

VALVCON® V-SERIES ACTUATOR 115VAC AND 230VAC

GENERAL

Metso is a leading designer and provider of compact, reliable, electronically controlled electric actuators for valves and dampers. We offer a complete line of Valvcon electric actuators for accurate positioning of dampers and valves in the aerospace, automotive, consumer services, discrete manufacturing, energy, environmental, oil/pipeline, petrochemical, power/utilities, process, recreation, transportation, and water/wastewater industries.

Metso has developed and introduced the industry's most innovative electric actuator features, including simple "set and go" calibration, intelligent processor-based digital electronics, "plug-in" accessory boards, back-up power, as well as electric actuators designed for remote control, solar-powered applications and two-wire network applications.

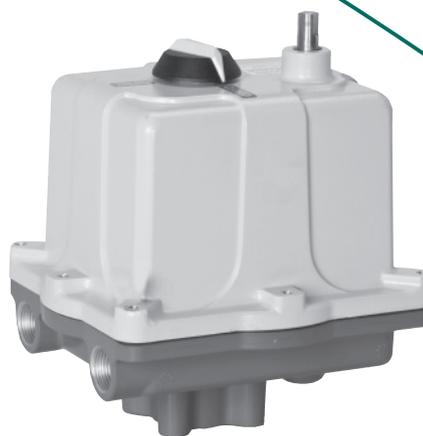
SPECIFICATIONS

The quarter-turn electric actuator complies with Part 15, Class A of the FCC regulations for emissions and conducted radiation for industrial devices. meets NEMA standards for use in weathertight or weathertight and hazardous locations. The actuator is a single, complete unit composed of a compact cast aluminum housing, motor, gearing, limit switches controlled by metal cams for end of travel control, a mechanical position indicator, and a wrench-operated manual override shaft. Actuator mounting flanges comply with ISO 5211 standards incorporating a female drive for direct output coupling. The actuator is capable of operating in ambient environments of -40° F to 150° F.

FEATURES AND BENEFITS

Motor

The motor is capable of running continuously at full torque for up to 15 minutes at ambient temperatures at or below 104 degrees F. Subsequently, the motor is capable of 75% duty cycle. Motors are split phase, capacitor driven with an auto reset thermal sensor, and provide high starting torque and are totally enclosed within the actuator's housing cover.



Lubrication

All rotating power train components are coated with a multi-purpose grease. Lubricants are suitable for ambient conditions of -40° F to 150° F.

Gearing

The powertrain is comprised of hardened steel, machine cut spur gears. Non-metallic, aluminum, cast or stamped gearing is not used.

Manual Operation

A wrench-operated override shaft is provided for manual operation. As an option, a metallic hand wheel may also be provided. The override device is engaged through a declutching mechanism, which separates the final output drive from the motor output.

Limit Switches

Actuators have two standard end of travel switches, single pole double throw, rated at 11 amps at 250 VAC. The limit switches are activated by metal cams mounted on the actuator drive shaft. At the end of travel, the power is routed through the limit switches to a terminal strip location for pilot or position indication applications. The limit indicator outputs are fuse protected with auto-resetting polyfuses, with a working limit of 0.25 amps, to protect the limit switches and internal circuitry from possible overloads originating outside of the actuator. To simplify maintenance, these polyfuses are permanent and do not need to be replaced. They reset automatically, shortly after the overload condition is corrected - in approximately 3 minutes. Two additional limit switches may be added to the actuator, adjustable to operate at any position, as required by the process application.

Open/Close Operation

Open/Close actuators are controlled via two, powered, maintained contacts, one for driving in the clockwise direction, and one for driving in the counter-clockwise direction. Power may be removed mid-stroke to position the valve. The AC input power is fuse protected on both AC Hot and AC Common. The fuses will never blow in normal operation - they are conservatively rated and soldered in place for high reliability.

Proportional Control (Modulating Operation)

Modulating control actuator accepts a variable, proportional 4-20mA or 0-10VDC valve position signal and responds by positioning the valve linearly with an accuracy of 1%. Normally, the actuator drives clockwise in response to a decreasing control signal; however, the actuator is capable of "reverse acting" operation (driving counterclockwise in response to a decreasing control signal) with no necessitated internal wiring changes. The actuator also supplies a 4-20mA or 0-10VDC position feedback signal, and provides the ability to adjust the cycle time of the actuator. A slide switch enables the user to set the actuator response to a loss of control signal. Locked rotor, stall protection initiates whenever the actuator is unable to achieve the position commanded by the control signal, and terminates power to the motor in order to prevent damage due to prolonged/repeated stall conditions.

The V-Series from Metso

With the innovative *Valvcon* V-Series, Metso pioneered the concept of plug-in, modular electronics in valve automation. This concept redefined and simplified the entire valve actuation process-upgrades and modifications can now be done in the field, in a matter of minutes, with no hard wiring, soldering or factory returns.

For years, the V-Series has set the standard for high quality, rugged and reliable electric actuators. Metso uses its proven technology to vastly simplify actuator set-up and calibration and to enhance actuator performance. V-Series electric actuators are designed to offer highly efficient operation in a compact package. Ideally suited for most quarter-turn valves and dampers, they are designed for a wide range of service, from on-off duty, to modulating or proportional control, to two-wire networks.

Flexible, Reliable Actuation

The Metso reputation for success is also built on the ability to meet the needs of its customers with high quality, reliable, "leading edge" actuator technology, products and services. We strive to anticipate and exceed your application needs. Engineered with a modular approach, *Valvcon* actuation systems allow you to modify or upgrade actuators in the field - giving you the flexibility to actuate new valves or to retrofit existing valves with amazing ease.

Extended Duty Cycle for Continuous Cycling

Metso conservatively rates its AC motors at 75% duty cycle. Motors can operate continuously at full rated torque for up

to 15 minutes without pausing. After running continuously for 15 minutes, motors need to rest for only 1/3 of the cycle time between each cycle. That is, if the cycle time is 30 seconds, they must rest for 10 seconds between each cycle. In constantly modulating applications, all *Valvcon* V-Series actuators can handle up to 30 starts per minute.

Breakaway Torque

Designed for efficiency and reliability, all *Valvcon* actuators deliver the power you need when and where it is needed. With efficient gear trains and motors these actuators are rated at breakaway torque. Immediately upon power up, the actuator supplies the rated torque - when it is needed to break the valve away from its seat. Other manufacturer's actuators may be rated at running torque, but actually deliver significantly less breakaway torque.

Simplified Set-up

The *Valvcon* V-Series Control Board introduces a revolutionary advance in the set-up and calibration of electric actuators — SIMPLICITY!!!

With the Mode Selector and the touch of simple "enter, set and go" push buttons, the V-Series Control Board simplifies actuator set-up. On-board push buttons and slide switches make manual positioning easy, and simplify the selection of input signal type, feedback signal type, and actuator fail position in the event of a loss of control signal. With a simple turn of a dial, signal sensitivity (dead band) and cycle time (speed) are easily adjusted.

Features at a Glance!

- Electronics are simple to use, with a clearly labeled terminal strip and easy access to user wiring
- Plug-in electronics for simple upgrades and modifications, with coded connectors to make internal mis-wiring impossible
- Standard extended 75% duty cycle at ambient temperatures up to 104 degrees F
- "Captive" cover screws are permanently attached to the cover and simplify installation in awkward locations
- Stall protection stops the motor if excessive torque or stop is encountered, providing protection from stall conditions (modulating applications only)
- Thermal overload cutout protects the motor from damage caused by over duty cycle applications

Certifications and Standards Compliance

Certification by the Canadian Standards Association of either hazardous or weatherproof locations is standard on all V-Series models.



Enclosure Ingress Protection (IP) Rating: 66

Facility: ISO 9001:2008 certified

Compliance with the following international standards: ISO 5211, EN60079-0:2012 (WX models only), EN60079-1:2007 (WX models only), IEC 60079-0:2011, 6th Ed. and IEC 60079-1:2007, 6th Ed.

V-SERIES BOARD OPTIONS

(Order Code C) Control Board

The add-on Control Board allows control from either 4-20mA or 0-10VDC (or 2-10VDC) control signals. This board also provides:

- position feedback (4-20mA or 0-10VDC)
- locked rotor/stall protection
- speed control for slower cycle times
- adjustable dead band (sensitivity to signal changes)
- on-board supervisory control via push buttons
- selectable pre-set response to loss of control signal (fail to zero or fail last position)
- reverse acting operation with no wiring changes required
- split range operation

(Order Code U) Iso/Readback Board

For 2-wire open/close and 3-wire (jogging) open/stop/close or 3-wire latching control. Isolates control signals and motor circuitry in multiple 2-wire or 3-wire actuator

systems. The control signal does not need to match the input power (i.e. a 115VAC powered actuator can be controlled by a 12VDC control signal). Provides 4-20mA or 0-10VDC position feedback.

(Order Code J) Speed Control/Timer Board

The Speed Control feature solves the problem of the valve opening too quickly in fluid and steam applications where the resulting "hammer" or "shock" is eliminated. Both cycles, (CW and CCW) can be extended independently anywhere from the normal speed down to 1/200th the normal speed.

The Timer feature provides automatic cycling in On/Off applications where the actuation cycle can be scheduled anywhere from once every minute to once every 24 hours.

The Timer and Speed Control functions can be used together or independently.

OTHER V-SERIES OPTIONS

(Order Code H) Tropical Heater/Thermostat

Recommended in all high humidity applications where condensation may accumulate inside the actuator. For 115VAC applications the heater consumes 15 watts, for 230VAC applications the heater consumes 40 watts.

(Order 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 metric drive output options, consult the "How to Order" section for available sizes for a given actuator model.

(Order Code K) Brake

A brake prevents the actuator from being backdriven. Required for all dampers, butterfly valves, PVC ball valves, and resilient seated valves.

(Order Code P) Feedback Potentiometer

Provides a 0-1000 ohm (3 wire) variable resistance to indicate actuator output position.

(Order Code S2) Additional Limit Switches

Up to two additional limit switches may be added for position indication or as dry contacts to operate other devices. Single pole, double throw switches rated for 1/2 HP, 11 amps 250VAC, CSA certified.

(Order Code T) Heater/Thermostat

Recommended in applications where the temperature may drop below 32°F. For 115VAC applications the heater consumes 15 watts, for 230VAC applications the heater consumes 40 watts.

(Order 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.

(Order Code Z) Handwheel

For manual operation when power is not available. The handwheel is disengaged from the geartrain and does not turn during normal operation. When the handwheel is pushed down, it disengages the motor from the geartrain and allows manual operation.

(VWX and LVWX) Hazardous Location Enclosures

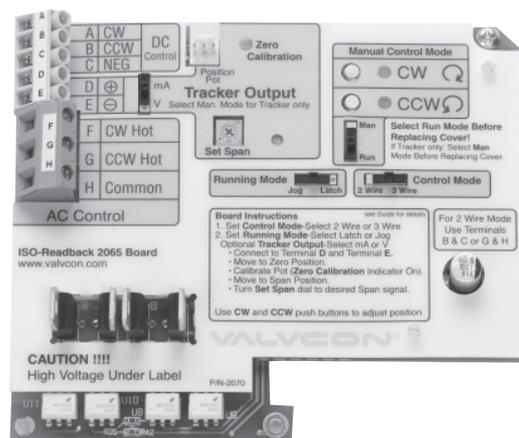
The standard enclosures (VW and LVW) are rated for NEMA 4/4X (weather tight and corrosion resistant). The Hazardous Location enclosures (VWX and LVWX) are Certified by CSA to meet NEMA 4/4X/7 & 9, Class I, Div 1, Groups C&D; Class II, Div. 1, Groups E, F, & G; Class III, and are also certified to ATEX Directive 94/9/EC, IECEx CSA 14.0057X.

Certificate Number: **Sira 13ATEX1166X**



II 2 G
Ex d IIB T6 Gb
Ta = -20°C to +66°C

✓ Input Impedance	Voltage Input: 35K ohms; Current Input: 200 ohms
✓ Control Signal	May be either 4-20mA or 0-10VDC (selectable via on-board slide switch) 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
✓ Position 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: 500K ohm
✓ Locked Rotor Protection	If the actuator cannot achieve the position commanded by the control signal, after 5 seconds it will stop the motor. The actuator will remain paused until the control signal commands it to drive in the opposite direction
✓ Control Fail Position	In the event of a loss of control signal (with power still supplied), user can choose between Zero and Last via slide switch. NOTE: If the minimum control signal = 0VDC, fail position must be set at "Last"
✓ Cycle Rate Speed Control	User can choose 90 degree rotation times of: normal, 2X normal, 3X normal, 5X normal, 10X normal and 20x normal
✓ 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%
✓ Accuracy	1% (dead band settings)
✓ Repeatability	For any given control signal value, the ability of the actuator to drive to the same physical position (i.e, a 12.0 mA signal should result in a 45.0° actuator output position). +/- 1%
✓ Resolution	The smallest amount of actuator response that can be obtained by changing the input signal. +/- 1%
✓ Split Range	Actuator may accept split range (i.e., 4-12mA or 12-20mA) control signal with no wiring changes
✓ Reverse Acting	With no wiring changes required, the actuator may be calibrated to drive clockwise upon increasing control signal, and counter-clockwise upon decreasing control signal
✓ On-Board Supervisory Control	Push buttons override the analog control signal, allowing the user to manually position the valve or damper



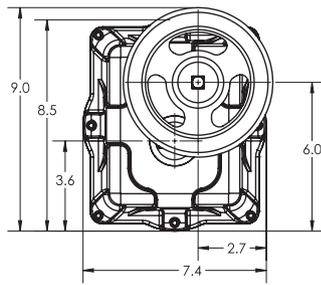
115VAC AND 230VAC MODELS*

Torque Output	Speed (seconds per 90° rotation)	Duty Cycle	VA Rating		Max Running Current at Full Load (True RMS)		Max Effective Peak Inrush Current (= .66 x Peak rush)	
			115VAC	230VAC	115VAC	230VAC	115VAC	230VAC
150 lb-in; 12 lb-ft; 17 Nm	8	75%	70vA	115vA	.6 amps	.5 amps	1.25 amps	.924 amps
300 lb-in; 25 lb-ft; 34 Nm	15	75%	70vA	115vA	.6 amps	.5 amps	1.25 amps	.924 amps
600 lb-in; 50 lb-ft; 68 Nm	30	75%	70vA	115vA	.6 amps	.5 amps	1.25 amps	.924 amps
1000 lb-in; 83 lb-ft; 113 Nm	25	75%	92vA	161vA	.8 amps	.7 amps	1.66 amps	1.29 amps
1500 lb-in; 125 lb-ft; 169 Nm	40	75%	92vA	161vA	.8 amps	.7 amps	1.66 amps	1.29 amps
2000 lb-in; 167 lb-ft; 226 Nm	55	75%	92vA	161vA	.8 amps	.7 amps	1.66 amps	1.29 amps
2500 lb-in; 208 lb-ft; 282 Nm	70	75%	92vA	161vA	.8 amps	.7 amps	1.66 amps	1.29 amps
3000 lb-in; 250 lb-ft; 339 Nm	75	55%	92vA	161vA	.8 amps	.7 amps	1.66 amps	1.29 amps

*Notes:
 1. The Maximum Current stated above includes all options. If the brake and/or heater & thermostat are not installed, the actual current draws will be less.

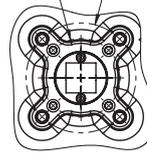
V-SERIES ENCLOSURES (150-600 LB-IN)

Mounting Flange, ISO 5211 F05 / F07

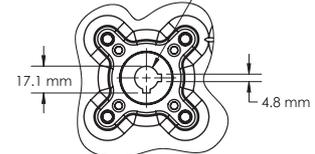


4 X M6-1.0 ∇ 0.75 MIN.
ON 1.969" B.C.

4 X M8-1.25 ∇ 0.75 MIN.
ON \varnothing 2.756" B.C.

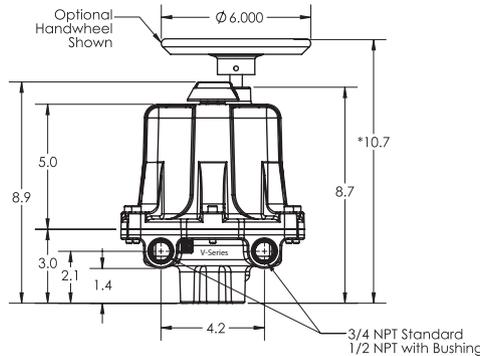


Female Square Drive

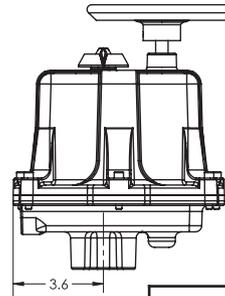


Female Keyed Drive

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"	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)



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

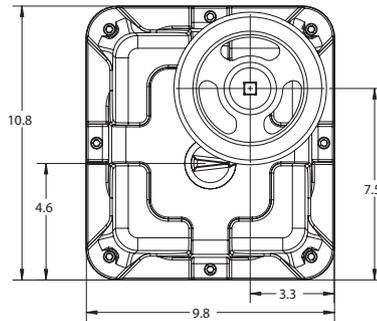


Approximate Weight	17 lb / 8 kg
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All Dimensions in inches unless otherwise stated

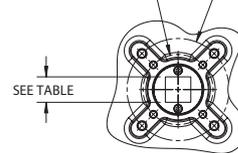
V-SERIES ENCLOSURES (1000-3000 LB-IN)

Mounting Flange, ISO 5211 F07 / F10

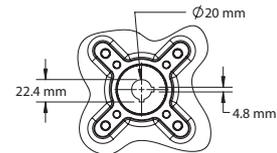


4 X M8-1.25 ∇ 0.75" MIN.
ON \varnothing 2.756" B.C.

4 X M10-1.5 ∇ 0.75" MIN.
ON \varnothing 4.016" B.C.

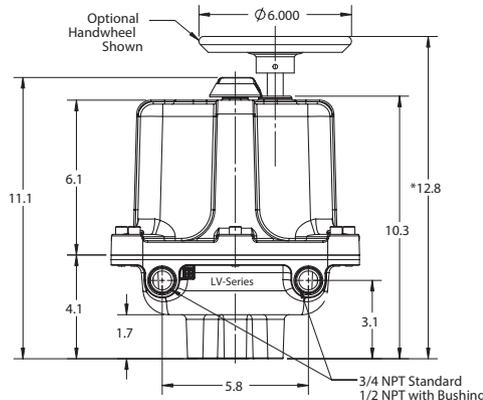


Female Square Drive

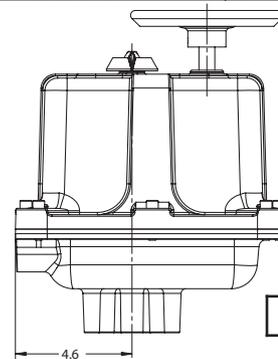


Female Keyed Drive

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"	Square	0.669 (17mm)	1.20 (30.5mm)
1000-3000 lb-in (83-250 lb-ft; 113-339 Nm)	Option "13"	Square	0.748 (19mm)	1.20 (30.5mm)
1000-3000 lb-in (83-250 lb-ft; 113-339 Nm)	Option "14"	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)



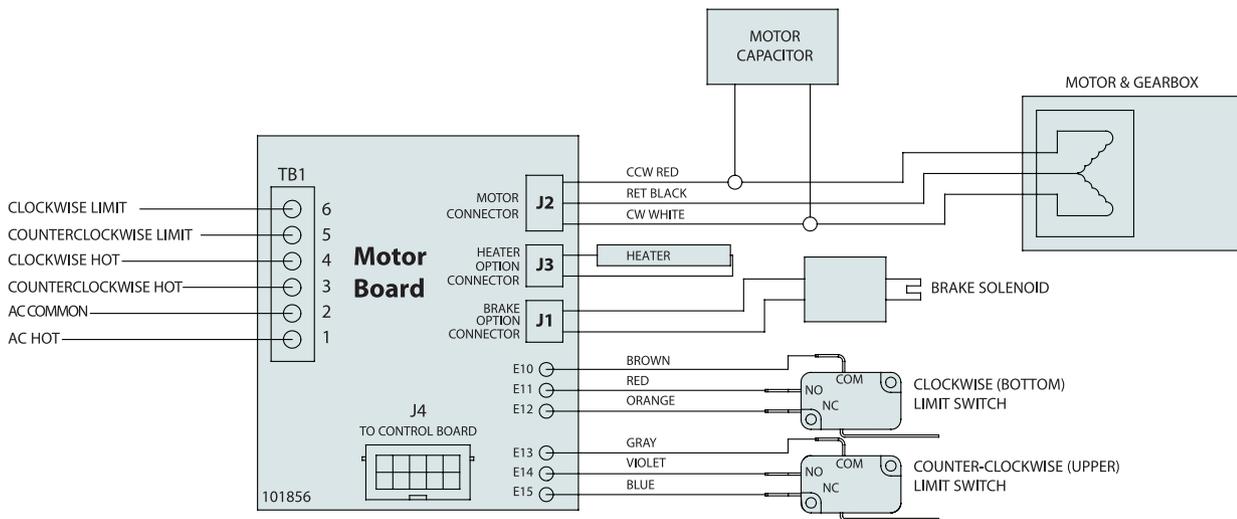
*11.7 WITHOUT HANDWHEEL
TO REMOVE COVER REQUIRES AN ADDITIONAL 5.75"



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

115VAC AND 230VAC ON/OFF STANDARD

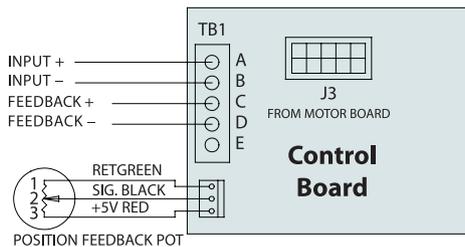
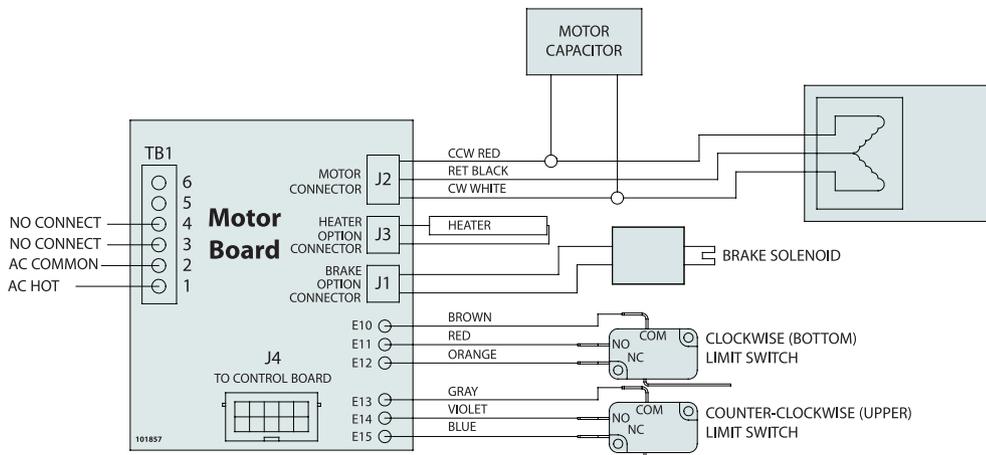


MOTOR BOARD WIRING

TERMINAL	6	CW LIMIT	(LINE VOLTAGE OUT)
TERMINAL	5	CCW LIMIT	(LINE VOLTAGE OUT)
TERMINAL	4	CW AC HOT	(MUST CONNECT)
TERMINAL	3	CCW AC HOT	(MUST CONNECT)
TERMINAL	2	AC COMMON	(MUST CONNECT)
TERMINAL	1	AC HOT	(FOR HEATER OPTION)+

CAUTION: 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 a minimum 250VAC (550VAC for 230VAC applications).** Due to the induced feedback voltage, multiple actuators can not be wired in parallel. Separate (isolated contacts) must be provided for each actuator.

115VAC AND 230VAC WITH OPTIONAL CONTROL BOARD



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 applications in which the actuators are used are outside the scope of this document. If you have questions concerning the use, application or compatibility of the actuator with the intended service, contact Metso Flow Control for more information.

HOW TO ORDER – V-SERIES ELECTRIC ACTUATORS (150-600 LB-IN)

Example:

Sample model code: VWX300CI2KN115AC

1	2	3	4	5	6
V	WX	300	C	I2, K	N115AC

1	Series
V	V

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

3	Torque
150	150 lb-in (12 lb-ft; 17 Nm)
300	300 lb-in (25 lb-ft; 34 Nm)
600	600 lb-in (50 lb-ft; 68 Nm)

4	Board Options ⁽¹⁾
C	Control Board
J	Speed Control/Timer Board
U	Iso/Readback Board

5	Other Options
H ⁽²⁾	Tropical Heater/Thermostat
I1 ⁽³⁾	14mm Female Square Output
I2 ⁽³⁾	17mm Female Square Output
K	Brake
P	Feedback Potentiometer
S2	Two Auxiliary Limit Switches
T ⁽⁴⁾	Heater/Thermostat
Y1 ⁽³⁾	15mm Female Keyed Output
Y2 ⁽³⁾	20mm Female Keyed Output
Z	Handwheel

6	Operating Voltage
N115AC	115AC
N230AC	230AC

HOW TO ORDER – V-SERIES ELECTRIC ACTUATORS (1000-3000 LB-IN)

Example:

Sample model code: LVW2000Y3ZN230AC

1	2	3	4	5	6
LV	W	2000	-	Y3, Z	N230AC

1	Series
LV	LV

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

3	Torque
1000	1000 lb-in (83 lb-ft; 113 Nm)
1500	1500 lb-in (125 lb-ft; 169 Nm)
2000	2000 lb-in (167 lb-ft; 226 Nm)
2500	2500 lb-in (208 lb-ft; 282 Nm)
3000	3000 lb-in (250 lb-ft; 339 Nm)

4	Board Options ⁽¹⁾
C	Control Board
J	Speed Control/Timer Board
U	Iso/Readback Board

5	Other Options
H ⁽²⁾	Tropical Heater/Thermostat
I2 ⁽³⁾	17mm Female Square Output
I3 ⁽³⁾	19mm Female Square Output
I4 ⁽³⁾	22mm Female Square Output
K	Brake
P	Feedback Potentiometer
S2	Two Auxiliary Limit Switches
T ⁽⁴⁾	Heater/Thermostat
Y2 ⁽³⁾	20mm Female Keyed Output
Y3 ⁽³⁾	25mm Female Keyed Output
Z	Handwheel

6	Operating Voltage
N115AC	115AC
N230AC	230AC

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.

Committed to Customer Service

Metso worldwide website: www.metso.com/electricactuators, provides 24 hour a day access to all technical support material - from sales brochures to instruction manuals to installation and troubleshooting tips. For local support, our network of trained stocking distributors/representatives are industry leading experts in valve automation. Visit the Metso, *Valvcon* product web site to locate the nearest stocking distributor/representative.

Timely Technical Support

Metso Flow Control can answer your engineering or application questions, and quickly repair or upgrade your actuators. Our highly trained support engineers offer a broad range of expertise, with the combined experience to assist specifying engineers and contractors with information on feasibility and special applications.

A Tradition of Quality

Metso is dedicated to producing superior-quality products that are second to none. Our development laboratory and manufacturing facilities exemplify our total commitment to producing quality products.

Subject to change without prior notice.

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