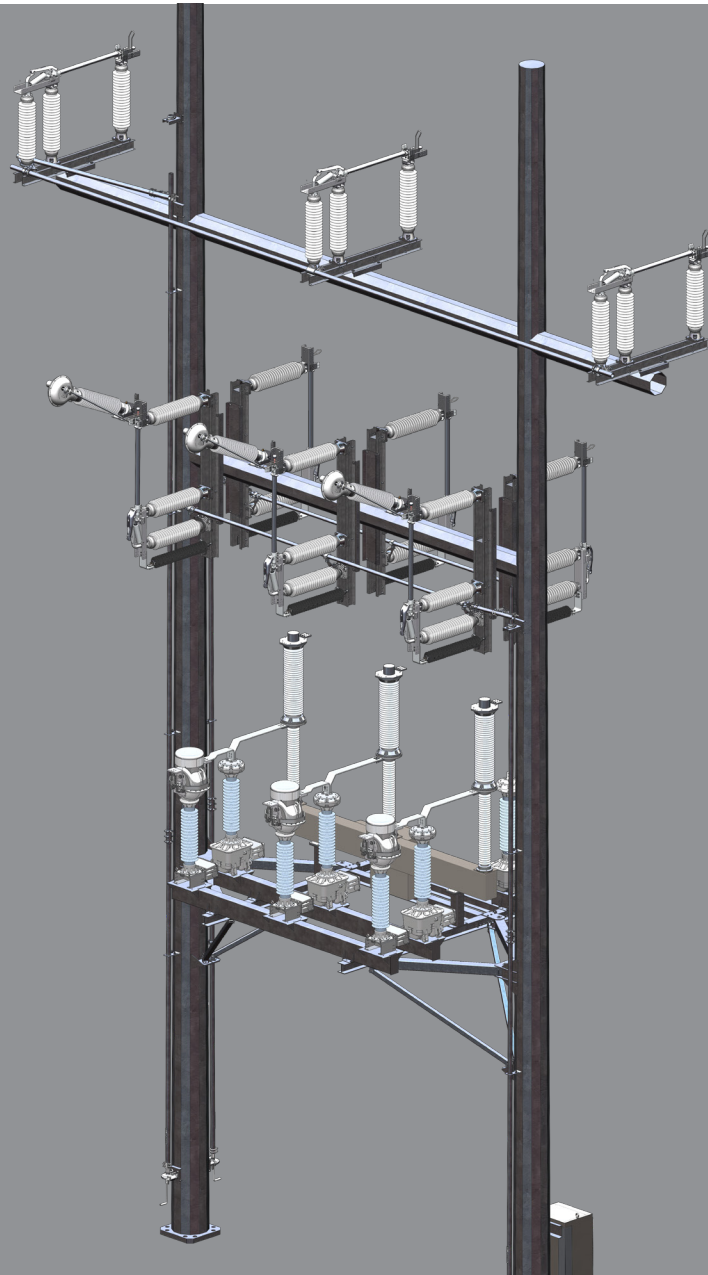


# Transmission Switching

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## PRODUCT BULLETIN



**Southern States** has been manufacturing switches for the transmission market since the early 1920s. Transmission line upgrades, “smart” systems, and the growing focus on clean power have created a significant increase in demand for new and innovative products in this market.

In response, Southern States established the **Transmission Switch Division**, focused on developing and marketing solutions for utility customers.

This bulletin highlights several of the new transmission switching products recently introduced by Southern States.



## INTRO / GENERAL APPLICATION

Southern States supplies a wide offering of Transmission Switching solutions in response to an increasing need for improved system reliability and reduced installation times.

This range of solutions spans from a fairly basic group operated disconnect switch to building a customized “Substation in the Sky.”

The ES-1, one-way, two-way, and three-way phase-over-phase side break switches offer an easy to install solution for isolation and sectionalizing of loop and radial transmission lines. These configurations are often used in restricted right-of-ways where a substation is too expensive or transmission network sectionalizing is desired.

Southern States now offers unitized designs for the vast majority of switch types. Unitized switches consist of all three phases, assembled and adjusted on a base, to speed up installation and simplify adjustments after mounting on the transmission line pole. Both the ES-1 and unitized switches are available with a full complement of accessories, operators, and interrupter attachments including the single gap, **LLS**<sup>®</sup> Load Break Interrupter.

Recent innovative solutions for Transmission Line Switching include the Substation in the Sky™.



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24/7 emergency support line: (770) 946-4565

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[SouthernStatesLLC.com](http://SouthernStatesLLC.com)

Safeguarding the Backbone of Power Infrastructure

# Southern States ES-1 Product Family

Through **Southern States'** research and development, understanding of existing issues, and integration of user feedback, the ES-1 family was designed to provide a reliable, quality product that resolves many of the common issues experienced by one-way and multi-way transmission disconnects.

The unique blade design with jaw end pivot produces a very low operating effort, eliminating concerns of operator dependent force requirements on closing. By shipping the phases assembled on a platform, the switch is easy to install and requires minimal adjustment.

The design is also compatible with the only single gap, Load Break Interrupter (**LLS®**) available through 145 kV.

## Design Features

- 360° position indicator
- Unique live parts that require very low operating effort
- Trouble-free contact alignment
- Shipped fully assembled and adjusted
- Quick and simple installation process (unfold/lift to install)
- Proven SF6, single gap, **LLS®** interrupters for worry-free switching under all conditions



## SWITCH OPTIONS

### ACCESSORIES

- AVS-1
- Mechanical Interlock
- Electrical & Key Interlocks

### OPERATORS

- VM-1 Motor Operator
- HOGO
- Swing Handle

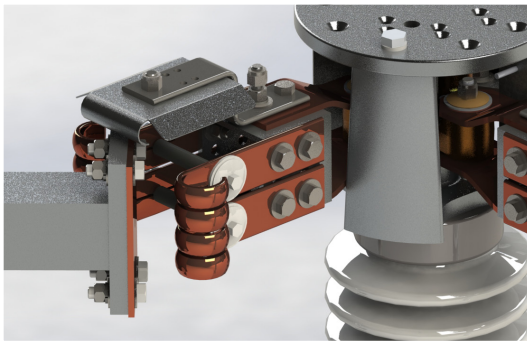
## RATINGS

Max Voltage, kV	72.5	123	145
BIL, kV	350	550	650
Rated Power Frequency	60 Hz		
Continuous Current	1200 & 2000		
Short-time Withstand, 3 sec, kA	38 & 63 kA RMS		
Peak Withstand, kA	99 & 164 kA		
Ambient Temperature Rating	-40°C to +50°C Standard -50°C Optional		

## SWITCH INTERRUPTER ATTACHMENTS

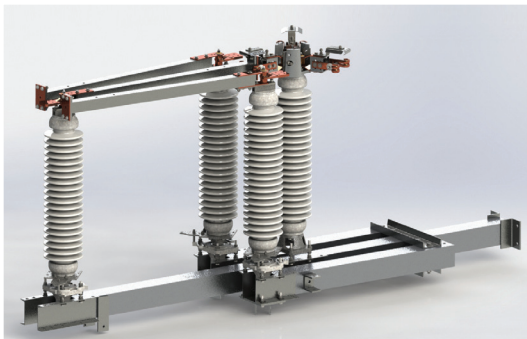
PRODUCT	Load Breaking	Loop Splitting	Line/Cable Dropping	Transformer Magnetizing
Standard Arcing Horn	x	x	✓	✓
Quick Break Whip	x	x	✓	✓
High Speed Whip	x	x	✓	✓
LLS®-IC	✓	✓	✓	✓
LLS®-II	✓	✓	✓	✓
LBI™	✓	✓	✓	✓
LLS® O <sub>2</sub> rigen	✓	✓	✓	✓

# ES-1 STANDARD DESIGN FEATURES



## Live Parts

- Reduced operating force due to unique blade design with jaw end pivot
- Contacts cleaned by sliding action during opening and closing
- Positive latching not dependent on operator closing speed
- Blade is not spring biased, removing the chance for mis-operation
- Oversized contact bar reduces impact of blade leveling to properly seat the contacts
- Aluminum/copper or all copper live parts available based on customer preference



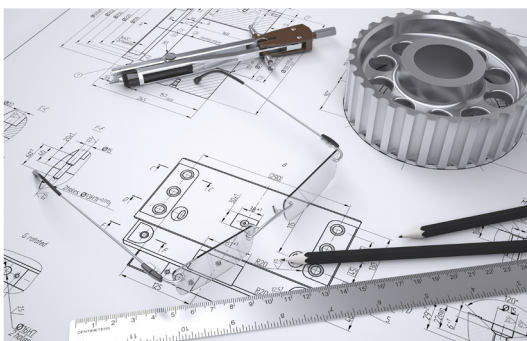
## Frame

- Collapsible frame allows for reduced shipping costs
- Reduced installation time as each phase is fully assembled on insulators
- Two and three-way collapsible frame reduces installation time
- Low closed profile frames reduce deflection and can take large pull-off



## Operating Mechanism

- Pipe diameter and gauge sized to eliminate torsional deflection
- Adjustable controls on each phase simplifies three-phase alignment
- Leveling bolts on each insulator for ease of contact alignment
- Robust design provides smooth, controlled operation while switching

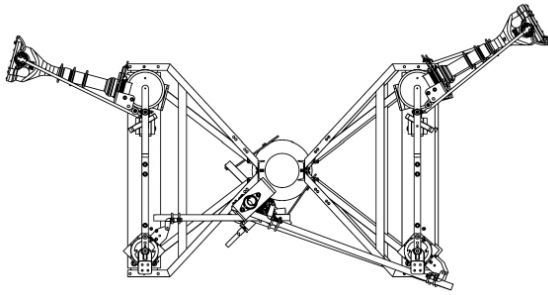


## Custom Design Benefits

- Over 100 years of custom engineered products designed to meet customer needs
- Capable of integrating a variety of accessories and interrupting devices including the single gap, SF<sub>6</sub> **LLS**<sup>®</sup> Load and Line Interrupter Switch attachment, **LBI**<sup>™</sup> Vacuum Interrupter
- Full engineering team to adapt equipment to existing structure and specification

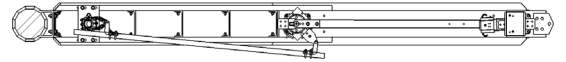
# ES-1 ONE WAY CONFIGURATIONS

## Phase Opposite Phase

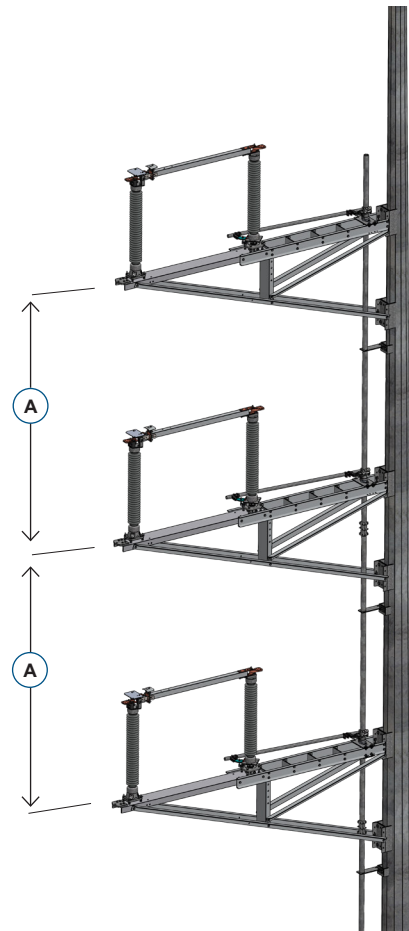
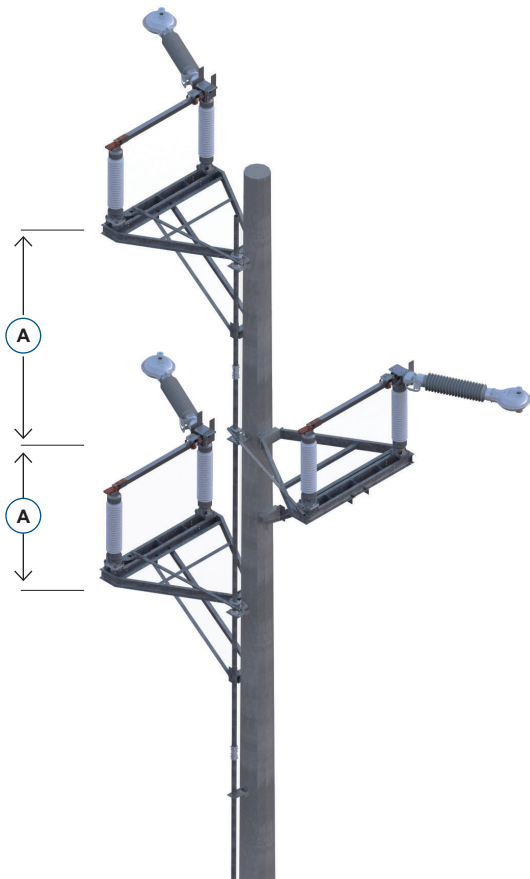


VOLTAGE	Min "A" Dim
72.5 kV	4.5'
123 kV	5.5'
145 kV	6'

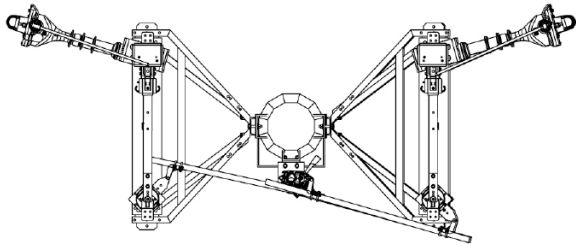
## In-Line Phase Over Phase



VOLTAGE	Min "A" Dim
72.5 kV	10'
123 kV	12'
145 kV	13.5'

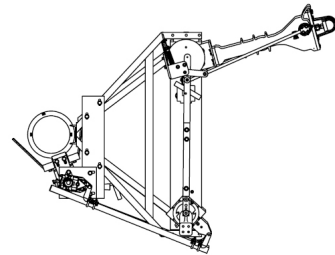


## Delta

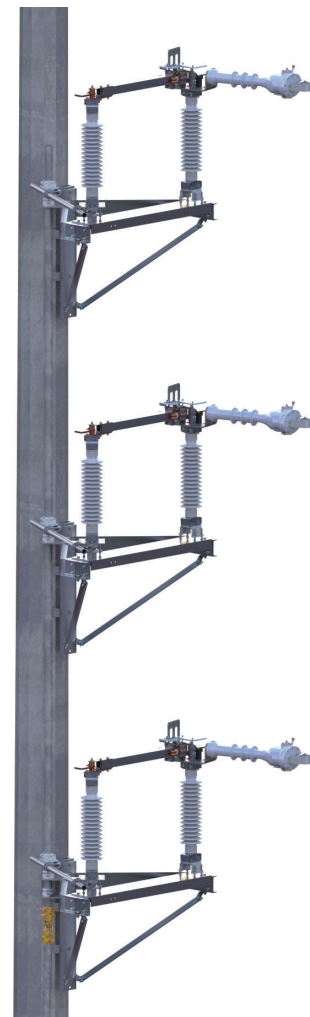
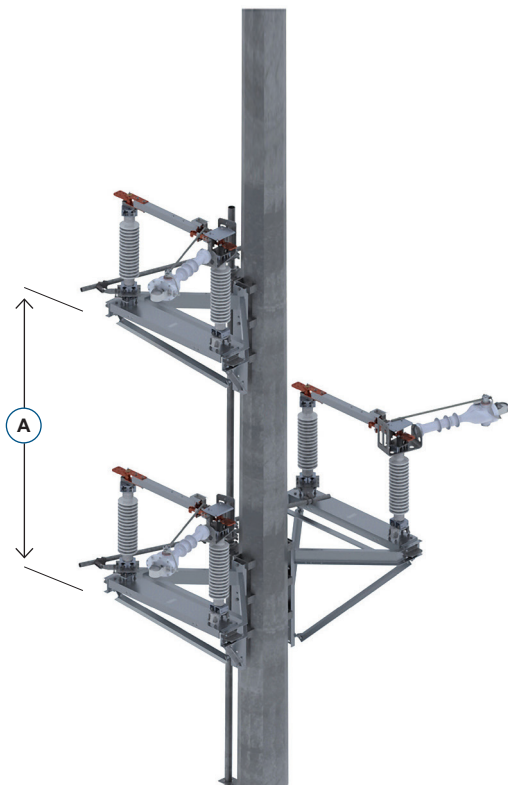


VOLTAGE	Min "A" Dim
72.5 kV	9'
123 kV	11'
145 kV	12'

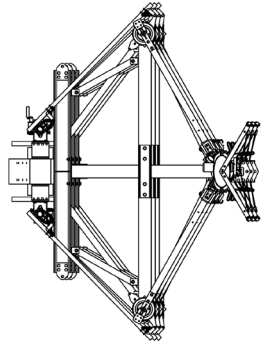
## Phase Over Phase



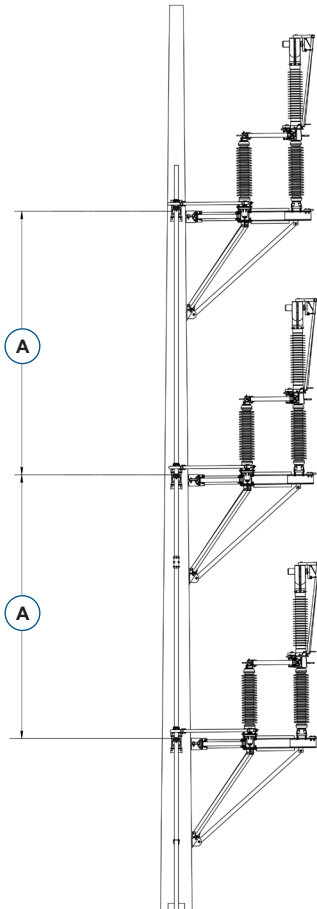
VOLTAGE	Min "A" Dim
72.5 kV	9'
123 kV	11'
145 kV	12'



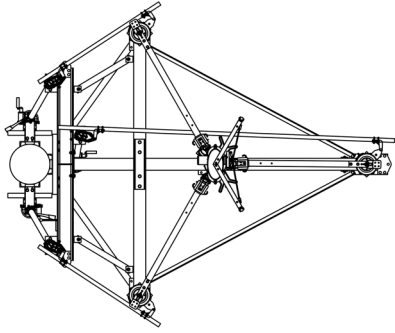
# ES-1 TWO WAY CONFIGURATIONS



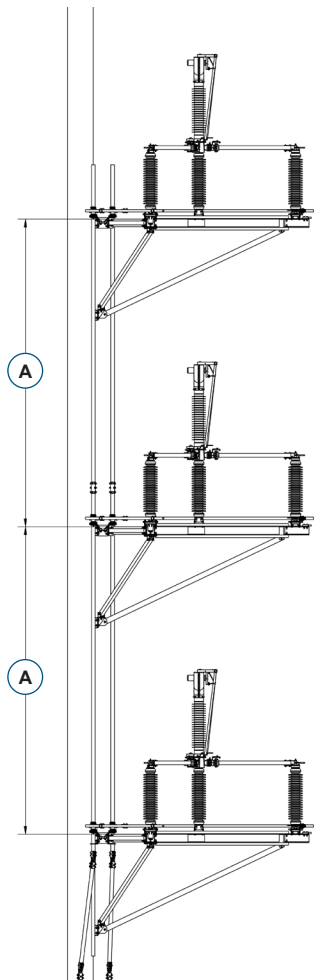
VOLTAGE	Min "A" Dim	Min "A" w/ Interrupter
72.5 kV	8'	12'
123 kV	12'	20'
145 kV	13'-6"	20'



# ES-1 THREE WAY CONFIGURATIONS

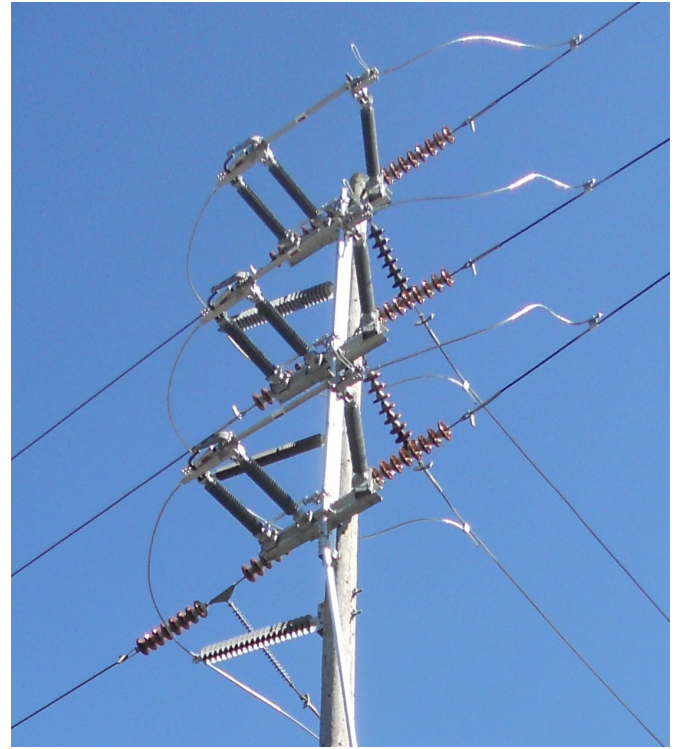


VOLTAGE	Min "A" Dim	Min "A" w/ Interrupter
72.5 kV	9'	12'
123 kV	13'	20'
145 kV	14'-6"	20'



# Southern States Unitized Disconnect Switching

**Southern States** offers a complete line of unitized disconnect switching solutions to satisfy a variety of market applications. Fully assembled and adjusted from the factory, customers experience reduced costs associated with quick installation times and simplified field assembly and adjustment. The unitized EV-2 and EC-1V have provided solutions for numerous market applications and offer valuable, minimized phase spacing. Attachments, such as the **LLS®-IC**, **LBI™**, **LLS®-II**, **LLS® O<sub>2</sub>rigen**, **CG-20™**, and accessories are also available for these unitized offerings.



## Design Features

- Horizontal or side mount mounting arrangements
- Configurations available for all switch types
- Easily accommodates full load break interrupters and other accessories
- Three-sided NEMA terminal pads for easy conductor terminations
- Reduced installation time

## RATINGS

Maximum Voltage Rating (kV)	15.5	27	38	48.3	72.5	123	145
BIL (kV)	110	150	200	250	350	550	650

Rated Power Frequency	60 Hz	
Continuous Current	1200 A - 3000 A	4000 A
Short-Time Symmetrical Withstand (3 Sec)	63 kA RMS	80 kA RMS
Peak Withstand	164 kA	208 kA
Ambient Temperature Rating	-40°C to +50° Standard / -50°C Optional	

## SWITCH INTERRUPTER ATTACHMENTS

PRODUCT	Load Breaking	Loop Splitting	Line/Cable Dropping	Transformer Magnetizing
Standard Arcing Horn	x	x	✓	✓
Quick Break Whip	x	x	✓	✓
High Speed Whip	x	x	✓	✓
LLS®-IC	✓	✓	✓	✓
LLS®-II	✓	✓	✓	✓
LBI™	✓	✓	✓	✓
LLS® O <sub>2</sub> rigen	✓	✓	✓	✓

## SWITCH OPTIONS

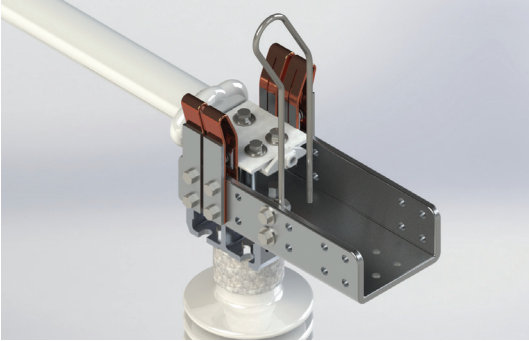
### ACCESSORIES

- AVS-1
- Mechanical Interlock
- Electrical & Key Interlocks

### OPERATORS

- VM-1 Motor Operator
- **SEGO®**
- HOGO
- Swing Handle

# UNITIZED STANDARD DESIGN FEATURES



## Live Parts/Contacts

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- Reverse loop design
- Wiping action
- Silver to silver surfaces using two different silver alloys
- Heavy duty mechanism
- Long life and suitable for high mechanical loads



## Base

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- Sealed and permanently lubricated double-row stainless steel ball bearings
- Double channel construction above 72 kV
- Galvanized steel - Aluminum optional



## Operating Mechanism

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- Available with swing handle, worm gear operator or motor operator
- Available with Rapid Set or EZ Set™
- Easy and fast installation and adjustment
- Interphase and phase drive arms are pre-installed and adjusted at factory

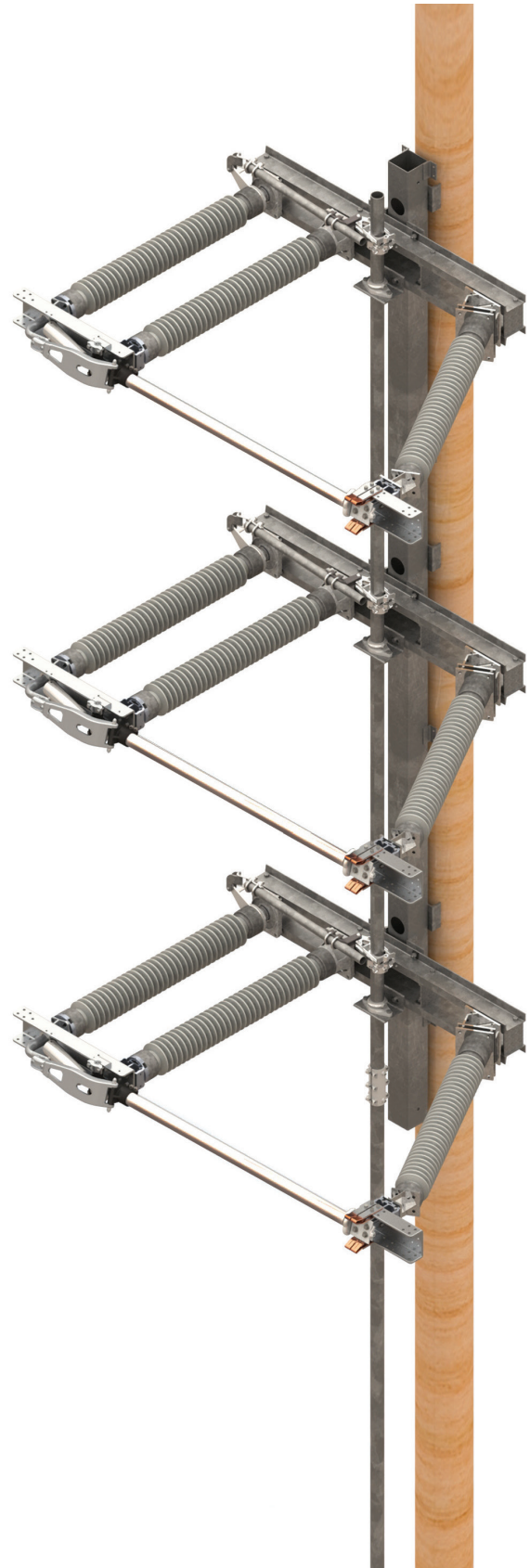
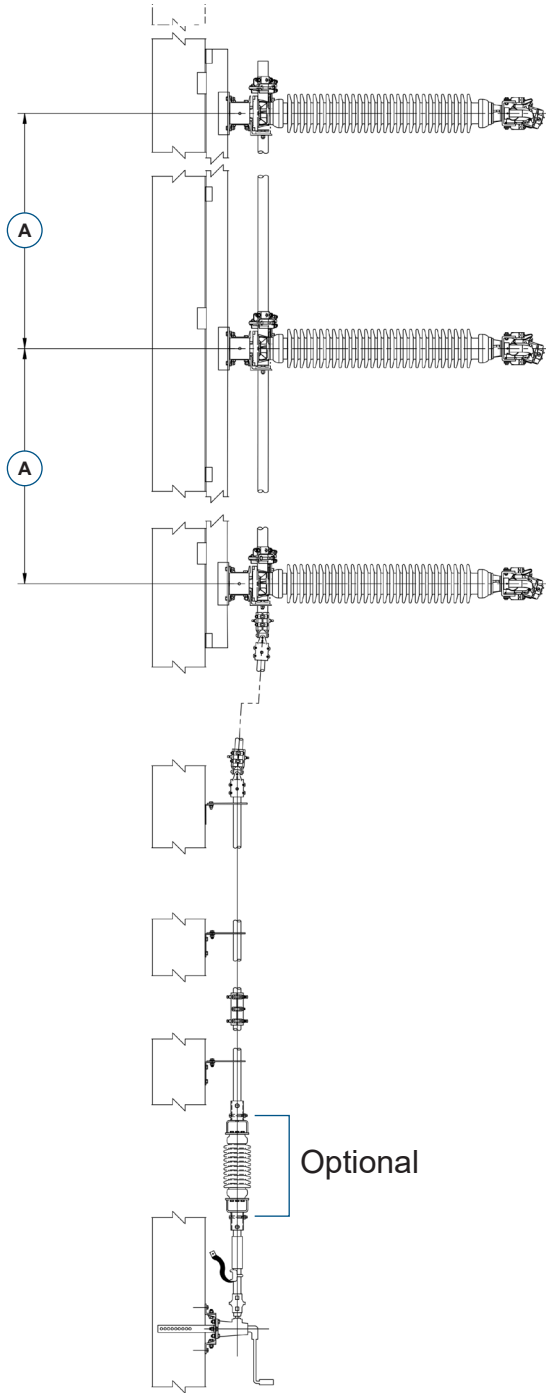


## Efficient Design

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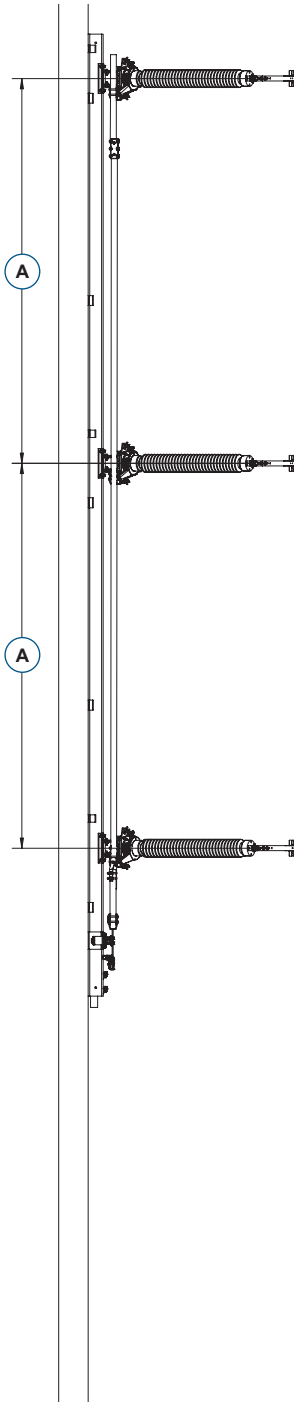
- Single pick installation
- Highly reduced installation time
- Minimal field assembly and adjustment
- The pole units (all three phases) are delivered fully adjusted and assembled on frame with outboard bearings, clevises, and reach pipes

# UNITIZED EV-2



VOLTAGE	Min "A" Dim
72.5 kV	5'
123 kV	7'
145 kV	8'
170 kV	9'
245 kV	11'

# UNITIZED EC-1V



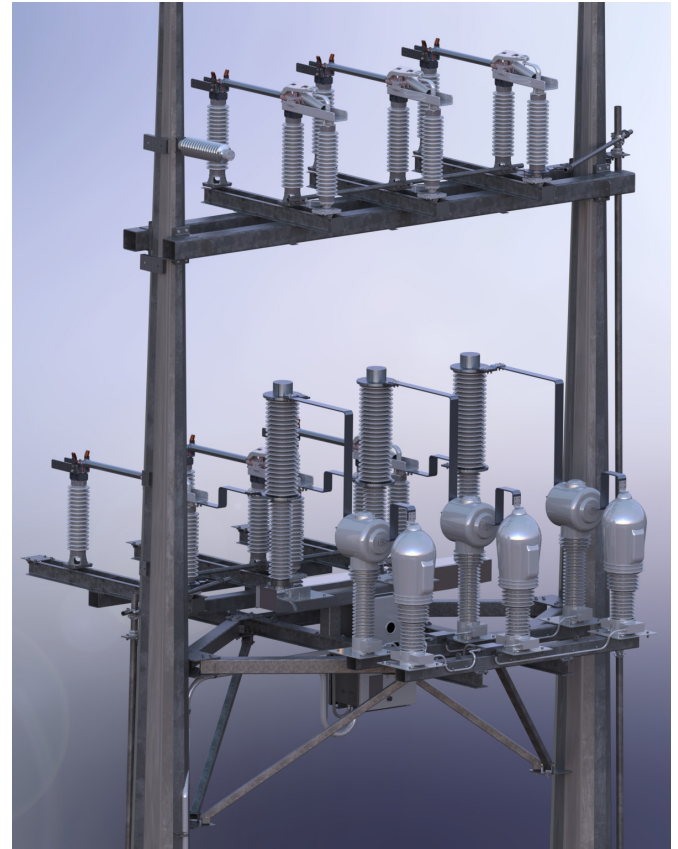
VOLTAGE	Min "A" Dim
72.5 kV	6'
123 kV	8'
145 kV	9'
170 kV	10'
245 kV	13'

# Southern States Substation in the Sky™

For unique transmission application challenges, **Southern States** offers specialized solutions. Substation in the Sky is a totally customized application, addressing system protection, sectionalizing, and isolating needs of our customers. Equipment can be tailored to meet a wide range of applications. The Substation in the Sky offers the ability to monitor, communicate system information, and switch transmission lines and taps. When space is at a premium, Southern States can engineer a more economical solution than the traditional practice of building a small substation.

## Design Features

- Custom engineered for each application
- Multiple voltage and current sensing options
- Wide selection of products for line isolation and equipment bypass
- Fault or load interrupting devices selected based on application
- Communication systems matched to customer specifications



## SWITCH OPTIONS

### COMMUNICATIONS

- SEL relays
- Battery Cabinets (Chargers)
- Wireless Routers
- VM-1
- AVS-1
- Electroswitch
- Others (per request)

### MONITORING

- **ICS®** platform (**Smart Tap®/Smart Trip®**)
- CT
- PT

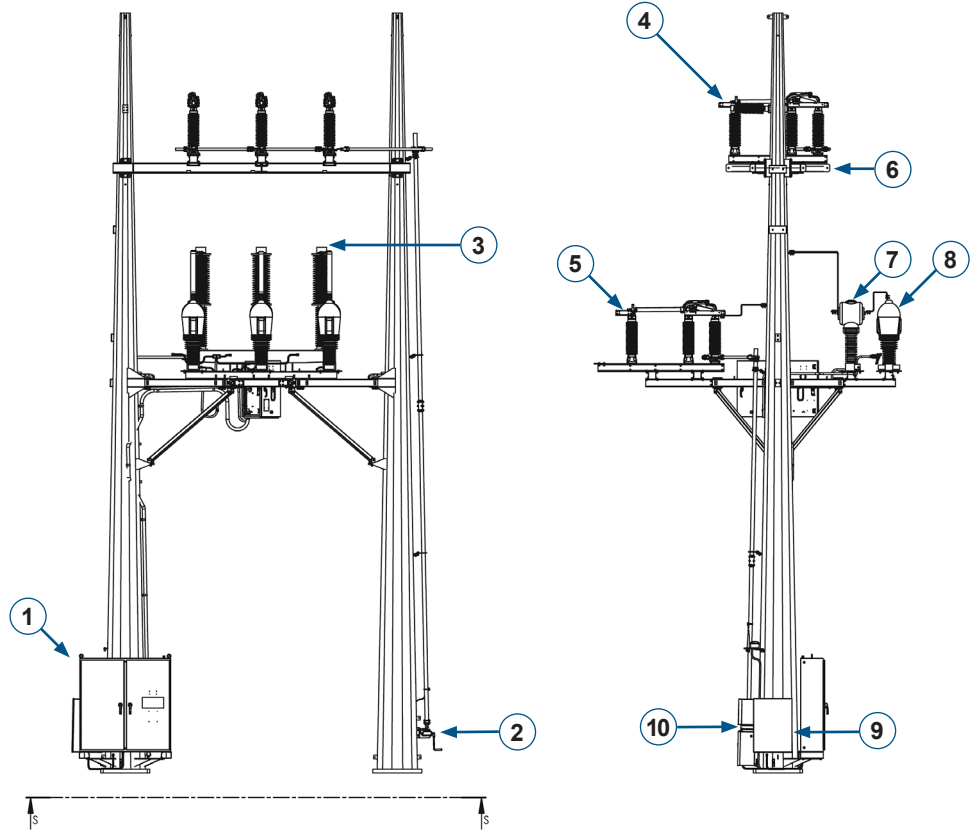
## SWITCHING EQUIPMENT

CATEGORY	Product	Rating
<i>Power Switching</i>	CSV	48.3 – 242 kV
	CSH	38 – 245 kV
<i>Disconnect Switching</i>	EV-2	15.5 – 362 kV
	PBO (PBO -1)	8.3 – 170 kV
	RDA-1	38 – 362 kV
	EC-1 (EC-1V)	38 – 245 kV

# SUBSTATION IN THE SKY CONFIGURATIONS

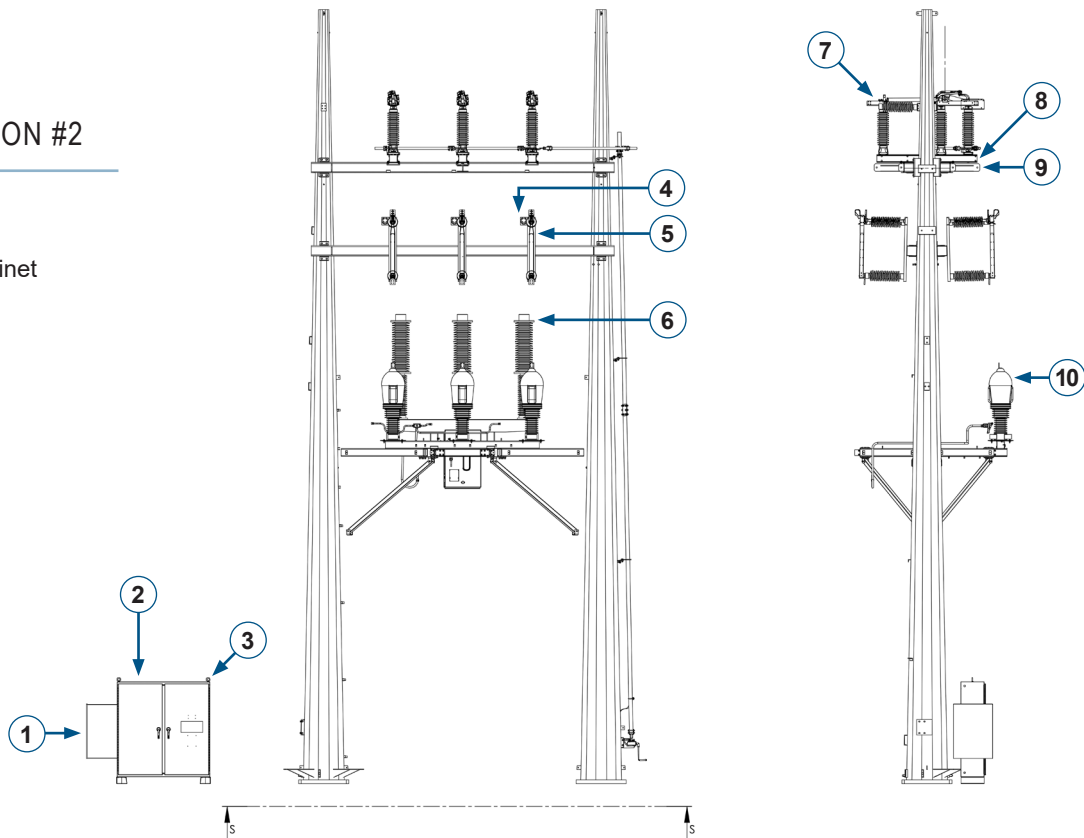
## CONFIGURATION #1

- ① Main Control Cabinet
- ② Gear Operation for Bypass
- ③ CSV
- ④ Bypass Switch
- ⑤ Air Disconnect
- ⑥ Vang Mounting
- ⑦ CT Assembly
- ⑧ PT Assembly
- ⑨ Battery Cabinet
- ⑩ VM-1 Motor Operator (for air disconnect)



## CONFIGURATION #2

- ① Battery Cabinet
- ② Main Control Cabinet
- ③ Antenna
- ④ Arrestor
- ⑤ PBO
- ⑥ CSV
- ⑦ Bypass Switch
- ⑧ Line Vang
- ⑨ Vang Mounting
- ⑩ PT Assembly



# Southern States LBI™

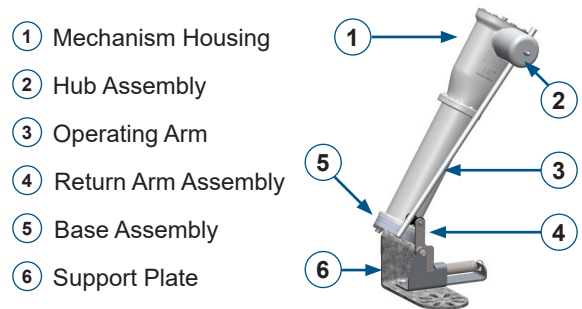
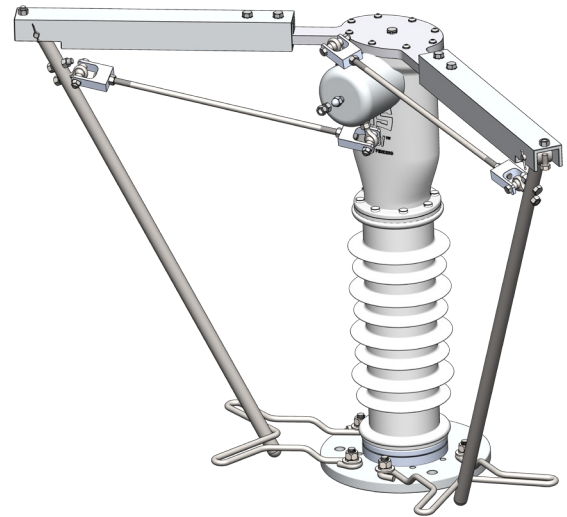
## Single Gap Vacuum Interrupter 15.5 kV - 72.5 kV

### Innovative Design Ensures Maximum Reliability

The Southern States LBI™ (Load Break Interrupter) will convert existing group operated, vertical break and side break disconnect switches to a Load Break disconnect capable of interrupting load, loop splitting, and line dropping currents within a single gap vacuum interrupter. Concerns about splitting the interruption across multiple devices are eliminated by removing the need for linkage components. Contact factory for compatibility with other manufacturers' switch offerings.

### Design Features

- Sealed vacuum interrupter chamber – no greenhouse gases used
- High mechanical reliability with minimal maintenance
- Factory full-power tested complete assembly
- Single-bottle interrupter design reduces complexity and potential failure points
- Single-gap interrupter through 72.5 kV
- UV-resistant PET interrupter housing minimizes device weight and resists sunlight degradation
- Limited linkage components increase reliability
- Low operator effort required
- Can be mounted on substation and transmission vertical-break, side-break, and multi-way switches

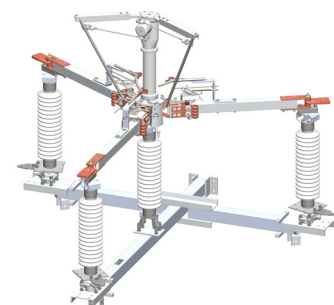
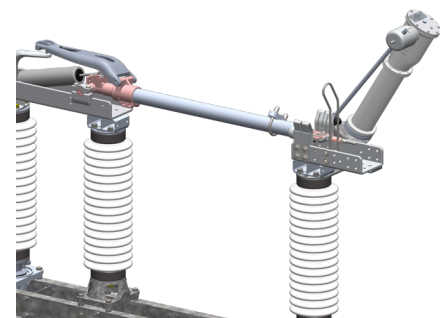


### SPECIFICATIONS

Maximum Voltage Rating	15.5 kV – 72.5 kV
Load Break Rating	2000 A
Loop Splitting Rating	2000 A
Line Dropping Rating	70 A

### RATINGS

Maximum Voltage Rating	15.5 kV	27 kV	38 kV	48.3 kV	72.5 kV
Load Breaking Capability	2000 A				
Loop Splitting Capability	2000 A				
Line Dropping Capability	70 A				



# Southern States **MACI**<sup>®</sup>

## Magnetically Actuated Closed Indicator

### **MACI**<sup>®</sup>: A Protection Solution that Improves System Integrity

Verifying that the blade of a disconnect switch is correctly placed in the jaw and properly rotated has created a challenge for ground level operators. Southern States' patented design uses magnetic technology to protect the disconnect by insuring proper blade positioning while not interfering with switch operation. Using MACI's binary indicator, operators can be certain a switch is safe to energize, thus minimizing the potential for unplanned outages which may lead to millions of dollars in costs annually.

### Design Features

- Visible from 100 ft
- Reflective "closed" pattern for nighttime visibility
- Retrofit solution for vertical-break switches
- Does not interfere with switch operation, even in icy conditions
- Binary indicator – no intermediate position
- False positive indication not possible
- Designed for vertical-break and double end break switches, 72 kV and above



switch open



switch closed

RATINGS	Double End Break Switches		Vertical Break Switches	
	RDA-1	RDA-1V	EV-1	EV-2
72 kV	1200 - 3000 A	1200 - 3000 A	1200 - 3000 A	1200 - 4000 A
123 kV				
145 kV		2000 - 4000 A	1200 - 4000 A	
170 kV				
245 kV	1200 - 5000 A	2000 - 5000 A	2000 - 4000 A	
362 kV	2000 - 4000 A	—		—
550 kV	—	—	—	
765 kV	—	—	—	



Now offering pole mounted **CapSwitcher®**

Built on more than a century of innovation, **Southern States** enhances reliability, power quality, resilience, and safety for the future of our power infrastructure with industry leading equipment, service, and solutions.



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24/7 emergency support line: (770) 946-4565

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