

The Eaton logo is displayed in white, bold, sans-serif font. It features the letters 'E', 'A', 'T', and 'N' with a stylized dot between the 'A' and 'T'.

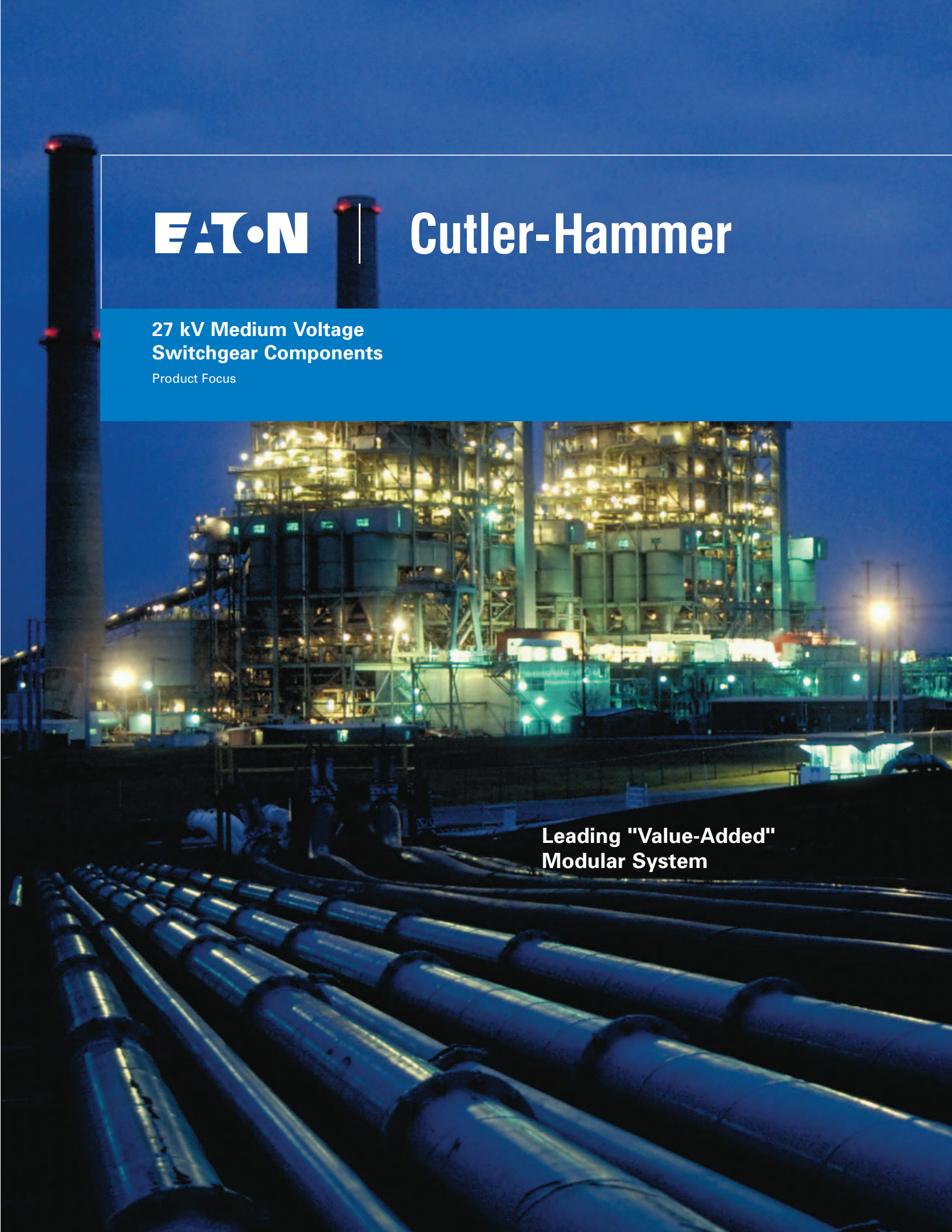
**EAT•N**

The Cutler-Hammer logo is displayed in white, bold, sans-serif font. A vertical line is positioned between the Eaton logo and the Cutler-Hammer text.

**Cutler-Hammer**

**27 kV Medium Voltage  
Switchgear Components**

Product Focus

The background of the entire page is a photograph of an industrial facility at night. In the foreground, there are several large, dark, cylindrical components of a switchgear system, likely busbars or cables, arranged in rows. In the background, a large, complex industrial structure is illuminated with warm yellow and green lights, creating a stark contrast against the dark blue night sky. Two tall smokestacks with red lights at their tops are visible on the left side of the image.

**Leading "Value-Added"  
Modular System**



# The OEM Value-Added Approach to Circuit Protection...Flexibility that Exceeds the Customer's Requirements



VacClad-W, Eaton's Cutler-Hammer® vacuum switchgear family, has been engineered to feature a standardized design, interchangeable parts, slot and tab construction, and industry-leading vacuum interrupter technology. This world-class switchgear includes the Type VCP-W Vacuum Circuit Breaker which meets both ANSI and IEC electrical standards.

## Industry-Leading Vacuum Technology Provides Unequaled Reliability

Eaton now provides the industry's most complete family of technologically advanced vacuum circuit breakers at 5 kV, 15 kV, 27 kV and 38 kV. Type VCP-W Vacuum Circuit Breakers incorporate many design features which have been field proven with more than 30 years of vacuum interrupter design and manufacturing experience...coupled with over 75 years of power circuit breaker design and manufacturing experience.

Type VCP-W Vacuum Circuit Breakers are available in a complete range of ANSI and IEC ratings:

### ANSI

5 kV through 38 kV, continuous currents from 600 through 3000 amperes.

### IEC

3.6 kV through 36 kV, continuous currents from 630 through 2000 amperes.

## ISO® Certified Facilities

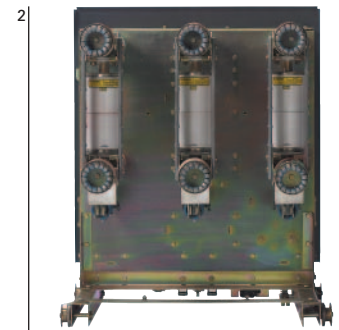
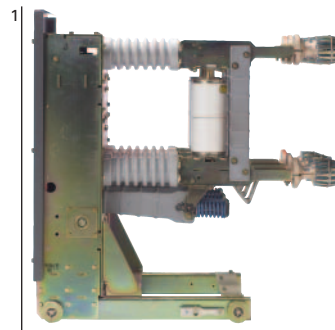
Type VCP-W Vacuum Circuit Breakers, including the vacuum interrupter, are assembled by Eaton in ISO 9002 certified facilities. The breakers are fully

tested to ANSI and IEC standards and each is provided with its unique Quality Assurance Certificate that documents all tests and inspections performed.

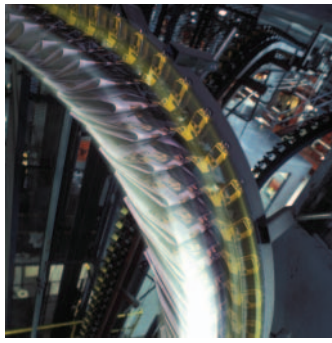
## Assembly Flexibility

Assembly flexibility is provided with a variety of industry-leading value-added approaches for assembling premier metal-clad switchgear. Customers have the unique opportunity to select the appropriate building block approach to match their manufacturing capabilities with those of Eaton's electrical business.

1. VCP-W 27 kV Side View
2. VCP-W 27 kV Rear View



# Industry-Leading Vacuum Technology Enhances Breaker and Switchgear Reliability



## Type VCP-W Vacuum Circuit Breakers

The highly dependable performance of Cutler-Hammer Vacuum Circuit Breakers results from our commitment to a continuing research and development program.

Beginning with early research in 1929, we have been a leader in the vacuum interrupter field. Production was launched in the mid-1960s, and since that time, hundreds of thousands of vacuum interrupters have been in reliable operation worldwide.

Eaton's experience has resulted in many significant vacuum interrupter breakthroughs including:

- Copper chrome contact materials that provide longer life.
- A smaller envelope size with higher performance.
- Lower chop currents.
- Improved dielectric strength.

Consequently, Cutler-Hammer vacuum interrupters are maintenance free...and provide increased service life and optimum operator safety.

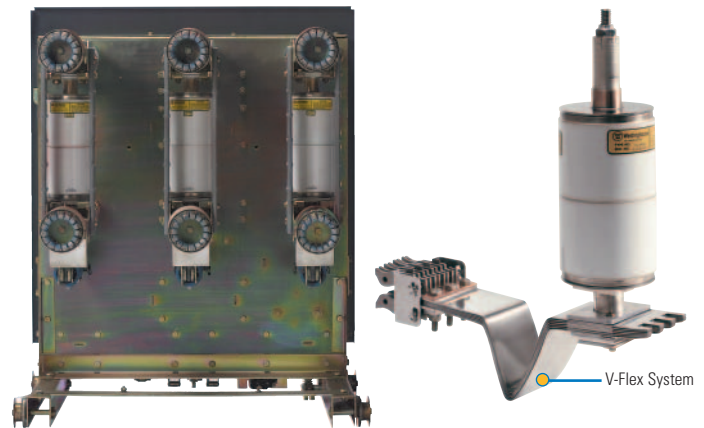
## Type VCP-W Vacuum Circuit Breakers are Designed with the Patented V-Flex Nonsliding, Nonrolling Current Transfer System

The current transfer system consists of a series of tin-plated, high-conductivity copper leaf conductors that are swaged onto the movable interrupter stem.

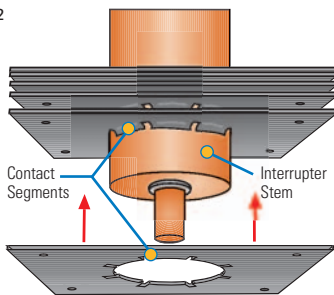
Unique swaged design benefits include:

- Improved current flow because the multipoint contact offers very low electrical and thermal resistance.
- Unlike sliding or rolling designs, there are no moving parts to wear out... therefore, no maintenance.
- Longer circuit breaker service life.

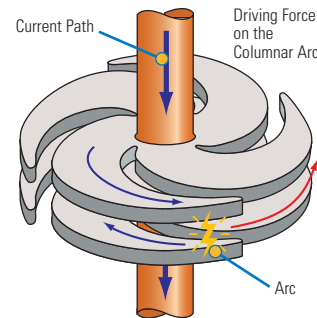
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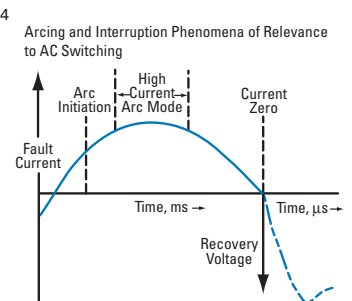
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### 1. V-Flex System

World-class VCP-W Vacuum Circuit Breakers designed with a patented V-Flex nonsliding current transfer system.

### 2. Nonsliding Current Transfer System

Connecting each leaf conductor to the vacuum interrupter stem initiates a flattening operation of the segments which are, in turn, swaged into contact with the stem. Each leaf, therefore, provides a multipoint connection. As the stem moves up and down, the V-Flex system flexes, eliminating the sliding action to provide a minimal wear and maintenance-free system.

### 3. Arcing and Interruption in Vacuum

Inside the vacuum bottle, the spiral contact design configuration provides a self-induced magnetic effect that moves the arc root around the contact periphery. This type of arc control prevents hot spot formations and minimizes electrode erosion. The low resistance of the spiral design results in less heat to dissipate, providing the smallest possible envelope size.

### 4. Arcing and Interruption Phenomena of Relevance to AC Switching

The important arcing and interruption phenomena that occur during fault current interruption in a vacuum are depicted above. These phenomena influence the design of the interrupter, particularly its size, configuration and material of the contacts. Full dielectric strength is re-established to withstand transient recovery voltage (TRV) within a few microseconds, the fastest available.

# Type VCP-W Vacuum Circuit Breaker... A New Level of Standardization



All Type VCP-W Vacuum Circuit Breakers, regardless of voltage or interrupting capacity, have the same time-proven stored energy mechanism...and are significantly smaller than conventional medium voltage drawout breakers in both size and weight.

## Four Methods of Easy Installation

### Lower compartment installation:

1. A roll-off-the-floor ramp.
2. A dockable dolly.

The floor ramp or dockable dolly is used for quick lower cell installation or removal.

### Upper and lower compartment installation:

3. A lifting yoke that is compatible with any standard lifting device.

Since the breaker rides on extension rails, alignment problems are eliminated and installation time is reduced. Additionally, a position indicator shows when the breaker is in the fully connected or disconnected position.

4. New to the Cutler-Hammer MV VCP-W Circuit Breaker line is an OEM offering of direct roll-in circuit breakers.

## Designed for Operator Safety

Two deadfront shields are provided to isolate the operator from high voltage when the breaker is energized.

During levering, safety interlocks render the breaker mechanically trip free and the breaker is grounded throughout its travel. The "T" handle latch which engages and disengages the breaker is at the bottom of the breaker, far from energized parts.

When the breaker is withdrawn, steel shutters automatically rotate to cover the primary disconnect supports...and a current transformer barrier is located in front of the shutters. This prevents the operator from accidental contact with primary voltage parts and controls.

## Cycloaliphatic Epoxy Insulation

Superior cycloaliphatic epoxy insulation has demonstrated outstanding electrical and mechanical characteristics such as track resistance, dielectric strength, and fungus resistance. The breaker's critical phase-to-ground insulation utilizes cycloaliphatic epoxy due to its proven superiority, even in the harshest industrial environments.

## Extended Life Control Wire

Nuclear grade type SIS cross linked polyolefin insulation wire (AWG #14) is used throughout the control circuits. It has been proven superior to standard insulation when exposed to aging effects caused by harsh environments, i.e., extreme temperatures, ozone and radiation. All control wire terminations utilize ring type terminals for slip-free connections.

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## 5. VCP-W

27 kV breaker in connected position in mini module.

## 6. VCP-W 27 kV Rear View

## 7. VCP-W 27 kV Front View

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# Convenient to Operate, Simple to Inspect, and Easy to Maintain



## User-Friendly Operation

Type VCP-W Vacuum Circuit Breaker controls and indicators are functionally grouped on the front control panel and include: contact position indicator, closing spring status, close and trip button, operation counter, and a breaker "T" handle latch (located at the bottom of the control panel).

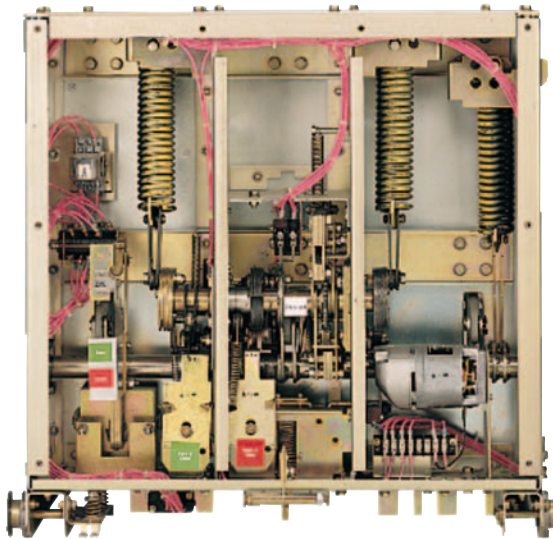
The simplified design includes just five major components: vacuum interrupter pole units, stored energy mechanism, push rod assembly, primary disconnecting contacts, and removable glass polyester insulating barriers.

## Convenient Inspection

The breaker is withdrawn on removable extension rails and no separate lifting device is required. There is no need to remove the breaker from the switchgear. With the breaker withdrawn, both the compartment and contact erosion indicator, and "T" cutout loading spring indicator can be visually inspected.

Both stored energy mechanism and control components are conveniently located behind the easily removed front panel. The current transformer barrier is

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easily removed for inspection and access to the current transformers. Auxiliary drawers use extension rails to provide for easy inspection and fuse replacement.

conveniently inspected and minor maintenance (such as lubricating the mechanism and replacing control components) is not complicated.

reduces and simplifies the spare parts inventory. Type VCP-W Vacuum Circuit Breakers of the same ratings are totally interchangeable between structures.

## Easy Maintenance

Type VCP-W Vacuum Circuit Breakers are easily maintained. The easy access mechanism and control components can be

## A Standardized Line

Type VCP-W Vacuum Circuit Breakers represent a standard line that utilizes common parts. Standardization provides for fewer total parts which, in turn,

### 1. Conveniently Located Stored Energy Mechanism

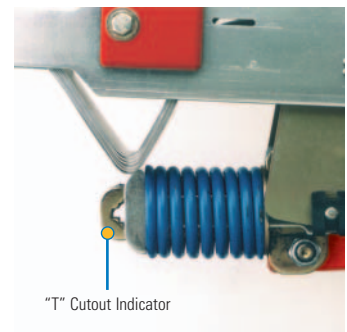
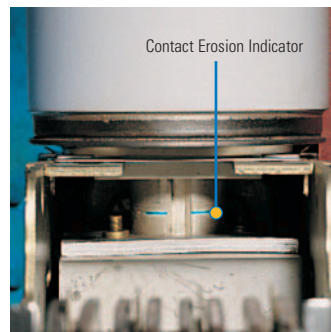
Stored energy mechanism is conveniently located behind the removable front panel. The front mounting of the mechanism provides two deadfront shields between the operator and high voltage when the circuit breaker is energized.

### 2. Easy-to-See Contact Erosion Indicator

The vacuum interrupter direct reading contact erosion indicator is clearly visible. Only periodic inspection of the erosion indicator is required.

### 3. Convenient Loading Spring Indicator

Visual inspection of the "T" cutout loading spring indicator ensures that when closing the breaker, the loading springs are applying proper pressure to the contacts.



# A Modular Value-Added Approach to Circuit Protection... Exclusively from Eaton



## 27 kV Power Modules

Ideal for OEMs who wish to maximize Cutler-Hammer standard design efficiencies with their custom-engineered value-added features. The power module incorporates all critical breaker/structure interfaces and the technological advances of Type VCP-W Vacuum Circuit Breakers and includes: a 27 kV Type VCP-W Vacuum Circuit Breaker compartment; two auxiliary voltage transformer or fuse compartments; or a combination of one 27 kV Type VCP-W Vacuum Circuit Breaker compartment and one auxiliary compartment.

- All breaker compartments are provided with cycloaliphatic insulating tubes which can accommodate up to four 600 volt class current transformers per phase.
- All secondary breaker contacts are terminated on a terminal block within the power module.
- Available in 11 standard configurations.
- Power modules also available as direct roll-in.

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① Requires an auxiliary B-Plane Kit.

## 4. Available Configurations

Eleven standard breaker configurations available.

## 5. 27 kV Epoxy Main Bus Support Provides 125 kV BIL Insulation

Modular main bus supports of cycloaliphatic epoxy, complete with rubber snubbers, are available for 1200 and 2000 ampere ratings.

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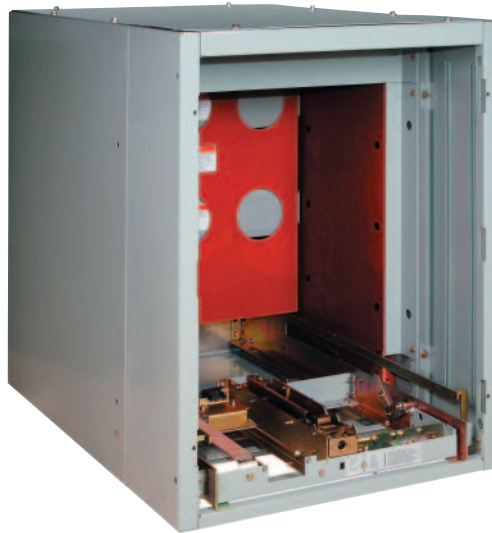
### 27 kV Mini Modules

A simple building block approach, easily configured to any project specification. Mini modules are available as:

- A one-high breaker mini module offered in a 1200 ampere or 2000 ampere compartment design.
- A one-high auxiliary mini module available for primary fuse or voltage transformer drawers. ❶
- Mini module also available as direct roll-in.

The switchgear assembler provides value-added items such as doors, bus, cable area compartment, instruments, relays and associated wiring.

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### 27 kV Auxiliary B-Plane Kits

A B-Plane kit is required to complete a fuse or voltage transformer auxiliary compartment. Included in each kit is a set of stand-off cycloaliphatic epoxy insulators, cycloaliphatic epoxy cable support and and covers, and miscellaneous hardware. ❶

- ❶ One auxiliary B-Plane Kit is required for each fuse or voltage transformer compartment.

#### AVAILABLE KITS

Description	Connection
1 Voltage Transformer	Line-to-Ground
1 Voltage Transformer	Line-to-Line
2 Voltage Transformers	Line-to-Ground
2 Voltage Transformers	Line-to-Line
3 Voltage Transformers	Line-to-Ground
1 Fuse	Series
2 Fuses	Series
3 Fuses	Series

### 1. 27 kV Mini Modules

Provide OEMs with a more value-added approach.

### 2. 27 kV Auxiliary B-Plane Kits

Allows OEMs to configure any type of auxiliary compartment.

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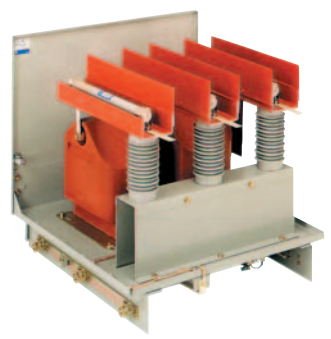
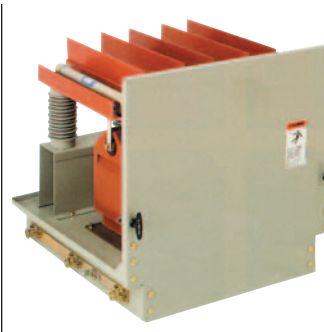


# Auxiliary Voltage Transfer and Fuse Drawers

## 3. and 4. Voltage Transformer Drawers

These drawers are compatible with both the power module and mini module value-added assembly approach.

The drawer is supplied fully assembled and complete with current limiting fuses, voltage transformers, and primary and secondary contact assemblies. Optional voltage transformers with dual-rated secondaries are also available.



### VOLTAGE TRANSFORMER DRAWERS

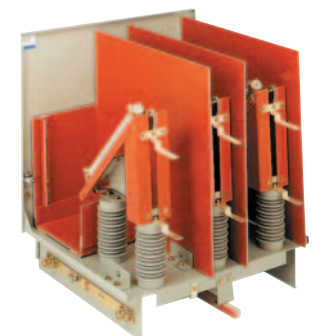
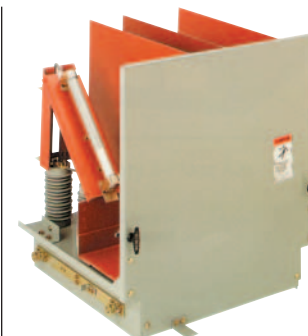
Primary Voltage Rating (kV)	Secondary Voltage Rating (Vac)	Quantity	Connection
18.0	120	1 Voltage Transformer	Line-to-Line
18.0	120	2 Voltage Transformers	Line-to-Line
21.0	120	1 Voltage Transformer	Line-to-Line
21.0	120	2 Voltage Transformers	Line-to-Line
24.0	120	1 Voltage Transformer	Line-to-Line
24.0	120	2 Voltage Transformers	Line-to-Line
27.0	120	1 Voltage Transformer	Line-to-Line
27.0	120	2 Voltage Transformers	Line-to-Line
10.8	120	1 Voltage Transformer	Line-to-Ground
10.8	120	2 Voltage Transformers	Line-to-Ground
10.8	120	3 Voltage Transformers	Line-to-Ground
12.0	120	1 Voltage Transformer	Line-to-Ground
12.0	120	2 Voltage Transformers	Line-to-Ground
12.0	120	3 Voltage Transformers	Line-to-Ground
14.4	120	1 Voltage Transformer	Line-to-Ground
14.4	120	2 Voltage Transformers	Line-to-Ground
14.4	120	3 Voltage Transformers	Line-to-Ground
15.6	120	1 Voltage Transformer	Line-to-Ground
15.6	120	2 Voltage Transformers	Line-to-Ground
15.6	120	3 Voltage Transformers	Line-to-Ground

### FUSE DRAWERS

Fuse Maximum Voltage (kV)	Fuse Size	Quantity
38.0	0.5E	1 Fuse
38.0	0.5E	2 Fuses
38.0	0.5E	3 Fuses
25.5	1.0E or 0.5E	1 Fuse
25.5	1.0E or 0.5E	2 Fuses
25.5	1.0E or 0.5E	3 Fuses
24/36	3.15	1 Fuse
24/36	3.15	2 Fuses
24/36	3.15	3 Fuses

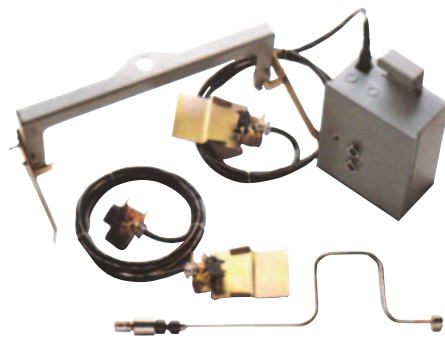
## 5. and 6. Fuse Drawers

The drawers are supplied fully assembled including fuse holder assembly, interlock handles, movable primary disconnecting contact assemblies, and live parts hardware. (Fuses are not included.)



# Tools and Accessories

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## 1. Optional Accessories

(Clockwise): lifting yoke, test cabinet, spin-free levering crank, and test jumper.

## 2. Portable Lifter

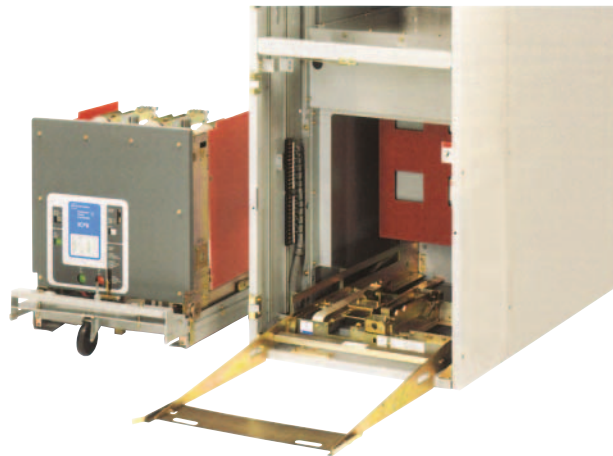
The optional portable lifter is used to lift the breaker from or onto the extension rails.

Eaton provides several standard and optional accessories including equipment used to transport the breaker and lift and lever it into a compartment, as well as a manually operated ground and test device.

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## 3. Easy Transport

A dockable dolly for transporting the lower breaker to or from the lower compartment.

A roll-off-the-floor ramp is used to move the lower breaker from the floor to the bottom compartment.

## 4. Standard Accessories

(Top to bottom): manual charging handle, left and right removable extension rails, rail clamps, and levering crank.

# 27 kV Medium Voltage Breaker Rating Chart

- 1 CESI tested to applicable ANSI Standards C37.04, C37.09 and C37.06. Consult Eaton for CESI copies of test reports on file. Operating Duty Cycle CO-15 seconds-CO. Operating Time Values: Opening 33 – 55 ms, Closing 50 – 60 ms and reclosing 18 cycles (300 ms).
- 2 Tested at 28.5 kV.
- 3  $K=1.0$ , therefore  $E = E/K$  and  $I = KI$ .
- 4 Also maximum interrupting rating and short-time current rating.
- 5 Duration of short-time current = 3 seconds, except as noted in 7, 8 and 9.
- 6 Optional interrupting time of 50 ms (3 cycles) is available.
- 7 Duration of short-time current = 2.5 seconds.
- 8 Duration of short-time current = 1.6 seconds.
- 9 Duration of short-time current = 1 second.
- 10 For capacitance current switching ratings, refer to SA01301001E.
- 11 CESI certified for rated operating sequence; 0 = 0.3 seconds-CO-15 seconds-CO in accordance with IEC Standard 66056. Consult Eaton for copies of test certificates.

## ANSI STANDARDS 1 — VCP-W VACUUM CIRCUIT BREAKER TYPES RATED ON SYMMETRICAL CURRENT RATING BASIS

IDENTIFICATION	RATED VALUES											TRANSIENT RECOVERY VOLTAGE		CURRENT VALUES		WEIGHT
	VOLTAGE		INSULATION LEVEL			CURRENT			CURRENT VALUES			E <sub>2</sub> kV PEAK	T <sub>2</sub> ms	CLOSING AND LATCHING CAPABILITY kA PEAK	CAPACITOR SWITCHING CABLE CHARGING AMPERES	
CIRCUIT BREAKER TYPE	NOMINAL VOLTAGE CLASS	NOMINAL 3-PHASE MVA CLASS	MAXIMUM VOLTAGE — E	VOLTAGE RANGE FACTOR — K	POWER FREQUENCY (1 MINUTE)	IMPULSE	CONTINUOUS CURRENT AT 60 Hz	SHORT CIRCUIT CURRENT (AT RATED MAXIMUM kV)	INTERRUPTING TIME	MAXIMUM PERMISSIBLE TRIPPING DELAY — Y						
	kV	MVA	kV RMS		kV RMS	kV PEAK	AMPERES	kA RMS	MS (CY)	SECONDS	kV PEAK	ms	kA PEAK	AMPERES	LBS.	
270VCP-W16 (750 MVA)	27	750	27 2	1.0	60	125	600	16	83 (5) 6	2	51	105	43	31.5	460	
	27	750	27 2	1.0	60	125	1200	16	83 (5) 6	2	51	105	43	31.5	480	
	27	750	27 2	1.0	60	125	2000	16	83 (5) 6	2	51	105	43	31.5	500	
270VCP-W22 (1000 MVA)	27	1000	27 2	1.0	60	125	600	22	83 (5) 6	2	51	105	60	31.5	460	
	27	1000	27 2	1.0	60	125	1200	22	83 (5) 6	2	51	105	60	31.5	480	
	27	1000	27 2	1.0	60	125	2000	22	83 (5) 6	2	51	105	60	31.5	500	
270VCP-W25 (1250 MVA)	27	1250	27 2	1.0	60	125	600	25	83 (5) 6	2	51	105	68	31.5	460	
	27	1250	27 2	1.0	60	125	1200	25	83 (5) 6	2	51	105	68	31.5	480	
	27	1250	27 2	1.0	60	125	2000	25	83 (5) 6	2	51	105	68	31.5	500	
270VCP-W32 (1600 MVA)	27	1600	27 2	1.0	60	125	1200	31.5	83 (5) 6	2	51	105	85	31.5	545	
	27	1600	27 2	1.0	60	125	2000	31.5	83 (5) 6	2	51	105	85	31.5	560	
270VCP-W40 (2000 MVA)	27	2000	27 2	1.0	60	125	1200	40	83 (5) 6	2	51	105	106	31.5	545	
	27	2000	27 2	1.0	60	125	2000	40	83 (5) 6	2	51	105	106	31.5	600	
270VCP-W25C	27	—	27	1.0	60	125	1200	25 7	50 (3)	2.5	50	50	85	31.5 10	545	
	27	—	27	1.0	60	125	1600	25 7	50 (3)	2.5	50	50	85	31.5 10	560	
270VCP-W32C	27	—	27	1.0	60	125	1200	31.5 8	50 (3)	1.6	50	50	100	31.5 10	545	
	27	—	27	1.0	60	125	1600	31.5 8	50 (3)	1.6	50	50	100	31.5 10	560	
270VCP-W40C	27	—	27	1.0	60	125	1200	40 9	50 (3)	1.0	50	50	112	31.5 10	545	
	27	—	27	1.0	60	125	1600	40 9	50 (3)	1.0	50	50	112	31.5 10	560	

## IEC STANDARDS 11 — VCP-W CIRCUIT BREAKER TYPES RATED ON SYMMETRICAL CURRENT RATING BASIS

IDENTIFICATION	RATED VALUES											TRANSIENT RECOVERY VOLTAGE		WEIGHT
	VOLTAGE		INSULATION LEVEL			NORMAL CURRENT	SHORT CIRCUIT BREAKING CURRENT	TRANSIENT RECOVERY VOLTAGE			SHORT TIME (3 SECONDS) CURRENT	SHORT CIRCUIT MAKING CURRENT	CABLE CHARGING BREAKING CURRENT	
CIRCUIT BREAKER TYPE	kV RMS 2	kV RMS	POWER FREQUENCY	LIGHTNING IMPULSE WITH-STAND	AMPERES			kA RMS	U <sub>c</sub>	T <sub>3</sub>				T <sub>D</sub>
	kV	RMS	kV	kV PEAK			kV CREST	μS	μS					
240VCP-W16	24	60	125	630	16	41	88	13	16	40	31.5	210		
	24	60	125	1250	16	41	88	13	16	40	31.5	220		
	24	60	125	2000	16	41	88	13	16	40	31.5	230		
240VCP-W20	24	60	125	630	20	41	88	13	20	50	31.5	210		
	24	60	125	1250	20	41	88	13	20	50	31.5	220		
	24	60	125	2000	20	41	88	13	20	50	31.5	230		
240VCP-W25	24	60	125	630	25	41	88	13	25	63	31.5	210		
	24	60	125	1250	25	41	88	13	25	63	31.5	220		
	24	60	125	2000	25	41	88	13	25	63	31.5	230		

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