

## **Extended Retracta Ladder® - Installation Manual & Safety Instructions**

Reference the enclosed **Extended Retracta Ladder® Installation Steps** sheet in addition to this manual. See below the manufacturer's recommended installation instructions for the proper, typical installation of the patented *Extended Retracta Ladder®*, retractable elevator pit access ladder, as manufactured by **Smart Elevator Tech, LLC**:

**Safety:** Follow all applicable national, state and local codes and engineering standards. Follow all safety standards and protocols per OSHA and applicable authorities. Wear protective gear as applicable and take safety precautions including eye protection, electrical shock protection, falling hazards protection, etc. Refer to the current, "*Elevator Industry Field Employees' Safety Handbook*" and all other applicable safety manuals, documents, etc. An *Extended Retracta Ladder®* should be installed only by technicians who are properly trained and have sufficient skills and expertise in elevator installation and maintenance. Evidence of such qualifications include: CCCM (Certified Competent Conveyance (Elevator) Mechanic), CET™ (Certified Elevator Technician), or equal. **Smart Elevator Tech, LLC** is not responsible for the installation of this product, nor any liability arising from damages or injury resulting from the installation or improper use of this product. Use of this product is limited to properly trained personnel as referenced in the **Limited Warranty & Product Liability Disclaimer**. Installation or use of this product constitutes express acceptance of the risks inherent in the installation and use of product.

**Codes:** The *Extended Retracta Ladder®* is designed in compliance with ASME A17.1-2022/CSA B44:22 or later, including section 2.2.4, rules 2.26.2.38, and 2.26.4.3.1. Some authorities having jurisdiction (AHJ) who have not adopted the ASME A17.1-2007/CSA B44-07 or newer code have made specific reference to the provisions of that code with respect to retractable elevator pit ladders. California has published Circular Letter E-10-02 defining the requirements to install a retractable elevator pit ladder in existing hoistways, which largely follows A17.1-2007/B44-07 but adds the requirement for key-operated hoistway access. It is the responsibility of the purchaser to verify with their specific authority(ies) having jurisdiction as to the acceptance of retractable pit ladders.

**Preparation:** Inspect the installation location and surrounding areas to assure a clean and safe workplace. The elevator pit and hoistway must be completed and ready for the installation of a pit access ladder. All related and adjoining equipment must be secured and at a stage of completion conducive to the installation of a pit access ladder. If an elevator is already installed, interconnection to the elevator safety circuit – such as the pit stop switch – must be operational for immediate connection. If the elevator installation follows the installation of the *Extended Retracta Ladder®*, the ladder electrical device interconnection to the elevator safety circuit must be made before a moving car is established.

**Ladder Length and Pit Depth:** Models of the standard *Extended Retracta Ladder®* are shipped ready to install for most standard pit depths. For non-standard pit depths, the base of the 5/16" x 2" steel bar risers (stiles) may be trimmed to suit the actual pit depth. In this way the top step rung would be level with the access landing sill, all rungs will be spaced 12" apart vertically, and the lowest rung would be less than 12" to the pit floor. The Elevator Code requires that the top rung be at least level with or above the sill. It is our understanding that most AHJ prefer to have the top rung of the ladder level with the access landing sill and for pit depths not in even 12" increments, the dimension less than 12" below the bottom rung. It is the responsibility of the installer to verify with the AHJ whether this is the local requirement or whether all rungs must be 12" apart vertically, including the first rung above the pit floor, which would result in the top rung being above the access landing sill.

The maximum the base may be trimmed is 3" or 10.75" depending on the model (bottom wall brackets bottom out at the pit floor). To avoid performing this function in the field, we recommend specifying the actual pit depth when ordering the *Extended Retracta Ladder®* and we can perform the necessary modifications at our shop for a nominal fee. To indicate a model with a non-standard pit depth, follow the "ERL" with the actual pit depth in inches. For example, an *Extended Retracta Ladder®* for a 4'-6" (54") pit would be our model #ERL54.

The standard *Extended Retracta Ladder®* rung width is the code prescribed 16", as measured inside between the vertical riser bars. The total ladder width at the outer edges of the wall brackets measures just less than 24". An additional 1.5" to 2" should be allowed at the side where you will mount the Ladder Electrical Device to make the electrical connection.

Consideration must also be given to the clearance around the vertical riser bars, to provide adequate space for hand gripping. A17.1/B44 section 2.2.4.2.5 requires a minimum 4.5" clearance, "from their centerline to the nearest permanent object." when in the extended position. Typically, the nearest permanent objects may include the entrance fascia, sill, entrance strike or opened door panel on the entrance side and the guiderail on the opposite side. Note the A17.1-2022/B44:22 code version allows the 4.5" clearance to be reduced provided horizontal handholds are provided 12" on center for the 48" vertical section of the ladder above the elevator entrance sill – our "**Full Rung Top**" option.

The *Extended Retracted Ladder®* is also available standard with 12" or 9" rung widths. To indicate a model with a non-standard (non-16") rung width, append the standard model number with a dash and the rung width in inches. For example, an *Extended Retracted Ladder®* for a 5-foot pit with a 12" rung width would be our model #ERL60-12. Note the A17.1-2022/B44:22 code version requires a 16" rung width.

### **Installation:**

1. **Unpacking Shipping Carton & Handling:** Remove all protective shipping materials taking care not to damage the *Extended Retracted Ladder®*.
  - a. The **ladder electrical device** (safety switch) is packed in its original box in a package that includes this manual, the *Extended Retracted Ladder®* Setup Blocks and Warning sign. Special care must be taken not to damage any of these items. Included in the box with the electrical device are two (2) 8-32 mounting screws. The electrical device must not be installed onto the wall bracket prior to mounting the ladder to the wall. The plunger roller mechanism on the electrical device can be damaged if the wall bracket is rotated backwards against the mechanism. Damage to the electrical device that occurs in this way will void the warranty of the device.
  - b. The two (2) **gas springs** will be factory pre-mounted at its cylinder end but not at the piston end. The gas springs will be wrapped in cardboard to the ladder riser bar to prevent damage during shipping. Leave this wrapping in place until the ladder is mounted to the pit wall or divider beam supports. It will be connected to the adjoining floor bracket at a later step. This is to prevent damage to the gas spring and will ease installation, as the gas spring will rotate the wall bracket making its installation difficult if connected beforehand.
2. **Inspect Pivot Hinge Brackets:** Check all pivot hinge arms and brackets. All hinge points should be factory lubricated with lithium grease and the nylon insert nuts left un-tensioned to allow free movement but not excess side play. If necessary, adjust tension on nylon insert nuts for free movement and minimal bracket and pivot arm side play.
3. **Trim Risers:** If the pit depth is non-standard (not in even 12" increments) and a standard ladder was ordered, the base of the 5/16" x 2" steel bar risers of the bottom ladder section may be trimmed up to 3" or 10.75", depending on the model, to suit the actual pit depth. See "Ladder Length and Pit Depth" section above. If the pit depth is standard or if this process was completed for you at our factory, skip this step.
4. **Attach Ladder Sections:** The *Extended Retracted Ladder®* has been split into from two to four sections for ease of handling and reduced shipping cost. To assemble the ladder, align sections with the lower section splice tabs lapping the upper section holes after removing the splice fasteners. The top and bottom sections have "FRONT" labels to ensure correct orientation. Any middle sections (without gas spring or pull-pin) are reversible. It is possible to mount the top section and bottom sections backwards with respect to the lower section(s), in which case the ladder will not function.



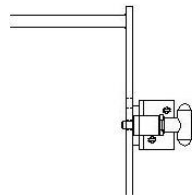
Look for the "**FRONT**" label on front face of one of the rungs on both the top and bottom sections to orient sections correctly. "Front" should face away from the wall/beam. Then insert and tighten the splice fasteners so that the ladder is straight and the vertical riser bars are mated.

5. **Determine Correct Pull-Pin Handle Orientation:** The *Extended Retracted Ladder®* is extended and retracted and locked into both positions by operating the pull pin handle. The pull pin handle must be within reach of the elevator pit access (lowest landing) entrance (see A17.1/B44, section 2.2.4 and Appendix J). To meet this requirement, the *Extended Retracted Ladder®* may require the optional **Pull Pin Pole™** reach extender (see below). The ladder is shipped with the pull pin handle, pivot arm & locking assembly mounted on the right-hand side as you face the

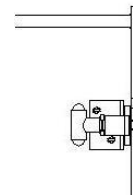
ladder. This is the correct configuration for installing the ladder at the right-hand side of the elevator, from the perspective of looking into the elevator hoistway from the entrance.

To install the ladder on the left-hand side of the elevator, the pull pin handle, pivot arm & locking assembly must be re-installed onto the left side of the ladder upper section and the top wall bracket on the left must be re-installed on the right side of the ladder. Both sides of the vertical uprights are prepared at the factory with the required holes to allow this change to be made in the field. For the pull pin assembly, ensure **the two holes vertically inline are nearest the hoistway wall or divider beam**. In addition, the *Extended Retractable Ladder®*, which comes with (2) gas springs with different load ratings (lbf), will function best if the more powerful gas spring is on the same side as the pull pin. Check the ratings written on the gas springs and switch their positions so the more powerful gas spring is on the same side as the pull pin.

6. Narrow Mounting Space: For unusually tight space along the wall or divider beam for the ladder, the complete pull pin handle assembly may be moved from the outside of the vertical riser bar to the inside of the bar as shown below. This option allows for four potential mounting locations for the pull pin assembly (R.H. & L.H, outside & inside). This option is not available with the optional "**Full Rung Top**" with horizontal handholds for the 48" of the ladder above the sill.



Outside Mounting -Standard Location



Inside Mounting -Optional Location

7. Mounting Method – Wall Mount: The *Extended Retractable Ladder®* must be mounted securely to the building structure to assure safe and compliant operation. The mounting method shall conform structurally to all applicable codes and the latest edition of the *AISC Manual of Steel Construction*. The mounting method depends on the structure to which the ladder will be mounted. If the ladder is to be mounted to the structure using engineered anchors or fasteners other than through bolts, follow the manufacturer's instructions. See below various acceptable mounting methods – note below bolts and anchors are not included:
- all structural substances & members: 3/8" through bolts
  - concrete: 3/8" wedge or epoxy anchors
  - concrete masonry units - filled: 3/8" wedge, sleeve or epoxy anchors
  - concrete masonry units - hollow: 3/8" sleeve anchors or epoxy anchors
  - brick & mortar: 3/8" epoxy anchors
  - wood timber or blocking: 3/8" lag bolts with 3.5" thread embedments
  - 1" shaft liner coreboard or (2) 5/8" drywall (upper bracket only): (2) 1/4" toggle bolts
8. Mounting Method – Divider Beams: When mounting the *Extended Retractable Ladder®* on the divider beam side of a multi-car hoistway, additional steel brackets, framework, channels, etc. may be required (not included). Most standard hoistway construction will not include structural mounting points at the standard ladder bracket locations and will require that they be added. Note that attaching the *Extended Retractable Ladder®* to a pit divider screen will not be adequate. A good solution is to add a proven metal framing system such as Unistrut® Metal Framing System channels or equal. These channels can be mounted vertically between the concrete pit floor and the underside or front face of the lowest hoistway divider beam. For the lower *Extended Retractable Ladder®* mounting points, the Unistrut® channel #P1000 should be adequate for spans up to 5 feet. For spans greater than 5 feet, model #P5500 or #P1001 may be required. To provide the required structural mount for the top, pull pin assembly bracket mount, a vertical #P1000 spanning between divider beams should be adequate with normal floor heights. Alternately, a #P1001 channel can be mounted horizontally, parallel to the divider beam. When using Unistrut (or equal) channel system, be sure to include Unistrut #P2864 Channel Plates between the channel legs and the ladder mounting brackets. Failure to do so may cause deformation of the channel and deficient bracket attachment. Seek the advice of a design professional if there is any question as to the required structural mounting point design strength or metal framework installation methods. It is the responsibility of the purchaser to certify the integrity of the structural mounting of the *Extended Retractable Ladder®*.

9. **Mounting Procedure:** When fastening the *Extended Retracta Ladder®* to the structural mounting surface, care must be taken to assure all the mounting brackets are vertically plumb, parallel and equidistant. Out-of-plumb mounting will cause the ladder to bind as torsion is introduced through the vertical risers. The top pull pin assembly bracket mounting alignment is critical to assure the locking function in the retracted and extended positions. Variations in the vertical mounting surface alignment or out-of-plumb conditions can be corrected by shimming or other structural means.

LADDER MUST BE INSTALLED WHILE IN THE RETRACTED (UP) POSITION, BLOCKED UP THE APPROPRIATE AMOUNT

To mount the *Extended Retracta Ladder®*, **locate the ladder against the mounting surface in the retracted (up) position, with the pivot arms dropping vertically and nominally aligned (1.5° offset) with the vertical uprights. Use the Setup Blocks provided to block the ladder's lower section vertical uprights up off the floor exactly 16.25 inches.** If the pit is sloped, trim blocks by the difference in floor level between pit edge and where ladder lands when it is in the extended (down) position. Temporarily brace the ladder against the mounting surface so it doesn't topple.

Drill the main wall bracket connection holes directly through the holes in the ladder mounting brackets or through-bolt for a metal framework attachment. This will assure the mounting fasteners are in the correct and precise locations. In this position the outward legs of the wall mount bracket angles, the pivot arms and the ladder riser bars are all aligned, side by side. An adjustable (Crescent) wrench or C-clamp can be employed along the top of the bracket leg to secure the three members together, which will prevent the wall mount angles from rotating out of alignment. It is important that this angle be straight with the pivot arm to prevent binding in the pivot joint.

**To assure proper operation of the pull pin locking function, the pull pin assembly bracket must be fastened to the structure separately – do not install at this time.**

Install the 3/8" fasteners or anchors (not included) in the main wall brackets and tighten, installing shims if necessary due to uneven, non-plumb, surfaces and ensuring brackets do not rotate as you tighten. Check that the ladder retracts and extends easily. Adjust as necessary.

Now remove the **Setup Blocks** and extend (lower) the ladder so that the bottoms of the ladder's vertical riser bars rest on the floor.

To mount the top pull pin assembly bracket to the structure or framework, lock the pull pin so its wall bracket aligns with the structural mounting surface (wall or framework). Move the bracket up until it stops and mark the top of the bracket, then move the ladder down and mark the bottom of the bracket. Locate the bracket at the center of the two marks and drill the structural mounting surface or locate the insert nut. Install the fastener(s) or anchor, shim if necessary and tighten.

10. **Attach Gas Springs:** After the *Extended Retracta Ladder®* is securely fastened to the structure, the gas springs should be attached. **It is critical that the plunger rod end be mounted facing down and the cylinder tube mounted up.** This rod-down orientation is required due to ladder geometry and to maintain the internal lubrication of the rod and therefore the seal between the rod and the cylinder tube. If the gas springs are mounted inverted, the ladder will not function properly, and it will void the warranty.

When installing the gas spring, assure that adequate grease exists in the ball socket end fitting and the ball stud connections. The gas springs include a retaining clip (spring wire) Suspa P/N D68-01039 that locks the steel ball socket end fitting Suspa P/N P68-00010 onto the ball stud Suspa P/N P67-00001F. The retaining clip must be removed to install the ball socket and replaced to lock the connection. It may be easier to install the gas spring by removing the cylinder tube (upper) end first and then connecting the rod (lower) end fitting. Then by applying force equal to the gas spring rating to the cylinder tube (upper), the cylinder tube can be lowered to make the upper end fitting reconnection. Verify that the force required to extend and retract the ladder is less than 50 lbf, as per the code. All *Retracta Ladders®* are designed with gas springs to reduce the required force to extend and retract the ladder to approximately 7 to 15 lbf.

11. **Install Ladder Electrical Device:** The *Extended Retracta Ladder®* is shipped with (packed with this installation manual) a ladder electrical device. A weatherproof IP67 rated ladder electrical device in compliance with ASME A17.1/CSA B44 is supplied. Each ladder electrical device contains a minimum of one (1) Positive-Break, forced-

contact, normally closed (N.C.) contact to prevent movement of the elevator when the ladder is in the extended position. The switch must be field piped and wired, per code, in series with the elevator safety circuit, either by interconnecting with the pit stop switch or a direct connection with the elevator controller. The installer must provide field wiring in compliance with the code. For NEMA 4 compliance, a suitable 1/2 NPT or G1/2 connection is required. Two of the main wall mount brackets on the ladder are equipped to allow the ladder electrical device to be mounted on either side of the ladder for convenient field wiring. Note that the ladder has tight clearance to the wall for its full height when in the retracted position. Therefore, the field wiring cannot be run between the wall and the ladder unless there is a void or pocket in this space (not common). The required two (2) 8-32 screws are in the OEM box containing the switch. It is the installer's responsibility to verify the switch operation and to adjust, if needed. The tightening of the nylon insert nuts (locking nuts) on the pivot arms will affect the amount the roller plunger travels to actuate the switch. Provided the nut is tensioned just to allow totally free movement of the pivot arm, the switch actuation will be correct.

12. **Warning Sign:** Contained in the envelope with this installation manual is an ANSI Z535.2, ANSI Z535.4, and ISO 3864-2 compliant 7"x10" adhesive-backed vinyl WARNING sign. This sign must be mounted to the hoistway wall above the ladder's top rung and between the riser bars. The sign must be visible and legible from the elevator pit access entrance prior to entering the hoistway. The peel-sheet adhesive should be adequate to adhere to most hoistway wall surfaces including drywall, CMU block and concrete. If the adhesive proves inadequate, the sign may be mounted using permanent double-stick tape. The sign may be mounted to a pit divider screen for multicar ladder installations using tie wraps (zip ties, cable ties), wire or other means. Pre-mounting to a hard surface is recommended. Contact Smart Elevator Tech, LLC for a replacement sign if necessary. The ladder must not be put into use without this sign.



13. **Optional Pull Pin Pole™ Reach Extender:** The *Retracta Ladder® Pull Pin Pole™*, model #ERL-PPP enables the operator to retract and extend the ladder from distances up to 30". Quantity (1) pole plus cable lanyard and self-drilling screw is an option available for the *Retracta Ladder®* and *Extended Retracta Ladder®*, sold separately. The *Pull Pin Pole™* should be installed near the pit access, readily accessible. Use the self-drilling screw to attach the loose end of the cable lanyard below the entrance landing sill (typically to the steel fascia), within easy reach of the pit entry. **IMPORTANT:** So that pole and lanyard do not interfere with elevator operation, ensure lanyard rests tight against the fascia and lanyard and *Pull Pin Pole™* lie flat on pit floor when not in use. The *Pull Pin Pole™* includes a PIT LADDER OUT OF REACH sign, to be mounted along with the WARNING sign, visible from the elevator entrance.



14. **Test Operation:** Test the operation of the *Extended Retracta Ladder®* from the lowest landing access door. Assure the pull pin handle can be unlocked and ladder can be extended and retracted by using the *Pull Pin Pole™* and that the pull pin properly locks in both the extended and retracted positions. Test the function of the ladder electrical device by operating the elevator on hoistway access operation (only when safe to do so). The elevator must operate (move) when the ladder is in the retracted (up against the wall) position. The elevator must NOT operate (move) when the ladder is in the extended (down with the base of the vertical riser bars resting on the pit floor) position. Verify that there is adequate code prescribed running clearance between the retracted ladder and all points of the moving car adjacent to the ladder. The authority having jurisdiction may require full inspection of the *Extended Retracta Ladder®*, including the operation of the safety limit switch / elevator safety circuit interface and the running clearance.

**Shop Drawings:** Model specific shop drawings, based on pit depth, ladder width and selected options, are available upon request.

**Patent #8944211 & IP:** Please note that the *Retracta Ladder®* has been awarded the USPTO Patent #8944211 B2 and shall not be copied or duplicated. All intellectual property is retained by Smart Elevator Tech, LLC.

**Questions & Comments:** If you have questions or comments about the installation of the *Extended Retracta Ladder®*, feel free to contact Smart Elevator Tech, LLC. (415) 819-5744, sales@smartelevatortech.com.

**Extended Retracta Ladder® - Parts List**

The *Extended Retracta Ladder®* is a completed assembly comprised of common steel members shop fabricated, fasteners, non-slip rungs, and a few replaceable parts. See below information on the replaceable parts:

<u>Description</u>	<u>Manufacturer/Vendor</u>	<u>Part Number</u>
Safety Limit Switch ladder electrical device, roller plunger, UL Labeled, NEMA 4X (IP67), Positive-Break N.C.	OMRON Giovenzana Pizzato	D4N-2132 FTN134-Z11N FR-515-M3
Gas Springs - last two digits reflect load rating, e.g. "25#" references 25 lbf. Check rating and part number of installed springs.	Suspa	C16-18868-25# C16-15952-40# C16-18869-50# C16-26256-60#
Weld-In Pull Pin w/ T-Handle T-Handle only, black	McMaster-Carr McMaster-Carr	90222A112 6477K72
Warning Signs (optional)	Smart Elevator Tech, LLC Smart Elevator Tech, LLC	Warning Retractable Ladder Out of Reach
Optional: <i>Pull Pin Pole™</i> with Lanyard Cable Rubber Bumpers (2)	Smart Elevator Tech, LLC McMaster-Carr Global Industrial	ERL-PPP 30645T866 to 68 T97AB3

**Limited Warranty & Product Liability Disclaimer**

Smart Elevator Tech, LLC (SET) warrants to the original purchaser that this product, the *Extended Retracta Ladder®* (ERL) will be free from defects in material or workmanship. This warranty is limited to twelve (12) months from the delivery date of the product.

**Limitations and Exclusions**

SET obligations under this warranty and the sole remedy for its breach are limited to repair, at its manufacturing facility, of any part or parts of the RL which prove to be defective; or, in its sole discretion, replacement of such products. All returns of defective parts or products must be made through an authorized SET distributor or arranged through SET Customer Service. Authorized returns must be shipped prepaid. Repaired or replacement parts will be shipped by SET or its distributor F.O.B. shipping point.

- The warranty provided herein does not cover charges for labor or other costs incurred in the troubleshooting, repair, removal, installation, service or handling of parts or complete products.
- All claims under the warranty provided herein must be made within ninety (90) days from the date of discovery of the defect. Failure to notify SET of a warranted defect within ninety (90) days of its discovery voids SET obligations hereunder.
- The warranty provided herein shall be void and of no effect in the event that: (a) the product has been operated outside its designed capacity; (b) the product has been subjected to misuse, neglect, accident, improper or inadequate maintenance, corrosive environments, environments containing high humidity or flooding; (c) unauthorized modifications are made to the product; (d) the product is not installed or operated in compliance with the manufacturer's printed instructions; or (e) the product is not installed and operated in compliance with applicable codes.
- The warranty provided herein is for repair or replacement only. SET shall not be liable for any loss, cost, damage, or expense of any kind arising out of a breach of the warranty. Further, SET shall not be liable for any incidental, consequential, exemplary, special, or punitive damages, nor for any loss of revenue, profit or use, arising out of a breach of this warranty or in connection with the sale, maintenance, use, operation or repair of any SET product. In no event will SET be liable for any amount greater than the purchase price of a defective product. The disclaimers of liability included in this paragraph 4 shall remain in effect and shall continue to be enforceable in the event that any remedy herein shall fail of its essential purpose.
- Use of this product is by its nature and necessarily due to the location of its installation being access restricted limited only to the Sophisticated User. Such users, operators, installers, etc. of the RL shall be limited to properly trained and licensed (if applicable) professionals, such as but not limited to elevator mechanics, technicians, service men/women, inspectors, consultants, and others in the elevator industry, etc. Should other tradesmen/women require access to such restricted areas through the use of the RL, such personnel shall also be considered as Sophisticated Users and shall be under the direct supervision of an aforementioned elevator professional.
- THIS WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY FOR SMART ELEVATOR TECH, LLC PRODUCTS, AND IS IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES. SMART ELEVATOR TECH, LLC SPECIFICALLY DISCLAIMS ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. No person or entity is authorized to bind SET to any other warranty, obligation or liability for any SET product.
- Installation, operation or use of the SET product for which this warranty is issued shall constitute acceptance of the terms hereof.