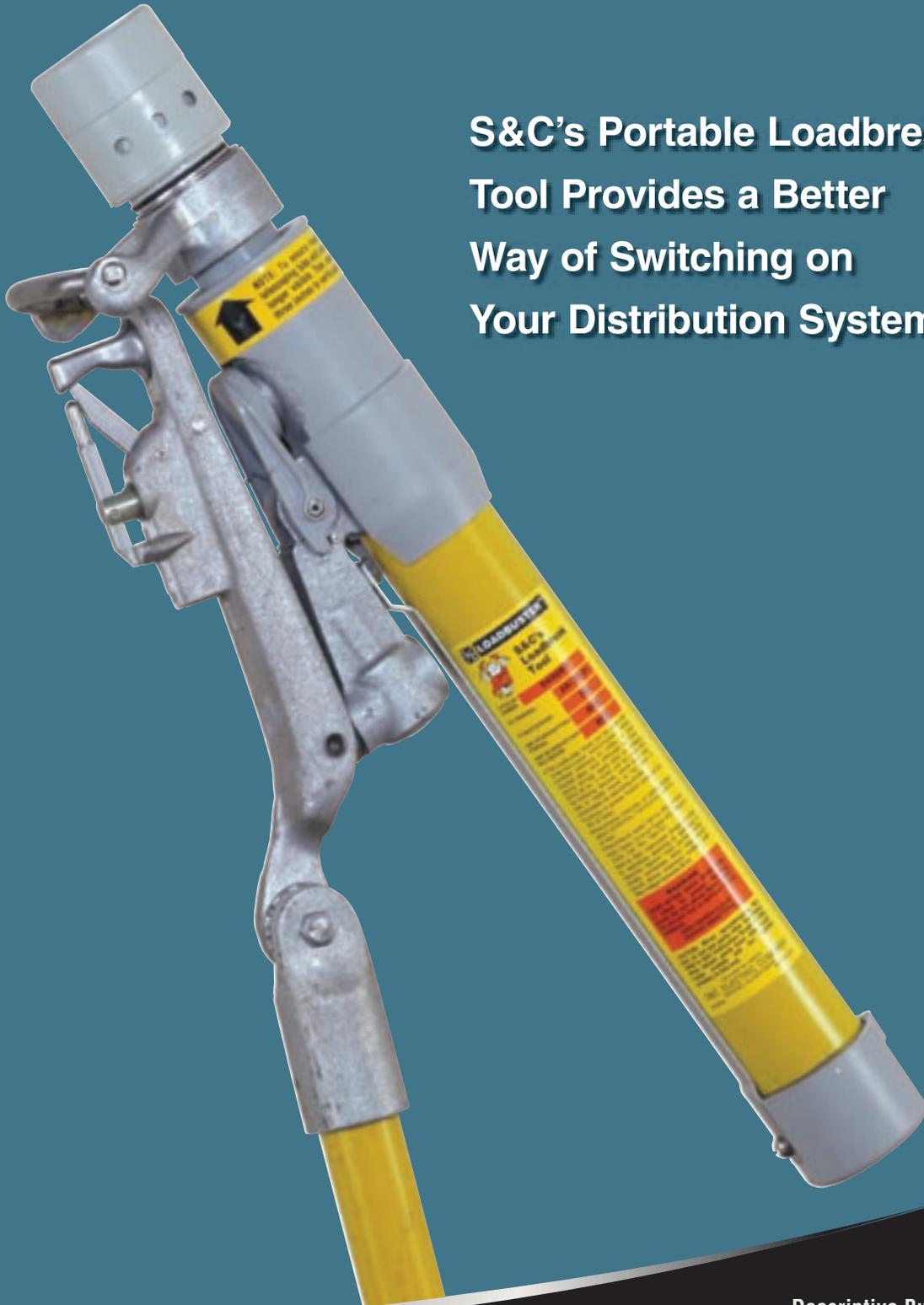


Loadbuster® Loadbreak Tool



**S&C's Portable Loadbreak
Tool Provides a Better
Way of Switching on
Your Distribution System**



**Descriptive Bulletin 811-30
September 11, 2006**

Supersedes Descriptive Bulletin 811-30 dated 5-12-03 ©2006

Here Are Five Reasons Why Loadbuster Is the Better Way:

1 Range

S&C's Loadbuster—unlike loadbreak cutouts or hookstick-operated interrupter switches—brings load switching capability through 34.5 kV and 600 amperes nominal, 900 amperes maximum to your overhead distribution system. You can even switch ungrounded transformers at 27 kV or 38 kV. No longer must you labor under the assumption of a limited voltage or current spectrum for load-switching devices on your distribution system. And with Loadbuster, the dollar savings are big.

2 Greater Flexibility . . . at Lower Cost

Having an arc-interrupting means built into every disconnect, cutout, power fuse, fuse limiter, and dropout recloser on your overhead distribution system is a prohibitive luxury—it simply costs too much. S&C's Loadbuster gives you the operating flexibility of a system with multipoint interrupter switches—but without the cost.

How? Loadbuster—S&C's *portable* loadbreak tool—brings the interrupter to the disconnect, cutout, power fuse, fuse limiter, or dropout recloser whenever loadbreak switch capability is needed . . . instantly. But only when needed. The rest of the time, these S&C Loadbuster-operable devices remain matched to the economics of the system. Loadbuster is S&C's unique method of providing low-cost, positive, and convenient load-switching capability for devices designed for Loadbuster operation.

The concept is simple. The advantages are many. The beauty of it all is that Loadbuster can be instantly reset for repeated use . . . so you limit your investment to only one Loadbuster Tool for each line truck, you spread an acceptable minimal cost across your system, and you can move quickly to restore service to power consumers.

There are two ways to perform single-phase live switching on a distribution system . . . interrupter-equipped cutouts and disconnects. Or the better way: S&C's portable loadbreak tool:

Loadbuster.

3 Power Consumers Benefit with Loadbuster

No one likes to be without electric power. And most power consumers cannot tolerate prolonged outages . . . not even short breaks in service.

Loadbuster switching helps keep service interruptions to a minimum. There's no need for complex switching procedures involving opening and reclosing of line and feeder breakers to permit dead switching. There's no need for one or more line crews to travel and retravel miles of system. Loadbuster makes every disconnect, cutout, power fuse, fuse limiter, and dropout recloser a sectionalizing point. Live switching can be done at the point that minimizes the length of planned outages and/or the point where the fewest power consumers will be affected.

4 Operating Personnel Like Loadbuster

Loadbuster is easy to operate. Loadbuster's anchor is simply hung on the attachment hook of the disconnect, cutout, power fuse, fuse limiter, or dropout recloser. Then the pull-ring is engaged with Loadbuster's pull-ring hook, held fast by the pull-ring latch (see page 6). A firm, steady downward pull opens the device and trips Loadbuster, breaking the circuit. There's no external arc, no contact burning.

Loadbuster-operable devices have no dubious arc chutes, auxiliary blades, or mechanisms to concern operating personnel. And, being portable, Loadbuster is always available for easy inspection. A minimum of attention assures operating personnel that it's in top-notch condition.

5 Universality — Loadbuster Does More Than Switch Load

In combination with portability, another concept, *universality*, has been embodied in Loadbuster.

Not only can Loadbuster switch load currents up through 600 amperes nominal, 900 amperes maximum at distribution system voltages up through 34.5 kV...it can break the associated transformer-magnetizing currents, line-charging currents, and cable-charging currents. And it can switch *single* capacitor banks typically found on distribution systems within its voltage rating, as spelled out in the table on page 4. Certain restrictions apply... see the limitations on page 5.

Loadbuster brings switching capability to suitably “hook-equipped” disconnects, cutouts, power fuses, fuse limiters, and dropout reclosers. It thus eliminates the need for loadbreak cutouts or hookstick-operated interrupter switches... even group-operated disconnects or interrupter switches where group operation is unnecessary.



Loadbuster

Catalog Number 5300R3

**Rated: 14.4/25 kV Nominal
27 kV Maximum**



Loadbuster

Catalog Number 5400R3

**Rated: 25/34.5 kV Nominal
38 kV Maximum**

Optional Carrying Case

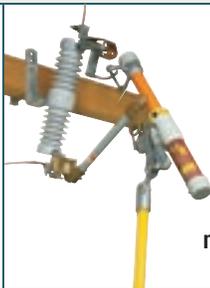
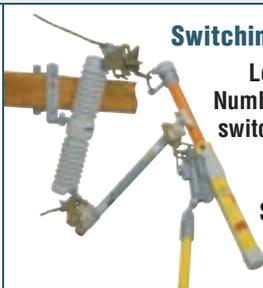


Double-wall, high-density polyethylene construction provides extraordinary protection for Loadbuster.

Loadbuster Switches a Wide Range of Devices

Considering its universality and switching capabilities, Loadbuster’s “easy-to-operate” design is all the more remarkable. Loadbuster can be used with all hook-equipped distribution devices—including disconnects

and cutouts not manufactured by S&C—when they qualify for switching with Loadbuster. See the quantitative requirements outlined on page 8.

 <p>Switching a Disconnect Loadbuster Catalog Number 5400R3 used with a 34.5-kV Crossarm Inverted Style Loadbuster Disconnect®</p>	 <p>Switching a Cutout Loadbuster Catalog Number 5300R3 and 25-kV Ultra-Heavy-Duty Overhead Pole-Top Style S&C Type XS Cutout are a perfect match for protection and switching</p>	 <p>Switching a Power Fuse Loadbuster Catalog Number 5400R3 brings switching capability to a 25-kV Overhead Pole-Top Style S&C Type SMD-20 Power Fuse</p>
 <p>Switching an S&C Fault Tamer® Fuse Limiter Loadbuster Catalog Number 5300R3 is shown here switching a 15-kV S&C Fault Tamer Fuse Limiter</p>	 <p>Switching an S&C TripSaver™ Dropout Recloser Loadbuster Catalog Number 5300R3 applied with 15-kV Branch-Feeder Style TripSaver Dropout Recloser</p>	

Switching Ratings

Loadbuster is available in two easy-to-use models: Catalog Number 5300R3, rated 14.4/25 kV nominal, 27 kV maximum; and Catalog Number 5400R3, rated 25/34.5 kV nominal, 38 kV maximum. Both have a 50/60-hertz interrupting rating of 600 amperes nominal, 900 amperes maximum. When used with suitably “hook-equipped” disconnects, cutouts, power fuses, fuse limiters, and dropout reclosers, Loadbuster is suitable for these live-switching duties on single-phase or three-phase circuits of overhead distribution systems through 34.5 kV:

Transformer switching – Loadbuster can switch transformer load currents up through 600 amperes nominal, 900 amperes maximum, as well as transformer-magnetizing currents associated with the applicable loads.

Line switching – Loadbuster may be used for load splitting (parallel or loop switching) and load dropping of currents up through 600 amperes nominal, 900 amperes maximum. It is also capable of line dropping (charging currents typical for distribution systems of these voltage ratings).

Cable switching – Loadbuster is suitable for load splitting (parallel or loop switching) and load dropping of currents up through 600 amperes nominal, 900 amperes maximum. It may also be used for cable dropping

(charging currents typical for distribution systems of these voltage ratings).

Capacitor bank switching – Loadbuster can switch single capacitor banks to the extent reflected in the table below.

Capacitor-Bank Switching Capability

Loadbuster Catalog Number	Nominal System Voltage, kV, Three-Phase	Maximum Capacitor Bank Rating, kVAC, Three-Phase		
		Solidly or Effectively Grounded System		Ungrounded System
		Single ^① Banks, Grounded-Wye Connected	Single ^① Banks, Ungrounded-Wye Connected	Single ^① Banks, Grounded- or Ungrounded-Wye Connected
5300R3	12–14.4	1800	1800	1800
	16	2400	2400	2400
	20.8–23.9	3000	▲	▲
	24.9 and 26	3600	▲	▲
5400R3	20.8–23.9	3000	3000	3000
	24.9 and 26	3600	3600	3600
	27.6	3600	3600	3600
	34.5	4800	▲	▲

① Loadbusters must not be used for switching parallel (“back-to-back”) capacitor banks.

▲ Loadbusters must not be used for switching ungrounded-wye connected banks—or grounded-wye connected banks on ungrounded systems—where maximum system operating voltage exceeds 18 kV for Loadbuster Catalog Number 5300R3, or 29 kV for Loadbuster Catalog Number 5400R3.

A Note on Single-Pole Switching

In single-pole switching of ungrounded-primary three-phase transformers or banks (or single-phase transformers connected line-to-line), circuit connections or parameters may, in some cases, produce excessive overvoltages. In particular, for the following applications above 22 kV, single-pole switching by any means—including Loadbuster—should be performed only under the conditions stated in italics:

- For unloaded or lightly loaded delta-connected or ungrounded-primary wye-wye connected three-phase transformers or banks (or line-to-line connected single-phase transformers), rated 150 kVA or less three-phase, or 50 kVA or less single-phase—or of any kVA rating when combined with unloaded cables or lines—where maximum system operating voltage exceeds 22 kV. *Single-pole switching should be performed only if each phase is carrying 5% load or more, or if the transformer or bank is temporarily grounded at the primary neutral during switching.*
- For loaded or unloaded ungrounded-primary wye-delta connected three-phase transformers or banks—alone or combined with unloaded cables or lines—where maximum system operating voltage exceeds 22 kV. *Single-pole switching should be performed only if each phase is carrying 5% load or more and if the lighting-load phase is always switched open first (or switched closed last); or if the transformer or bank is temporarily grounded at the primary neutral during switching.*

Operating Life

Loadbuster is a sturdy and reliable tool that will provide years of excellent service. Only a minimum of attention is required to keep it in top-notch operating condition. Inspection intervals are dictated by the number of operations—as indicated on the operation counter—and the severity of switching duties. Aside from the counter reading, there are no audible or visible signals to indicate the need for attention.



From 1,500 to 2,000 Loadbuster operations may normally be expected between required inspections, based on typical usage involving a mixture of varied switching duties. Included in these duties are switching of line-charging currents, transformer-magnetizing currents, pole-top capacitor-bank currents, and moderate parallel or loop load currents, with only occasional switching of heavier load currents. Only if Loadbuster is used primarily for switching of load currents approaching the rating of the tool will more frequent inspections be required.

Benchmarks indicating the need for replacement of Loadbuster parts include the degree of erosion of the trailer portion of the moving contact assembly and the condition of its flexible cable. The simplicity of Loadbuster inspection and the ease of parts replacement are described in Loadbuster Instruction Sheet 811-505.

Limitations on Use

1. Loadbusters must be used only with disconnects, cutouts, power fuses, fuse limiters, or dropout reclosers which meet S&C's applicable minimum construction specifications found in the current revision of Data Bulletin 811-60.
2. Loadbuster Catalog Number 5400R3, rated 25/34.5 kV, must not be used with metal-enclosed switchgear, metal-enclosed switches or fuses, or pad-mounted gear, of any make.
3. Although the interrupting ratings of Loadbuster Catalog Number 5400R3, rated 25/34.5 kV, are equally applicable at lower voltages, it *must not* be used with the following devices, since the fuse tube or blade travel of such devices is too short to accommodate Loadbuster's operating stroke:
 - (a) Cutouts, power fuses, fuse limiters, or dropout reclosers of any make, rated 110 kV BIL or less;
 - (b) Disconnects, cutouts, power fuses, fuse limiters, or dropout reclosers of any make, rated 7.2/14.4 kV, 7.8/13.8 kV, 8.25 kV, or less;
 - (c) Disconnects of any make, rated 125 kV BIL or less;
 - (d) Discontinued Station Style S&C Type XS Fuse Cutout Catalog Number 189131 (with or without catalog number supplements).
4. Loadbuster must not be used in applications where maximum system operating voltage exceeds the Loadbuster's maximum voltage rating.

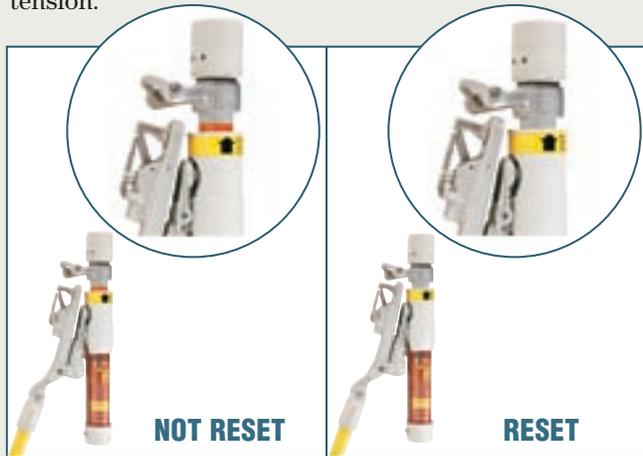
Switching with Loadbuster Is Easily Learned . . . It's as Easy as One-Two-Three

Loadbuster is light in weight and simple to operate. It enables you to open disconnects, cutouts, power fuses, fuse limiters, and dropout reclosers quickly and easily. Just position Loadbuster across the front of the device, with the tool's anchor placed on the attachment hook on the far side of the device. Engage Loadbuster's pull-ring hook on the pull-ring of the blade or fuse tube; it's held fast by the tool's pull-ring latch. As the universal pole is pulled downward with a firm, steady stroke—and Loadbuster is extended to its maximum length—the device is opened; current is simultaneously diverted through Loadbuster . . . at the same time Loadbuster's internal operating spring is charged. At a predetermined point in Loadbuster's operating stroke, its internal trigger trips, the charged operating spring is released, internal contacts are separated, and the circuit is *positively* interrupted. The only sound is that of Loadbuster tripping.

Circuit interruption is independent of the speed with which Loadbuster is operated. All that's required is a smooth operating stroke, without hesitation or jerking . . . until the tool is extended to its maximum length. The resetting latch retains the tool in the open position

for removal from the device and until released to reset Loadbuster for its next operation.

Resetting Loadbuster is easy too. Release the resetting latch and firmly close the tool to its fully telescoped position until the orange band on the inner tube assembly is no longer visible. Then extend the tool about three inches and let it snap back to verify spring tension.



	Switching a Disconnect ■	Switching a Fuse Cutout★, Power Fuse, Fault Tamer Fuse Limiter, or TripSaver Dropout Recloser
<p>1 Attach</p> <p>Reach across the front of the device and attach Loadbuster's anchor to the attachment hook on the far side. Then engage the device's pull-ring with Loadbuster's pull-ring hook. Loadbuster's pull-ring latch prevents inadvertent disengagement of the pull-ring and pull-ring hook.</p>		
<p>2 Pull</p> <p>A firm, steady downward pull on Loadbuster—to its maximum extended length—opens the device in the normal manner, as the current is diverted through Loadbuster. At a predetermined point in the opening stroke, Loadbuster trips, breaking the circuit positively.</p>		
<p>3 Roll Off</p> <p>Loadbuster is disengaged by first removing its anchor from the device's attachment hook. Then, with the blade or fuse tube in the fully open position, Loadbuster is removed from the pull-ring with a simple "roll-off" motion.</p>		

■ 34.5-kV Crossarm Inverted Style S&C Loadbuster Disconnect shown.

★ 25-kV Ultra-Heavy-Duty Overhead Pole-Top Style S&C Type XS Cutout shown.

This Is How Loadbuster Works

1 Loadbuster Provides a Current Path

between the upper contact and the pull-ring of the disconnect, cutout, power fuse, fuse limiter, or dropout recloser, as indicated by the solid red line. Note the points of similarity to the interrupting unit of a conventional load-interrupting device: the moving contact, stationary contact, arc-extinguishing chamber, and trailer.

2 When Loadbuster Is Extended

by a firm, steady downward pull on the universal pole, the disconnect, cutout, power fuse, fuse limiter, or dropout recloser is opened; the current is diverted through the tool (along the current path represented by the solid red line); and the internal operating spring is charged.

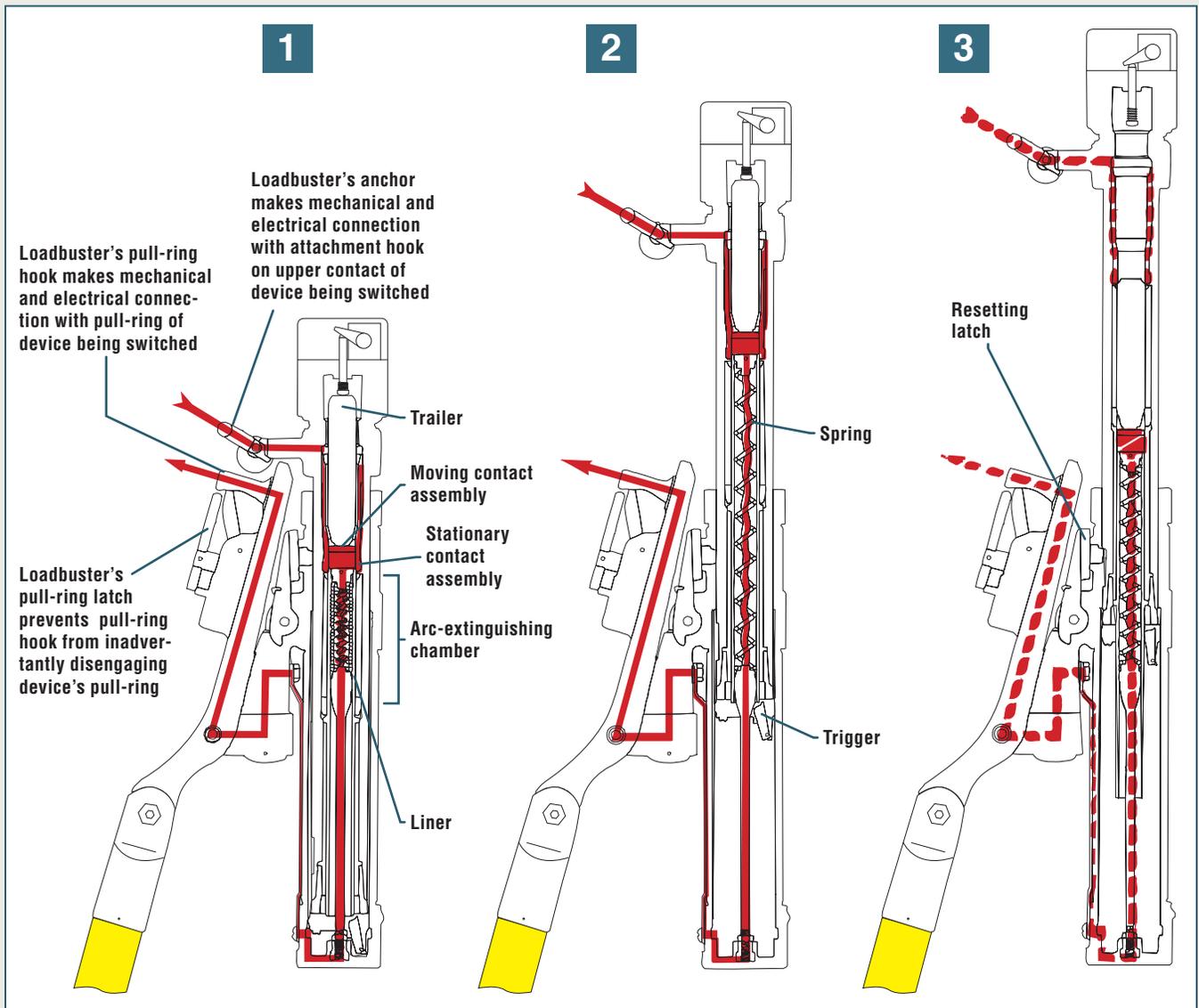
At a predetermined point in the opening stroke, the

trigger inside the tool trips, releasing the charged spring to effect high-speed separation of the moving contact from the stationary contact.

3 The Current Is Positively Interrupted

by rapid elongation of the arc confined within the arc-extinguishing chamber, in the narrow annular space formed between the trailer and the liner—and by the efficient deionizing action of the gases yielded by the surrounding materials of the trailer and the liner.

In the maximum extended position, pictured here, an isolating gap is established (where the broken, shaded red line is parted) within the arc-extinguishing chamber. The resetting latch retains the tool in this open position until released to reset Loadbuster for its next operation.



Selecting a Disconnect, Cutout, Power Fuse, Fuse Limiter, or Dropout Recloser

Here's what to look for when selecting a disconnect, cutout, power fuse, fuse limiter, or dropout recloser to be switched with Loadbuster:

- There must be an attachment hook at the upper (jaw) end of the device, over which Loadbuster's anchor can be hooked; and a pull-ring on the device's switch blade or fuse tube which can be readily engaged with Loadbuster's pull-ring hook and held fast by the pull-ring latch.
- The device must mechanically coordinate with Loadbuster's operating sequence such that (a) engagement of Loadbuster will not cause or allow the switch

blade or fuse tube to drop open prematurely and (b) the attachment hook will keep Loadbuster positively anchored until tripping occurs, while (c) permitting easy removal of Loadbuster whether the opening stroke has been completed or whether, for any reason, the device being switched has been reclosed after partial (incomplete) opening.

- The device must be capable of easy, positive manipulation with Loadbuster from all practical angles and directions—and in all mounting positions intended or the device—while maintaining the minimum mechanical and electrical requirements, as listed in the table below.

Quantitative Requirements for Devices Qualifying for Use with Loadbuster

I Loadbuster Catalog Number	II Disconnect, Cutout, Power Fuse, Fuse Limiter, or Dropout Recloser Application—Max System Operating Voltage, Three-Phase kV	III ^① Minimum Dry Withstand Voltages Across External Disconnect Gap ^②		IV ^③ Suggested Minimum External Disconnect Gap Separation ^② at Time of Tripping ^④		V ^⑦ Suggested Minimum External Disconnect Gap Separation ^② with Loadbuster Fully Extended to “Latched-Open” Position			
		60-Hertz ^④ —at Time of Tripping ^④		Capacitance Switching Test ^⑤ — Circuit Voltage					
		kV, RMS	kV, RMS	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)		
5300R3	9	18	9	3½ (89)		4 (102)			
5300R3 & 5400R3	15	30	15	3½ (89)◆	3¾ (99)▲	4½ (115)◆	5 (127)▲		
5300R3 & 5400R3	18	36	18	3¾ (99)		5 (127)			
5300R3 & 5400R3	27	41◆	54▲	20.5◆	27▲	3¾ (99)▲	4¾ (121)▲	5 (127)◆	6 (153)▲
5400R3	29	★		29		5¼ (134)		6½ (166)	
5400R3	38	★		29		5¼ (134)		6½ (166)	

① Disconnects, cutouts, power fuses, fuse limiters, or dropout reclosers (while being switched with Loadbuster) must be capable of withstanding at least one of these tests without flashover, preferably with the mounting bracket or base of the device under test grounded. However, in the case of devices with insulation just meeting minimum ANSI standards, it may be necessary to test with mounting bracket or base floating. The specified voltages are given for standard atmospheric conditions of temperature, barometric pressure, and humidity, and must be corrected for the existing atmospheric conditions at the time of test.

② Between all live parts of the combination of Loadbuster and disconnect, cutout, power fuse, fuse limiter, or dropout recloser for the most unfavorable practical operating position of Loadbuster.

③ These minimum voltages must be applied for a period of 10 seconds. The voltage shall be applied starting at 75% of the ultimate value and raised to the listed test voltage at a constant rate such that the test voltage is reached in not less than 5 seconds nor more than 10 seconds. An appropriately calibrated means must be used to measure the voltage.

④ Tripped condition is simulated when Loadbuster Catalog Number 5300R3 is telescoped to 1⅞ inches (48 mm) from “latched-open” position, or when Loadbuster Catalog Number 5400R3 is telescoped 1⅜ inches (35 mm) from “latched-open” position.

⑤ This test consists of interruption of a 0% PF leading capacitance current of 2 to 5 amperes with Loadbuster used in the most unfavorable operating position. The test circuit is to be energized by a 60-hertz source at the voltage specified. A test series of 20 successive operations must be performed without flashover across the external disconnect gap.

⑥ These dimensions are approximately those required to meet the voltages specified in Column III. They are based on designs where sharp points, sharp edges, protrusions, etc., are avoided so that essentially rod-gap configuration is obtained on disconnect, cutout, power fuse, fuse limiter, or dropout recloser contacts. Sharp points, edges, etc., may require minimum gaps measuring as much as 25% greater than the dimensions listed to achieve the same dry withstand values.

⑦ These dimensions permit Loadbuster to be removed without reducing the gap below the values listed in Column IV, and should be maintained after circuit interruption (even though the transient recovery voltage may not then be a factor) to provide margin for possible inattentive manipulation of Loadbuster.

◆ Loadbuster Catalog Number 5300R3.

▲ Loadbuster Catalog Number 5400R3.

★ Loadbuster should not be subjected to sustained 60-hertz voltage of the value that would be required for this test. Only the “Capacitance Switching Transient” test (column at right) is applicable at this voltage.



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