Network Protector
Catalog Data
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New Issue

VisoVac™ padmount fault interrupter

General

The medium voltage padmount vacuum fault interrupter from Eaton delivers economical, reliable and flexible solutions for your underground distribution applications. Eaton's VisoVac is a three-phase, padmounted switchgear with high-fault interrupting capability. It includes vacuum interruption with visible isolation and visible grounding. Electrical insulation medium is air (no oil or gas required). VisoVac is available in standard and custom ordered configurations suited to meet the unique requirements of your system's needs.

VisoVac padmounted switchgear utilizes proven legacy vacuum fault interrupting (VFI) breaker technology that provides higher interrupting ratings and higher operations to meet your application needs. VisoVac padmount switchgear is designed and manufactured in accordance with IEEE Std C37.74-2014, IEEE Std C37.04 and IEEE C37.09 standards. This innovative vacuum interrupting device yields operation savings:

- No regular maintenance
- Gas, oil and regulation free
- Advanced Eaton vacuum proven breaker technology
- Robust, all-in-one design reduces need for extra equipment
- Manual and remote operation capable
- 10,000 mechanical operations

Powering Business Worldwide

Features and construction

VisoVac padmount switchgear utilizes a stored-energy spring charged mechanism for OPEN and CLOSE operations. The gear comes standard with a spring charging motor on all VFI-ways with optional spring charge motors for all switched-ways. VisoVac also comes standard with a manual spring charge handle that allows for dead-start closing with out the need for control power. Each way comes with OPEN and CLOSE pushbutton controls and spring charge indication.

The switchgear is available with visible isolation and visible grounding capability. These features are mechanically interlocked internally.

The switchgear is available in the most commonly used ac and dc voltages for control power and comes pre-wired to reduce on-site field install time.

V3 Series visible isolation

A three-pole, group-operated, non-load break, air insulated, isolation switch is included internal to the enclosure. This feature also includes a viewing window to confirm a physical disconnect between the switchgear and underground cable.

A mimic diagram physically linked to the operating mechanism shows exactly what position the isolation switch is in. The isolation switch is mechanically interlocked internally with the vacuum interrupting mechansim.

The isolation switch is also mechanically interlocked internally with the grounding switch to prevent the grounding switch from being operated while the isolation switch is in the CLOSED position

Figure 1. V3 Series front viewing window

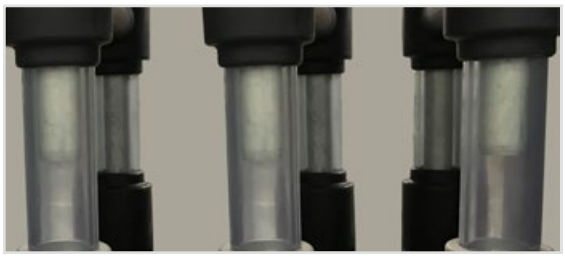


Figure 2. V3 Series front mimic diagram

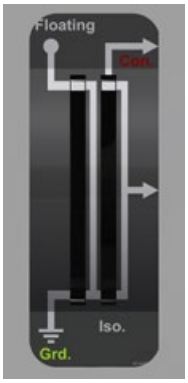
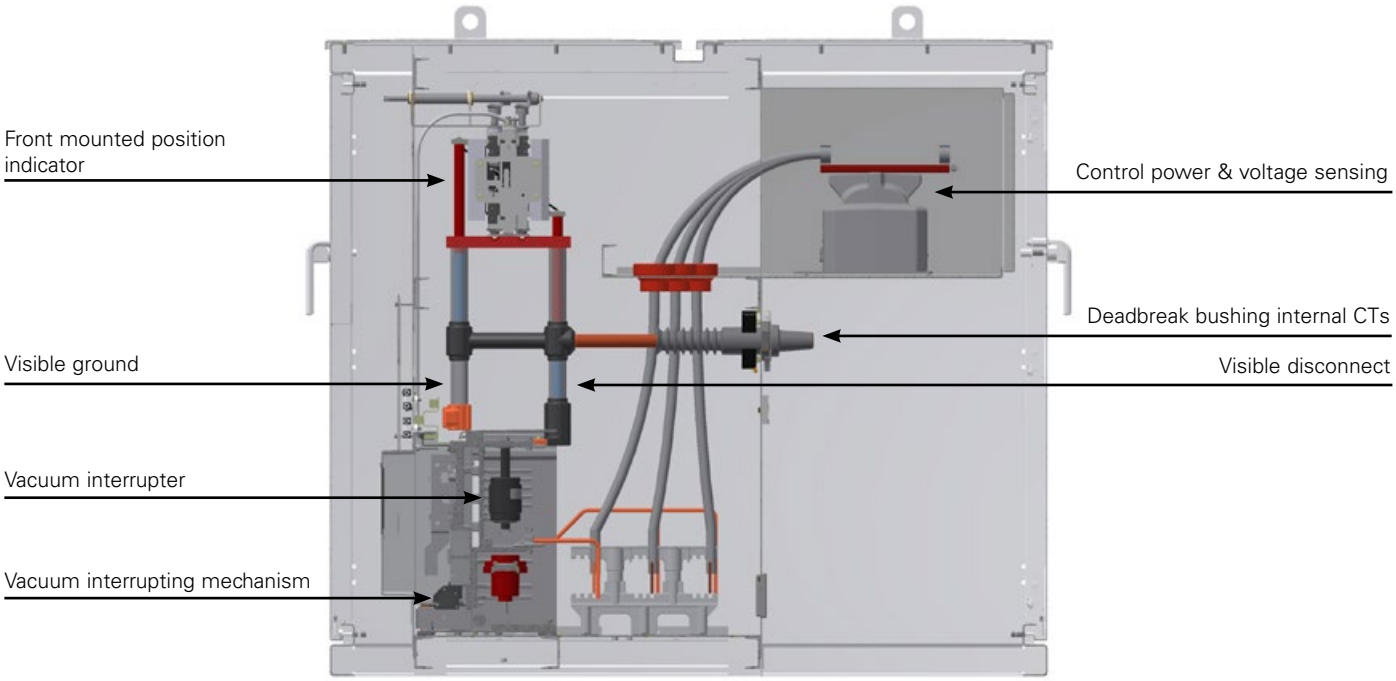


Figure 3. V3 Series VisoVac internal layout



V3 Series visible grounding

A three-pole, group-operated grounding switch is included internal to the enclosure. This feature also includes a viewing window to confirm a physical ground connected to the underground cable.

The grounding switch is equipped with mechanical interlocks located internal to the enclosure to prevent operation of the grounding switch while the visible isolation switch is in the CLOSED position.

A mimic diagram physically linked to the operating mechanism shows exactly what position the grounding switch is in.

Vacuum interruption

VisoVac fault interrupter's vacuum interrupting mechanism utilizes proven Eaton technology which allows for an exceptional 25 kA or 40 kA interrupting rating. Eaton's environmentally friendly medium voltage interrupters are capable of reliably switching highstress currents robustly and carrying their rated continuous current without forced cooling.

The interrupting mechanism was designed for applications where space is a premium such as padmount environments. The load break mechanism is available with up-to a 900 A continuous current rating and comes with a mechanical endurance of 10,000 operations.

The three-phase vacuum interrupter can be opened manually or remotely via SCADA, protective relaying or pendant. The vacuum interrupter is equipped with a mechanical indicator and nonreset-table operations counter. Eaton vacuum interrupters are the industry standard in quality.

- Each Eaton vacuum interrupter is tested throughout the manufacturing process and once again before packaging
- A dielectric withstand test and a vacuum assurance test are performed on every interrupter
- Additionally, Eaton also incorporates a sequential bar code that allows us to track material lots, as well as the operators involved with building each interrupter in a database
- With well over three million Eaton vacuum interrupters in service around the world, our customers testify that our vacuum interrupters are one of the most critical and reliable components

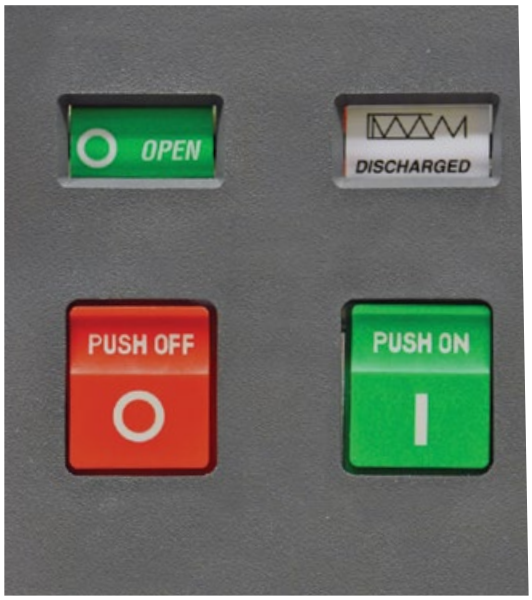
Spring charge mechanism

VisoVac utilizes legacy Eaton vacuum breaker fault interruption technology. Each VFI way comes standard with a spring charge motor operator located internal to the gear.

When springs are fully charged the switch is capable of an O-C-O operation via the pushbutton control without the need for control power. The gear also includes an integral manual charging handle to allow recharging the stored energy mechanism if power is lost and springs are discharged. The manual spring charge handle is front plate mounted and easily accessible without the need for any tools.

Figure 4. Vacuum interrupter status indicator. Left image shows status indicator in the closed position, the image on the right shows the status indicator in the open position.

Charged Display

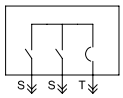
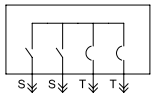
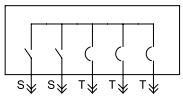
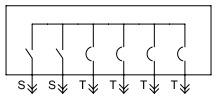


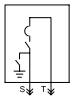
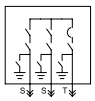
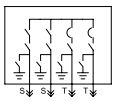
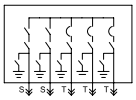
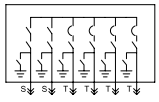
Ratings and specifications

Table 1. General Specifications

Feature	25 kA	40 kA
Rated Maximum Voltage, 50/60 Hz		
Maximum Design Voltage, kV	15.5/17.5	15.5/17.5
Impulse Withstand Voltage		
Line to ground (kV BIL)	95	95
Open Contact (kV BIL)	95	95
Withstand Voltage, 60 Hz		
1 min withstand, ac kV	35	35
5 min withstand, dc kV	53	53
Continuous Current, 50/60 Hz (A)	600/900	600/900
Load Break Current, 50/60 Hz (A)	600/900	600/900
Momentary Withstand (asym pk.)	65	104
1s sym withstand rating, kA	25	40
Sym interrupting rating, kA	25	40
Fault Close (asym pk.)	65	104
5s withstand in ground position, kA	15	15
0.2 withstand in ground position, kA	45	45
Mechanical Operations	10,000	10,000

Eaton standard control front/cable rear padmount offerings

[1]V1 Series	One line diagram	Nominal voltage (kV)	Style code*
MODEL 5-V1		15kV	VP5162201X5T
MODEL 6-V1		15kV	VP5162221X5T
MODEL 9-V1		15kV	VP5162222X5T
MODEL 5W2-V1		15kV	VP5162223X5T
MODEL 6W2-V1		15kV	VP5162224X5T

[2]V3 Series	One line diagram	Nominal voltage (kV)	Style code*
MODEL 5-V3		15kV	VP5162201Y5T
MODEL 6-V3		15kV	VP5162221Y5T
MODEL 9-V3		15kV	VP5162222Y5T
MODEL 5W2-V3		15kV	VP5162223Y5T
MODEL 6W2-V3		15kV	VP5162224Y5T

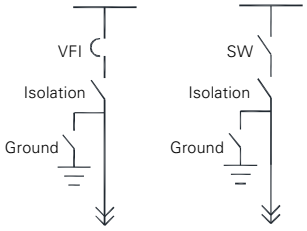
S–Source
T–Tap
SW–Switched-ways (loadbreak)
VFI–Vacuum Fault Interrupting Ways

Product details

[1]V1 Series models provided with vacuum fault interruption and switching

[2]V3 Series models provided with vacuum fault interruption, switching, visible isolation and visible ground

Location of visible isolation and ground on V3 Series models.



Control front/cable rear models are designed with control access and switch operators on the front with cable terminations in the rear. Available in V1 and V3 Series.

Double-sided models are designed with control access, switch operators, and cable terminations on the front with the same configuration in the rear. Only available in V1 Series, consult your local Eaton representative for details.

Single-sided models are designed with control access, switch terminations and cable terminations on the front with no access in the rear. Only available in V1 Series, consult your local Eaton representative for details.

*Style code examples listed include the following standard VisoVac features:

- All models are control front/cable rear and dead-front
- Padmount enclosures are painted Munsell Green 7.0GY3.29/1.5
- All VFI-Ways include Eaton Digitrip 1150V and Eaton current sensors
- All Ways include stored energy operation and include a spring charge motor. Capable of remote operation without the need of additional motor operators.
- All Ways are rated 600A continuous with 25kA sym RMS fault interruption and withstand capability
- One internal CPT provided for 120VAC control power

Applications

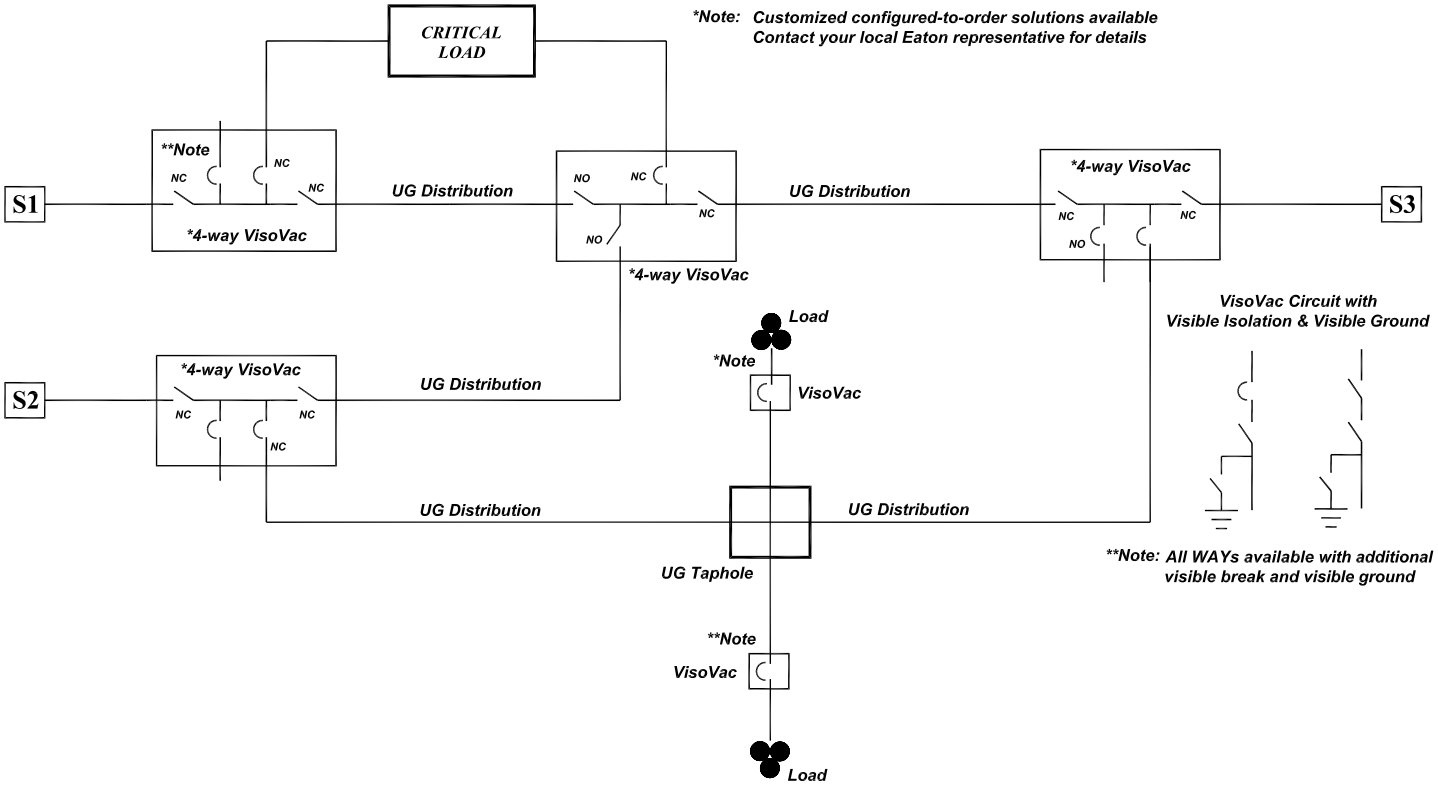
Underground distribution sectionalizing

VisoVac fault interrupters are an ideal solution for underground distribution sectionalizing. VisoVac fault interrupters can be installed to provide local isolation and three-phase overcurrent protection for radial loads. Alternatively, VisoVac fault interrupters can be used for single-ways or up to six-way switching configurations with or without the visible isolation and visible grounding. Utilizing Eaton's configured-to-order services, a solution can be designed to tailor fit the end user's requirements. VisoVac fault interrupters can be placed inside an enclosure for pad-mounted applications. Enclosures conform to the security requirements of IEEE Std C57.12.28™-2005 standard.

VisoVac fault interrupters are also available with an Eaton Digitrip controller that allows for unique control settings, overcurrent protection and the ability to communicate with utility feeder automation systems such as Eaton's Cooper Power™ series Yukon™ Feeder Automation platform.

Consult your local Eaton representative for more information.

Figure 9. Underground distribution sectionalizing applications



Accessories

Automatic transfer control

Eaton's ATC-900 brings intelligence, adaptability, supervisory and programming capabilities to automatic transfer switch equipment.

Extreme reliability makes the ATC-900 ideal for mission critical applications where VisoVac is used for auto transfer switching. Typically used for utility-to-utility, utility-to-generator, generator-to-generator and three source transfer systems, the ATC-900 can address virtually any system requirements.

Ease-of-use is a major benefit of the ATC-900 controller. With a simple, powerful user interface, many intuitive operating features are included. LED indications and a TFT based color display provide high visibility. Simple arrow keys are used for quick screen navigation. No codes or abbreviations are used to avoid potential confusion and/or slow operation, and data screens are grouped for ease of viewing and edits.

The ATC-900 is available in one standard model that offers a variety of monitoring and control features such as selective and automatic load shedding, remote load testing, and event logging/ recording. Flexibility is another important benefit, allowing field configurability and expandability in the future with add-on accessory modules and hardware.

The ATC-900 is available with Open (break-before-make) and Close (make-before-break) transition switching. For more information please reference Eaton ATC-900 Instruction Bulletin - IB140012EN.

Figure 10. Automatic transfer control interface

Digitrip 1150 V controller

Eaton's Digitrip 1150 V is used for advanced current and voltage protections, metering and communication functions.

The Digitrip 1150V comes standard with energy harvesting overcurrent protection capability, during the loss of power or voltage sag from a fault the Digitrip can use the energy of the fault to maintain protection and initiate a trip in the absence of control power.

The controller continuously analyzes secondary current signals from the current sensors and when preset current levels and time delay settings are exceeded, sends a trip signal to the trip actuator of the vacuum interrupter. The trip actuator causes tripping of the vacuum interrupter by providing the required mechanical force for tripping.

The trip actuator is automatically reset each time the vacuum interrupter opens. The current sensors, controller and vacuum interrupter are fully tested as a system for time-over-current response over the entire current range up to the interrupting rating of the vacuum interrupter.

The Digitrip 1150V trip unit can provide the following protection and metering functions:

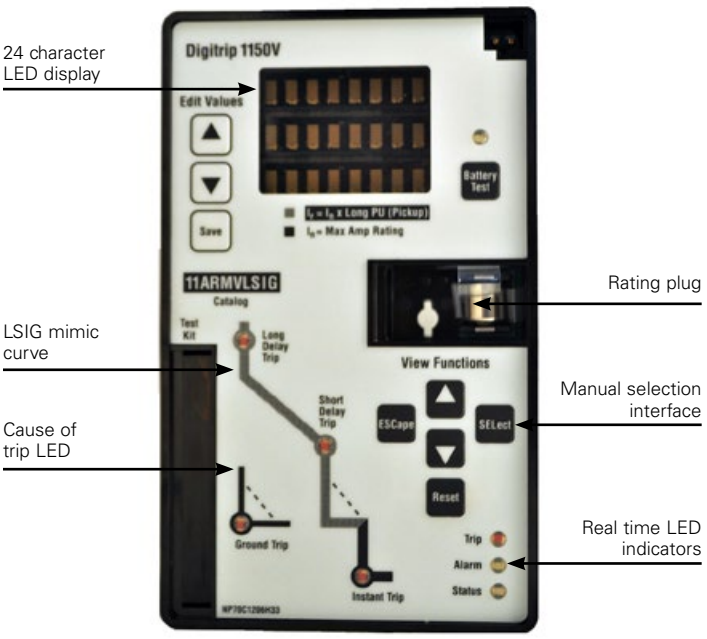
51 – Phase Long Delay	50T – Phase Short Delay
50 – Phase Instantaneous	51/50G – Ground Fault
37 – Phase Loss (Current Based)	46 – Current Unbalance
27 – Undervoltage	59 – Overvoltage
81U – Underfrequency	81O – Overfrequency
47 – Voltage Unbalance	32 – Reverse Power

Thermal Memory – analyses the thermal loading of VFI Metering - I, V, kVA, kVAR, kW, THD, PF *Voltage sensors required for power and voltage related functions

Eaton CH-Type current sensors are provided on Ways using the Digitrip 1150V. CH-Type sensors come standard with 1A secondaries and are available with the following primary current ratings: 100A, 200A, 300A, 400A, 600A, 800A & 1000A.

For more information please reference Eaton Digitrip 1150V Instruction Bulletin - I.L. 66A7535H02

Figure 11. Digitrip 1150 V controller



Arc reduction maintenance system (ARMS)

Eaton's Arcflash Reduction Maintenance System technology is based on the realization that when working on energized electrical equipment, a fault that occurs within the gear or downstream needs to be cleared as quickly as possible. While this seems obvious, in actual installations, intentional delays are included in upstream devices to ensure selective coordination with downstream devices. This means that if a fault were to occur inside the equipment the downstream breaker may never clear the fault regardless of how much delay is or isn't programmed in the upstream device. While other Eaton arcflash technologies are available, the Arcflash Reduction Maintenance System comes standard with the Digitrip 1150V. This patented technique provides "faster than instantaneous" clearing times. When the Arcflash Reduction Maintenance System is enabled, the internal digital logic is bypassed by a "faster than instantaneous" analog trip circuit based on user preset values. In this mode, the Digitrip is set to hair trigger and issues subcycle tripping. Total clear is estimated within 4 cycles. When properly used, PPE requirements can be considerably reduced.

Communications module

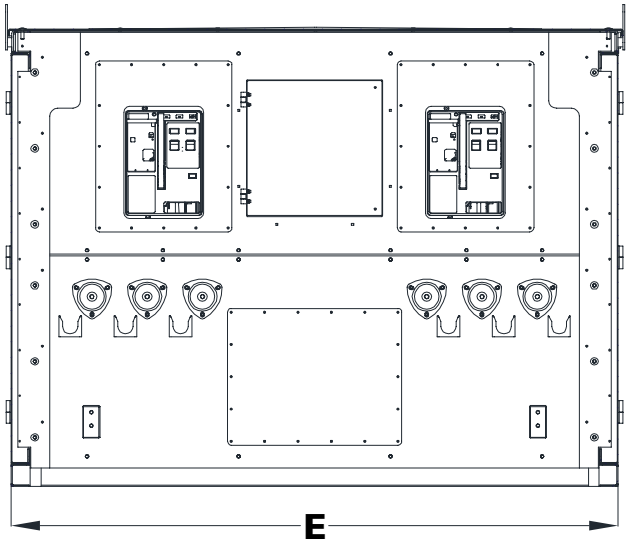
A communications module is used for remote and secure access to view or change the Digitrip settings, remote control of the VisoVac fault interrupter and gain status of the vacuum interrupter, isolation and grounding positions.

The communications module provides easy to configure data communications with seamless integration into the user's central control system. Supports secure DNP3 and INCOM protocols.

Configured-to-order protection and control options

Eaton can provide a customized protection and control package configured to meet each user's unique application requirements. Protective relays like Eaton's Cooper Power series Edison™ Idea™ relay, relays from Schweitzer Engineering Laboratories or General Electric, or other suppliers can be designed and come ready to install. Please consult factory for details.

Dimensions V1 Series double-sided



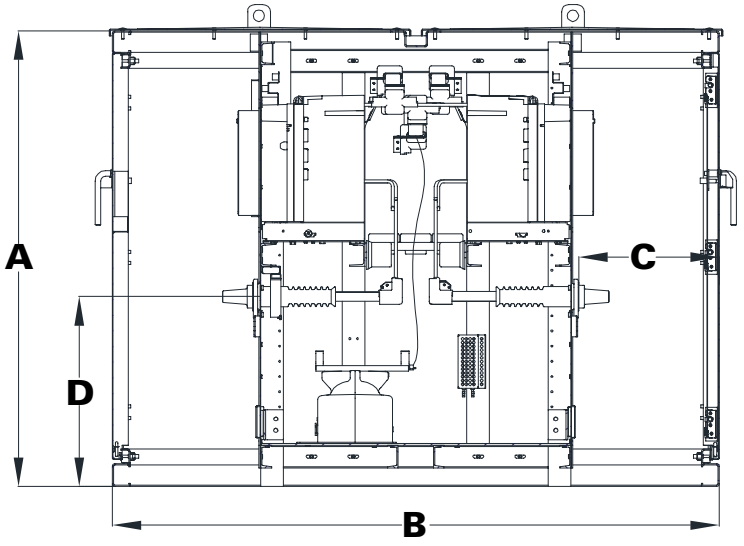
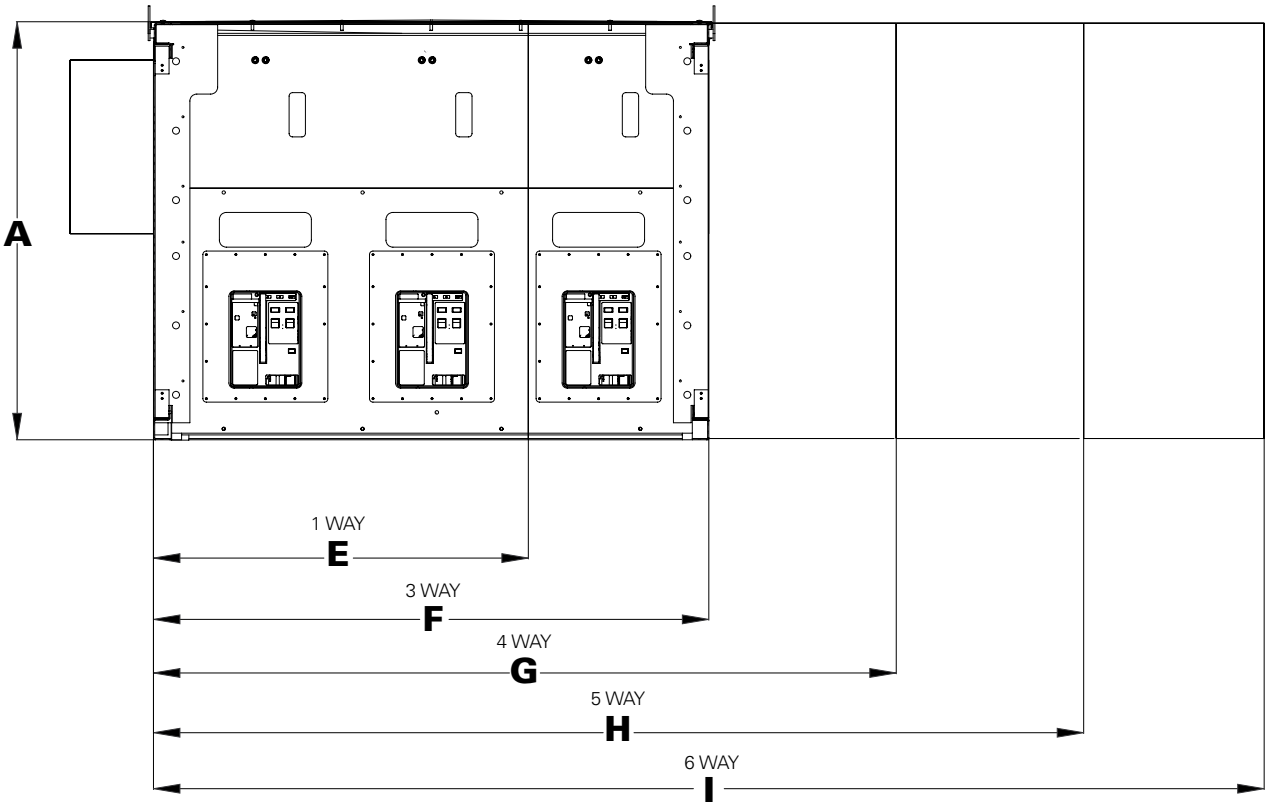


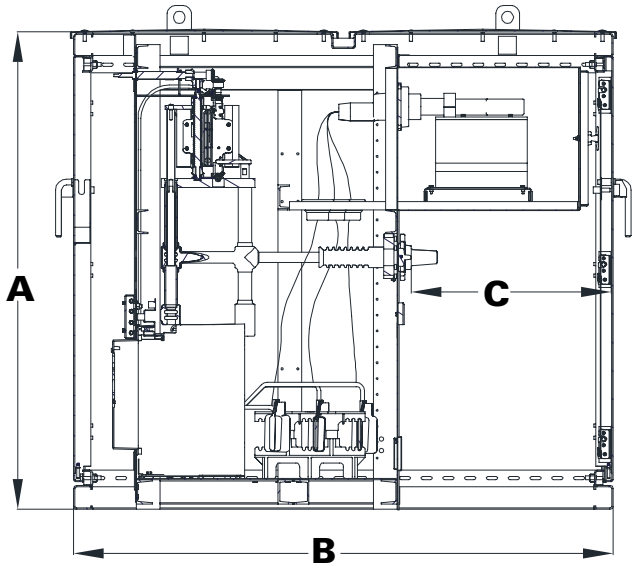
Table 2. Dimensional information

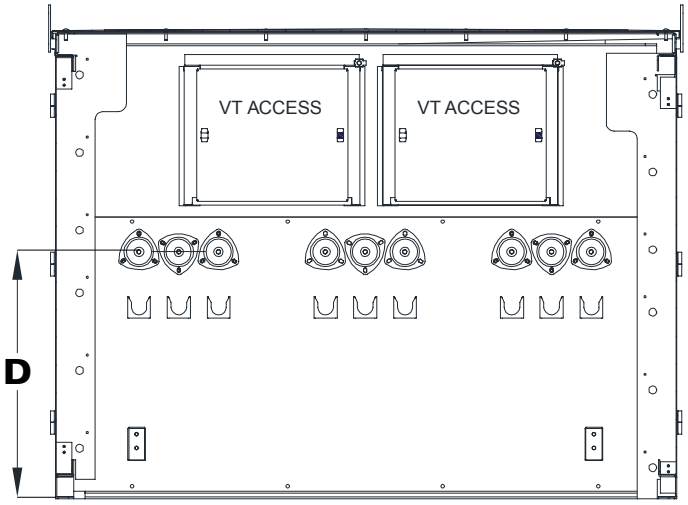
Style	kAIC	A	B	C	D	E
1 way	25kA	60″	80″	18.5″	25″	80″
	40kA	65″	80″	18.5″	25″	80″
3 way	25kA	60″	80″	18.5″	25″	80″
	40kA	65″	80″	18.5″	25″	80″
4 way	25kA	60″	80″	18.5″	25″	80″
	40kA	65″	80″	18.5″	25″	80″
5 way	25kA	60″	80″	18.5″	25″	80″
	40kA	65″	80″	18.5″	25″	80″
*6 way	25kA	60″	80″	18.5″	25″	80″
	40kA	65″	80″	18.5″	25″	80″

*Dimensions subject to change based on control power requirements

Dimensions V3 Series control front/cable rear







Note: V1 Series control front/cable rear models have the same dimensions as V3 Series control front/cable rear models

Table 3. Dimensional information

Style	kAIC	A	B	C	D	E	F	G	H	I
1 way	25kA	60″	68″	25″	32″	54″	–	–	–	–
	40kA	65″	68″	25″	32″	56″	–	–	–	–
3 way	25kA	60″	68″	25″	32″	–	80″	–	–	–
	40kA	65″	68″	25″	32″	–	80″	–	–	–
4 way	25kA	60″	68″	25″	32″	–	–	107″	–	–
	40kA	65″	68″	25″	32″	–	–	107″	–	–
5 way	25kA	60″	68″	25″	32″	–	–	–	128″	–
	40kA	65″	68″	25″	32″	–	–	–	128″	–
6 way	25kA	60″	68″	25″	32″	–	–	–	–	149″
	40kA	65″	68″	25″	32″	–	–	–	–	149″

Table 4. Ordering information

Style code[1]

VisoVac	Voltage Rating		Voltage Impulse rating		Continous current rating		Fault withstand rating		Enclosure color		Switched ways[2]		VFI-ways[2]		Visble isolation/ ground Series–model[3]		Control voltage			Accessories[5]
VP	5	15kV	1	95kV	6	600A	2	25kA	1	ANSI 70 - Gray	0	N/A	1	one	Y	Required V3–control front/ cable rear	1	24 VDC	A	ATC-900 automatic transfer control
	7	17.5kV			9	900A	4	40kA	2	Munsell Green 7.0GY3.29/1.5	1	one	2	two	X	N/A V1–control front/ cable rear	2	48 VDC	C	Communication module
											2	two	3	three	W	N/A V1–double-sided	3	110 VDC	T	Control power transformer
											3	three	4	four	V	N/A V1–single-sided	4	125 VDC	Z	Customized relay panel[6]
											4	four	5	five			5	120 VAC	V	Voltage sensing
													6	six			6	220 VAC	X	None
																	7	240 VAC		

Notes:

1. Style Code for general reference only, consult factory with specific application requirements
2. Single and Multi-way options available in different arrangements, consult factory with specific application requirements
3. V3 Series are only available in control front/cable rear models; V1 Series are available in control front/cable rear, double-sided and single-sided models. Consult factory for V1 single-sided model dimensions.
4. Switched ways available with mechanical interlocking used for Open Transition (break-before-make) applications.
5. Eaton Digitrip 1150V provided on all VFI-Ways as standard unless a customized relay panel is specified. Eaton current sensors required with Digitrip.
6. Consult factory with application requirements for customized relay panels

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