

KEYSTONE

**Electric actuator for quarter-turn valves.
For output torques to 17,700 lb. in.**

Features

Standard

- Standard actuator accepts 100 to 240 Volt DC or AC single phase input, 50 and 60 Hz. Three phase is optional.
- Separate terminal enclosure isolated from the electronics and motor compartment. Only the wiring terminal is exposed during field installation.
- Standard adjustable torque switches, from 40 to 100% of rated torque output.
- Manual override does not require a declutchable mechanism - always engaged.
- NEMA 4/4X/6 enclosure rating with CSA (C-US) and CE.
- Anodized aluminum with epoxy powder coat to help protect unit in most aggressive environments.
- Visual mechanical position indicator for accurate visual reference of valve position.
- Direct mounting to Keystone valves or readily adaptable to other quarter-turn valves; minimizes costs associated with adaptation.
- Permanently lubricated self-locking gear train helps eliminate the need for motor brakes.
- Mechanical travel stops designed to prevent over-travel during hand wheel or motor operation.
- Over temperature motor thermostat.
- Integral speed control independently adjustable in opening and closing directions.



Optional Controls

- Analog control modules offer 4 to 20 mA input/output. Complete with additional output relays and monitor relay. Alternate 0 to 10 VDC input/output.
- Communication modules for most standard communication bus protocols. Bluetooth® modules allow for non-intrusive access to the EPI2 for configuration, operation and integration via a Bluetooth® enabled handheld PDA or PC.
- Integral local control panel.

General Applications

Quarter-turn ball, butterfly, or rotary plug valves, dampers, etc.

Technical Data

Temperature: Units available for
-40°F to 158°F
[-40°C to 70°C]

Output torque: up to 17,700 lb. in.
[2000 Nm]

Basic Unit Technical Detail

Voltage Ratings

100 to 240 Volts DC or AC single phase, 50/60 Hz. +/- 10% voltage tolerance

Working Temperature

Standard Range: -40°F to 140°F
[-40°C to 60°C]

Optional Ranges Covering From:
-40°F to 158°F
[-40°C to 70°C]

Environmental Protection

Standard Weather Tight Enclosure

NEMA 4/4X/6 according to NEMA ICS6/NEMA 250

IP68 according to EN 60529

Standard unit is CSA (C-US)

Optional Explosion Proof Enclosure

NEMA 4/4X/6 according to NEMA ICS6/NEMA 250

IP68 according to EN 60529

FM/CSA (C-US) NEC 505 (Class 1, Zones 1 & 2)

NEC 500 (Class 1, Div. 2)

Electric Motor and Universal Power Supply

Innovative POWER SUPPLY MODULE™ to accept 100 V to 240 V DC and AC 1-phase input voltages at 50 and 60 Hz provides flexibility for a broad range of applications.

Over temperature device to protect the motor and electronics is included.

Local Indicator

Standard "Window" type located in the cover.

Travel Stops

Mechanical stops on the base of the actuator provide +/- 10 degree over/under travel in each direction (70 degree minimum to 110 degree maximum angular stroke).

Anti-condensation Heater

Standard with 10 Watt thermostat will activate the heater when the internal temperature drops below +59°F.

Terminal Enclosure

Terminal board is in a separate compartment.

Removal of the actuator's control cover to do field wiring is no longer required.

Four 1" NPT conduit openings allow flexibility in wiring access.

Electronic Controls

"Push-to-Run" 3 wire (Open/Close/Common) remote control signals.

Torque sensing in both directions of travel, adjustable in 10 steps from 40% to 100% of the actuator's rated torque output.

Absolute encoder is used for position feedback.

Output speed independently adjustable for the opening and closing directions.

Four SPST (NO/NC) latching contacts are provided for fully Open / fully Closed remote indication. Contact ratings are 5 Amp at 120VAC and 5 Amp at 30 VDC.

Base Unit Default Settings

The actuators are provided with the following default values:

- Closing limit by Position.
- Opening limit by Position.
- Stroking time for closing and opening; 18 seconds for models E006, E013, E025, and E051, 30 seconds for the E091, and 66 seconds for the E171.
- Torque Limiting for closing and opening set at 100% of nominal torque.

AWWA

Unit is tested to, and compliant with AWWA C540.

Material of Construction

Main Components

Body and Cover

Epicyclical gearing

Output drive

Base Plate

Manual Worm Shaft

Worm Wheel

O-ring

Lubrication

Materials

Anodized ESPC aluminum alloy AC-44300

All metal gearing (on most models)

Ductile cast iron grade GJS-500-7

Investment cast iron

High-grade alloy steel

Alloy steel

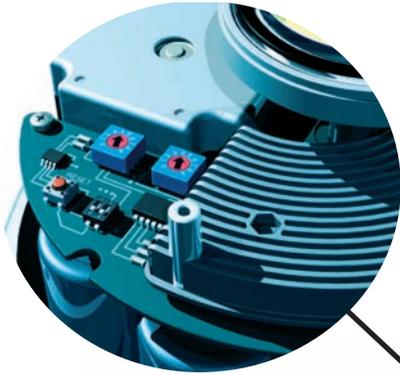
NBR or Fluorosilicon suitable for ambient temperature range

Grease suitable for ambient temperature range

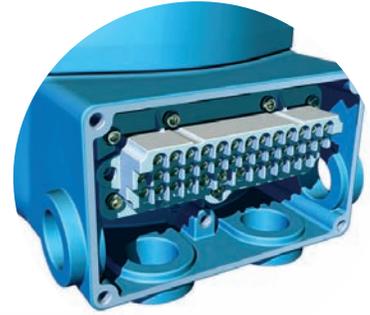


Easily accessible control panel helps allow setting of torque, speed, and position quickly and simply. All settings are done from this control panel.

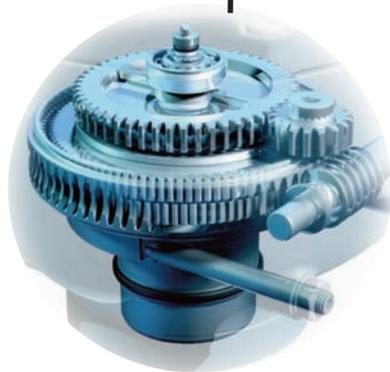
New Standards for the Small Electric Quarter-turn Market



Control panel offers easy way to set all functions from one location



Separate terminal block for easy field wiring terminations



Self-locking, epicyclical internal gearing helps ensure a smooth and reliable operation

Option Modules

OM1 - Servoamp and Retransmission Module (available with integral Bluetooth® Non-intrusive Configuration)

Analog Position INPUT of 4 to 20 mA or 0 to 10 VDC (selectable).

Analog Position OUTPUT of 4 to 20 mA or 0 to 10 VDC (selectable).

Monitor Relay Alarm contact to indicate loss of power, torque alarm, over temperature of motor or electronics and loss of analog signal.

Motor Running output contact.

Four additional SPST Output Contacts set independently at one of 10 points along the stroke.

Contacts are configurable (make or break).

Non-intrusive Configuration of Servoamp/Retransmission

Optional - OM1 module may be specified with integral, non-intrusive, configuration using Bluetooth® wireless technology protocol.

OM3 - Local Interface

Integral pushbutton panel with Local/Remote Selector, Open/Close pushbuttons and 2 LEDs (Red/Green) for local indication.

OM13 - Three-wire Interface Control Module

Converts unit to three-wire configuration where power and directional control are the same.

BUS Communication - Network Interface

Optional network interface modules to allow communication with BUS systems. These modules are plug and play.

OM9 - PROFIBUS® DPV0 and DPV1 (available with integral Bluetooth® Non-intrusive Configuration)

PROFIBUS DPV0 cyclic communication and acyclic communication as per PROFIBUS DPV1 extension.

OM11 - DeviceNet™ Module (available with integral Bluetooth® Non-intrusive Configuration)

DeviceNet™ interface module.



Keystone Direct Mount System

Keystone pioneered the direct mounting compact valve actuator system. The EPI₂ has dual mounting bolt circles and dual shaft acceptance with most units. This feature helps provide coverage of more valve sizes and types with less actuator models.



Dimensions (inches, mm were shown)

Model	Standard Bore			Bolt Circle				Standard Shaft Inserts				
	Bore Dia.	A Key	Depth	B Dia.	Holes	C Dia.	Holes	Double D D	E	F Keyed Key Size	Depth	
E006	1.125	1/4 x 1/4	1.34	1.75	1/4" - 20 UNC	3.25	3/8" - 16 UNC	0.5	0.75	-	-	1.37
E013	35 mm	10 x 8 mm	2.12	-	-	3.25	3/8" - 16 UNC	-	-	1.125	1/4 x 1/4	2.12
E025	1.875	1/2 x 3/8	2.12	3.25	3/8" - 16 UNC	5.00	1/2" - 13 UNC	-	-	1.125	1/4 x 1/4	2.12
E051	1.875	1/2 x 3/8	2.12	3.25	3/8" - 16 UNC	5.00	1/2" - 13 UNC	-	-	1.125	1/4 x 1/4	2.12
E091	2.250	1/2 x 3/8	4.80	5.00	1/2" - 13 UNC	6.50	3/4" - 10 UNC	-	-	1.875	1/2 x 3/8	4.25
E171	2.250	1/2 x 3/8	4.80	5.00	1/2" - 13 UNC	6.50	3/4" - 10 UNC	-	-	1.875	1/2 x 3/8	4.25

Notes:

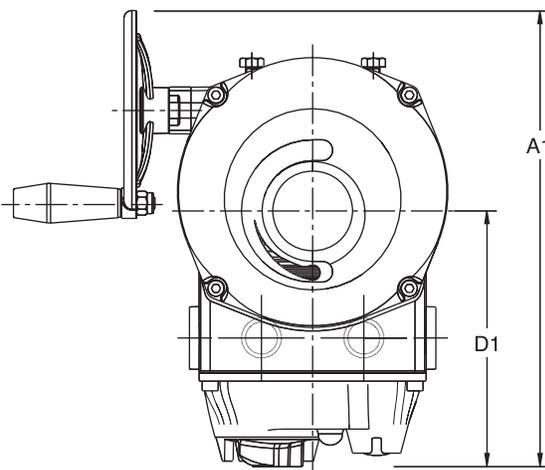
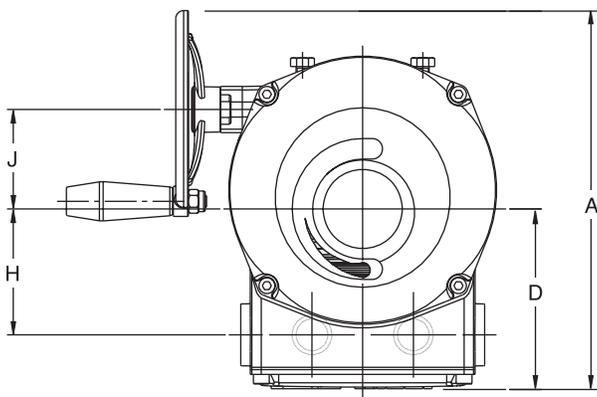
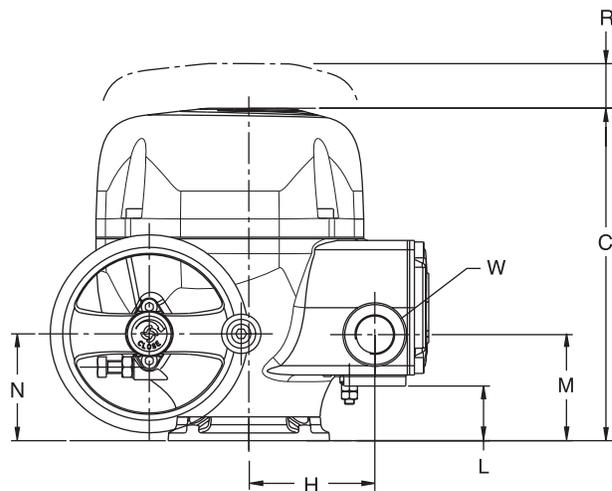
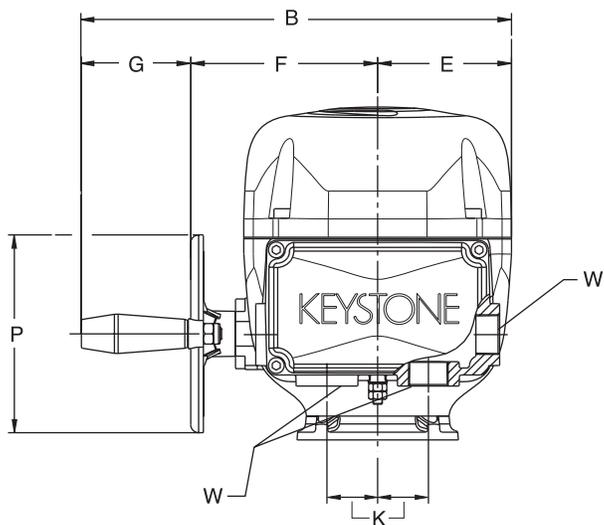
Standard Bore - W1, W2, X1, and X2 on models E013 and E025 are 35 mm bore with 8 mm x 10 mm key. W5, and X5 are as listed above.

Insert - W1, W2, X1, and X2 on model Model E051 is 1.625 with 3/8 x 3/8 key. W5, and X5 are as listed above.

Keystone EPI₂ Electric Actuator

Models E006 to E171

Models E006, E013, E025, E051, E091



With optional local interface module OM3

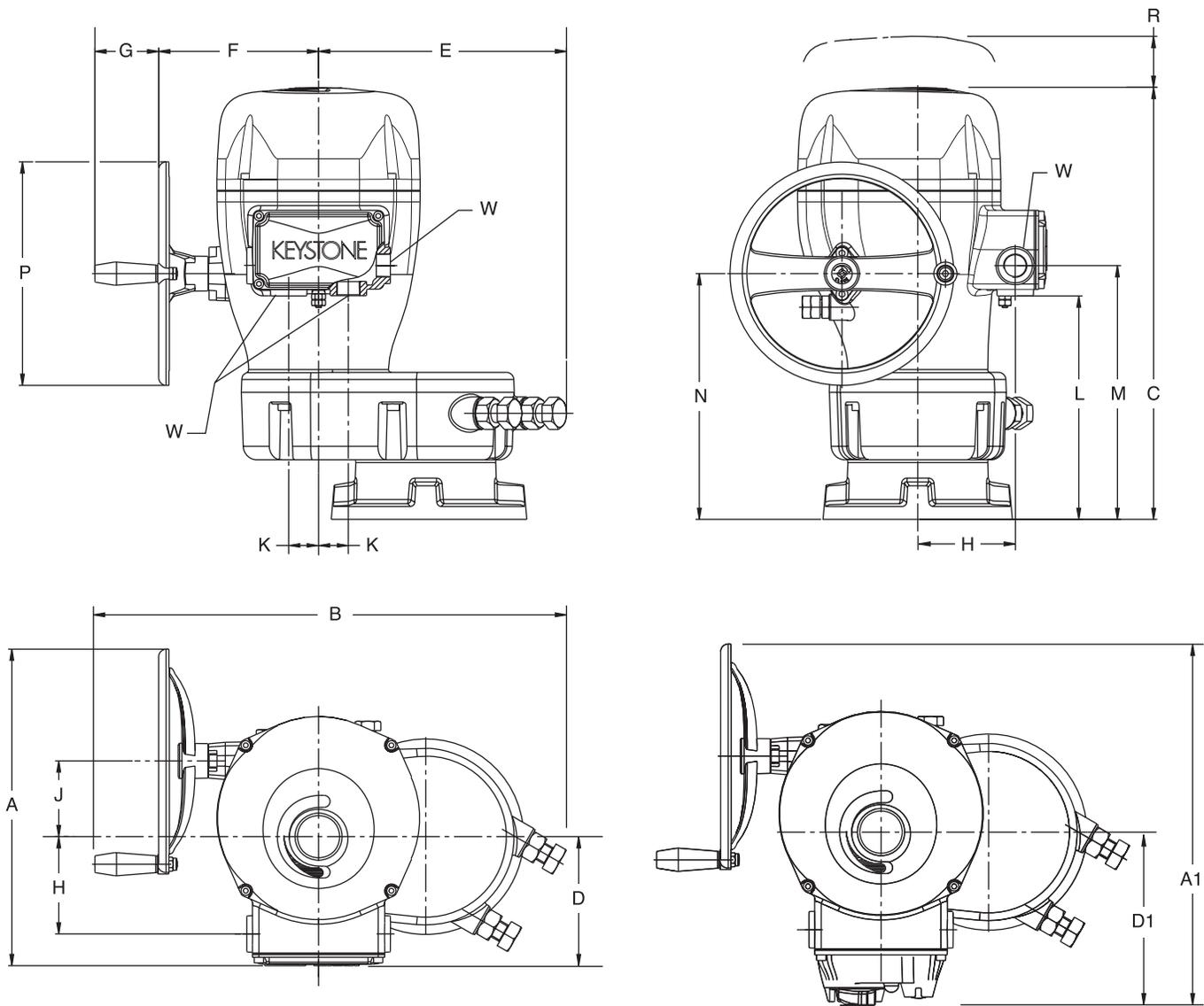
Dimensions (inches)

Model	A	A1	B	C	D	D1	E	F	G	H	J	K	L	M	N	P	R ¹	W ²	Weight ³ (lbs)
E006	9.4	11.3	10.7	8.3	4.5	6.3	3.3	4.7	2.7	3.1	2.5	1.3	1.4	2.6	2.7	4.9	6.9	1" NPT	19.8
E013	9.4	11.3	10.7	9.0	4.5	6.3	3.3	4.7	2.7	3.1	2.5	1.3	2.1	3.4	3.4	4.9	6.9	1" NPT	20.9
E025	11.6	13.4	13.1	11.3	5.1	6.9	4.3	6.1	2.7	3.7	3.0	1.3	2.5	3.7	3.6	7.1	9.1	1" NPT	34.2
E051	11.6	13.4	13.1	11.3	5.1	6.9	4.3	6.1	2.7	3.7	3.0	1.3	2.5	3.7	3.6	7.1	9.1	1" NPT	37.5
E091	13.4	15.3	13.7	14.3	5.5	7.3	4.3	6.8	2.7	4.1	3.2	1.3	5.5	6.8	6.5	9.5	9.1	1" NPT	57.0

Notes:

1. Space required for cover removal
2. 4 total conduit connections
3. Add 1.1 lbs. for Option Module OM3 Local Interface

Model E171



With optional local interface module OM3

Dimensions (inches)

Model	A	A1	B	C	D	D1	E	F	G	H	J	K	L	M	N	P	R ¹	W ²	Weight ³ (lbs)
E171	13.4	15.3	19.9	18.3	5.5	7.3	10.5	6.8	2.7	4.1	3.2	1.3	9.5	10.7	10.4	9.5	9.1	1" NPT	99.2

Notes

1. Space required for cover removal
2. 4 total conduit connections
3. Add 1.1 lbs. for Option Module OM3 Local Interface

Performance

Adjustable torque and stroke time offers flexibility in performance and valve protection that is virtually unsurpassed in the small electric quarter-turn market.

Torque Output at Selected Setting (lb. in.)

Model	← 100%										40%
E006	600	560	520	480	440	400	360	320	280	240	240
E013	1300	1214	1127	1040	954	867	780	693	607	520	520
E025	2500	2334	2167	2001	1834	1667	1500	1334	1167	1000	1000
E051	5100	4761	4421	4081	3741	3401	3061	2720	2380	2040	2040
E091	9100	8496	7889	7282	6675	6068	5461	4854	4247	3640	3640
E171	17700	16525	15344	14164	12983	11802	10622	9441	8261	7080	7080
Position	9	8	7	6	5	4	3	2	1	0	0

Output torque is independently adjustable from 40% to 100% in both directions of travel. Adjustments are in increments of 1 from 0 to 9. The default setting is 100%, position 9 on the rotary selector used for configuration.

Operating Time at Selected Setting (sec's/90)

Models	Torque Output (inches pounds)	Operating Time – Seconds/90 Degrees			
		9	8	7	6
E006	600	12	15	18	26
E013	1300	12	15	18	26
E025	2500	12	15	18	26
E051	5100	12	15	18	26
E091	9100	20	24	30	45
E171	17,700	44	53	66	100
Position		9	8	7	6

Output speed is adjustable from in both directions of travel. Adjustments are in increments of 1 from 6 to 9. The default settings are: 18 seconds for the E006, E013, E025 & E051 - 30 seconds for the E091 - and 66 seconds for the E171. The tolerance is +/- 10% of nominal.

Current Draw

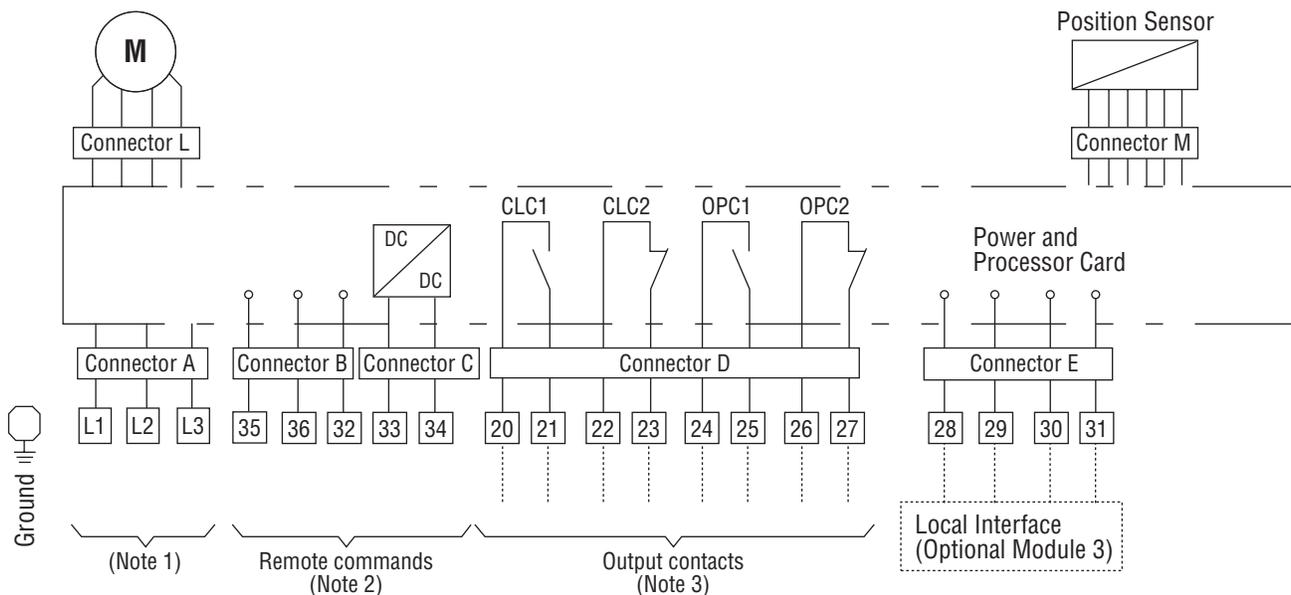
Single Phase Universal Voltage Motor	Voltage Code	Voltage	VAC/ VDC	E006		E013		E025		E051		E091		E171	
				Inrush	Full Load										
0	120	VAC	6	1.1	6	1.2	16	2.2	16	3.7	16	3.7	16	3.7	
		VDC	4	0.6	4	0.7	14	2.4	14	3.4	14	3.4	14	3.4	
	240	VAC	5	0.7	6	0.8	8	1.25	8	2.7	8	2.7	8	2.7	
		VDC	5	0.3	5	0.4	6	1.3	6	1.8	6	1.8	6	1.8	

Single Phase Voltages

- 1: Amps = current draw at nominal conditions
- 2: Maximum current at stall conditions = 1.2 x listed amps
- 3: Power factor for VAC supply = 0.60

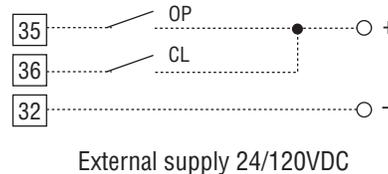
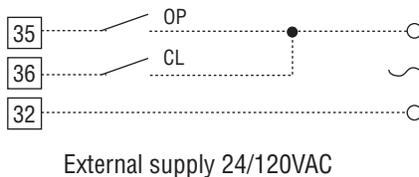
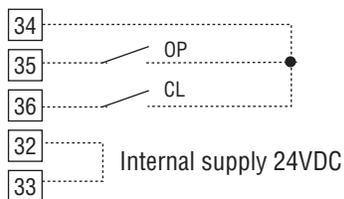
Wiring Diagram

General Arrangement with Base Card



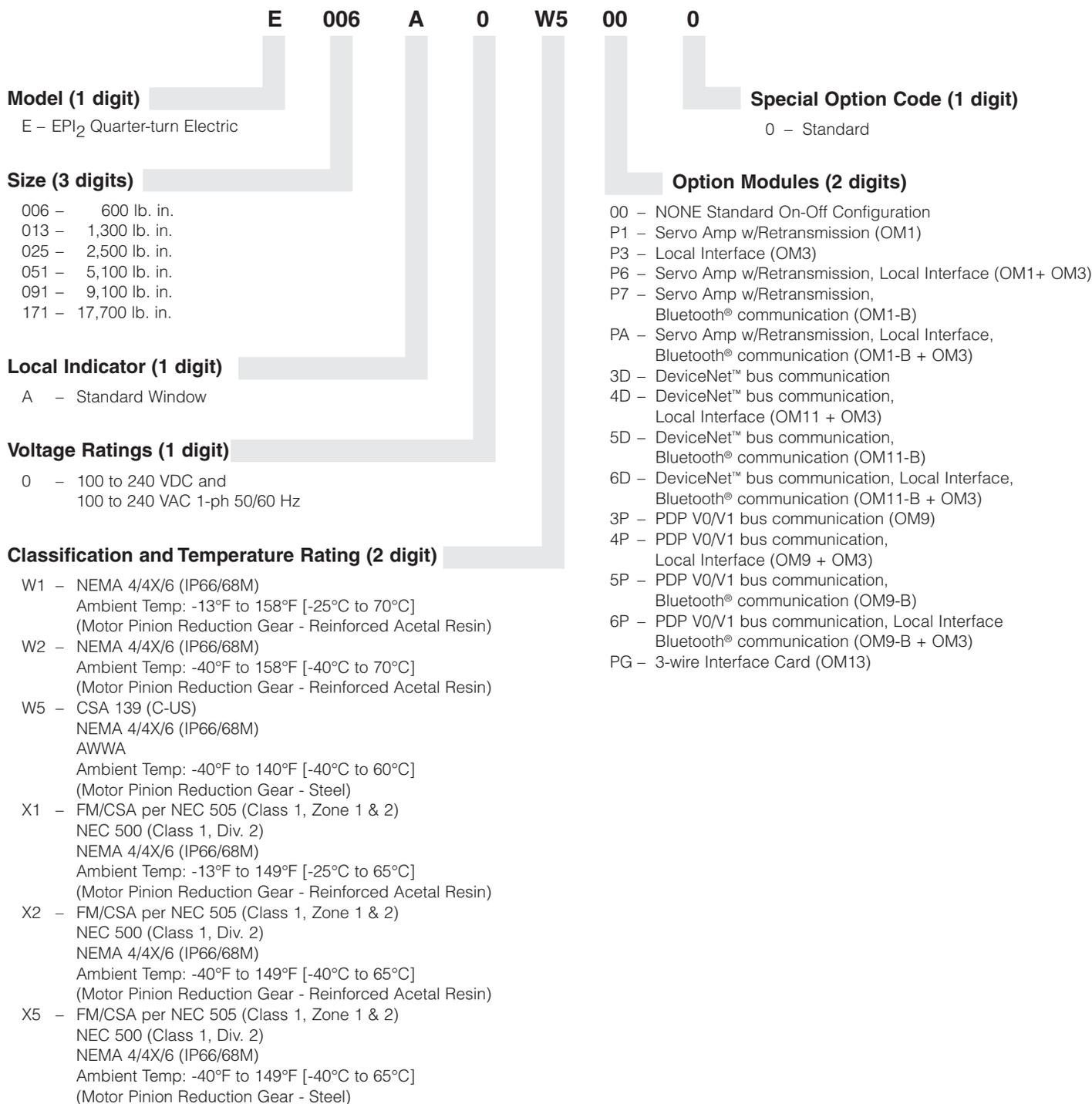
Notes:

- 1) Connection L1-L2 for VDC or VAC single phase motor supply from 100 to 240 volt
- 2) Remote commands options



- 3) Contacts shown in intermediate position CLC1-CLC2 end of travel signalling in CLOSING
Contacts shown in intermediate position OPC1-OPC2 end of travel signalling in OPENING
- 4) See wiring diagram WD40A0001 for units with OM1
See wiring diagram WD40A0002 for units with OM13

Model Number Detail



Available for Keystone Direct Mounting:



Keystone 79U Pneumatic Actuators

Rack and Pinion actuator available both double acting and spring return. Torques to 18,100 lb. in.



Keystone MRP Pneumatic Actuators

Rack and Pinion actuator available both double acting and spring return. Torques to 18,100 lb. in.

Keystone EPI₂ Electric Actuator

Models E006 to E171

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