ERV Series Rodless Actuators

Contents

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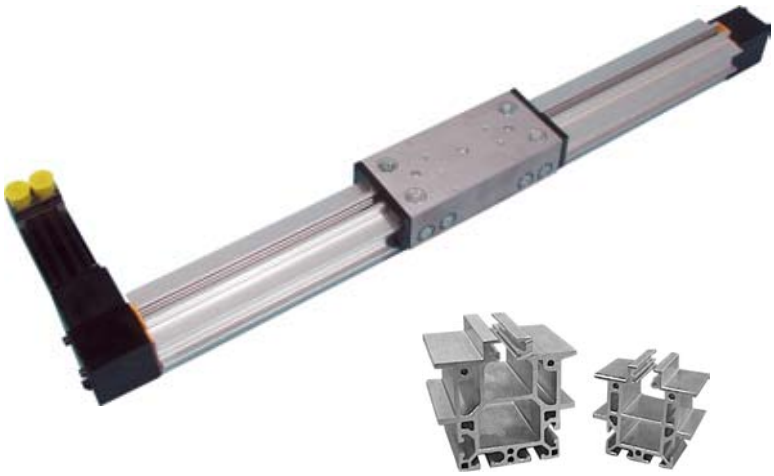
ERV Overview

The ERV Series

Expanding on the ER, the ERV was designed with an external carriage containing outboard roller bearing support for higher loads. The actuator is designed to directly interface with our structural framing, providing a simple and cost effective solution for single or multiple-axis systems.

The ERV design means . . . .

- High loading to 3590 N
- High speeds to 5m/sec
- High thrust to 808 N
- Multi-axis connectivity for Gantry systems
- Strokes to 6 meters for single extrusion, spliced units for longer strokes.
- Internal belt drive
- Extrusion body cylinder with additional center web for rigidity and axial stiffness.



The ERV multiple design options can be matched to your application demands.

- 2 profile sizes (56 and 80mm)
- Polyurethane steel reinforced drive belt
- Standard and extended carriages for high loads
- Ready to mount stepper or brushless servo motors.

ERV Markets and Applications

With thousands of axes installed worldwide, the ERV series rodless actuator has proven to be a robust and reliable solution for numerous motion control applications across many markets and industries. Listed below are some examples of where and how the ERV series rodless actuator has been successfully applied.

Markets and Industries Served

Automotive	Life Sciences	Machine Tool
Tire & Rubber	Medical	Wood & Lumber
Packaging	Conveyor	Research & Testing
Food & Beverage	Transportation	Aerospace
Computer / Electronics	Pharmaceutical	Glass / Fiber
Textile	Semiconductor	Factory Automation

Application Examples

Discrete / Multi-Point Positioning	Small Area Gantry	Large Area Gantry	Complex Motion Control
Vertical Stackers / Elevator Lift	Pick & Place	Walking Beam	Flying Cut-to-Length
Scanning / Inspection	Contoured Glue Dispensing	Palletizing / Depalletizing	Crosscutting / Slitting
Transfer Unit	Part Load & Unload	Material Handling	Mechanical Cam Replacement
Lane Diverter	Profile Engraving / Etching	Storage & Retrieval	Profile Contouring
Backstop Index	Automated Assembly	Parts Transfer	High Speed Winding Traverse

ERV Specifications

ERV-Belt Overview	Units	ERV5		ERV8	
		Standard Carriage	Extended Carriage	Standard Carriage	Extended Carriage
Performance Limits					
Max Thrust (Belt Traction Force) Fx[4]	lbf (N)	132 (587)	132 (587)	182 (808)	182 (808)
Max Speed	in/s (m/s)	200 (5.0)	200 (5.0)	200 (5.0)	200 (5.0)
Max Acceleration	in/s² (m/s²)	386 (9.8)	386 (9.8)	386 (9.8)	386 (9.8)
Max Travel with bumpers	in (mm)	235 (5970)	228 (5800)	233 (5920)	227 (5785)
Max Travel without bumpers	in (mm)	238 (6050)	232 (5900)	237 (6035)	232 (5900)
System Characteristics					
Pulley Lead (travel distance per rev)	mm/rev	100	100	150	150
Pulley Diameter	in (mm)	1.253 (31.83)	1.253 (31.83)	1.880 (47.75)	1.880 (47.75)
Pulley Tooth Count	# Teeth	20	20	30	30
Efficiency [1] - inline	%	90%	90%	90%	90%
Max Breakaway Torque	oz-in	96	107	177	186
Repeatability [2] - inline / parallel	in	±0.004 / ±0.008	±0.004 / ±0.008	±0.004 / ±0.008	±0.004 / ±0.008
System Backlash	in	0.004	0.004	0.004	0.004
Reflected Rotational Inertia					
Base Unit Inertia, 100mm travel	oz-in²	20.71	29.36	118.79	129.44
Additional Inertia per 100mm travel	oz-in²/100mm	0.03	0.03	0.05	0.05
Bearing Carriage Load Capacity[3]					
Normal Load Fz	lbf (N)	253 (1126)	430 (1915)	474 (2112)	807 (3590)
Side Load Fy	lbf (N)	126 (563)	215 (957)	237 (1056)	403 (1795)
Pitch Moment My	ft-lbf (Nm)	39 (53)	145 (197)	109 (148)	311 (422)
Roll Moment Mx	ft-lbf (Nm)	40 (54)	67 (91)	96 (130)	163 (222)
Yaw Moment Mz	ft-lbf (Nm)	32 (43)	103 (140)	78 (106)	215 (292)
Weight & Inertia Data					
Base Unit Weight, Zero Stroke	lb (kg)	10.2 (4.65)	13.4 (6.08)	17.5 (7.96)	22.1 (10)
Carriage Weight	lb (kg)	2.99 (1.36)	5.0 (2.27)	4.82 (2.19)	7.39 (3.35)
Additional Travel Weight	lb (kg) / 100mm	1.0 (0.45)	1.0 (0.45)	1.55 (0.70)	1.55 (0.70)

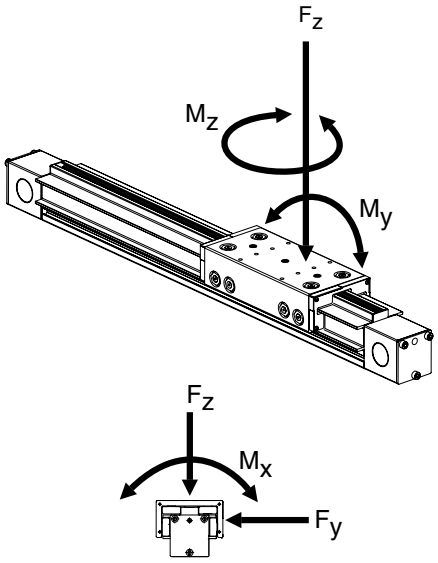
1. Parallel driven unit efficiency = inline efficiency x 0.9
2. Repeatability is unidirectional achieved under ideal conditions and slow speeds. Actual repeatability may vary with the application.
3. Load Capacities shown are based on 1 billion inches of expected travel life @ 1 m/s.
4. Traction Force is speed dependent. The values shown are based on 0.5 m/s speed.

Operating Temperature Range

0° to 60°C (32° to 140°F)

ERV Technical Data

ERV5 Loading



Graph Legend

1m/s 2m/s 3m/s 4m/s 5m/s

Static Moment Loads

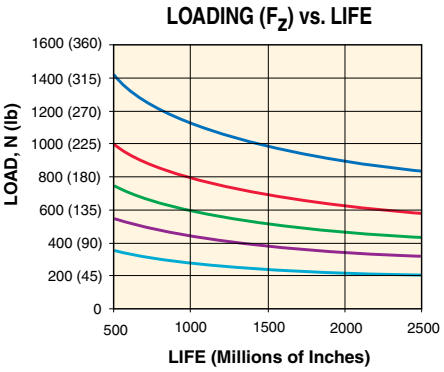
Determine which moment loads are induced by the static load. Locate the center of gravity of the load and the length of the moment arm.

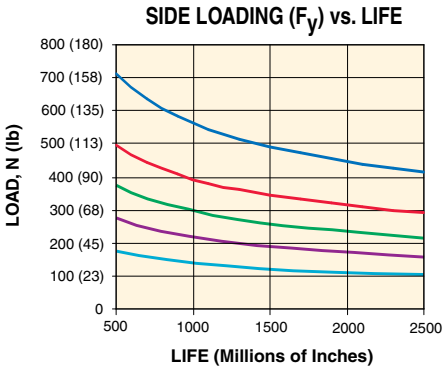
Moment Arm Lengths

Determine the moment arm lengths associated with each moment load by measuring the distance from the center of the load to the center of the carriage in each moment load direction.

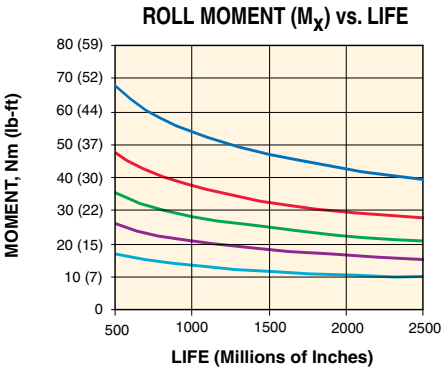
Pitch Moment

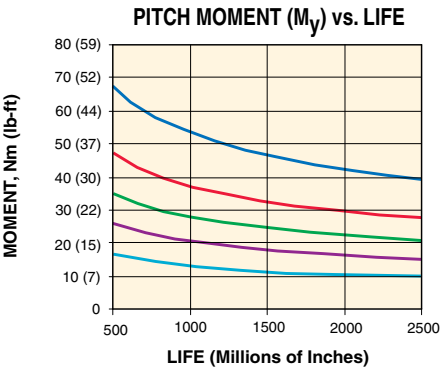
When determining the pitch moment arm, it is necessary to consider the distance from the top of the load attachment plate to the center of the carriage bearings. For the ERV5 Series, this distance is 40mm.

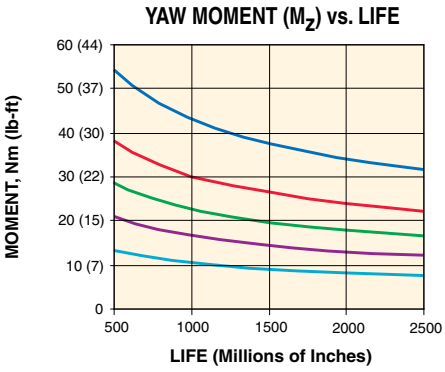




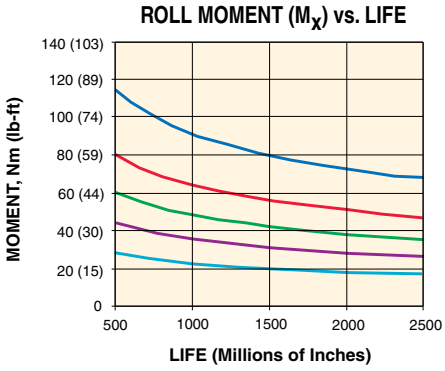
Standard Carriage

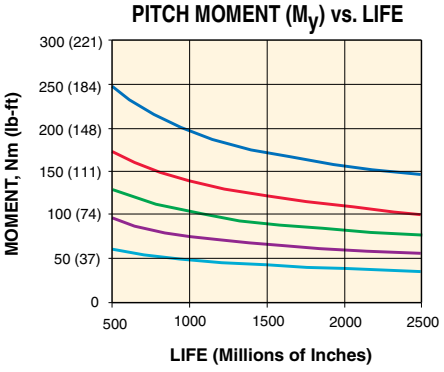


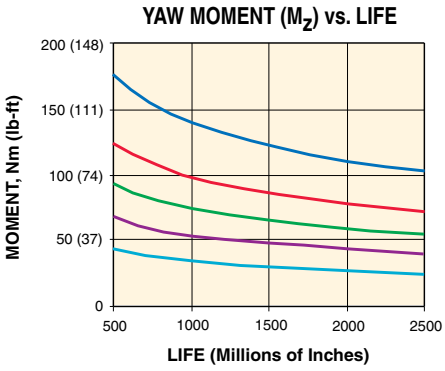




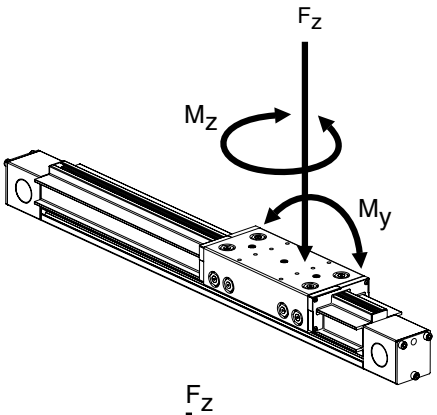
Extended Carriage

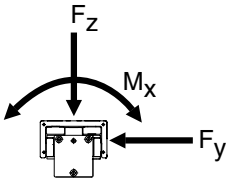






ERV8 Loading





Graph Legend

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Pitch Moment

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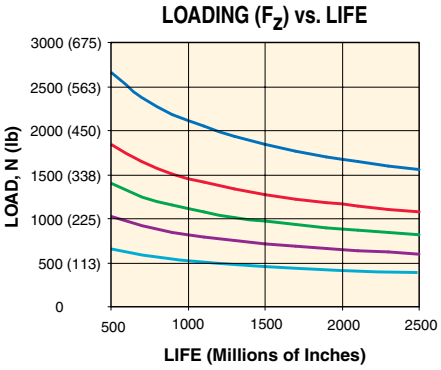
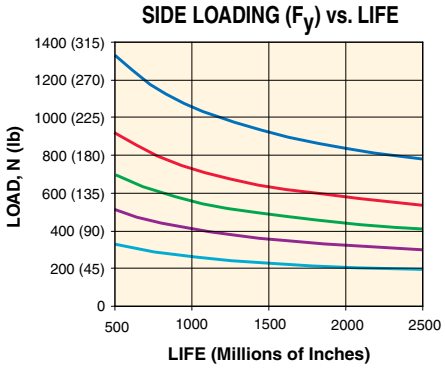
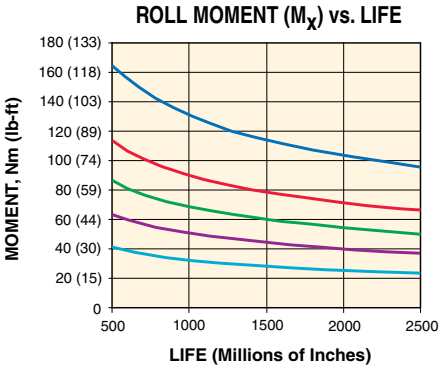
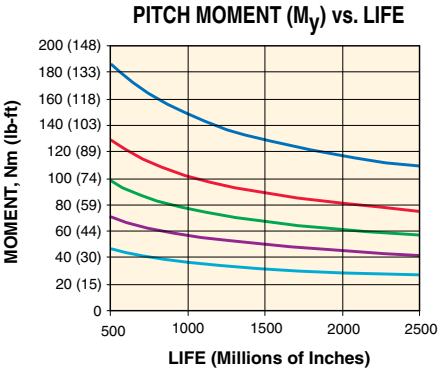
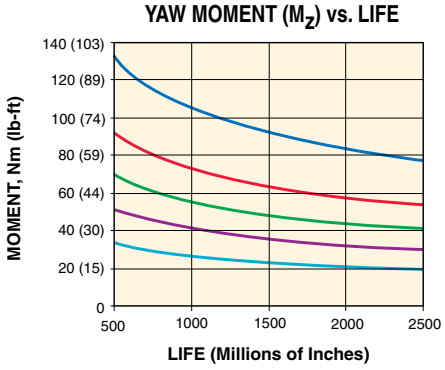




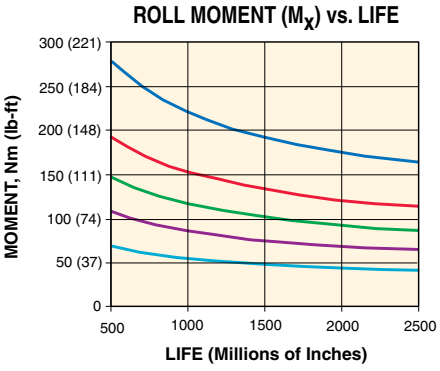
Standard Carriage

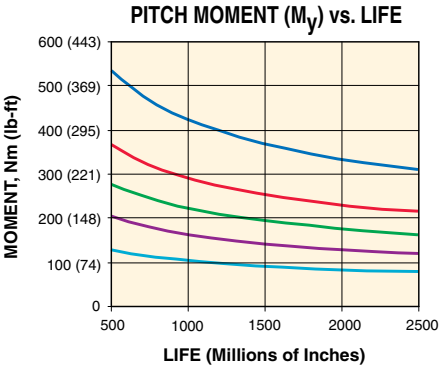


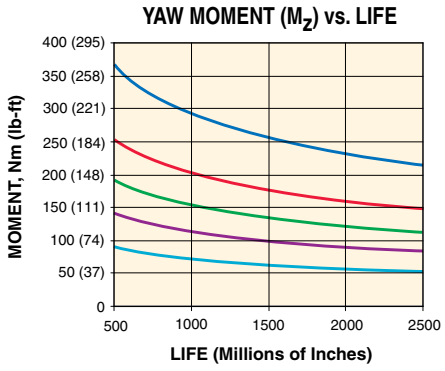




Extended Carriage

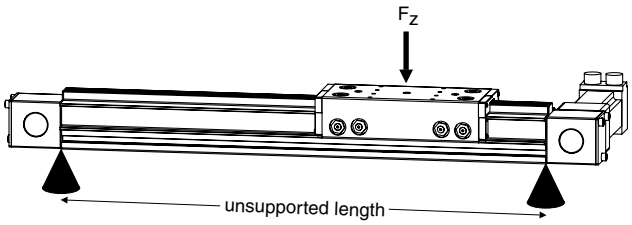




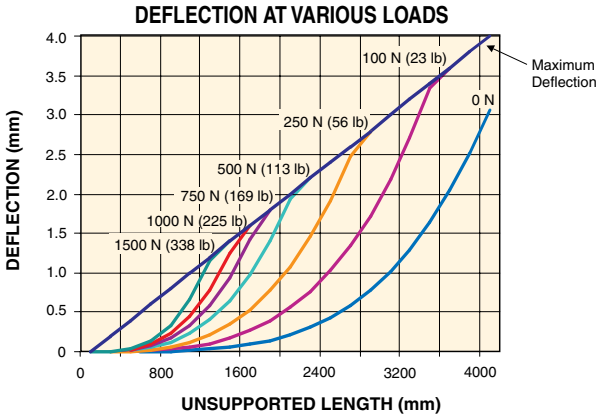


ERV Technical Data

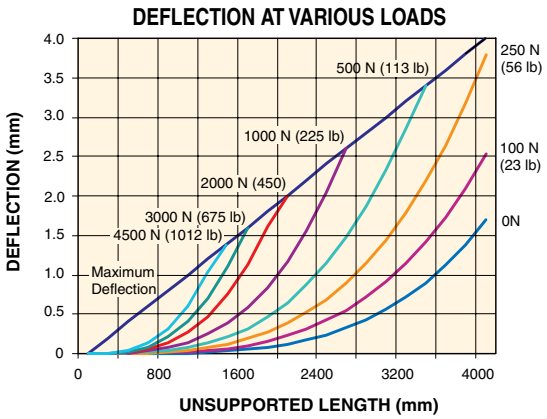
Deflection



ERV5

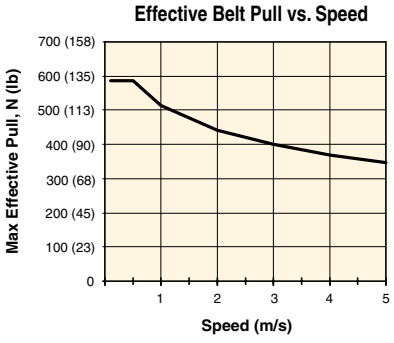


ERV8



Effective Belt Pull

ERV5



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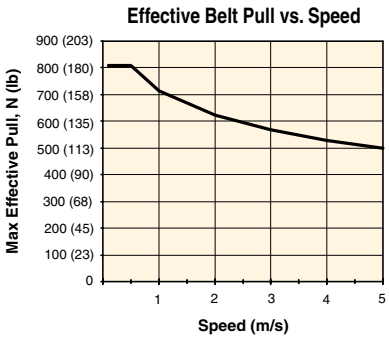
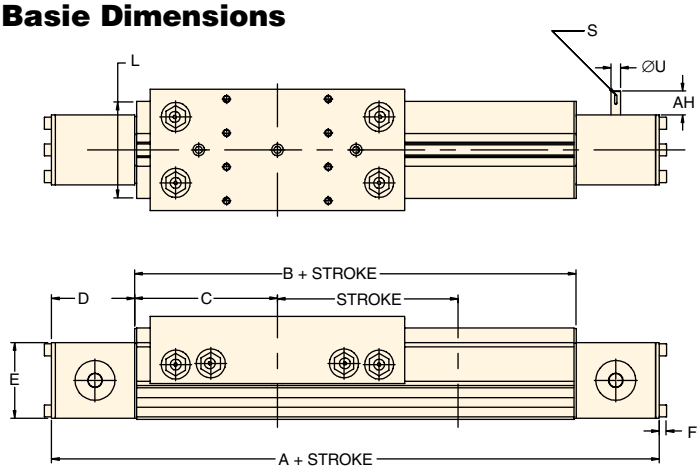
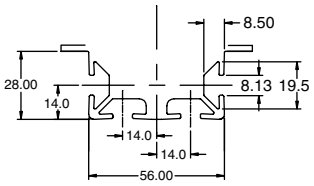
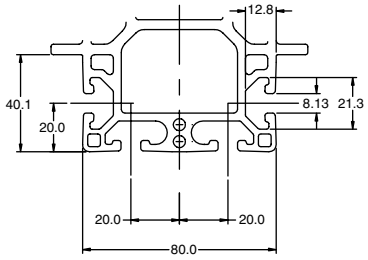


Basie Dimensions





MOUNTING DETAIL 56



MOUNTING DETAIL 80

Size	Carriage	Option	A	B*	C
5	Standard	w/o bumpers	369.8	232.5	116.2
		w/ bumpers	470.8	333.5	166.7
	Extended	w/o bumpers	509.8	372.5	186.2
		w/ bumpers	610.8	473.5	236.7
8	Standard	w/o bumpers	473.8	272.5	136.2
		w/ bumpers	586.8	386.0	193.0
	Extended	w/o bumpers	598.8	397.5	198.7
		w/ bumpers	711.8	511.0	255.5

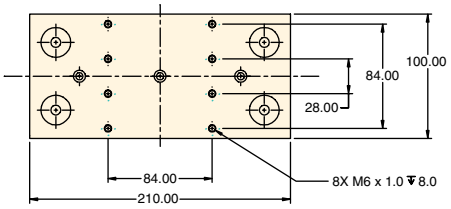
*Dimension is referenced from hard stop to hard stop.

NOTE:
Felt wipers do not increase A, B or C dimensions.

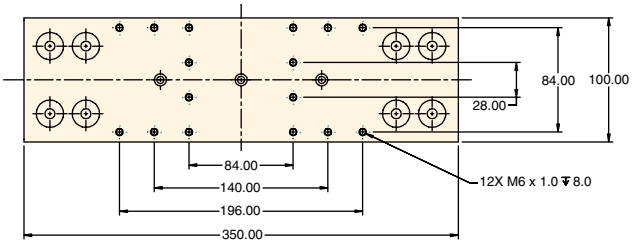
Size	D	E	F	G	H	J	K	L	U	AH	S
5	68.7	62.5	6.0	85.0	55.5	58.0	100.0	80.0	7.96	19.7	M2 X 6
8	100.7	84.0	6.0	110.0	67.5	80.0	130.0	106.0	13.95	32.0	M5 X 9

Carriage Mounting Detail

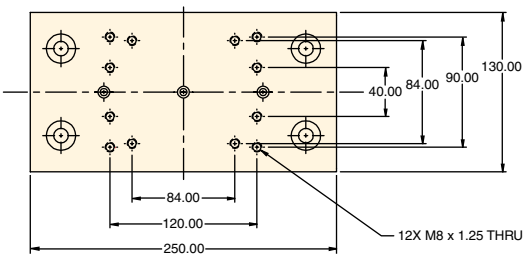
ERV5 Standard Carriage



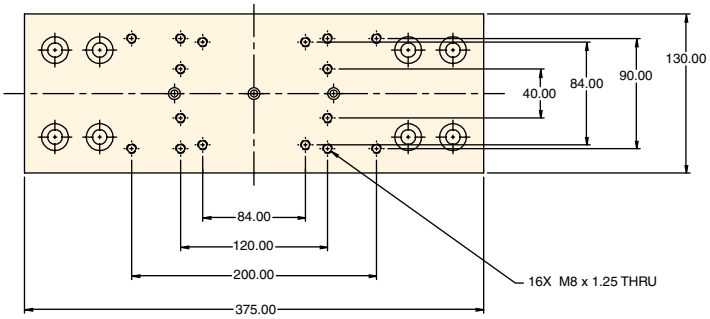
ERV5 Extended Carriage



ERV8 Standard Carriage



ERV8 Extended Carriage



ERV Series

ERV Options

Carriage Style (S, L)

Standard carriage

Extended carriage

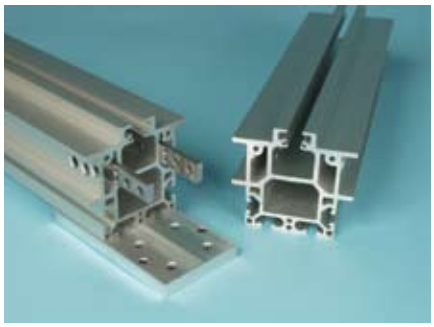
(Shown with Wipers)

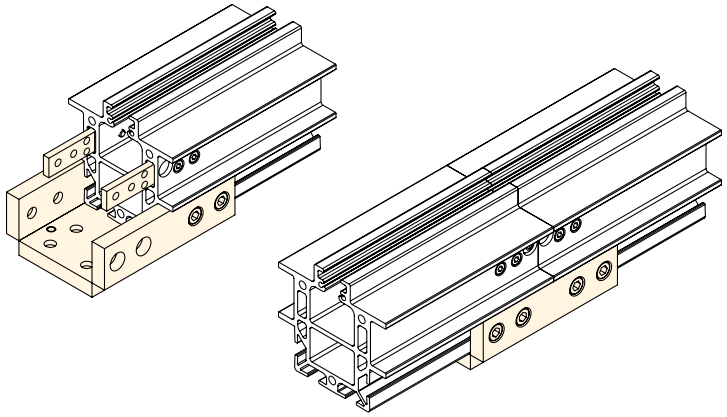
Carriage Features

- Bearing Wheels
  - 12 wheels for standard carriage
  - 24 wheels for extended carriage
- Eccentric Pre-loaded wheels
- Concentric Wheel
- 2 options for carriage loading,
  - Positive (Toward Actuator)
  - Negative (Away from Actuator).
- Magnet for Limit and Home Switches.

Spliced Units

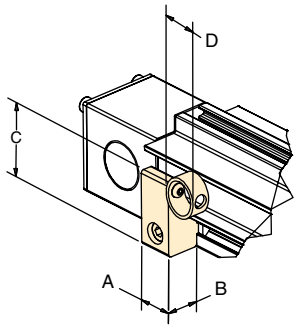
Standard units are available in lengths up to 20 feet.
For additional length, spliced units are available.





Bumpers (B)

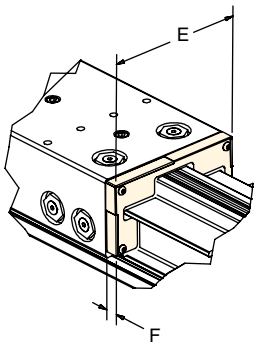
Optional bumpers are designed to prevent over-travel and can be adjusted along the full length of travel. The bumpers are fixed to the actuator extrusion via a standard T-slot (M8 SHCS and T-nut).



Model	A	B	C	D
ERV5	25.4	23.9	52.5	25.1
ERV8	25.4	30.3	71	31.1

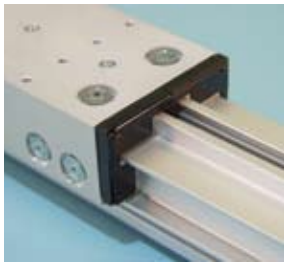
Felt Wiper (W)

Although not 100% sealed, the felt wiper option is designed to wipe contaminants away from entering the carriage assembly.

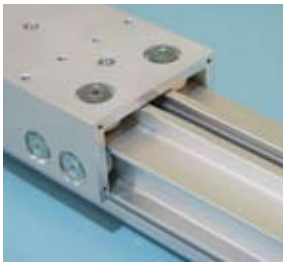


Model	E	F
ERV5	99	9.5
ERV8	129	9.5

Carriage with Wiper



Carriage without Wiper



ERV Mounting Options

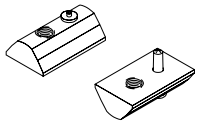
Machined Gussets

Machined gussets provide a high strength, accurate right angle connection for ERV5 profiles. The mounting surfaces are milled perpendicular.

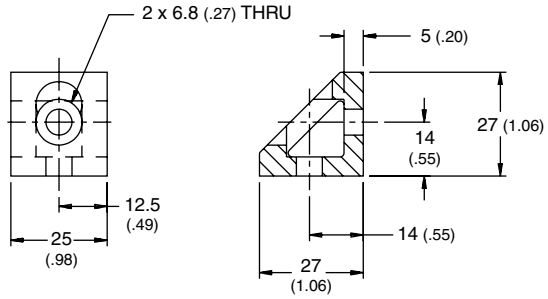
Material: 6063-T6 Aluminum alloy, clear anodized
Machining: None

Model	Gusset Part Number	Recommended Fasteners
ERV5	20-2828M	(2) 24-112-6 BHSCS and (2) 20-099 Drop-in T-Nuts
	20-2856M	(4) 24-112-6 BHSCS and (4) 20-099 Drop-in T-Nuts
ERV8	20-4040M	(2) 20-118-8 BHSCS and (2) 20-098 Drop-in T-Nuts
	20-4080M	(4) 20-118-8 BHSCS and (4) 20-098 Drop-in T-Nuts

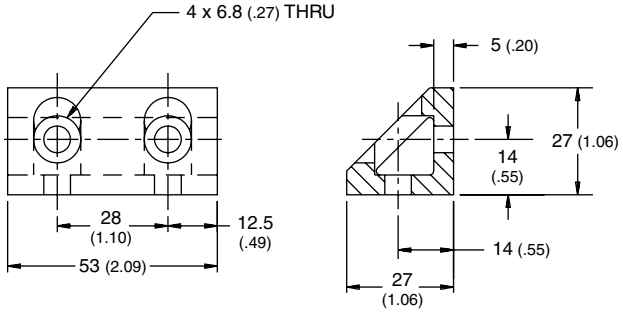
Drop-In T-Nuts



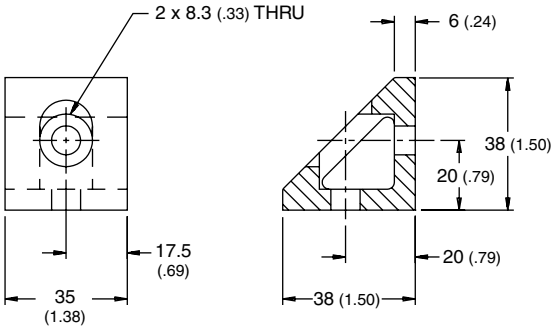
20-2828M Dimensions



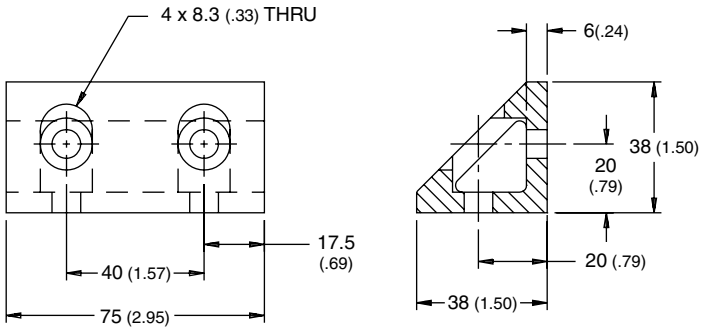
20-2856M Dimensions



20-4040M Dimensions



20-4080M Dimensions

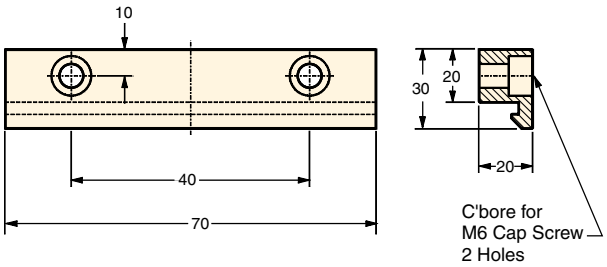


Toe Clamp

For attachment of ERV8 profiles to each other, to a structural profile or a mounting surface. Must be used in pairs. Requires M6 socket head cap screws.

Part Number 500-000900

Dimensions



M6 Socket Head Cap Screws

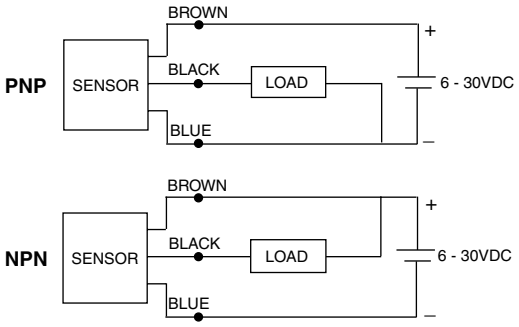
Length (mm)	Part Number
10	24-310-6
12	24-312-6
14	24-314-6
16	24-316-6
20	24-320-6
25	24-325-6
27	24-327-6
30	24-330-6
33	24-333-6
35	24-335-6
40	24-340-6
45	24-345-6
50	24-350-6
80	24-380-6
90	24-390-6
100	24-3100-6

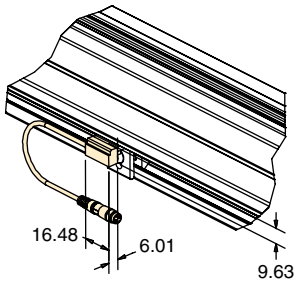
Sensors

Two types of Hall effect sensors are available for use with ERV Series actuators. The normally open sensor is typically used for mid-position sensing, such as homing applications. The normally closed sensor is generally used to indicate over-travel at the end of the stroke, and is used in a safety circuit to prevent damage to components caused by over-travel.

Hall Effect Specifications

	Solid State
Type	Solid State Type (PNP or NPN)
Switching Logic	Normally Open or Normally Closed
Supply Voltage Range	5 - 24 VDC
Switch Current	150 mA max
Current Consumption	7 mA at 12 VDC, 14 mA at 24 VDC
Switching Response	500 Hz Maximum
Residual Voltage	0.8 V Maximum (150 mA)
Leakage Current	10 uA Maximum
Insulation Resistance	100 M Ohm min.
Min. LED Current	1mA
Operating Temperature	-10° to 85°C (14° to 185°F)**
Lead Termination	1500 mm (60 in) or 150mm (6 in) w/connector
Industrial Protection	IP67
Shock Resistance	50 g's, 490 m/sec²



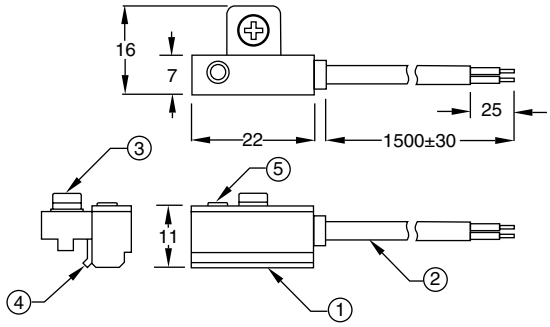


Hall Effect Sensors with Clamp

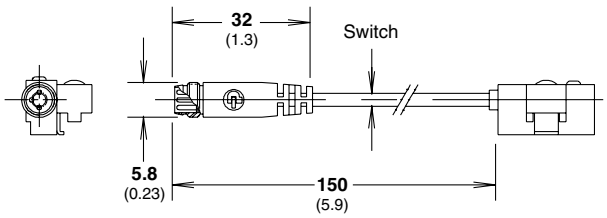
Part No.**	Type	LED Color	Logic	Cable/Connector
SMHnn-1P	N.O.	Green	PNP	1.5m Black with Leads
SMHnn-1N	N.O.	Red	NPN	
SMCnn-1P	N.C.	Yellow	PNP	
SMCnn-1N	N.C.	White/Red	NPN	
SMHnn-1PC	N.O.	Green	PNP	150mm Black with Connector*
SMHnn-1NC	N.O.	Red	NPN	
SMCnn-1PC	N.C.	Yellow	PNP	
SMCnn-1NC	N.C.	White/Red	NPN	

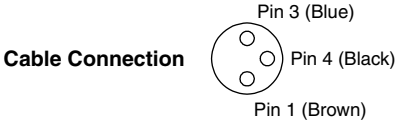
* Mating sensor cable assembly **B8786** purchased separately.
** nn = V5 to fit ERV5 or V8 to fit ERV8

Dimensions



1. Housing material: plastic
2. Cable type: ∅3.3mm, 3C wire, 24AWG
3. Clamp screw: M3x8mm, stainless steel
4. Adjustable clamp: stainless steel
5. LED color when activated: red
6. IP67 and CE certified





ERV Series

ERV Ordering Information

ERV	5	BLT	R	A	D25
Series	Profile Size	Drive Type	Motor Mounting Style	Drive Ratio	Gearbox

Continued on next page

Code	Profile Size
5	56mm
8	80mm

Code	Drive Type
BLT	Belt Drive

Code	Motor Mounting Style	
R	Direct Drive Right	
L	Direct Drive Left	
M	Parallel Over Right with Timing Belt or Gear Drive	
N	Parallel Under Right with Timing Belt or Gear Drive	
S	Parallel Over Left with Timing Belt or Gear Drive	
T	Parallel Under Left with Timing Belt or Gear Drive	
V	Reverse Parallel Over Right with Timing Belt or Gear Drive	
W	Reverse Parallel Under Right with Timing Belt or Gear Drive	
Y	Reverse Parallel Over Left with Timing Belt or Gear Drive	
Z	Reverse Parallel Under Left with Timing Belt or Gear Drive	
J	Reverse Parallel Rear Right with Timing Belt or Gear Drive	
K	Reverse Parallel Rear Left with Timing Belt or Gear Drive	

Code	Drive Ratio
A	1:1 Inline 1:1 Timing Belt (Parallel)
B	1.5:1 Timing Belt (Parallel)
D	2:1 Timing Belt (Parallel)
K	1:1 Gear Drive (Parallel)
E	3:1 Gear Drive (Parallel)
F	5:1 Gear Drive (Parallel)
G	7.5:1 Gear Drive (Parallel)
H	9.5:1 Gear Drive (ERV5 Parallel) 10:1 Gear Drive (ERV8 Parallel)

Code	Gearbox Option [1]
0	No Gearbox
A	PX23
B	PS60 – Shaft Horizontal
C	PS60 - Shart Vertical
D	PX34
E	PS90 - Shaft Horizontal
F	PS90 - Shaft Vertical
G	PX115
P	PV23FE
Q	PV34FE

Code	Gearbox Ratio
00	Flange Only [2]
03	3:1
04	4:1
05	5:1
07	7:1
10	10:1
15	15:1
20	20:1
25	25:1
30	30:1
40	40:1 (PS only)
50	50:1
70	70:1
A0	100:1

1 Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.
2 When combined with Gearbox Option "0" (no gearbox), this option is direct mount with no flange included.

ERV Ordering Information

J13	L	P	Y	N	N	0750	A
Motor	Carriage Style	Normal Carriage Loading	Carriage Options	Options	Brake Option	Stroke	Design Level

Code	Carriage Style
S	Standard
L	Extended

Code	Normal Carriage Loading
P	Positive (Toward Actuator)
G	Negative (Away from Actuator)

Code	Carriage Options
W	Wipers
B	Bumpers
Y	Wipers and Bumpers
N	None

Code	Options
N	None
X	Dust Shield (Consult Factory)

Code	Brake Option [7]
N	No Brake
E	115VAC w/Flying Leads [4]
F	24VDC w/Flying Leads [4]
G	115VAC w/Connector [4]
H	24VDC w/Connector [4]

Code	Standard Stroke [5]
xxxx	Standard increments of 1mm. See table for maximum travel lengths.

Code	Motor Option [1]
A	S57, ES2x - Round Shaft
B	S83, ES3x - Round Shaft
C	HV34, LV34 - Shaft Flat
D	HV23, LV23 - Shaft Flat
E	SM23x***-T*** (x = 1, 2, 3)
F	BE23***-K***
G	BE34***-K***
H	SMN0602***-K***
J	SMN0822***-K***
K	SMN1002***-K***
L	SMN1152***-K***
M	SMN1422***-K***
N	MPP092****-K***
P	MP100****-K***
Q	MPP115****-K***
R	MPP142x***-K*** (x = 2, 4, 6)
S	MPP1428***-K***

Code	Motor Model [3]
00	Motor Flange only
01-99	Reference Motor Section for Specific Models (01-99)

Maximum Standard Stroke Length

(Consult factory for longer lengths)

Model	Standard Carriage	Extended Carriage
ERV5 - No Bumpers	6050mm	5900mm
ERV5 - With Bumpers	5970mm	5800mm
ERV8 - No Bumpers	6025mm	5900mm
ERV8 - With Bumpers	5920mm	5785mm

1 Not all motor/gearbox options physically fit on all cylinder sizes and mounting styles. Reference mounting matrix to determine suitable combinations. PS precision gearboxes are oil filled. Shaft orientation is required to insure proper oil fill levels.

3 Reference Motor Section for motor compatibility and coding.

4 Parallel mounting only.

5 Non-standard stroke lengths available in increments of 1mm.

ERV Application Fax Form

Fax completed form to (330) 334-3335 or email to actuatorsales@parker.com

Contact Information:

Name _____ Phone _____

Company _____ email _____

City, State, Zip _____

Application Sketch

NOTES:

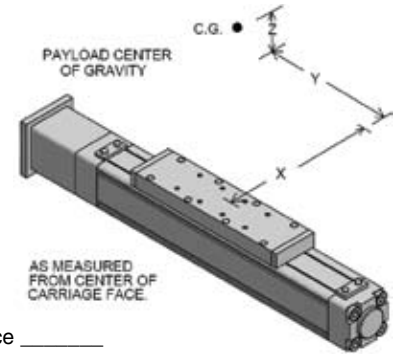
Please include the critical dimensions in your sketch.

In order to achieve the best solution, it is important that you provide as much information as possible.

Motion Profile

Moves	Distance (Stroke)	Time	Thrust or Load	Dwell
First Motion				
Second Motion				
Third Motion				
Fourth Motion				

Moment Loading



X distance _____

Y distance _____

Z distance _____

Environmental Requirements

1. Operating Temperature

Max _____ Min _____

2. Comtanimation (check one)

☐ Particle ☐ Liquid

Type: _____

3. Special Considerations _____

_____

_____

Application Requirements:

1. Overall Stroke (add 25mm per end minimum) _____

2. Cylinder Orientation (check one)

☐ Horizontal ☐ Inverted ☐ Side Mount

☐ Vertical ☐ Angle: Degree _____

3. Load/Tooling Weight _____

4. Repeatability Requirements _____

☐ Unidirectional ☐ Bidirectional

5. Is the load externally guided? (check one)

☐ Yes ☐ No

If yes, how? _____

6. Is the actuator body supported? (check one)

☐ Yes ☐ No

If yes, how? _____

7. Life Requirements (cycles, distance or years)

Hours per day _____ Days per year _____

8. Special Considerations _____

_____

_____

_____

Please attach another sheet if more room is needed.

Parker

ERV Application Fax Form

Actuator Type and Mounting

1. Carriage Type (check one)

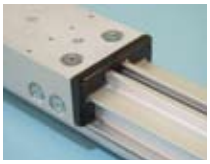
☐ Standard

☐ Extended

☐ No Preference

2. Carriage Options (check one)

☐ Wipers



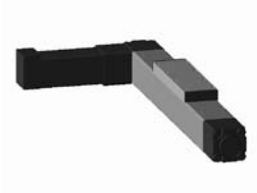
☐ Bumpers

☐ Wipers & Bumpers

3. Motor Mount (check one)

☐ Inline – Direct Drive Left (shown)

☐ Inline – Direct Drive Right

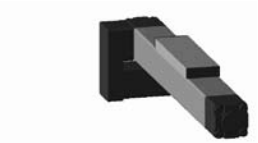


☐ Parallel Over Right

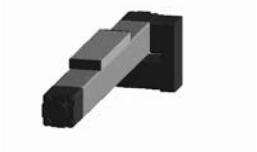
☐ Parallel Over Left

Parallel mounts can limit the actuator's total thrust capacity.

☐ Parallel Under Right



☐ Parallel Under Left



☐ Other Parallel Option (select from catalog page 64) _____

Motor, Drive and Control Options:

1. Motor Options (check all that apply)

☐ Stepper ☐ Servo

☐ Parker Supplied ☐ Customer Supplied (provide print)

☐ Gearhead

2. Other Options (check one)

☐ Drive ☐ Drive/Controller ☐ Controller

3. Available Line Voltage _____

4. Switches/Sensors (quantity)

End of Travel _____ Home _____

5. Brake Option (check one)

☐ Motor ☐ None

6. Special Options _____

_____

_____

_____

_____