Bulletin PM-ERV-B/USA

Maintenance Instruction & Parts List

Revision Date: September 2005
Supersedes: April 2002

ERV Series
Value Line Rodless Linear Actuator

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General

This guide contains maintenance instructions, replacement parts information, and information on various actuator options. Consult the factory or the Product Catalog for additional information.

ERV Series Linear slides are electromechanical belt driven actuators. The mechanical capabilities and response of the units are greatly dependent on the entire drive train system including the motor or motor and gearbox combination.

In both size units an extended carriage option is offered. This option increases the actuator carriage length and significantly increases the load carrying capacity of the carriage. Please note that this option does not alter the actuator body. The body may require additional support along its length.

See the Product Catalog for additional design considerations.

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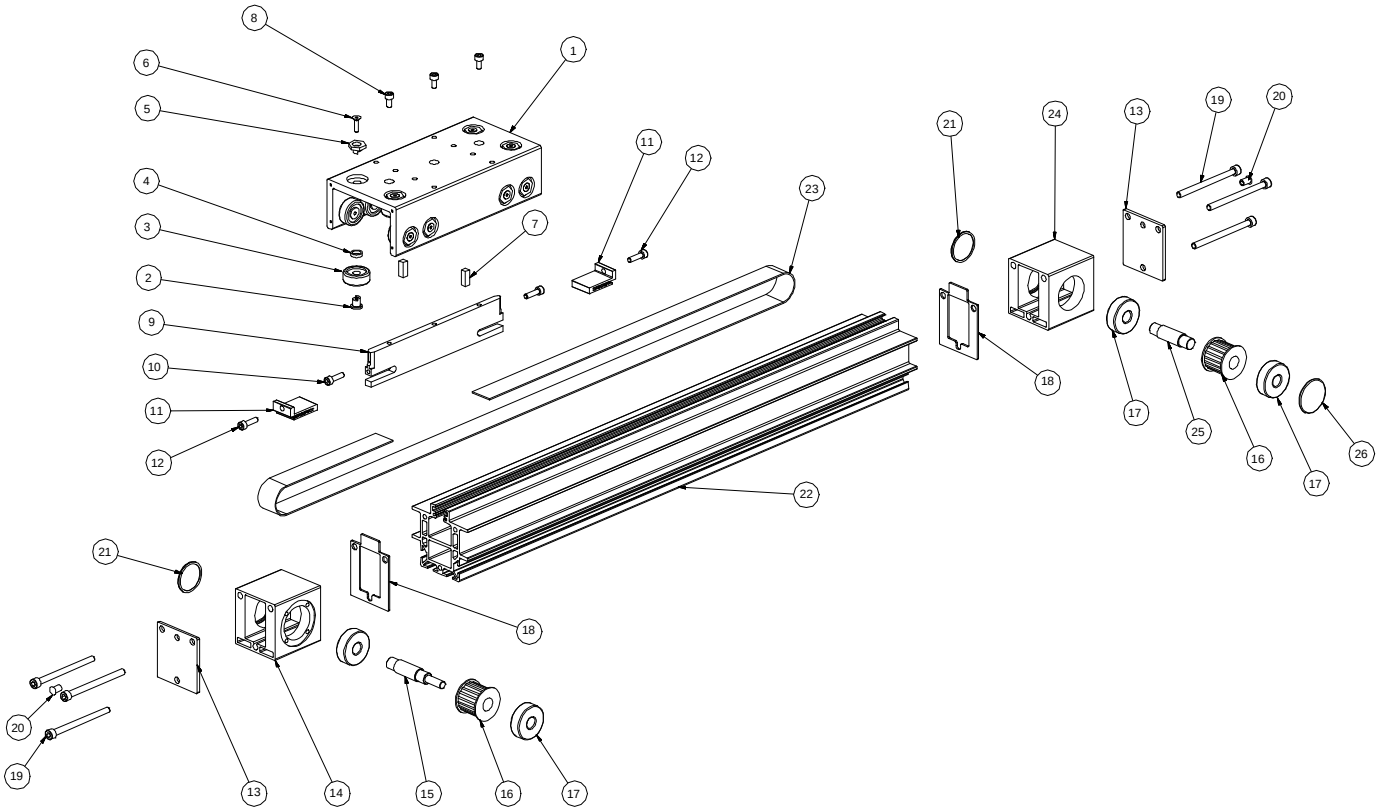
Exploded View



Carriage Assembly & Preload Adjustment

When the actuators come from the factory the carriage wheels will be preloaded. If over the course of time the actuator becomes damaged or the preload is lost the wheels can be easily adjusted or if necessary replaced in the following manner.

1. Use good general safety guide lines when working on any type of machinery
2. Review the specific application for any potential personal injury and property damage while servicing the actuator.
3. Disconnect all power to the actuator.
4. If the actuator is equipped with end of travel bumpers, remove the bumper assemblies on the idler (not the motor) end of the actuator.
5. Disconnect the carriage from the shuttle by removing the three carriage bolts (8).
6. Roll the carriage off the end of the body extrusion. Note, the actuator is designed so that the carriage assembly can be removed for carriage maintenance purposes without disturbing the drive belt tension.

*** DO NOT REMOVE THE CARRIAGE ROLLER WHEELS FROM THE CARRIAGE AT THIS TIME ***

7. Review the hex nuts/roller cams (5) on the carriage. Take special note that on half of the hexes the bolt is off center inside the hex. These are the cams that produce the preload in the carriage. The other half of the hexes have the bolts in the center. These are the main load bearing roller wheels.
8. Use a removable marker of some type to identify what locations on the carriage use the off center cams. This will help you to put the carriage back together the same way (i.e. positively or negatively loaded carriage – see the product catalog for a description).

9. Only after marking the cam locations should you remove a roller assembly. If a roller needs to be replaced or the preload needs to be adjusted, remove the wheel retainer screw in combination with the appropriate sized hex wrench.

    *** Note: Using a socket is the best way to get a firm grip on the roller cams (5). ***

10. If you are adjusting the preload skip to step 14, otherwise continue.
11. If you are replacing a roller you will need to remove the bearing retainer (2) from the inside of the roller wheel (3). The fit between the two pieces is tightly controlled. They will probably fall apart but they can be disassembled with finger pressure. Do not use a hammer etc.
12. Insert the bearing retainer into the roller wheel assembly.
13. Reinstall the wheel washer (4).
14. Apply a drop of removable anaerobic adhesive (thread locking agent – ex. Loctite®) to the internal threads of the bearing retainer (2).
15. Pass the wheel retainer screw (6) through the appropriate style of roller cam (i.e. on-center or off-center). At this time take special note that there are interlocking steps milled on both the cam and the bearing retainer. The interlocking steps allow you to preload the carriage while the carriage is on the body extrusion.
16. Assemble the cam through the carriage body itself and engage the thread of the wheel retainer screw into the bearing retainer.
17. Finger tighten the wheel retainer screw while taking caution to make sure the two steps interlock.
18. If this particular cam is one with the screw in the center (i.e. for the load bearing wheels), tighten the screw to the proper torque per the specification in the rear of this instruction. Otherwise wait to tighten the screw if the following carriage preloading discussion.
19. Roll the carriage back onto the extruded cylinder body.

Adjusting the Carriage Preload – Since this step is "Pre-loading" of a carriage assembly, we will only be discussing the off center roller cams. The other cams should be properly torqued at this point.

20. Use the socket to rotate the hex/cam until the roller underneath the carriage comes into contact with the body extrusion. This is identified by a slight increase to the amount of torque required to turn the cam/socket. It is very beneficial at this point to turn the cam past the maximum preload point so that you can feel the maximum and more importantly the minimum/contact point. This also verifies that the wheel retainer screw is not tightening and you are preloading the carriage.

Note: Anymore than a minimal amount of preload puts unnecessary stress/load on the main carriage bearings and roller tire material.

21. Turn the cam back to the point at which the wheel comes into contact with the body extrusion.
22. While holding the cam in a fixed position with the socket, tighten the wheel retainer screw (6) and torque it to the specification in the rear of this instruction.
23. Be sure to adjust the wheels evenly on all three sides so that the carriage runs parallel with the body.

Note: If several of the wheels have lost their preload it may be difficult to immediately find the contact point. You may need to tighten a few of the questionable wheels and then adjust them one at a time.

Belt Tension

Tension the actuator drive belt (23) using either an inductive or laser based frequency meter. See the manual for the specific meter you have chosen for specific setup and use instructions.

1. After installation of the belt into the actuator body and the belt clamps (11), tighten the belt by hand using the belt clamp bolts (12).
2. Space the carriage assembly, that is attached to the belt by way of the shuttle, away from one of the endcaps by a distance "L" (see below chart). "L" should be measured from the centerline of the drive endcap to the attachment point of the belt to the shuttle (belt clamp bolts). Use the largest measurement possible from the chart below for tensioning (i.e. an actuator with an 850mm stroke would use the 500mm measurement).

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3. Place the meter sensor approximately half way between the endcap and the carriage (i.e. “L”/2).
4. Vibrate the belt.
5. Adjust the tension of the belt by tightening or loosening the belt clamp screws (12) appropriately. This can be done through the access hole in the endcap cover plate or with a ball end hex wrench.
6. After the belt has been properly tensioned, install the plastic plugs (20) in the endcap access holes (if required).

Belt Frequency		
“L” (mm)	ERV56 (Hz ± 4 Hz)	ERV80 (Hz ± 4 Hz)
100	353	357
200	176	178
500	71	71
1000	35	36

Lubrication

The wheel and pulley bearings are pre-lubricated for the life of the unit. No additional lubrication is necessary.

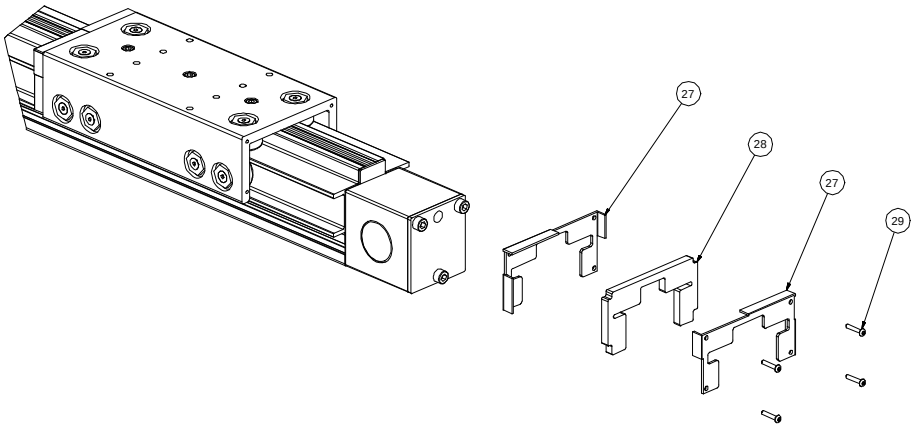
Actuator Mounting

The ERV units should only be mounted down by way of the T-slots on the body of the unit. The endcaps should never be used as mounting points. The mounting holes provided on the carriage as well as the T-slots are designed to accommodate standard Parker Hannifin IPS mounting brackets in the 28mm and 40mm profile sizes (ERV56 and ERV80 respectively).

See the ERV product catalog for additional mounting gussets.

Roller Wheel Wiper Accessory

A roller wheel wiper accessory is offered for applications where large particles may accumulate on the wheel rails. This is constructed of a felt pad on either end of the carriage which will wipe the rails before the wheels pass over. Below is a parts layout for this option.



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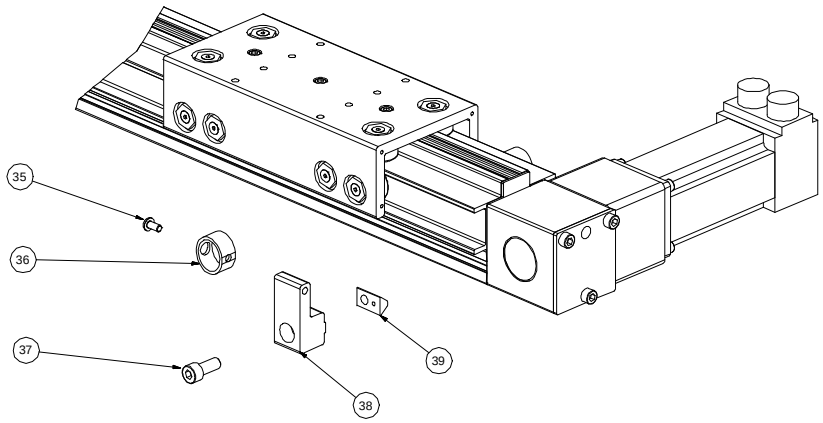
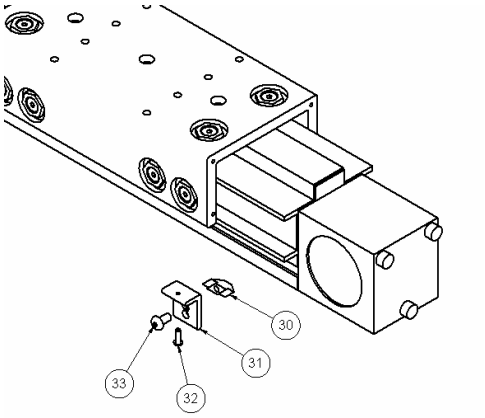
Bumper Accessory

External bumpers are available on these units for safety reasons or as emergency stops. These bumpers are designed as safety stops only and should not be used as end of stroke stops. Continuously using them as end of stroke stops may damage the drive train. See the diagram below for an exploded view of the bumper option.



Hall Effect & Reed Switches

Hall Effect and Reed switches are available for sensing the position of the carriage. This is accomplished by detecting the magnet attached to the carriage. Magnets come as standard on all units. The switches may be attached to either of the side T-slots on the actuator body and are easily adjusted to any position along the length. See the figure below for the mounting bracket hardware needed for the switches.



Description	Part Number
Preassembled Mounting Kit For ERV56	SCV5
Preassembled Mounting Kit For ERV80	SCV8

Item	Description	Part Number
30	Drop In "Z" Nut	20-038
31	Switch Bracket	ERV56M10
32	Switch Mounting Screw	CB-CM3X0.5-010
33	Switch Bracket Mounting Screw	CB-CM5X0.8-010

Note: The components for each of the kits are identical. The difference between the kits is location of item #33 in the switch bracket.

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Hall Effect Sensors				
Part Number	Type	LED Color	Logic	Cable/Connector
SMHnn-1P	N.O.	Green	PNP	1.5M Cable With Leads
SMHnn-1N	N.O.	Red	NPN	
SMCnn-1P	N.C.	Yellow	PNP	
SMCnn-1N	N.C.	White or Red	NPN	
SMHnn-1PC	N.O.	Green	PNP	150mm Cable With Quick Dis. **
SMHnn-1NC	N.O.	Red	NPN	
SMCnn-1PC	N.C.	Yellow	PNP	
SMCnn-1NC	N.C.	White or Red	NPN	

Reed Switches				
Part Number	Type	LED Color	Rating	Cable/Connector
SMRnn-1	N.O.	Green	Hi Amp	1.5M Cable With Leads
SMRnn-1L	N.O.	Red	Low Amp	
SMDnn-1L	N.C.	Yellow	Low Amp	
SMRnn-1LC	N.O.	Red	Low Amp	150mm Cable With Quick Dis. **
SMDnn-1LC	N.C.	Yellow	Low Amp	

“nn” represents place holders for the purpose of ordering pre-assembled mounting brackets for the ERV product line. Replace the “nn” with “V5” or “V8” depending on the size actuator. Note: leave blank for the switch only

** Extension cables with mating quick disconnects are purchased separately

Fastener Torque Table

Item	Description	Qty	ERV56			ERV80		
			Size	N-m	in-lbs	Size	N-m	in-lbs
6	WHEEL RETAINER SCREWS	12	M5	5.1	45	M6	7.9	70
8	CARRIAGE BRACKET SCREWS	3	M5	9.6	85	M5	9.6	85
19	END CAP SCREWS	6	M6	15.8	140	M6	15.8	140
29	WIPER PLATE SCREWS	8	M3	0.1	1	M4	0.1	1
35	BUMPER SCREWS	4	M6	0.6	4	M6	0.6	4
37	BUMPER T-SLOT SCREWS	4	M6	15.8	140	M8	39.6	350
43	INLINE COUPLING BOLT	1	M3	1.2	11	M6	5.1	85

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Generic Part List

ITEM #	DESCRIPTION	QTY	ERV56	ERV80
1	Carriage/Extended carriage	1	ERV56R03(E)	ERV80R03(E)
2	Bearing retainer	12/24	ERV56R02	ERV80R02
3	Roller wheel assemblies	12/24	ERV56RCA	ERV80RCA
4	Wheel washer	12/24	WS-FHS-CM08	WS-FHS-CM12
5	Concentric roller cam	6/12	ERV56R01	ERV80R01
5	Eccentric roller cam	6/12	ERV56R04	ERV80R04
6	Wheel retainer screws	12/24	CF-CM5X0.8-018-Z	CF-CM6X1.0-020-Z
7	Magnet	2	ET32M10	ET32M10
8	Carriage bracket screws	3	CS-CM5X0.8-010-Z	CS-CM5X0.8-016-Z
9	Carriage shuttle bracket	1	ERV56M03	ERV80M03
10	End of stroke stop screw – std. carriage	2	CS-CM5X0.8-020-Z	CS-CM5X0.8-020-Z
10	End of stroke stop screw – ext. carriage	2	CS-CM5X0.8-090-Z	CS-CM5X0.8-080-Z
11	Belt clamp	2	ER80R09	ERV80R09
12	Belt clamp bolts	2	CS-CM5X0.8-020-Z	CS-CM5X0.8-020-Z
13	End Cap cover plate	2	ERV56M04	ERV80M04
14	Drive end cap	1	ERV56E02	ERV80E02
15	Belt drive shaft	1	ERV56S02	ERV80S02
16	Pulley	2	ERV56P01	ERV80P01
17	Pulley bearings	4	RA446	RA447
18	Body cover plate	2	ERV56M15	ERV80M15
19	End cap screws	6	CS-CM6X1.0-080	CS-CM6X1.0-110
20	Access hole plug	2	18-710	18-710
21	Bearing rear cover plate	2	ERV56M16R	ERV80M16R
22	Extrusion body	1	ERV56CXXXX	ERV80CXXXX
23	Belt material	1	ER80B01BSC	ERV80B01BSC
23	Belt material – high performance	1	ER80B02BSC	ERV80B02BSC
24	Idler end cap	1	ERV56E01	ERV80E01
25	Belt idler shaft	1	ERV56S01	ERV80S01
26	Bearing front cover plate	1	ERV56M16F	ERV80M16F
27	Wheel wiper plate	4	ERV56M05	ERV80M05
28	Felt wiper	2	ERV56M09	ERV80M09
29	SHCS – wiper plate screws	8	CS-CM3X0.5-016-Z	CS-CM4X0.7-016-Z
35	Bumper screws	4	24-312-6	24-312-6
36	Carriage bumper	4	B8504-32ER	B8504-50ER
37	Bumper t-slot screws	4	24-320-6	CS-CM8X1.25-030-Z
38	Bumper block	4	ERV56M06	ERV80M06
39	Drop In T-nut	4	20-099	20-056
40	Linear wiper seal	2	ERV56M08	ERV56M08
41	Drive shaft key	1	B8534M2-08	B8534M5-14
42	Inline coupler	1	RGSM140802	RGSM191405
43	Inline coupler bolt	1	CS-CM3x0.5-012	CS-CM6x1.0-016

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