

# Rope Pull Emergency Stop Switches

RP-LM40 Series 40 mm Limit-Switch-Style Switches with Rope Actuators



## Features

- Positive-opening safety contacts (IEC 60947-5-1), not dependent upon springs
- Standard limit switch housing (EN 50041)
- Heavy-duty diecast metal housing, rated IP65, suitable for demanding industrial environments
- Rope spans up to 6 meters (20')
- Both contacts are closed with normal rope tension; one contact opens when rope is pulled, the other contact opens if rope breaks (or if tension is reduced from normal amount)
- Long life; switch rated at 1 million mechanical operations, minimum
- Two available models: trip and latch
- Protective Earth Terminal (IEC 60947-1)

## Models

Model	Actuation	Max. Rope Length	Run Position	Cable Pulled	Cable Break	Switching Diagram
RP-LM40D-6	Trip	6 m (20')				
RP-LM40D-6L	Latch					

NOTE: This symbol for a positive opening safety contact (IEC 60947-5-1) is used in the switching diagrams to identify the point in actuator travel where the normally closed safety contact is fully open.

Contacts:  Open  Closed  Transition



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## Important Information Regarding the Use of Safety Switches

In the United States, the functions that Banner safety switches are intended to perform are regulated by the Occupational Safety and Health Administration (OSHA). Whether or not any particular safety switch installation meets all applicable OSHA requirements depends upon factors that are beyond the control of Banner Engineering Corp. These factors include the details of how the safety switches are applied, installed, wired, operated, and maintained.

Banner Engineering Corp. has attempted to provide complete application, installation, operation, and maintenance instructions. This information is found in the instruction manual packaged with each safety switch. In addition, we suggest that any questions regarding the use or installation of safety switches be directed to the factory applications department at the telephone numbers or address shown below.

Banner Engineering Corp. recommends that safety switches be applied according to the guidelines set forth in international (ISO/IEC) standards listed below. Specifically, Banner Engineering Corp. recommends application of these safety switches in a configuration which meets safety category 4, per ISO 13849 (EN954-1).

In addition, the user of Banner safety switches has the responsibility to ensure that all local, state, and national laws, rules, codes, and regulations relating to the use of Banner safety switches in any particular application are satisfied. Extreme care is urged that all legal requirements have been met and that all installations and maintenance instructions are followed.

### Application Assistance

**Toll Free:** 1-888-3-SENSOR (1-888-373-6767)  
**Email:** sensors@bannerengineering.com  
**Address:** 9714 Tenth Avenue North  
Minneapolis, MN 55441

### U.S. Regulations Applicable to Use of Banner Safety Switches

OSHA Code of Federal Regulations: Title 29, Parts 1900 to 1910

Available from: Superintendent of Documents  
Government Printing Office  
P.O. Box 371954  
Pittsburgh, PA 15250-7954  
Tel: 202-512-1800

### U.S. Standards Applicable to Use of Banner Safety Switches

ANSI B11 "Standards for Construction, Care, and Use of Machine Tools"  
Available from: Safety Director  
AMT—The Association for Manufacturing Technology  
7901 Westpark Drive  
McLean, VA 22102  
Tel: 703-893-2900

### Applicable European and International Standards

ISO/TR 12100-1 "Safety of Machinery—Basic Concepts, General Principles for Design"  
(EN292-18-2)  
ISO 13852 (EN 294) "Safety of Machinery—Safety Distances to Prevent Danger Zones Being Reached by the Upper Limbs"  
ISO 13853 (EN 811) "Safety of Machinery—Safety Distances to Prevent Danger Zones Being Reached by the Lower Limbs"  
ISO 13849 (EN 954-1) "Safety of Machinery—Safety Related Parts of Control Systems"  
ISO 13855 (EN 999) "Safety of Machinery—The Positioning of Protective Equipment in Respect to Approach Speeds of Parts of the Human Body"  
ISO 14119 (EN 1088) "Safety of Machinery—Interlocking Devices Associated with Guards—Principles for Design and Selection"  
IEC/EN 60204-1 "Safety of Machinery—Electrical Equipment of Machines"  
IEC/EN 60947-5-1 "Low Voltage Switchgear—Electromechanical Control Circuit Devices"

Available from: Global Engineering Documents  
15 Inverness Way East  
Englewood, CO 80112-5704  
Phone: 1-800-854-7179  
Fax: 303-397-2740

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## WARNING . . . Not a Safeguarding Device

An Emergency Stop Device is not considered a safeguard or a safety device because it requires an overt action by an individual to stop machine motion. (A safety device limits or eliminates an individual's exposure to a hazard, *without action by the individual or others.*)

Because an individual must actuate the E-Stop button or Rope Pull in order for it to function, these devices do not fit the definition of a safety device.

An Emergency Stop Device can not be substituted for required safeguarding. Refer to the relevant standards to determine those requirements; see page 2.

## Overview

Models RP-LM40D-6 and RP-LM40D-6L are rope pull emergency stop switches in compact, limit switch-style housings. When used with steel wire rope, they can provide emergency stop actuation along conveyors and similar machinery. Red PVC-covered 2 mm diameter wire rope, up to 6 m (20') long is recommended (see page 8).

When the rope is properly tensioned (using a turnbuckle), both contacts of the switch are closed. When the rope is pulled, the positive-break contacts between terminals 25–26 open. If the rope breaks or goes slack, the contacts between terminals 13–14 open. These two contacts typically should be wired together, in series. See Figure 1.

These rope pull emergency stop switches are not safeguarding devices, in that they do not protect personnel from injury. They provide the same function as other types of emergency stop switches.

The two switch models differ in their switching operation. Model RP-LM40D-6 is a momentary switch, which returns immediately to the Run condition (i.e., both contacts close) after releasing the rope, following a Pull condition; when using this model, a separate latching circuit is required. Model RP-LM40D-6L latches contacts 25–26 open with each Pull condition, and must be reset by pulling the integral reset button (see Figure 2).

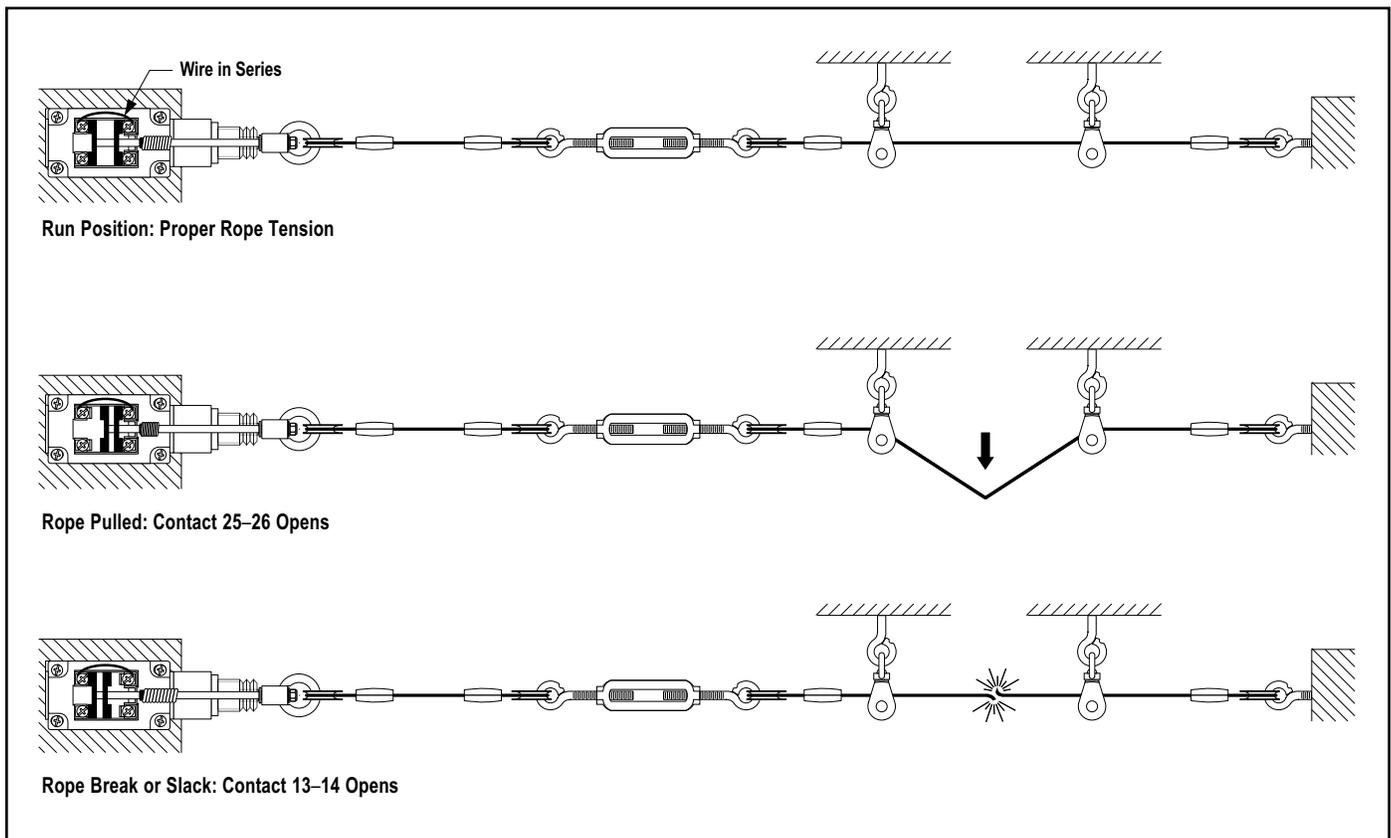


Figure 1. Run, rope pulled, and rope break switch positions

# Rope Pull Emergency Stop Switches – RP-LM40 Series

## Mechanical Installation

### Installation Guidelines

- The wire rope should be easily accessible and visible along its entire length. Markers or flags may be fixed on the rope to increase its visibility.
- Mounting points, including support points, must be rigid.
- The rope should be free of friction at all supports. Pulleys are recommended.
- Use only pulleys when routing the rope around a corner, or whenever direction is changed, even slightly.
- Never run rope through conduit or other tubing.
- Never attach weights to the rope.
- Temperature affects rope tension. The rope expands (lengthens) when temperature increases, and contracts (shrinks) when temperature decreases. Significant temperature variations require frequent checks of the tension adjustment.
- Do not exceed the 6 m (20') maximum rope length. Banner offers models for greater spans; contact the factory or visit [www.bannerengineering.com](http://www.bannerengineering.com) for model selection.

### Installation Procedure

1. Mount the switch securely on a solid, stationary surface.
2. Fasten an eye bolt at the opposite end of the rope span, up to 6 m (20') from the switch. The anchor for the eye bolt also must be solid and stationary, to withstand the constant tension of the rope.
3. Assemble the rope as shown in Figure 2. Keep the rope's PVC cover intact along its complete length.
4. Use pulleys (recommended) or eye bolts at each support point. A pulley must be used when routing the rope around a corner, regardless of the angle.
5. Connect a continuity tester (or ohmmeter) between terminals 25–26 of the switch. Adjust the turnbuckle to tighten the rope, until contact 25–26 closes. This indicates sufficient rope tension.
6. Pull hard on the rope several times. If contact 25–26 remains open (following reset, for model RP-LM40D-6L), further tighten the turnbuckle, until contact 25–26 closes.
7. Repeat step #6 until contact 25–26 remains closed for the Run condition.

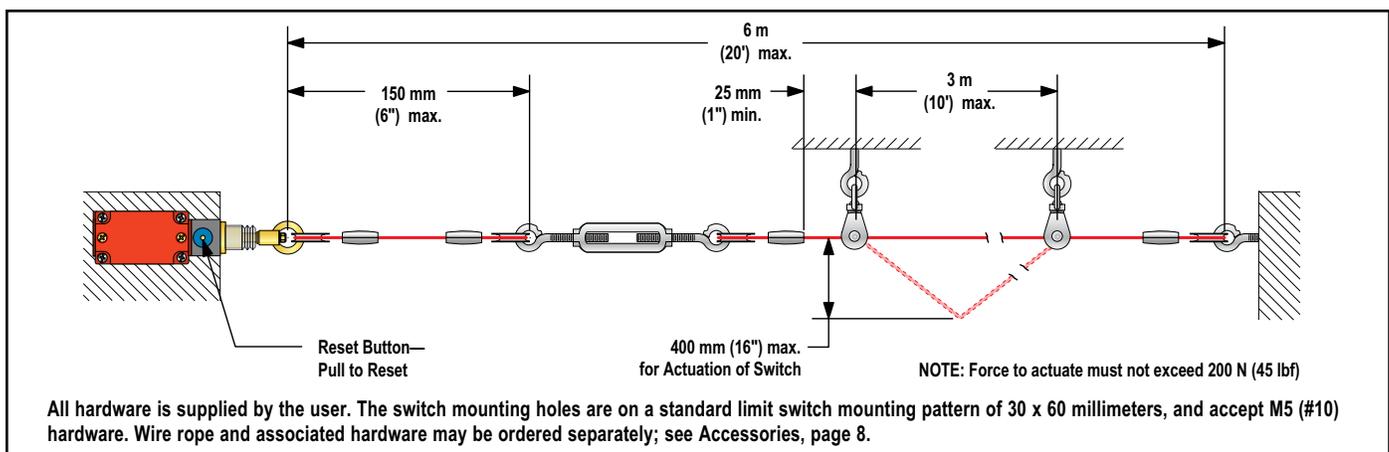


Figure 2. Assembly of rope and hardware

# Rope Pull Emergency Stop Switches – RP-LM40 Series

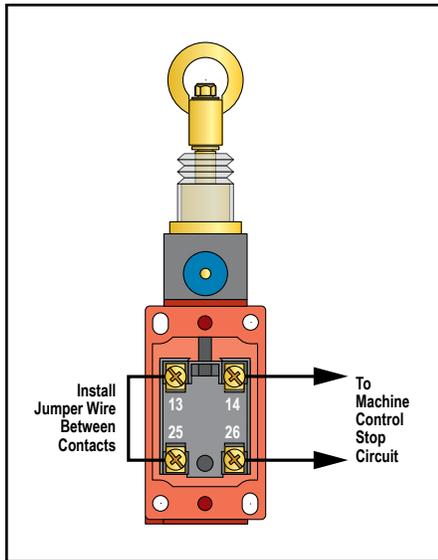


Figure 3. Wire the two switch contacts in series

## Electrical Installation

### Access to the Wiring Chamber

The wiring chamber is accessed via a cover plate (remove two screws). A conduit adapter is supplied to convert the 20 millimeter threaded entrance to 1/2" NPT. An accessory cable gland which fits the M20 thread is also available (see page 7).

### Wiring

Install a jumper wire to place the two switch contacts in series, as shown in Figure 3.

**IMPORTANT: Model RP-LM40D-6 does not latch contacts 25–26 open when the rope is pulled. The contacts close when the rope is released. When using model RP-LM40D-6, a latch circuit must be included in the machine control circuitry.**

## Maintenance

Each rope pull emergency stop installation should be tested for proper machine shutdown response at each shift change or machine setup by a *Designated Person*\*. In addition, a *Qualified Person*\* should check for proper rope tension, and adjust as needed, on a periodic schedule determined by the user, based upon severity of the operating environment and the frequency of switch actuations.

The pulleys and other moving parts associated with the rope should be periodically lubricated. If inspection reveals dirt on the rope pull switch or rope assembly, the dirt must be cleaned off and its cause must be eliminated. Replace the rope pull switch and/or rope assembly when any parts (including contacts) or assemblies are found to be damaged, broken, deformed, or badly worn.

The rope pull switch and rope assembly should be replaced at specified intervals based upon the environment and operating conditions. Replacement of the rope pull switch and rope assembly should be considered after no more than 500,000 operations. Always test the control system for proper functioning under machine control conditions after maintenance or replacement of the rope pull switch.

\* A *Designated Person* is identified in writing by the employer as being appropriately trained to perform a specified checkout procedure. A *Qualified Person* possesses a recognized degree or certificate or has extensive knowledge, training, and experience to be able to solve problems relating to the emergency stop rope pull switch installation (reference ANSI B30.2).

## Repairs

Banner rope pull emergency stop switches have no field-replaceable components. Contact the Banner Factory Application Engineering Group at the address or the numbers listed at the bottom of the back page. They will issue an RMA (Return Merchandise Authorization) number for your paperwork, and give you the proper shipping address.

# Rope Pull Emergency Stop Switches – RP-LM40 Series

## Specifications

<b>Contact Rating</b>	10A @ 24V ac, 10A @ 110V ac, 6A @ 230V ac 6A @ 24V dc 2.5 kV max. transient tolerance NEMA A300 P300														
<b>European Rating</b>	<b>Utilization categories:</b> AC15 and DC13  <b>Switches with 1 and 2 contact pairs:</b> $U_i = 500V$ ac $I_{th} = 10A$	40-60 Hz													
		<table border="1"> <thead> <tr> <th><math>U_e</math> V</th> <th><math>I_e/AC-15</math> A</th> <th><math>I_e/DC-13</math> A</th> </tr> </thead> <tbody> <tr> <td>24</td> <td>10</td> <td>6</td> </tr> <tr> <td>110</td> <td>10</td> <td>1</td> </tr> <tr> <td>230</td> <td>6</td> <td>0.4</td> </tr> </tbody> </table>	$U_e$ V	$I_e/AC-15$ A	$I_e/DC-13$ A	24	10	6	110	10	1	230	6	0.4	
$U_e$ V	$I_e/AC-15$ A	$I_e/DC-13$ A													
24	10	6													
110	10	1													
230	6	0.4													
<b>Contact Material</b>	Silver-nickel alloy														
<b>Maximum Switching Speed</b>	50 operations per minute														
<b>Recommended Rope Size</b>	2 mm diameter steel rope (see accessories, page 8)														
<b>Maximum Rope Pull Length</b>	6 m (20')														
<b>Short Circuit Protection</b>	10 amp Slow Blow, 15 amp Fast Blow. Recommended external fusing or overload protection.														
<b>Mechanical Life</b>	1 million operations														
<b>Wire Connections</b>	Screw terminals with pressure plates accept the following wire sizes – <b>Stranded and solid:</b> 20 AWG (0.5 mm <sup>2</sup> ) to 16 AWG (1.5 mm <sup>2</sup> ) for one wire <b>Stranded:</b> 20 AWG (0.5 mm <sup>2</sup> ) to 18 AWG (1.0 mm <sup>2</sup> ) for two wires														
<b>Cable Entry</b>	M20 x 1.5 threaded entrance. Adapter supplied to convert M20 x 1.5 to ½"-14 NPT threaded entrance														
<b>Construction</b>	Aluminum alloy die-cast														
<b>Environmental Rating</b>	IEC IP65														
<b>Operating Conditions</b>	<b>Temperature:</b> -30° to +80° C (-22° to +176° F)														
<b>Weight</b>	<b>RP-LM40D-6:</b> 0.22 Kg (0.49 lbs) <b>RP-LM40D-6L:</b> 0.26 Kg (0.57 lbs)														
<b>Certifications</b>	  														



# Rope Pull Emergency Stop Switches – RP-LM40 Series

Components for Wire Rope Assembly		
Model	Package Quantity	Description
RPA-C1-10	10 m (33')	2 mm steel wire rope with 0.5 mm red PVC jacket (unterminated)
RPA-C1-20	20 m (66')	
RPA-C1-100	100 m (330')	
RPA-T1-4	4 pcs	Thimble for 2 mm wire rope
RPA-CC1-4	4 pcs	Clamp for 2 mm wire rope
RPA-TA1-1	1 pc	#4 Turnbuckle
RPA-EB1-1	1 pc	1/4"-20 Eye bolt (3" bolt shaft)
RPA-P1-1	1 pc	Pulley

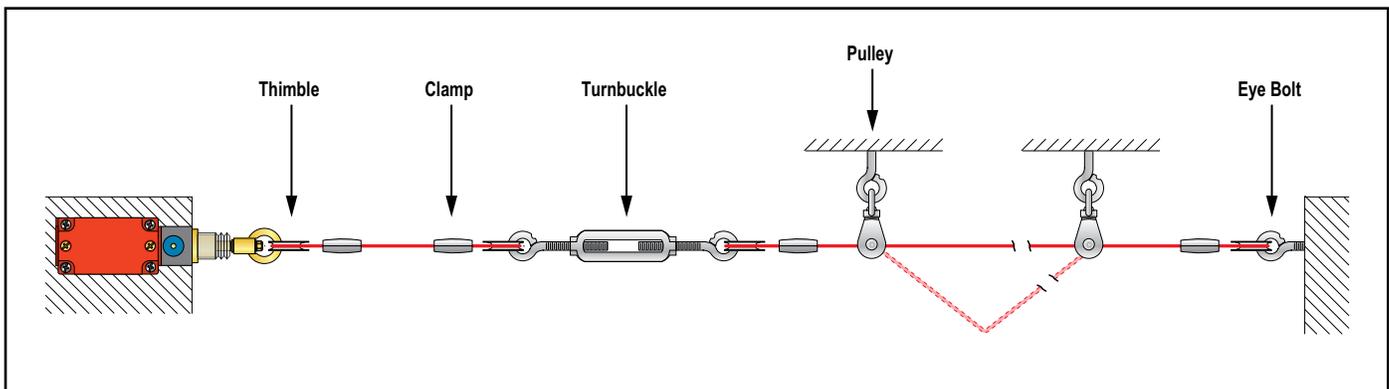


Figure 4. Wire rope assembly components



**WARRANTY:** Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.