal wiring to the Control Board terminals should be properly shielded. To further prevent control signal noise, control signal wiring should be separated from the power wiring and should enter the actuator through a conduit opening separate from the entry used for the power wiring.

WARNING

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

Terminal 5, counter-clockwise, and terminal 6, clockwise, position indication does not apply to actuators with the Control Board option. If status feedback is required with the Control Board option, install optional limit switches or use the standard readback feature provided with the Control Board. See (Section 4) for additional switches.

3.4 OPERATION FOR MODULATING APPLICATIONS (MOTOR BOARD AND CONTROL BOARD INSTALLED) (90° ROTATION)*

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

WHEN CONTROL BOARD IS INSTALLED, POWER TO TERMINAL 3 OR TO TERMINAL 4 WILL DAMAGE ELECTRONIC CIRCUIT BOARDS. POWER TERMINALS 1 AND 2; USE [CW] CLOCKWISE AND [CCW] COUNTERCLOCKWISE BUTTONS TO DRIVE ACTUATOR.

SET UP FOR OPERATION

1. Remove actuator cover. Remove the override shaft from the actuator cover bushing; if the actuator is equipped with a handwheel, remove the handwheel before removing the top piece of the "two-piece" shaft from the cover bushing. **NOTE:** Use caution to prevent damage to machined flange surface of cover casting; see cover replacement for additional information.
2. Select Input Control Signal type – "mA" or "VDC" (current or voltage), the actuator will accept 4-20 mA or 0-10 VDC. The unit will also accept a split range signal, i.e. 4-12 mA, 12-20 mA or a 2-10 VDC signal. Slide the [INPUT SIGNAL] switch up to select mA or down to select VDC.
3. Select Output Feedback Signal type – "mA" or "VDC" (current or voltage), the actuator will provide a 4-20 mA or 0-10 VDC feedback signal. Slide the [FEEDBACK SIGNAL] switch up to select mA or down to select VDC.
4. Select Signal Fail Position – "Zero" or "Last" – Slide the [SIGNAL FAIL] to the right to select Zero or to the left to select Last. Selecting Zero will drive the actuator to the minimum signal position upon loss of control signal. If Last is selected the actuator will remain in place upon loss of control signal. If using 0 VDC as the minimum signal, the actuator cannot differentiate between a commanded minimum signal or a loss of signal; therefore, Zero should be selected.

POTENTIOMETER CALIBRATION

- Calibration Field installation of the Control Board option or replacement of the position tracking potentiometer requires calibration of the position tracking potentiometer prior to setting positions and values for Zero and Span. Control Board options installed at the factory are fully calibrated at the factory and should not require further calibration. To confirm proper potentiometer calibration:
 1. Turn the Mode Selector Dial to [CAL] and press [ENTER] for 2 seconds. ([CAL] LED may begin to flash)
 2. Using the CW pushbutton, drive the actuator to the full clockwise position. (as viewed from above)

Wiring Diagram – Modulating Applications (Motor Board and Optional Control Board Installed)

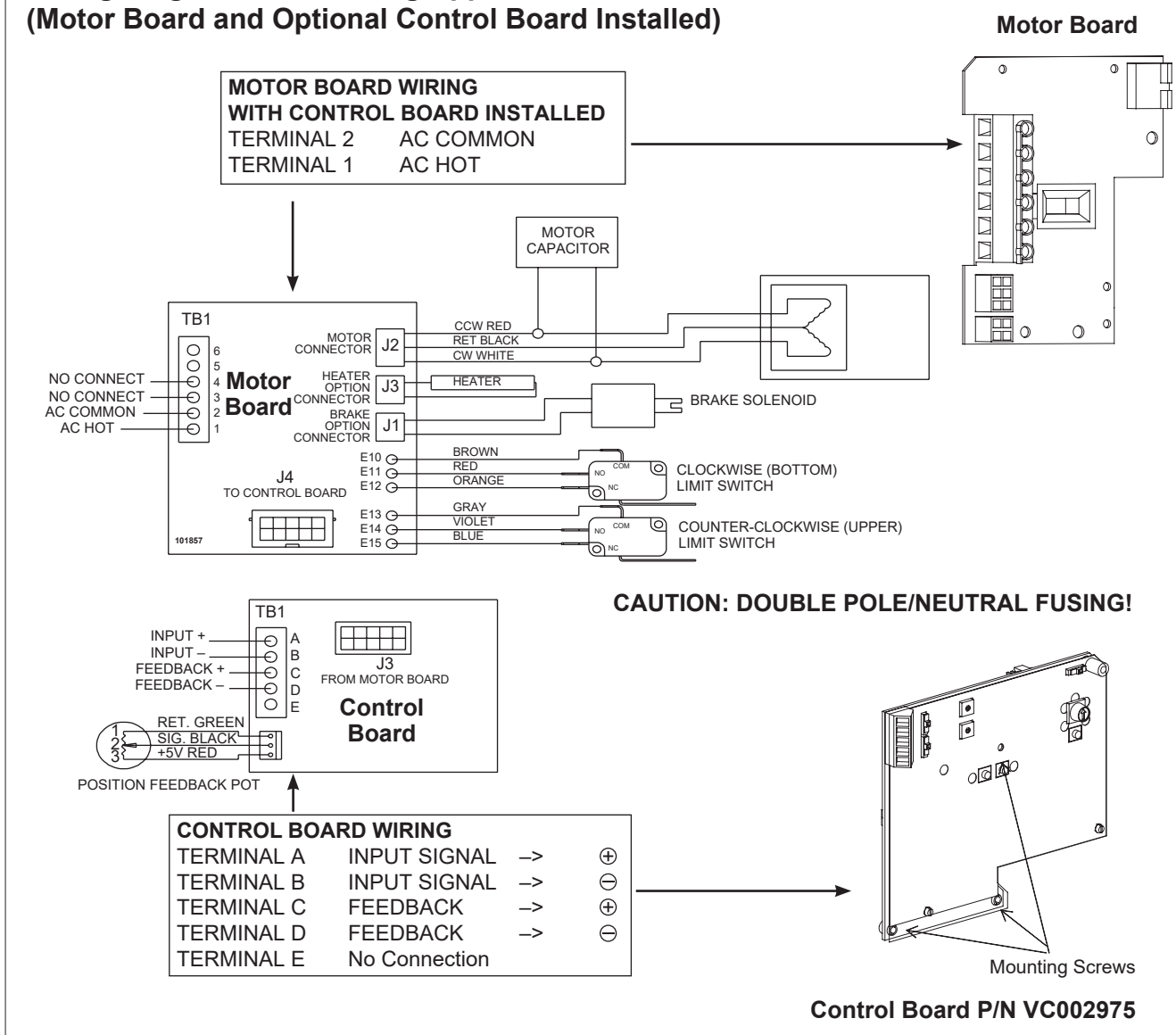


Figure 3.

- If the **[CAL]** LED is flashing, potentiometer calibration is required; proceed to step 3 below.
- If the **[CAL]** LED remains on, calibration is not required; proceed to Setting Zero and Span Positions section below.
- 3. Loosen the set screw in the larger plastic gear with a 1/16" hex wrench.
- 4. Rotate the gear until the LED remains on constantly; hold the gear in place and tighten the set screw. Ensure that the LED remains on after the set screw is tightened. Note: The LED assists the user in locating the proper calibration window; it will flash faster as you approach the calibration window and slower as you move away from it.
- 5. Press the **[ENTER]** button to save the potentiometer setting.

SETTING ZERO AND SPAN POSITIONS

- Setting Zero and Span Positions Once potentiometer calibration has been confirmed, set the desired end of travel positions. Make certain that the limit switch cams are set beyond the desired range for the Zero and Span positions.

- Zero and Span may be set at any position between 0 degrees and 94 degrees of travel. Zero or Span may be either clockwise or counter-clockwise and may be set to either a high value or low value control signal. The Control Board features full reverse acting set up, requiring no wiring changes. See below for simple Set Zero and Set Span procedures.
- * For 180° Rotation order Option Kit P/N VC099180 to replace 90° Potentiometer and Cam Gears.
- For 270° Rotation order Option Kit P/N VC099270 to replace 90° Potentiometer and Cam Gears.

WARNING

WHEN CONTROL BOARD IS INSTALLED, POWER TO TERMINAL 3 OR TO TERMINAL 4 WILL DAMAGE ELECTRONIC CIRCUIT BOARDS. POWER TERMINALS 1 AND 2; USE [CW] CLOCKWISE AND [CCW] COUNTERCLOCKWISE BUTTONS TO DRIVE ACTUATOR.

Set Zero:

1. Turn the Mode Selector Dial to **[ZERO]** and press **[ENTER]** for 2 seconds. The Zero LED will begin to flash.
2. Drive the actuator to desired minimum signal position using the CW or CCW pushbutton. If the "STALL" LED begins to flash; check to see if the limit switch cam is preventing actuator from reaching desired end-of-travel. If necessary back the cam off so that it will trip the switch slightly beyond the desired end-of-travel.
3. Apply input control signal, (i.e. 4 mA).
4. Press the **[ENTER]** button to save the Zero setting.

Set Span:

1. Turn the Mode Selector Dial to **[SPAN]** and press **[ENTER]** for 2 seconds. The Span LED will begin to flash.
2. Drive the actuator to desired maximum signal position using the CW or CCW pushbutton. If the "STALL" LED begins to flash; check to see if the limit switch cam is preventing actuator from reaching desired end-of-travel. If necessary back the cam off so that it will trip the switch slightly beyond the desired end-of-travel.
3. Apply input control signal, (i.e. 20 mA).
4. Press the **[ENTER]** button to save the Span setting.

Verify Zero and Span Settings:

1. Turn the Mode Selector Dial to **[RUN]**.
2. Apply various control signals to verify operation.
3. Replace actuator cover.

PROPER ACTUATOR COVER INSTALLATION

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 2 for captive cover screw specifications. Consult the factory for replacement parts.

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 part(s) must be replaced. Consult the factory for replacement parts.

4. Remove the override shaft from the actuator cover bushing; if the actuator is equipped with a handwheel, remove the handwheel before removing the top piece of the "two-piece" shaft from the cover bushing.
5. Install the override shaft on the square motor shaft; if the actuator is equipped with a handwheel, install the bottom piece of the "two-piece" shaft on the motor shaft and then install the top piece of the shaft onto the bottom piece of the shaft.
6. Align cover so that the override shaft will pass through the override bushing and carefully push it down so that the cover flange contacts the base flange.
7. Once the cover is properly seated, tighten the screws to secure the cover; a cross pattern is recommended for uniform distribution of load.
8. 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.

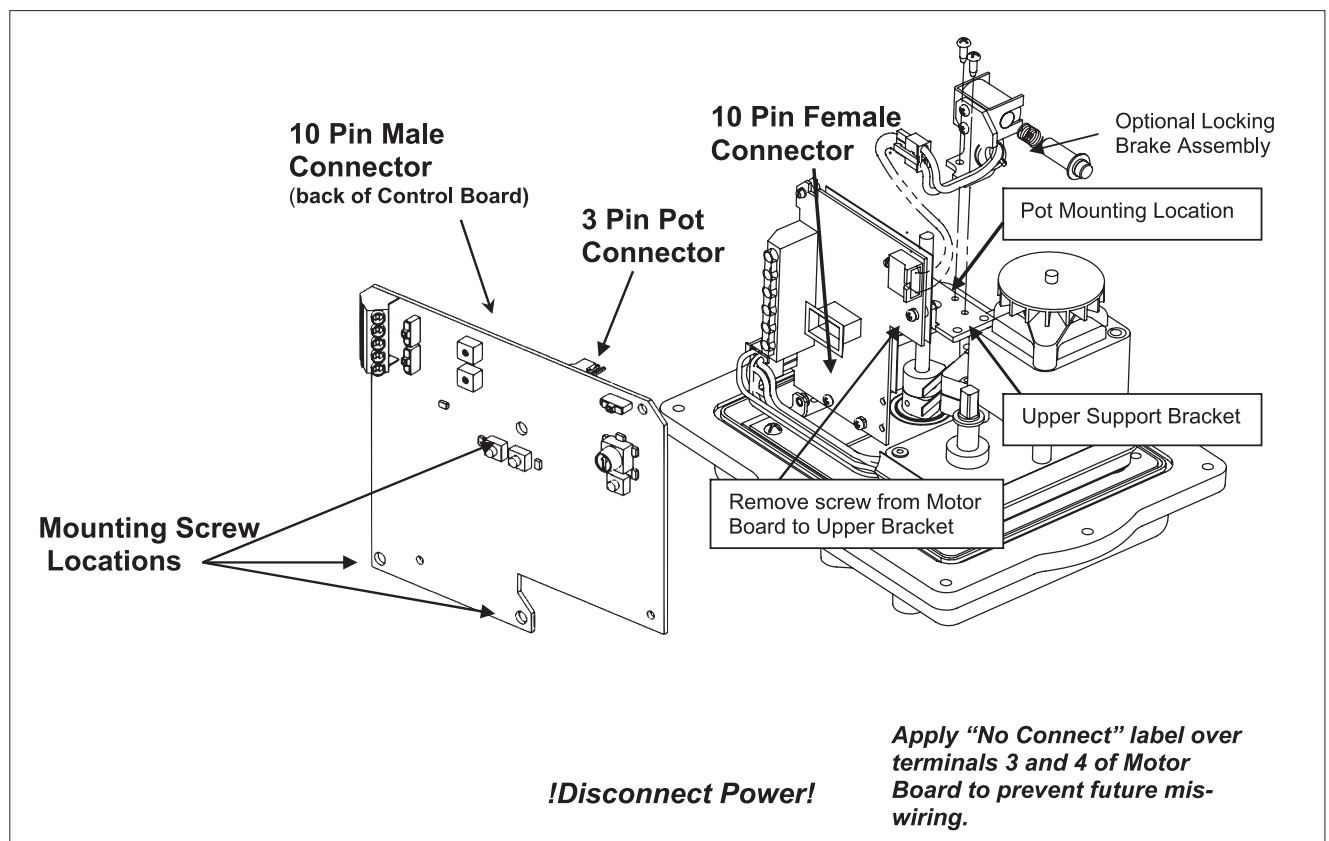


Figure 4.

3.5 BOARD INSTALLATION

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

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.

TOOLS REQUIRED

- Philips Screwdriver
- Hex wrench, 1/16" (supplied with kit)
- Wrench/Nut driver, 1/2"

INSTALLATION INSTRUCTIONS

!Disconnect Power!

1. Remove and discard the screw that secures the Motor Board to the upper bracket. (See Figure 4)
2. Remove 1/2" locking nut from potentiometer (Pot) shaft and insert pot shaft up through hole in upper support bracket. Align locking tab and tighten the locking nut on pot shaft.
3. Plug Pot connector into the 3-Pin connector on the front of Control Board. Plug Control Board into the Motor Board via the 10-pin connector. (Note that the pot wires should be between the two boards)
4. Secure Control Board to Upper and Lower Support Brackets with the 3 mounting screws. (Note that the 1" screw goes in the upper-most mounting hole)
5. Place small (20-tooth) gear on Pot shaft and tighten. Place spacers on Camshaft then place large (60-tooth) gear on Camshaft. Properly positioned, gears should mesh evenly.
6. Supply power to terminal 1 and terminal 2, only. (Affix "No Connect" label; see Figure 4)

Refer to Section 3.4 for Set Up and Calibration Procedures.

4. V-SERIES STANDARD OPTIONS

All V-Series options are designed to be easily installed in the field. Options for all standard V-Series actuators are universal and completely interchangeable with each enclosure size. For additional V-Series Options, see (Table 3). Voltage is not field changeable.

4.1 OPTION "H" – TROPICAL HEATER AND THERMOSTAT P/N VC099716, VC099723

The tropical heater and thermostat option is a self-adhesive, resistance heater strip which is applied to the primary gearbox. It installs with a plug-in connector and is recommended in high-humidity applications. The tropical heater option is also

recommended in installations that experience wide temperature swings in order to evaporate any condensation. Thermostat is pre-set to activate at or below 90°F (32°C) and deactivate at or above 110°F (43°C). The tropical heater draws 15 watts at 115 VAC; 40 watts at 230 VAC (see IMO-I9500 for additional reference).

WARNING

WHENEVER WORKING INSIDE THE ACTUATOR BE SURE TO FOLLOW ALL GUIDELINES, AND HEED ALL WARNINGS IN THIS MANUAL. IF INSTALLING AN OPTION KIT, BE SURE TO READ AND FOLLOW THE SUPPLIED INSTRUCTIONS CAREFULLY AND HEED ANY ADDITIONAL WARNINGS.

This option can be installed in the field; for 115 VAC applications, order kit P/N VC099716 and for 230 VAC applications, order kit P/N VC099723.

Option "H" Tropical Heater and Thermostat Option "T" Standard Heater and Thermostat

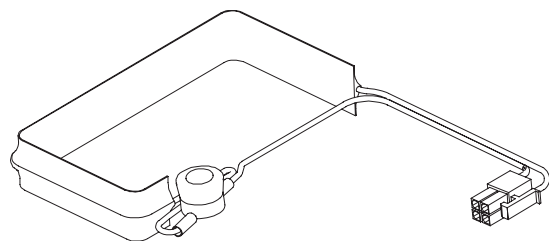


Figure 5.

4.2 OPTION CODES "I1", "I2", "I3", AND "I4" - ISO 5211 METRIC OUTPUT

The actuator is equipped with an ISO 5211 compliant mounting configuration. The standard drive output for 150-600 lb-in models is a 3/4" female square. The standard drive output for 1000-3000 lb-in models is a 1" female square. We offer several female keyed drive output options, consult the "How to Order" section for available sizes for a given actuator model.

This option is factory installed only.

4.3 OPTION "K" – MECHANICAL BRAKE P/N VC099715

The brake option prevents back-driving; it is required on all butterfly valve and damper applications. It is also recommended on PVC ball valves and resilient seated valves. The brake option draws 4 watts and is universal to all standard V-Series actuators. It is simple to install with a plug-in connector and two philips head mounting screws. No additional brackets are required.

WARNING

WHENEVER WORKING INSIDE THE ACTUATOR BE SURE TO FOLLOW ALL GUIDELINES, AND HEED ALL WARNINGS IN THIS MANUAL. IF INSTALLING AN OPTION KIT, BE SURE TO READ AND FOLLOW THE SUPPLIED INSTRUCTIONS CAREFULLY AND HEED ANY ADDITIONAL WARNINGS.

This option can be installed in the field; order kit P/N VC099715.

4.4 OPTION “P” – FEEDBACK POTENTIOMETER P/N VC099200

The Feedback Potentiometer option provides 0 – 1000 Ohm resistance feedback and includes a 12-position terminal block for internal wiring (see IMO-I9200 for additional reference).

WARNING

WHENEVER WORKING INSIDE THE ACTUATOR BE SURE TO FOLLOW ALL GUIDELINES, AND HEED ALL WARNINGS IN THIS MANUAL. IF INSTALLING AN OPTION KIT, BE SURE TO READ AND FOLLOW THE SUPPLIED INSTRUCTIONS CAREFULLY AND HEED ANY ADDITIONAL WARNINGS.

This option can be installed in the field; order kit **P/N VC099200**.

4.5 OPTION “S2” – TWO AUXILIARY LIMIT SWITCHES P/N VC099000

The extra switches and stainless steel cams provide dry contacts and are fully adjustable to trip at any position. They are often used for position indication or to interlock other devices (such as in sequencing operations). The switches are single pole, double throw switches rated for 1/2 HP, 11 amps at 250 VAC, CSA certified. Auxiliary switch kit **P/N VC099000** is universal to all standard V-Series actuators and includes “flying wiring leads” for termination inside of the actuator enclosure using the supplied 6-position terminal block.

WARNING

WHENEVER WORKING INSIDE THE ACTUATOR BE SURE TO FOLLOW ALL GUIDELINES, AND HEED ALL WARNINGS IN THIS MANUAL. IF INSTALLING AN OPTION KIT, BE SURE TO READ AND FOLLOW THE SUPPLIED INSTRUCTIONS CAREFULLY AND HEED ANY ADDITIONAL WARNINGS.

This option can be installed in the field; order kit **P/N VC099000**.

4.6 OPTION “T” – HEATER AND THERMOSTAT P/N VC099515, P/N VC099523

The heater and thermostat option is a self-adhesive, resistance heater strip which is applied to the primary gearbox. It installs with a plug-in connector and is recommended in installations where the ambient temperatures drop below 32°F (0°C). Thermostat is pre-set to activate at or below 40°F (4°C) and deactivate at or above 60°F

(15°C). The heater draws 15 watts at 115 VAC; 40 watts at 230 VAC (see IMO-I9500 for additional reference).

WARNING

WHENEVER WORKING INSIDE THE ACTUATOR BE SURE TO FOLLOW ALL GUIDELINES, AND HEED ALL WARNINGS IN THIS MANUAL. IF INSTALLING AN OPTION KIT, BE SURE TO READ AND FOLLOW THE SUPPLIED INSTRUCTIONS CAREFULLY AND HEED ANY ADDITIONAL WARNINGS

This option can be installed in the field; for 115 VAC applications, order kit **P/N VC099515** and for 230 VAC applications, order kit **P/N VC099523** (see **Figure 5**).

4.7 OPTION CODES “Y1”, “Y2”, AND “Y3” - KEYED OUTPUT

The actuator is equipped with an ISO 5211 compliant mounting configuration. The standard drive output for 150-600 lb-in models is a 3/4" female square. The standard drive output for 1000-3000 lb-in models is a 1" female square. We offer several female keyed drive output options, consult the “How to Order” section for available sizes for a given actuator model.

This option is factory installed only.

4.8 OPTION “Z” – HANDWHEEL OVERRIDE P/N VC009097, P/N VC009098

All V-Series actuators are supplied with a wrench-operated manual override shaft. If the Handwheel Override option is selected the shaft is replaced by a declutchable shaft and a six-inch handwheel (see IMO-I9090 for additional reference).

WARNING

WHENEVER WORKING INSIDE THE ACTUATOR BE SURE TO FOLLOW ALL GUIDELINES, AND HEED ALL WARNINGS IN THIS MANUAL. IF INSTALLING AN OPTION KIT, BE SURE TO READ AND FOLLOW THE SUPPLIED INSTRUCTIONS CAREFULLY AND HEED ANY ADDITIONAL WARNINGS

This option can be installed in the field; for 150 – 600 lb•in (12 - 25 lb•ft; 17 - 68 Nm) models order kit **P/N VC009097** and for 1000 – 3000 lb•in (83 - 250 lb•ft; 113 - 339 Nm) models order kit **P/N VC009098**.

Option “K” - Mechanical Brake

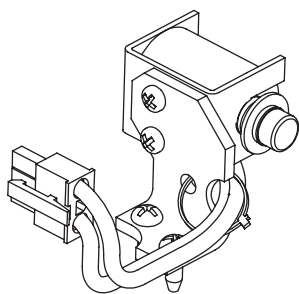


Figure 5.

Option “S2” - Two Auxiliary Limit Switches

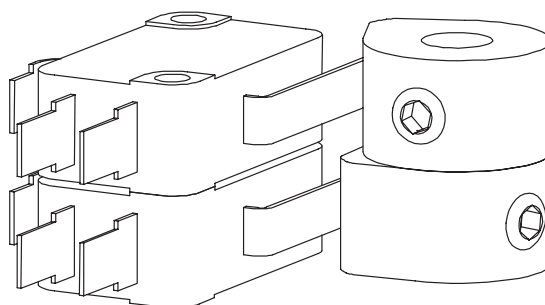


Figure 6.

4.9 VOLTAGE

115 VAC or 230 VAC. V-Series actuators are rated for full torque at +/- 10% of the nominal voltage at 60 Hz. Note: operation at 50 Hz will proportionally decrease the duty cycle and increase the cycle time. V-Series actuators are rated for a minimum of 75%* duty cycle at 60 Hz at/below 104°F (40°C).

* 55% duty cycle for 3000 lb•in actuators.

5. GENERAL OPERATING INFORMATION

For enclosure specifications and dimensions, see (Tables 1-2 and Figure 8).

5.1 ENCLOSURE RATINGS AND PRODUCT CERTIFICATIONS

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

5.2 WIRING

WARNING

VALVCON™ AC VOLTAGE ACTUATORS USE REVERSING INDUCTION MOTORS WHICH CAUSE HIGH VOLTAGES. DEVICES CONNECTED TO TERMINAL 3 AND TO TERMINAL 4 MUST BE RATED FOR MINIMUM 250 VAC (440 VAC FOR 230 VAC APPLICATIONS).

CONTROLLERS WITH SOLID STATE OUTPUTS MUST BE RATED FOR MORE THAN 250 VAC. WE STRONGLY RECOMMEND THAT RELAY OUTPUTS BE USED ON CONNECTED DEVICES. DUE TO THE INDUCTION FEEDBACK VOLTAGE, MULTIPLE ACTUATORS CAN NOT BE WIRED IN PARALLEL. SEPARATE (ISOLATED CONTACTS) MUST BE PROVIDED FOR EACH ACTUATOR. IF THE ACTUATOR IS DRIVEN BY CONTACTS ON A PC OR PLC, MAKE SURE THE CONTACTS HAVE THE PROPER RATINGS.

5.3 DUTY CYCLE AND MOTOR PROTECTION

V-Series actuators can operate continuously for up to 15 minutes at 104°F (40°C). After 15 minutes of continuous operation they are rated for 75% duty cycle operation at 104°F and for 30 starts per minute. Duty cycles decrease at temperatures in excess of 104°F. Duty cycle is the maximum proportion of "on" time and the minimum required "off" time to prevent thermal overloading. Actuators with cycle times of 30 seconds must rest at least 10 seconds between cycles. Higher temperature applications decrease duty cycle.

AC motors contain thermal overload protection. Exceeding the rated duty cycle may cause the thermal overload switch to temporarily remove power to the motor and cause it to stall. After the motor cools, the actuator will resume normal operation. The thermal protector is a safety device, designed for infrequent use. Constant tripping of the thermal overload protector may cause premature motor failure.

5.4 OPERATING TEMPERATURE LIMITS

V-Series actuators are designed to operate in ambient environments between -40°F (-40°C) and 150°F (66°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.

Heaters and thermostats are recommended for all outdoor applications and may also be used to dry condensation in high humidity environments.

5.5 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 8) for output drive dimensions and mounting hardware specifications.

WARNING

FAILURE TO USE MANUAL OVERRIDE PROPERLY COULD RESULT IN DAMAGE TO THE ACTUATOR GEARING. ENSURE THAT THE OVERRIDE IS FULLY DISENGAGED AND DO NOT USE EXCESSIVE FORCE WHEN MANUALLY POSITIONING ACTUATOR. DO NOT DRIVE THE ACTUATOR BEYOND THE TRAVEL LIMIT SETTINGS. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN DAMAGE TO THE ACTUATOR AND/OR FINAL DRIVE ELEMENT.

5.6 MANUAL OVERRIDE

To use the manual override, push the override shaft down approximately 1/4 inch to disengage the motor from the gear train. Failure to disengage motor prior to turning override will cause damage to the actuator. While holding the shaft down, turn the shaft with a wrench or handle to the desired position. **NOTE:** The override shaft on actuators below 1000 lb•in must be rotated in the opposite direction of the desired direction of the output shaft. In actuators 1000 lb•in and above, the override and the output shaft turn in the same direction.

Do not drive the actuator beyond the limit switch settings; it is possible to damage installed options such as a feedback potentiometer. The manual override shaft must be returned to its fully upward position before the motor is re-engaged. Rotate the shaft slightly to align the spur gears until the shaft "springs" back to its re-engaged position. **NOTE:** The rotation direction of the output may not be the same as the rotation of the override shaft!

5.7 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.

5.8 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.

5.9 WARRANTY

All V-Series actuators are backed by a 2-year warranty that covers materials and workmanship. The warranty expires 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 Neles distributor.

5.10 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@neles.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.neles.com/products/actuators/electric-actuators/. **NOTE:** When ordering spare parts, always include the following information:

- a. Actuator model number from the product identification nameplate label.
- b. Serial number from the product identification nameplate label.
- c. Part number and/or description of the part required.
- d. Required quantity.

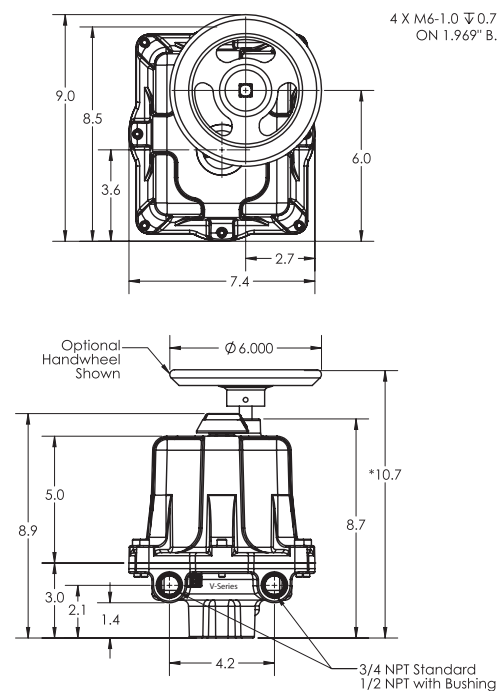
6. SPECIFICATIONS & TECHNICAL INFORMATION

Table 1 - Torque & VA Ratings									
Torque Output (Breakaway)	Speed (seconds per 90° rotation)	Duty Cycle (at/below 104°F/40°C)	Duty Cycle (at max temp; 150°F/66°C)	VA Rating		Max Running Current at Full Load (True RMS)		Max Effective Peak Inrush Current (= .66 x Peak rush)	
				115VAC 60Hz	230VAC 60Hz	115VAC 60Hz	230VAC 60Hz	115VAC 60Hz	230VAC 60Hz
150 lb-in; 12 lb-ft; 17 Nm	8	75%; 8 sec ON, 3 sec OFF	50%; 8 sec ON, 8 sec OFF	70vA	115vA	0.6 amps	0.5 amps	1.25 amps	0.924 amps
300 lb-in; 25 lb-ft; 34 Nm	15	75%; 15 sec ON, 5 sec OFF	50%; 15 sec ON, 15 sec OFF	70vA	115vA	0.6 amps	0.5 amps	1.25 amps	0.924 amps
600 lb-in; 50 lb-ft; 68 Nm	30	75%; 30 sec ON, 10 sec OFF	50%; 30 sec ON, 30 sec OFF	70vA	115vA	0.6 amps	0.5 amps	1.25 amps	0.924 amps
1000 lb-in; 83 lb-ft; 113 Nm	25	75%; 25 sec ON, 9 sec OFF	50%; 25 sec ON, 25 sec OFF	92vA	161vA	0.8 amps	0.7 amps	1.66 amps	1.29 amps
1500 lb-in; 125 lb-ft; 169 Nm	40	75%; 40 sec ON, 14 sec OFF	50%; 40 sec ON, 40 sec OFF	92vA	161vA	0.8 amps	0.7 amps	1.66 amps	1.29 amps
2000 lb-in; 167 lb-ft; 226 Nm	55	75%; 55 sec ON, 19 sec OFF	50%; 55 sec ON, 55 sec OFF	92vA	161vA	0.8 amps	0.7 amps	1.66 amps	1.29 amps
2500 lb-in; 208 lb-ft; 282 Nm	70	75%; 70 sec ON, 24 sec OFF	35%; 70 sec ON, 130 sec OFF	92vA	161vA	0.8 amps	0.7 amps	1.66 amps	1.29 amps
3000 lb-in; 250 lb-ft; 339 Nm	75	55%; 75 sec ON, 62 sec OFF	25%; 75 sec ON, 225 sec OFF	92vA	161vA	0.8 amps	0.7 amps	1.66 amps	1.29 amps

Table 2 - Specifications	
Temperature Range	-40°F to 150°F (-40°C to 66°C); ATEX Temperature rating -20°C to 66°C
Conduit Connections	(2) 3/4" NPT all sizes (3/4" to 1/2" reducing bushings included)
Output	150 to 600 in-lbs: ISO 5211 F05 and F07 bolt circles, 3/4" female square; see "Dimensions" section and "How to Order " table for additional output options. 1000 to 3000 in-lbs: ISO 5211 F07 and F10 bolt circles, 1" female square; see "Dimensions" section and "How to Order " table for additional output options.
Duty Cycle	The actuator may run continuously at temperatures at/below 104° F for up to 15 minutes. After that 15 minutes, the actuators may run up to 75% duty cycle (between each full cycle), the actuator must rest for 1/3 of the 90 degree cycle time. NOTE: At 50 Hz, the duty cycle is ~60% at 104° F (40°C).
Voltage	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 250 VAC, CSA certified, fuse protected. Two standard switches are used for end of travel control, and for pilot or position indication at terminal 5 and terminal 6. Indication outputs are protected by 0.25 AMP permanent auto reset polyfuses – reset time approximately 3 mins.
Motor	Split phase, capacitor driven motor with Class B or better insulation; sub-fractional horsepower
Lubrication	Permanently lubricated gear train and bearings
Gear Train	Hardened steel spur gears
Approximate Weight	17 lbs (8 kg) for sizes up to 600 lb•in (50 lb•ft; 68 Nm) 31 lbs (14 kg) for sizes 1000 lb•in (83 lb•ft; 113 Nm) and above
Enclosure	Die cast aluminum; with a baked-on, super durable polyester powder coat finish
Cover Screws	Captive cover screws for models starting with V are Class 12.9, M6 x 1.0 x 30 mm socket head cap screw; tighten to between 48 - 72 in•lb (for non-lubricated fasteners). Captive cover screws for models starting with LV 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).

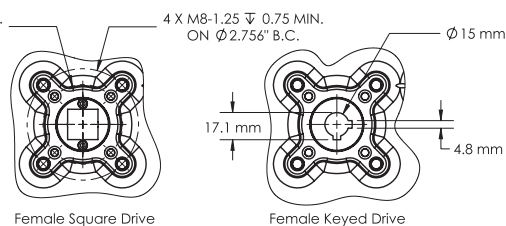
6.1 DIMENSIONS

V-SERIES ENCLOSURES (150-600 LB-IN)

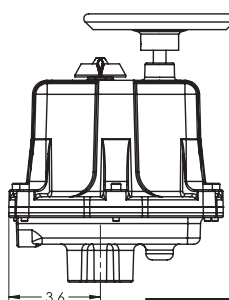


*9.7 WITHOUT HANDWHEEL
TO REMOVE COVER REQUIRES AN ADDITIONAL 4.75"

Mounting Flange, ISO 5211 F05 / F07



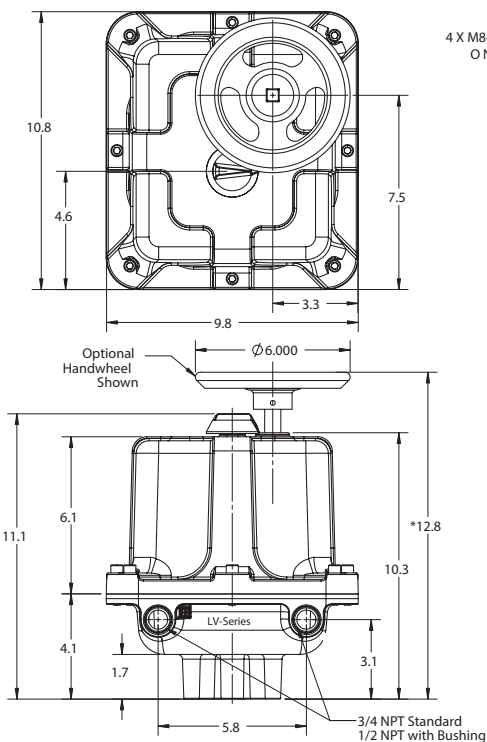
Actuator Size	Drive Option	Drive Type	Drive Size	Depth
150-600 lb-in (12-50 lb-ft; 17-68 Nm)	Standard	Square	0.750 (19mm)	0.90 (22.9mm)
150-600 lb-in (12-50 lb-ft; 17-68 Nm)	Option "11"	Double Square	0.551 (14mm)	0.90 (22.9mm)
150-600 lb-in (12-50 lb-ft; 17-68 Nm)	Option "12"	Square	0.669 (17mm)	0.90 (22.9mm)
150-600 lb-in (12-50 lb-ft; 17-68 Nm)	Option "Y1"	Keyed	0.591 (15mm)	1.40 (35.6mm)
150-600 lb-in (12-50 lb-ft; 17-68 Nm)	Option "Y2"	Keyed	0.787 (20mm)	1.40 (35.6mm)



Approximate Weight	17 lb / 8 kg
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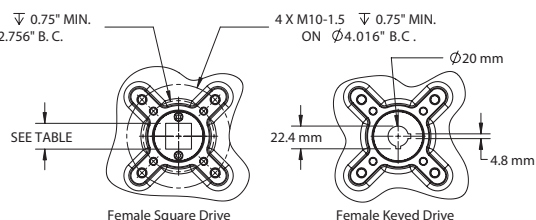
All Dimensions in inches unless otherwise stated

V-SERIES ENCLOSURES (1000-3000 LB-IN)

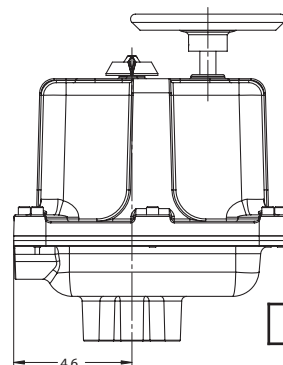


*11.7 WITHOUT HANDWHEEL
TO REMOVE COVER REQUIRES AN ADDITIONAL 5.75"

Mounting Flange, ISO 5211
F07 / F10



Actuator Size	Drive Option	Drive Type	Drive Size	Depth
1000-3000 lb-in (83-250 lb-ft; 113-339 Nm)	Standard	Square	1.000 (25mm)	1.20 (30.5mm)
1000-3000 lb-in (83-250 lb-ft; 113-339 Nm)	Option 12"	Double Square	0.669 (17mm)	1.20 (30.5mm)
1000-3000 lb-in (83-250 lb-ft; 113-339 Nm)	Option 13"	Double Square	0.748 (19mm)	1.20 (30.5mm)
1000-3000 lb-in (83-250 lb-ft; 113-339 Nm)	Option 14"	Double Square	0.866 (22mm)	1.20 (30.5mm)
1000-3000 lb-in (83-250 lb-ft; 113-339 Nm)	Option "Y2"	Keyed	0.787 (20mm)	1.50 (38.1mm)
1000-3000 lb-in (83-250 lb-ft; 113-339 Nm)	Option "Y3"	Keyed	0.984 (25mm)	1.50 (38.1mm)



Approximate Weight	31 lb / 14 kg
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All Dimensions in inches unless otherwise stated

Figure 7.

6.2 EXPLODED VIEW

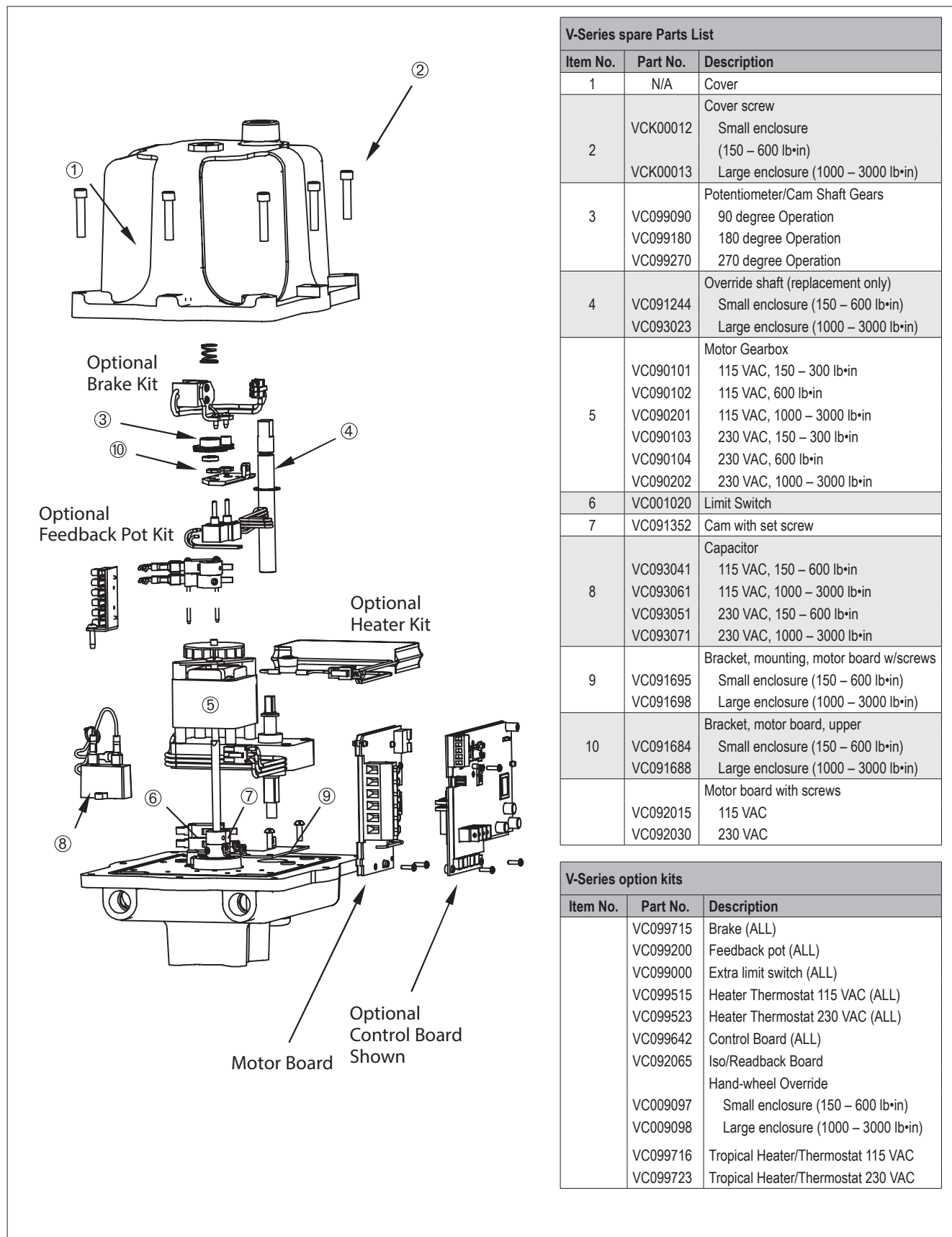


Figure 9.

7. V-SERIES ACTUATORS BY MODEL NUMBER

How To Order - V-Series Electric Actuators										
Actuator Series	Enclosure Type		Torque		Board Options (see note 1)		Other Options (if desired)		Operating Voltage	
	Order Code		Order Code	Description	Order Code	Description	Order Code	Description	Order Code	Description
V	W	Weathertight	150	150 in lb	C	Control Board	H (see note 2)	Tropical Heater/Thermostat	N115AC	115VAC
		NEMA 4/4X	300	300 in lb	J	Speed Control/Timer Board	I1 (see note 3)	14mm Female Square Output	N230AC	230VAC
			600	600 in lb	U	Iso/Readback Board	I2 (see note 3)	17mm Female Square Output		
	WX	Weathertight & Explosionproof NEMA 4/4X/7&9					K	Brake		
							P	Feedback Potentiometer		
							S2	Two Auxiliary Limit Switches		
							T (see note 4)	Heater/Thermostat		
							Y1 (see note 3)	15mm Female Keyed Output		
							Y2 (see note 3)	20mm Female Keyed Output		
							Z	Handwheel		
LV	W	Weathertight	1000	1000 in lb	C	Control Board	H (see note 2)	Tropical Heater/Thermostat	N115AC	115VAC
		NEMA 4/4X	1500	1500 in lb	J	Speed Control/Timer Board	I2 (see note 3)	17mm Female Square Output	N230AC	230VAC
			2000	2000 in lb	U	Iso/Readback Board	I3 (see note 3)	19mm Female Square Output		
	WX	Weathertight & Explosionproof NEMA 4/4X/7&9	2500	2500 in lb			I4 (see note 3)	22mm Female Square Output		
			3000	3000 in lb			K	Brake		
							P	Feedback Potentiometer		
							S2	Two Auxiliary Limit Switches		
							T (see note 4)	Heater/Thermostat		
							Y2 (see note 3)	20mm Female Keyed Output		
							Y3 (see note 3)	25mm Female Keyed Output		
							Z	Handwheel		

NOTES:

- Select only one board option, as needed.
- This heater option activates at or below 90°F and deactivates at 110°F; it is recommended in high-humidity applications.
- The standard drive output for 150 - 600 lb-in actuators is a 3/4" female square; the standard drive output for 1000 - 3000 lb-in actuators is a 1" female square.
- This heater option activates at or below 40°F and deactivates at 60°F; it is recommended in applications where the temperature may drop below 32°F.

For enclosure specifications and dimensions see **Tables 1-2 and Figure 8**.

- Enclosure "W"** (weathertight) is certified by CSA to meet specifications for NEMA 4/4X; IP 66 for weathertight and dust-tight, environments and is CE compliant. It is intended for non-hazardous locations; 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. The enclosure is CE compliant, certified to ATEX directive 2014/34/EU: Ex db IIB T6 Gb, and IECEx CSA 14.0057X.

Sample Model Code: LVW1500CHI3KS2N230AC

Actuator Series	LV
Enclosure Type	W
Torque	1500
Board Option	C
Other Options (if applicable)	H I3 K S2
Operating Voltage	N230AC

- 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.

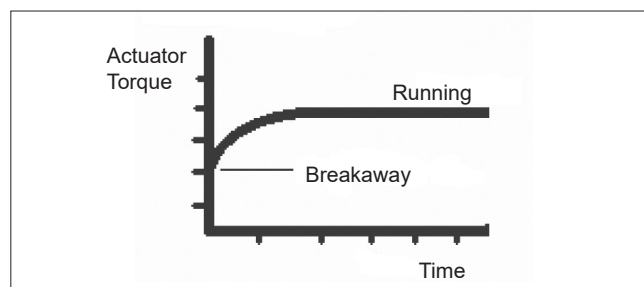


Figure 10.

8. DECLARATION OF CONFORMITY

Manufacturer:

Neles USA Inc.
44 Bowditch Drive
Shrewsbury, MA 01545 USA

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Products:

VALVCON™ Electric Actuators – Series V, and LV

Model – Type	Certificates / Directives / Standards	Marking
Models beginning with VWX150, VWX300, VWX600, or LVWX1000, LVWX1500, LVWX2000, LVWX2500, and LVWX3000	EU Type-Examination Certificate # Sira 13ATEX1166X ATEX 2014/34/EU MD 2006/42/EC EMC 2004/108/EC EN IEC 60079-0:2018 EN 60079-1:2014 IECEX Certificate of Conformity IECEX CSA 14.0057X IEC 60079-0:2017 IEC 60079-1:2014-06	 II 2 G  2460 Ex db IIB T6 Gb Sira 13ATEX1166X IECEX CSA 14.0057X
Models beginning with VW150, VW300, VW600, or LVW1000, LVW1500, LVW2000, LVW2500, and LVW3000	MD 2006/42/EC EMC 2004/108/EC	

Specific Conditions of Use:

- The maximum constructional gap (ic) is 0.038 mm which is less than that specified in Table 2 of EN 60079-1:2014.
- Flameproof joints are not intended to be repaired.
- Cover captive screws Class 12.9, M8 x 1.25 x 36 mm socket head shall be used on LVWX Series and Class 12.9, M6 x 1.0 x 30 mm socket head shall be used on VWX Series.

ATEX Notified Bodies for the EU-Type Examination Certificates:

Sira Hawarden, UK (Notified Body Number 0518)

Quality Assurance Certificates:

ISO 9001:2015 73538-2010-AQ-FIN-FINAS
ATEX 2014/34/EU Annex IV Presafe 18 ATEX 91983Q (Notified Body Number 2460)

We declare that the products, as described, are in conformity with the listed standards and directives.

Place of Issue: Shrewsbury, MA USA

Date of Issue: June 1, 2020



Matti Rousku, Quality Manager
Neles USA Inc.

9. ADDITIONAL ACTUATOR PRODUCTS AND ACCESSORIES FROM NELES

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

ESR-Series

- Up to 600 inch pounds (50 lb•ft; 68 Nm) for true "Two-Wire" On/Off applications
- 80% Duty Cycle
- 115VAC and 230VAC voltages
- NEMA 4/4X and NEMA 4/4X/7&9 enclosures
- Available Options: dynamic brake, extra limit switches, heater/thermostats and metric and "keyed" female outputs

I-Series Network Capable

- AS-Interface
- DeviceNet[™]
- Foundation Fieldbus
- Other fieldbus protocols (consult factory)
- CSA Certified to Canadian and U.S. standards

QX-Series

- Up to 3000 inch pounds (250 lb•ft; 339 Nm) for On/Off applications
- Economical NEMA 4/4X/7&9 solution
- 12VDC & 24VDC voltages
- 80% Duty Cycle
- CSA (C US) Certified
- Standard Features: auxiliary limit switches, dynamic brake, manual override and visual position indicator
- Available Options: metric and "keyed" female outputs, heater/thermostats 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)

Q6-Series for Remote Solar Applications

- 600 inch pounds (50 lb•ft; 68 Nm)
- 12VDC
- Low current draw
- 80% Duty Cycle
- NEMA 4/4X/7&9
- CSA (C US) Certified

Valmet Flow Control Oy

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flowcontrol@valmet.com

Tel. +358 10 417 5000.

www.valmet.com/flowcontrol

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For more information www.neles.com/trademarks

