

## Load Interrupter Attachments

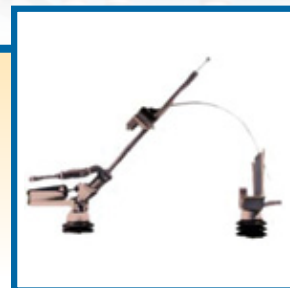
Use load interrupter attachments to enable loop sectionalizing, line dropping, load breaking and transformer-magnetizing current interruption.

Increase the capability of your disconnect switches by adding Joslyn Hi-Voltage® load interrupter attachments to expand their versatility for loop sectionalizing, line dropping, load breaking and transformer-magnetizing current interruption. The value of this added capability is increased operational efficiency and flexibility, as well as reduced number of circuit breaker operations and/or investment. Additionally, devices that provide multiple functions on a single switch, such as the Joslyn Hi-Voltage® Series LSI Load Sectionalizer Interrupter, which provides both loop splitting and line dropping, increase personnel safety because they can eliminate switch misoperation.

Joslyn Hi-Voltage® load interrupter attachments do not in any way reduce the rating of the disconnect switch, nor do they violate the coordinated open gap design of the switch. Joslyn Hi-Voltage® interrupter attachments include custom-designed mounting brackets and arc horns to ensure that interrupters are properly transitioned into the circuit when the disconnect switch opens. In addition, the arc horns are designed to withstand the prestrike developed upon closing of the switch. Joslyn Hi-Voltage® load interrupter attachments are designed for a 30-year life and can be operated 5,000 times without any maintenance.

### Series HVI Hi-Velocity Interrupter Attachment

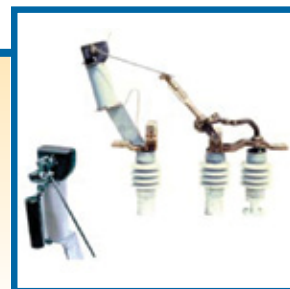
This device stores energy in the spring rod and in the coil spring inside the aluminum housing. The stored energy in the spring rod is added to the energy stored in the coil spring at the instant the spring rod separates from the latch. The parting velocity is 22" (558mm) per cycle. This allows the Series HVI to be the highest rated device in this category. Applications include interruption of line charging current up to 161kV and transformer-magnetizing current up to 230kV.



### Series UVI Universal Vac-Rupter Interrupter Attachment

This device uses one vacuum interrupter per phase. The vacuum interrupter is inserted into the circuit when the disconnect switch is opened. Once the switch blade is sufficiently away from the switch jaw, the vacuum contacts separate and interrupt the circuit. Specially designed arcing horns are designed to handle prestrikes upon closing of the switch. Applications include 2,000A load breaking up to 34.5kV for solidly grounded systems and parallel switching up to 230kV.

Add the Joslyn Hi-Voltage® Voltage Limiter (V/L) Attachment to interrupt line charging current of 15A up to 69kV.



### Series LSI Load Sectionalizer Interrupter Attachment

The Series LSI combines both the Series HVI and Series UVI devices into one system.

The interrupter automatically determines which device will be providing the interruption with a preset latch/spark gap assembly.



## Load Interrupter Attachments



### Series JMVI Modular Vac-Rupter Interrupter Attachment for 230kV Systems

This device uses up to eight vacuum interrupters in series per phase for 230kV systems. The vacuum interrupters are inserted into the circuit when the disconnect switch is opened. Once the switch blade is sufficiently away from the switch jaw, the vacuum contacts separate and interrupt the circuit. Specially designed arcing horns handle prestrikes upon closing of the switch. Applications include 2,000A load breaking, line charging current interruption and parallel switching up to 230kV.

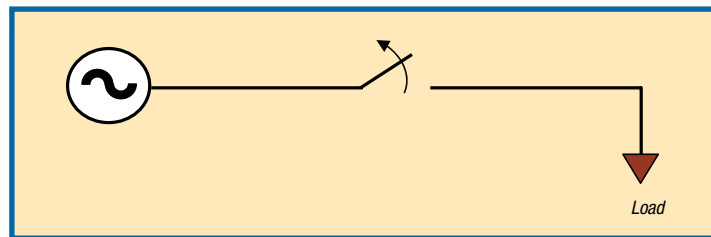
## Applications for Joslyn Hi-Voltage® Load Interrupter Attachments

### Load Dropping

Loads are being fed from one source, and opening the switch will disconnect the loads from that source. The interrupter needs to be able to interrupt the continuous load current at the system voltage. This is rarely done since it interrupts service to customers, and is usually specified only as a safety measure in case of an emergency.

#### Products used in this application:

- Series UVI (34.5kV and below)
- Series JMVI (46kV to 230kV)

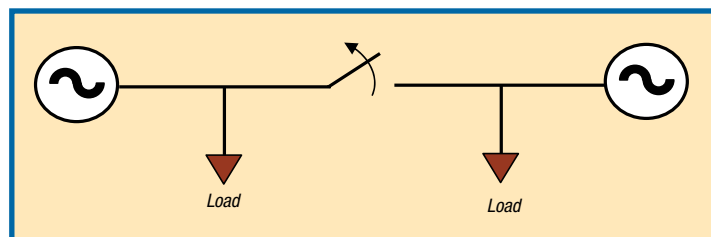


### Loop Sectionalizing

Loads are being fed from multiple sources, and a switch in the circuit needs to be opened. The interrupter needs to be able to interrupt the circulating current between the two energized sources. When the switch is open, both sides will still be energized at the system voltage. The recovery voltage is typically low, but currents can be high.

#### Products used in this application:

- Series UVI (230kV and below, unless peak recovery voltage is greater than 30kV)
- Series JMVI (if peak recovery voltage is greater than 30kV)



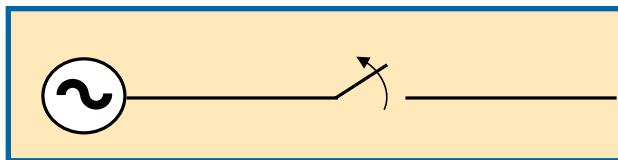
## Load Interrupter Attachments

### Line and Cable Dropping

When a section of line is energized and no load is connected, a small amount of charging current is flowing. When the line is de-energized, the recovery voltage will be high, because the system voltage will be seen on the source side of the switch and a charge will be trapped on the other side of the switch.

Products used in this application:

- Series UVI (34.5kV and below; up to 69kV with Voltage Limiter)
- Series HVI (69kV to 161kV)
- Series JMVI (230kV and below)



## Typical Conductor and Cable Charging Currents

### Underground Cable

Many factors determine the amount of cable charging current, such as the cable insulation material and geometry of the conductors. A common guideline for determining the charging current is to use 1.5A per 1,000 ft. of cable; however, it is always recommended to contact the cable manufacturer to obtain the exact charging current for a particular cable.

### Overhead Conductor

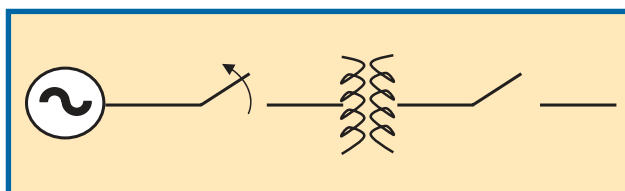
SYSTEM VOLTAGE (kV)	TYPICAL CHARGING CURRENT PER MILE (A)
69	.226
115	.377
138	.440
161	.502
230	.737

## Transformer-Magnetizing Current

When a transformer is energized and no load is connected to it, a small amount of current still flows. This current is called transformer-magnetizing current. When the transformer is de-energized, the recovery voltage will be high, because the system voltage will be seen on the source side of the switch and a charge will be trapped on the other side of the switch.

Products used in this application:

- Series UVI (34.5kV and below; up to 69kV with Voltage Limiter)
- Series HVI (69kV to 230kV)



### Transformer General Reference Information\*

SYSTEM VOLTAGE (kV)	TRANSFORMER MVA	MAGNETIZING CURRENT PER PHASE	FULL LOAD CURRENT (%)
69	10	2.6	3.1
	25	5.0	2.4
	10	.98	2.4
138	25	3.2	3.1
	50	6.5	3.1
	25	3.5	3.9
161	50	7.0	3.9
	25	2.2	3.5
230	50	3.5	2.8

\* Transmission & Distribution — Westinghouse Electric Corp., Fifth Edition, 1964

## Load Interrupter Attachments

### Series LSI Load Sectionalizer Interrupter Application

A typical application for the Series LSI Load Sectionalizer Interrupter is when a particular section of a circuit needs to be de-energized for maintenance. Loop sectionalizing is the first step in this process. At the other end of the line, a device will have to de-energize the line by interrupting the line charging current.

The Series LSI Load Sectionalizer Interrupter combines the functions of both low charging current interruption and higher current loop sectionalizing. To accomplish this, the Series LSI Load Sectionalizer Interrupter consists of two complementary devices connected in parallel:

- Series UVI Universal Vac-Rupter Interrupter
- Series HVI Hi-Velocity Interrupter

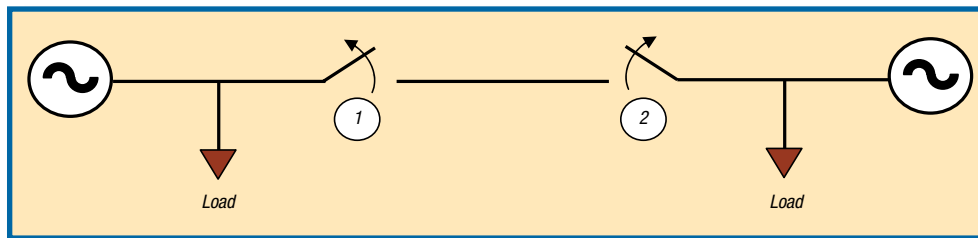
The UVI device interrupts the high current associated with loop sectionalizing, and the HVI device interrupts the line charging current. During an opening operation, the two interrupters are mechanically controlled so that the vacuum contact opens prior to the separation of the HVI device. If the recovery voltage is within the capability of the UVI device, the UVI device interrupts the circuit. If the recovery voltage exceeds the capability of the UVI device, a spark gap will ignite and instantly place the HVI device in the circuit. The HVI device will then interrupt the circuit. The mechanical operation of the Series LSI Load Sectionalizer Interrupter is the

same every time it is operated. The determining factor as to which interrupter is used is the magnitude of the recovery voltage.

In the figure below, Series LSI Load Sectionalizer Interrupters are installed on both switches. When Switch 1 is opened while Switch 2 is closed, loop sectionalizing will be performed. Because the recovery voltage is low, the UVI device interrupts the loop current. When Switch 2 is subsequently opened, the higher recovery voltage associated with line dropping will result in the HVI device being inserted into the circuit. The HVI device will then interrupt the line charging current.

The significant advantage of the Series LSI Load Sectionalizing Interrupter is that the switches can be opened in any sequence, because this device automatically inserts the correct interrupting device in the circuit. This provides operational flexibility and is inherently safer than specific function devices. Some advantages are:

- Reduce switching time
- Eliminate misoperation due to switching errors
- Increase personnel safety
- Reduce breaker operations



**Application Summary Table**

SYSTEM VOLTAGE (kV)	2,000A LOAD DROPPING	2,000A LOOP SECTIONALIZING <sup>1,2</sup>	LINE DROPPING <sup>2</sup>	MAGNETIZING CURRENT <sup>2</sup>
15.5	UVI	UVI	UVI	UVI
25	UVI	UVI	UVI	UVI
34.5	UVI	UVI	UVI V/L	UVI
46	JMVI	UVI	UVI V/L	UVI V/L
69	JMVI	UVI	HVI	HVI
		UVI V/L	UVI V/L	UVI V/L
115	JMVI	LSI	LSI	LSI
		UVI	HVI	HVI
		JMVI V/L	JMVI V/L	JMVI V/L
138	JMVI	LSI	LSI	LSI
		UVI	HVI	HVI
		JMVI V/L	JMVI V/L	JMVI V/L
161	JMVI	LSI	LSI	LSI
		UVI	HVI	HVI
		JMVI V/L	JMVI V/L	JMVI V/L
230	JMVI	LSI	JMVI	LSI
		UVI		HVI
		JMVI V/L		JMVI V/L

**Notes:** 1. UVI and LSI can be applied where the peak recovery voltage is less than 30kV.

2. V/L = Joslyn Hi-Voltage® Voltage Limiter Attachment.

## *Load Interrupter Attachments*

Easy and economical interrupting of line charging or transformer-magnetizing current.

### **Joslyn Hi-Voltage® Series HVI Hi-Velocity Load Interrupter Attachments**



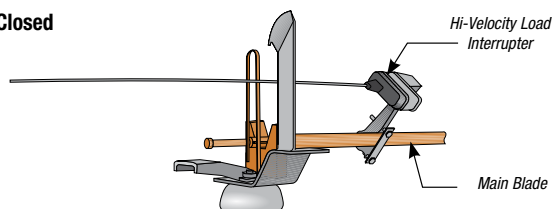
- Economical attachments for air switches mount quickly on most gear- or motor-operated vertical- and side-break switches, enabling affordable conversion of existing air switches
- Install on the air switch's existing hardware — no special tools or training required
- Reliable operation
- Interruption reliability is not dependent upon switch opening speed
- Virtually maintenance-free; requires only an inspection every five years or 5,000 operations
- Unique design ensures proper operation at all times, and air switches equipped with Series HVI Interrupters have operated dependably in the field for many years
- Interrupting performance far exceeds the capabilities of quick-break attachments of more conventional design
- Mount on almost any vertical- or side-break horn gap air switch equipped with 3" or 5" bolt circle insulators and a manual gear or motor-operated mechanism

## Load Interrupter Attachments

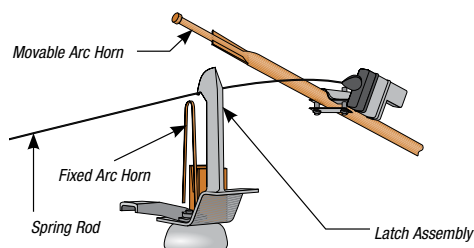
### Operation

1. With the air switch closed (top diagram), current flows through the main blade. The Series HVI Interrupter is out of the circuit.
2. As the air switch blade operates (second diagram), the movable arc horn slides along the fixed arc horn until the spring rod engages the latch. Current flow is established through the Series HVI Interrupter, its spring rod and the latch.
3. As the air switch blade continues to open (third diagram), energy is stored in the spring rod of the Series HVI Interrupter.
4. At the point where the spring rod is released from the latch, a large open gap has been established between the movable arc horn and the fixed arc horn (bottom diagram). The circuit is interrupted, and visible isolation is provided.

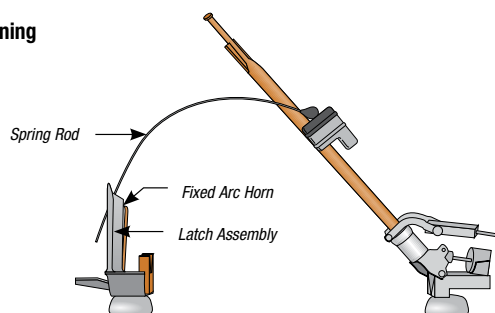
#### 1. Closed



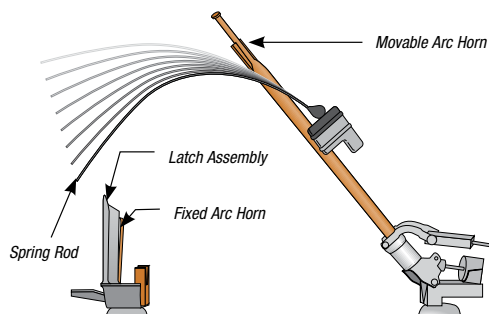
#### 2. Opening



#### 3. Opening



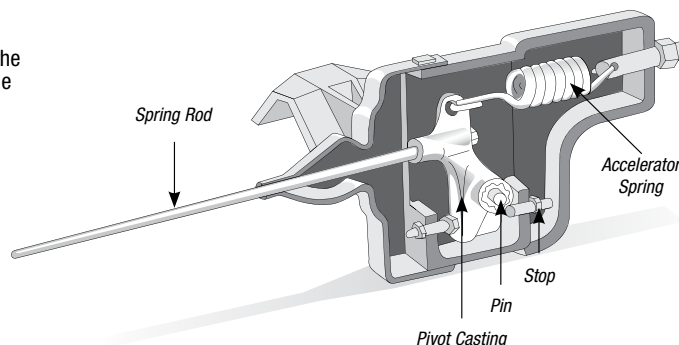
#### 4. Open



### Mechanical Data

#### Cutaway of Series HVI Hi-Velocity Load Interrupter

When latched, the spring rod pivots around the pin, loading the accelerator spring. Maximum energy is stored in the accelerator spring when the pivot casting reaches its full travel as set by stop.



### Ratings

#### Loop Dropping and Cable Switching

System Voltage (kV)	96	115	138	161	230
Approximate Line Length (miles)	70	50	30	20	—
Current (amps)	20	20	15	10	.5

#### Transformer-Magnetizing Switching

System Voltage (kV)	96	115	138	161	230
Transformer Size (MVA)	70	100	150	200	300

**Note:** To order a Joslyn Hi-Voltage® Series HVI Load Interrupter, please supply the following information:

1. Air switch manufacturer
2. Switch model number
3. Voltage rating
4. Current rating
5. Size of insulator bolt circle
6. Description of blade movement, including rotation as viewed from hinge end looking back at the jaw assembly end

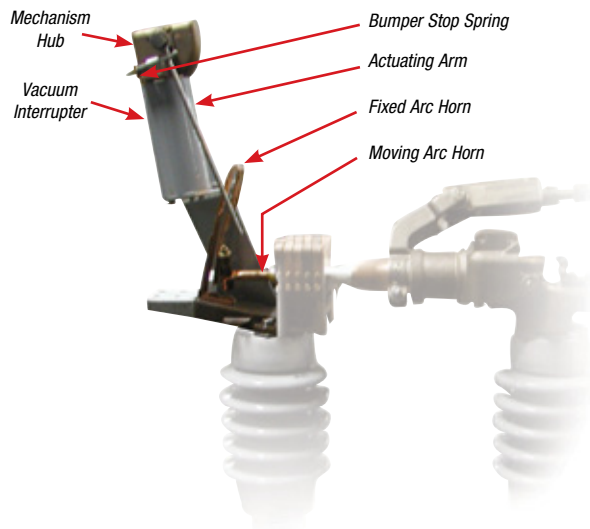


## Load Interrupter Attachments

Convert an isolating switch into a load interrupter switch.

### Joslyn Hi-Voltage® Series UVI Universal Vac-Rupter Load Interrupter Attachments

- Quick and affordable conversion of existing switches
- Mount quickly on most group-operated isolating switches, including vertical-break, side-break, double-side break, center-side break and in-line designs, in all configurations including phase-over-phase, with no special tools or training required
- May be used for full load interruption up to 34.5kV
- May also be used for reduced recovery voltage applications of loop splitting or parallel switching up to 230kV, depending on system voltage, grounding of system and load and load characteristics
- Optional voltage limiter expands capability for transmission line charging current and transformer-magnetizing current interruption at voltages up to 72.5kV, in addition to providing 2,000A of loop splitting or parallel switching capability
- Virtually maintenance-free; requires only an inspection every five years or 5,000 operations
- Anodized aluminum mechanism housing protects against corrosive action
- Fiberglass interrupter module housing with special coating inhibits ultraviolet activity
- Sealed vacuum interrupter chamber is encapsulated in Joslyte solid-dielectric, closed-cell insulation to seal against moisture and contamination
- Current-transfer and arcing horn components are made from special non-welding, high-current materials
- The Series UVI Interrupter is in the power circuit only for a few seconds during the opening operation; it is not in the circuit while the switch is closing or closed, and continuous momentary and impulse ratings of the switch are unaffected
- Reliable operation — a spring toggle mechanism opens the vacuum contacts at the proper speed, independent of air switch operation
- External spark gap protects vacuum module if operated above its recovery voltage capability



Joslyn Hi-Voltage® Series UVI Universal Vac-Rupters are economical attachments to convert an isolating switch into a load interrupter switch. Depending upon system voltage, grounding considerations of the system and the load and load characteristics, the Series UVI Interrupter enables the switch to be used for full load interruption or for the reduced recovery voltage application of loop splitting or parallel switching.

Series UVI Interrupters mount quickly on most types of group-operated isolating switches from all manufacturers, whether vertical-break, side-break, double side-break, center side-break or in-line designs in all configurations, including phase-over-phase.

You can easily and affordably convert an existing air switch. No special tools or training are required. Instructions detail simple procedures to install the interrupter, along with the fixed and moving arc horns, and to verify proper operation. Adding a Series UVI Load Interrupter will not affect the mechanical operation of the switch.

The Series UVI Interrupter converts an isolating switch into a load interrupter switch. The switch may be used for full 2,000A load interruption up to 34.5kV. The Series UVI Interrupter may also be used for the reduced recovery voltage application of loop splitting or parallel switching up to 230kV, depending on system voltage, grounding considerations of the system and load and load characteristics. Use the ratings table for determination.

## Load Interrupter Attachments

### Loop Sectionalizing (Loop Splitting — Parallel Switching)

This switching requirement arises at switches in closed transmission loops and tie switches in substation primary and secondary buses. These are situations in which the switch will still be energized at both terminals after it has opened. Depending upon system conditions, rated load current may be flowing through the switch. The recovery voltage (i.e. the voltage that will appear across the switch terminals immediately following interruption of the circuit) is generally a small percentage of full system voltage. This reduced recovery voltage enables the economics of application of the Series UVI Interrupter on systems energized at voltages up to 230kV. A more detailed technical discussion of this application is contained in the Joslyn Hi-Voltage paper, "Some Fundamental Aspects of Recovery Voltage," TD 745-510.

As load currents increase, the ability to reliably open transmission loop switches and substation tie switches while they are energized becomes increasingly important from the standpoint of safety and system operating efficiency. Unlike other types of interrupters, the life of the Joslyn Hi-Voltage Series UVI Interrupter does not significantly relate to number of amps interrupted or recovery voltage duty.

#### Operation

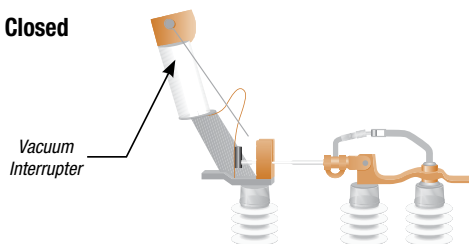
##### Opening Sequence

1. Air switch is closed. Series UVI Interrupter is not in the circuit. Current flows between the jaw and blade contacts. Vacuum contacts are closed, but no current flows through them because the device is not engaged in the circuit when the switch is fully closed.
2. Air switch contacts separate, but the circuit is maintained through the moving arc horn and fixed arc horn. As blade movement continues, the moving arc horn engages the actuating arm. Vacuum contacts are closed.
3. As blade movement continues farther, the fixed and moving arc horns separate. The current has been transferred to a path through the closed vacuum contacts. Rotation of the mechanism hub brings the spring toggle mechanism to the trip position after adequate clearance distance is established. Current is interrupted inside the vacuum chamber with no external arcing as contacts open.
4. The switch moves to full open position, releasing the actuating arm, which is spring loaded to return to original position, closing the vacuum contacts.

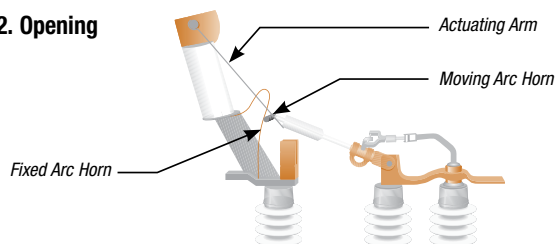
##### Closing Sequence

5. As the switch blade closes, the circuit is energized between the moving and fixed arc horns.
6. As the switch nears the fully closed position, the moving arc horn depresses the actuating arm. The bumper stop spring returns the actuating arm to its original position for the next operation.

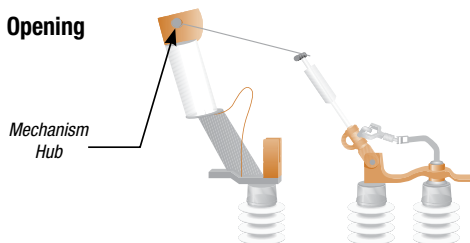
1. Closed



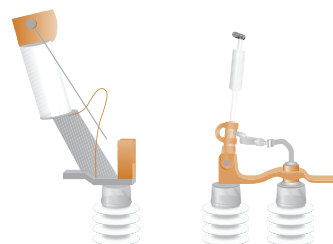
2. Opening



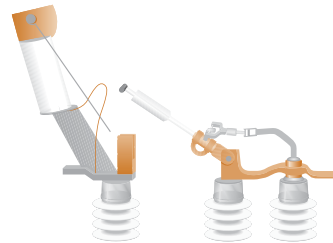
3. Opening



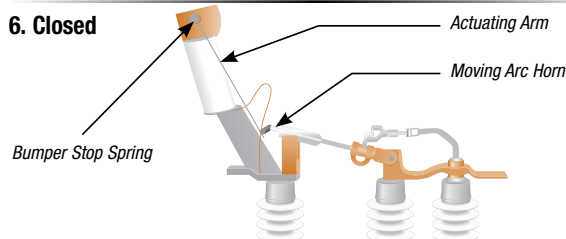
4. Open



5. Closing



6. Closed





## Load Interrupter Attachments

### Voltage Limiter extends capability of Series UVI Interrupter

With the addition the Joslyn Hi-Voltage® Voltage Limiter (V/L), the Series UVI Interrupter can be used for transmission line charging current and transformer-magnetizing current interruption at voltages up to 72.5kV in addition to providing 2,000A of loop splitting or parallel switching capability. The V/L and Series UVI Interrupter combination enables a single switch to be opened to split a loop or drop charging current — the two operations required to isolate a section of a transmission line for maintenance. Sequential switching operations or temporary outages are thereby eliminated with a resulting economical increase of system operating convenience and efficiency. The small, lightweight V/L and Series UVI Interrupter combination represents an advanced technology version of the Joslyn Hi-Voltage® Series LSI Load Sectionalizer Interrupter, which provides the same functions through 161kV.



Series UVI Interrupter  
with Voltage Limiter

#### Ratings for Standard UVI

SYSTEM VOLTAGE (kV)	APPLICATION	INTERRUPTING CAPABILITY (AMPS) (PEAK RECOVERY VOLTAGE OF 30kV)
Up to 15	Capacitor Switching, Grounded & Ungrounded	800
25	Capacitor Switching, Grounded Only	140
Up to 25	Load Switching, Grounded & Ungrounded	2,000
34.5	Load Switching, Grounded Only	2,000
Up to 25	Reactor Switching	2,000
Up to 25	Transformer-Magnetizing Switching	2,000
Up to 25	Line Dropping	140
Up to 25	Cable Switching	800
Up to 230	Loop Splitting/Parallel Switching	2,000

#### Ratings for UVI with Voltage Limiter

SYSTEM VOLTAGE (kV)	CABLE CHARGING CURRENT (AMPS)	LINE CHARGING CURRENT (AMPS)	PARALLEL OR LOOP SWITCHING CURRENT (AMPS)
38	50	25	2,000
48.3	25	20	2,000
72.5	15	15	2,000

**Note:** To order a Joslyn Hi-Voltage® Series UVI Load Interrupter, please supply the following information:

1. Air switch manufacturer
2. Switch model number
3. Voltage rating
4. Current rating
5. Size of insulator bolt circle
6. Description of blade movement, including rotation as viewed from hinge end looking back at the jaw assembly end
7. Application, system voltage and grounding

## Load Interrupter Attachments

Convert an isolating switch into an interrupter switch.

### Joslyn Hi-Voltage® Series LSI Load Sectionalizer Interrupter Attachments

- Eliminate sequential switching of a loop system, which minimizes the possibility of a switching error, thereby increasing personnel safety and system operating flexibility
- Can be supplied mounted and pre-adjusted on Joslyn Hi-Voltage® isolating switches to provide a complete, single-source interrupter switch
- Also available as an add-on for existing air switches — can be applied easily and economically to existing vertical-break or side-break disconnect switches rated 69kV through 161kV, regardless of manufacturer
- 69kV Series LSI with Voltage Limiter is ideally suited for additional switch types including center-break and in-line designs
- Virtually maintenance-free; requires only an inspection every five years or 5,000 operations
- Anodized aluminum mechanism housing protects against corrosive action
- Fiberglass interrupter module housing with special coating inhibits ultraviolet activity
- Sealed vacuum interrupter chamber is encapsulated in Joslyte solid-dielectric, closed-cell insulation to seal against moisture and contamination
- Current-transfer and arcing horn components are made from special non-welding, high-current materials
- The Series LSI Interrupter is in the power circuit only for a few seconds during the opening operation; it is not in the circuit while the switch is closing or closed, and the continuous momentary and impulse ratings of the switch are unaffected
- Spring toggle mechanism opens the vacuum contacts at the proper speed, independent of air switch operating time
- External spark gap protects vacuum module if operated above its recovery voltage capability



Joslyn Hi-Voltage® Series LSI Load Sectionalizer Interrupters convert isolating switches into interrupter switches for sectionalizing transmission loops. A transmission loop switch requires the functions of loop splitting, or parallel switching, and line dropping (see Load Interrupter Attachment Applications on **page H-223** for more information). The Series LSI Interrupter is a co-coordinated device that combines the capability of a vacuum interrupter for loop splitting with the articulated spring-rod interrupter (HVI) or the Joslyn Hi-Voltage® Voltage Limiter (V/L) for line dropping. The spring rod design incorporates a gap-type voltage sensor, which automatically determines the required function and inserts the proper interrupter into the power circuit. The Series LSI Interrupter can also interrupt the magnetizing current of unloaded transformers.

#### Design Features

Each Series LSI Interrupter consists of a vacuum interrupter (UVI) and an articulated spring rod interrupter (HVI) or a voltage limiter (V/L). A gap-type sensor measures the recovery voltage across the switch when the spring rod is supplied. If the recovery voltage is within the capability of the vacuum interrupter — which will be the case in the reduced recovery voltage loop-splitting situation — the circuit will be interrupted within the vacuum interrupter. If the recovery voltage exceeds the capability of the vacuum interrupter — which will be the case if another switch in the loop has already opened — the voltage limiter will function, or the gap-type sensor will trigger and insert the articulated spring rod to interrupt the line charging current. Therefore, it doesn't matter which switch is opened first. The Series LSI Interrupter will automatically determine the required function and insert the correct interrupter. Use of the Series LSI Load Sectionalizer Interrupter on every transmission loop switch eliminates sequential switching procedures and precludes the possibility of switching sequence error.

## Load Interrupter Attachments

### Series LSI Operation

#### Opening Sequence of Series LSI Interrupter with Spring Rod Component

1. With the air switch closed (top diagram), the Series LSI Interrupter is completely out of the circuit. The only current path is through the air switch blade.
2. As the air switch blade operates (second diagram), the movable arc horn slides along the fixed arc horn and engages the actuator arm of the vacuum interrupter. Current flow is diverted through the closed contacts of the vacuum interrupter. The spring rod of the Hi-Velocity Interrupter (HVI) is caught on its latch. No current flows through the Hi-Velocity Interrupter (HVI) because an insulating rod supports the latch.
3. When the actuator arm approaches the limit of travel (third diagram), a toggle mechanism within the weatherproof housing opens the vacuum interrupter contacts. If the application is loop sectionalizing (parallel switching), the circuit is interrupted. If the application is line dropping, cable switching or transformer-magnetizing switching, the air gap ignites, inserting the Hi-Velocity Interrupter (HVI) into the circuit. Current flow is established through the Hi-Velocity Interrupter (HVI), spring rod, latch and air gap.
4. As the air switch blade continues to open (bottom diagram), the movable arc horn disengages from the actuator arm and allows it to reset, closing the vacuum contact. After a sufficient opening is established between the air switch blade and fixed arc horn, the spring rod releases from the latch. The circuit is interrupted. Visible isolation is now provided by the air switch.

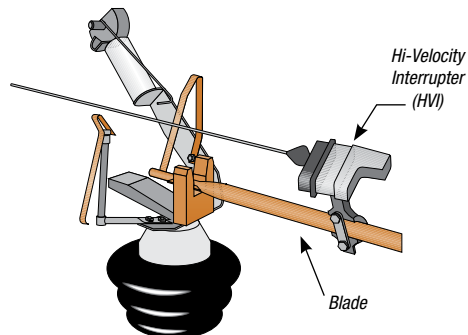
#### Closing

As the air switch blade closes, the load is picked up through the movable arc horn and fixed arc horn.

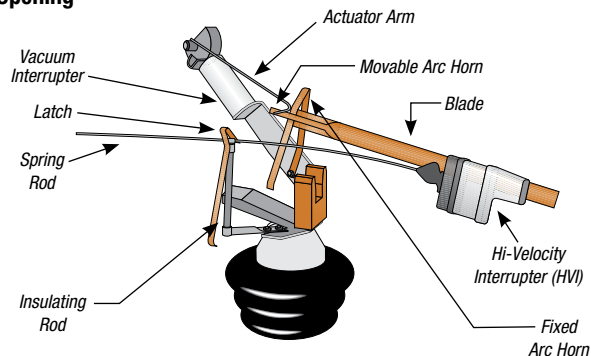
#### Opening Sequence of Series LSI Interrupter with Voltage Limiter

Operation is similar except the spark gap and spring rod considerations are eliminated.

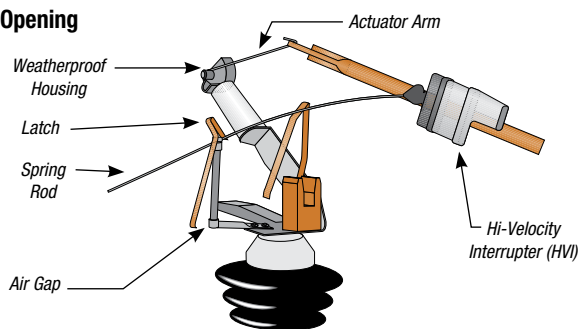
#### 1. Closed



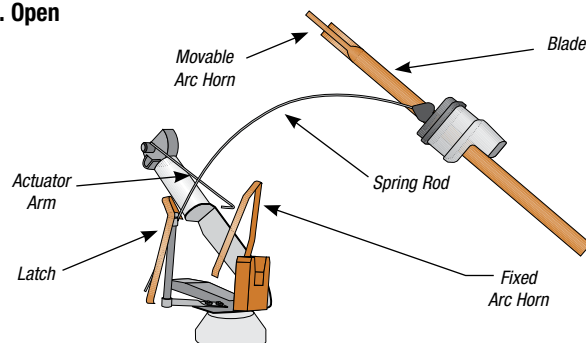
#### 2. Opening



#### 3. Opening



#### 4. Open



## Load Interrupter Attachments

### Ratings

#### Loop Splitting/Parallel Switching

69–230kV: Maximum interrupting current 2,000A — Maximum recovery voltage 30kV peak

#### Line Dropping and Cable Switching

System Voltage (kV)	69	115	138	161	230
Approximate Line Length (miles)	70	50	30	20	—
Current (Amps)	20 (15*)	20	15	10	.5

#### Transformer-Magnetizing Switching

System Voltage (kV)	69	115	138	161	230
Transformer Size (MVA)	70	100	150	200	300

\* Rating using Voltage Limiter instead of HVL.

**Note:** To order a Joslyn Hi-Voltage® Series LSI Load Interrupter, please supply the following information:

1. Air switch manufacturer
2. Switch model number
3. Voltage rating
4. Current rating
5. Size of insulator bolt circle
6. Description of blade movement, including rotation as viewed from hinge end looking back at the jaw assembly end

## Load Interrupter Attachments

Use with a disconnect switch to provide load switching capability.

### Joslyn Hi-Voltage® Series JMVI Modular Vac-Rupter Interrupter Attachments

- Consist of one or more vacuum interrupter modules connected in series to form an interrupter assembly to be installed on a disconnect switch to provide load switching capability
- Supplied complete with all mounting hardware, enabling fast and easy installation on most vertical-break disconnect switches from any manufacturer
- Available with Joslyn Hi-Voltage® Series RF-2 Vertical Break Switches to provide a complete load interrupter switch package

The Joslyn Hi-Voltage® Series JMVI Modular Vac-Rupter Interrupter is one or more vacuum interrupter modules connected in series to form an interrupter assembly, which is installed on a disconnect switch to provide load switching capability. The movement of the air switch blade activates a high-speed toggle mechanism that opens all contacts of each phase simultaneously. The contact speed is independent of the air switch blade speed. Switches equipped with Series JMVI Interrupters can provide a high degree of pole-to-pole synchronization. The Series JMVI Interrupter does not change the continuous, momentary or closing capabilities of the air switch because the interrupter is not in the circuit when the air switch is closing or fully closed. Interruption takes place inside permanently sealed ceramic vacuum chambers encapsulated in Joslyte, a sealed, solid-dielectric insulation, to provide a permanent dielectric system inside a rugged housing.

## Operation

### Opening

1. Switch is closed. Series JMVI Interrupter is not in circuit. The only current path is through the switch blade and jaw contacts.
2. As switch begins to open, blade has rotated and raised out of the jaw. The current path is maintained through the moving and fixed arc horns. As the blade continues to open, the contact on the moving arc horn engages the actuator arm of the Series JMVI Interrupter and the control transfer rod. The control transfer rod holds the moving arc horn contact against the actuator arm and breaks any accumulation of ice on the arm.
3. After the moving and fixed arc horns have separated, continuity is retained through the switch blade, moving arc horn contact, actuator arm and closed vacuum contacts to the jaw terminal.
4. When the blade raises the actuator arm to a position that establishes necessary clearances between the blade and the jaw, the over-center toggle mechanism in the housing on top of the interrupter stack opens the vacuum contacts at high speed.
5. As the air switch blade continues to its full open position, the actuator arm is disengaged and returns to its normal position. This closes the vacuum contacts and resets the mechanism for the next operation.

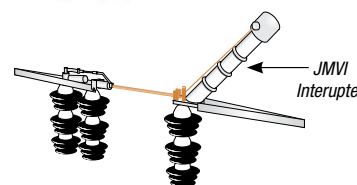
### Closing

6. As the blade closes, the moving arc horn approaches the fixed arc horn until an arc strikes to close the circuit in air. After the arc horns contact, the moving arc horn will depress the bottom tip of the actuator arm and pass under it in reaching the fully closed position. The interrupter is not in the circuit when the switch is closed or closing.

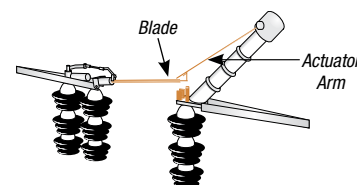


Single pole of Series JMVI Interrupter installed on the Series RF-2 Vertical-Break Switch.

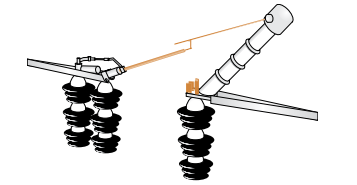
#### 1. Closed



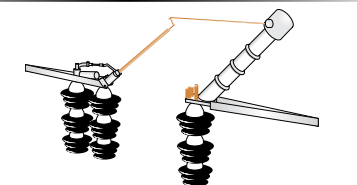
#### 2. Opening



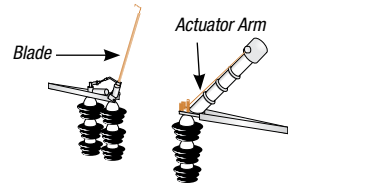
#### 3. Opening



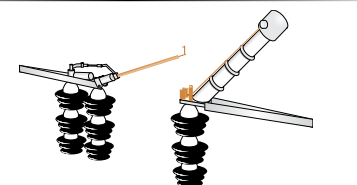
#### 4. Opening



#### 5. Open



#### 6. Closing



## Load Interrupter Attachments

# Vacuum Module Requirements Guide for Full-Voltage Applications

### Applications

- High-Voltage Transmission Line Switching
- High-Voltage Capacitor Bank Switching
- Shunt Reactor Bank Switching
- Cable Switching

### Reduced Voltage Applications

For loop switching or parallel switching, each vacuum contact per phase is rated 2,000A interrupting at a peak recovery voltage of 30kV. In most cases, these applications may be served with a single vacuum contact per phase.

### Voltage Limiter Extended Capability

For loop splitting and line dropping/load sectionalizing, use the Joslyn Hi-Voltage® Voltage Limiter in parallel with Series JMVI Interrupter modules to extend capability. The resulting interrupting will be smaller because fewer modules are required. See Series LSI Load Sectionalizer Interrupters on **pages H-229-H-231**.



138kV typical full load-break switch combining the Series JMVI Interrupter with the Joslyn Hi-Voltage® Series RF-2 Vertical-Break Switch. The Series JMVI Interrupter converts the isolating switch for full load switching at system voltages up to 230kV.

### Ratings for Standard JMVI

NOMINAL SYSTEM VOLTAGE	MAXIMUM INTERRUPTING CURRENT (RMS AMPS) SWITCHING APPLICATION				MODULES REQUIRED PER PHASE
	70% P.F. LOAD	LINE CHARGING OR 3-PHASE CABLE	CAPACITOR BANK GROUNDED NEUTRAL	UNGROUND NEUTRAL	
14.4	2,000	600	800	140	1
14.4	2,000	600	1,000	800	2
23	2,000	140	700	—	1
23	2,000	600	700	600	2
34.5	2,000	600	700	—	2
34.5	2,000	600	700	600	3
46	2,000	450	700	—	2
46	2,000	600	800	140	3
46	2,000	600	1,000	600	4
69	2,000	450	600	—	3
69	2,000	600	600	—	4
69	2,000	600	600	450	5
69	2,000	600	600	600	6
115	2,000	450	600	Call	5
115	2,000	600	600	Call	6
115	2,000	600	600	Call	7
138	2,000	450	600	Call	6
138	2,000	600	600	Call	7
161	1,200	110	450	Call	6
161	2,000	450	600	Call	7
230	2,000	110	450	Call	8



## Load Interrupter Attachments

### Ratings for JMVI with Voltage Limiter

SYSTEM VOLTAGE	JMVI REQUIRED MODULES PER PHASE	CABLE CHARGING CURRENT (AMPS)	LINE CHARGING CURRENT (AMPS)	PARALLEL OR LOOP SWITCHING (AMPS)
72.5	2	50	50	2,000
121	2	50	15	2,000
145	2	10	10	2,000
145	3	50	20	2,000
169	3	50	25	2,000
242	4	15	15	2,000
242	5	50	100	2,000

**Note:** To order Joslyn Hi-Voltage® Series JMVI Modular Vac-Rupter Interrupter Attachments, please supply the following information:

1. Air switch manufacturer
2. Switch model number
3. Voltage rating
4. Current rating
5. Size of insulator bolt circle
6. Description of blade movement, including rotation as viewed from hinge end looking back at the jaw assembly end
7. Application, system voltage and grounding