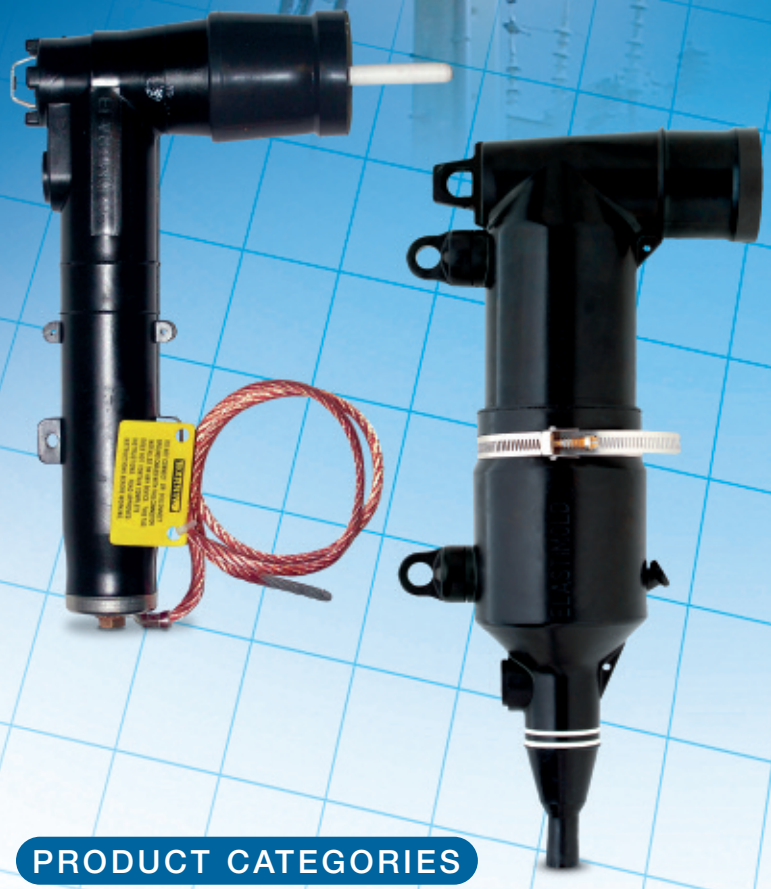
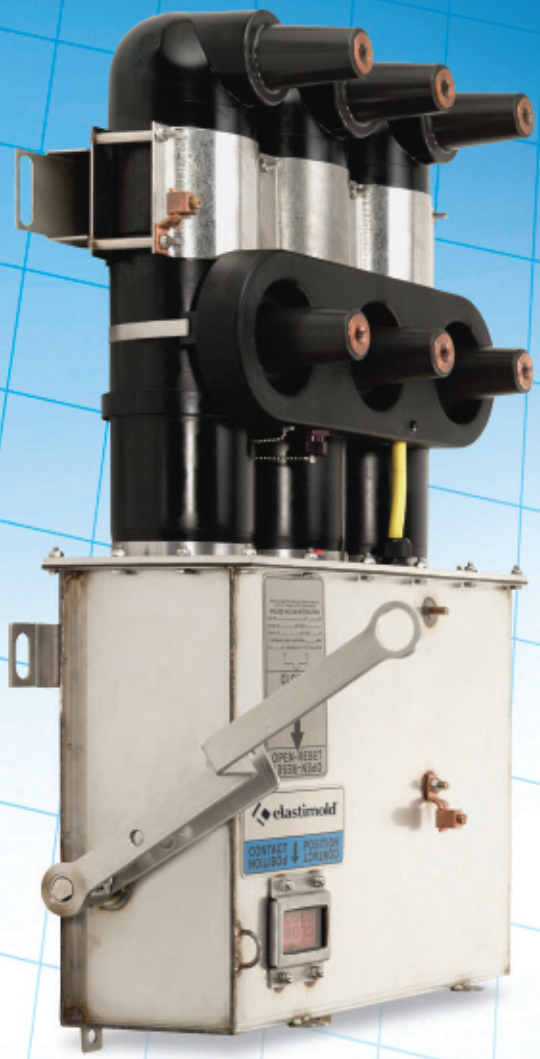
elastimold®

PRODUCT SELECTION GUIDE





PRODUCT CATEGORIES

- Underground Distribution Switchgear
- Molded Fuse Products
- Surge Arresters

Thomas&Betts

utility.tnb.com

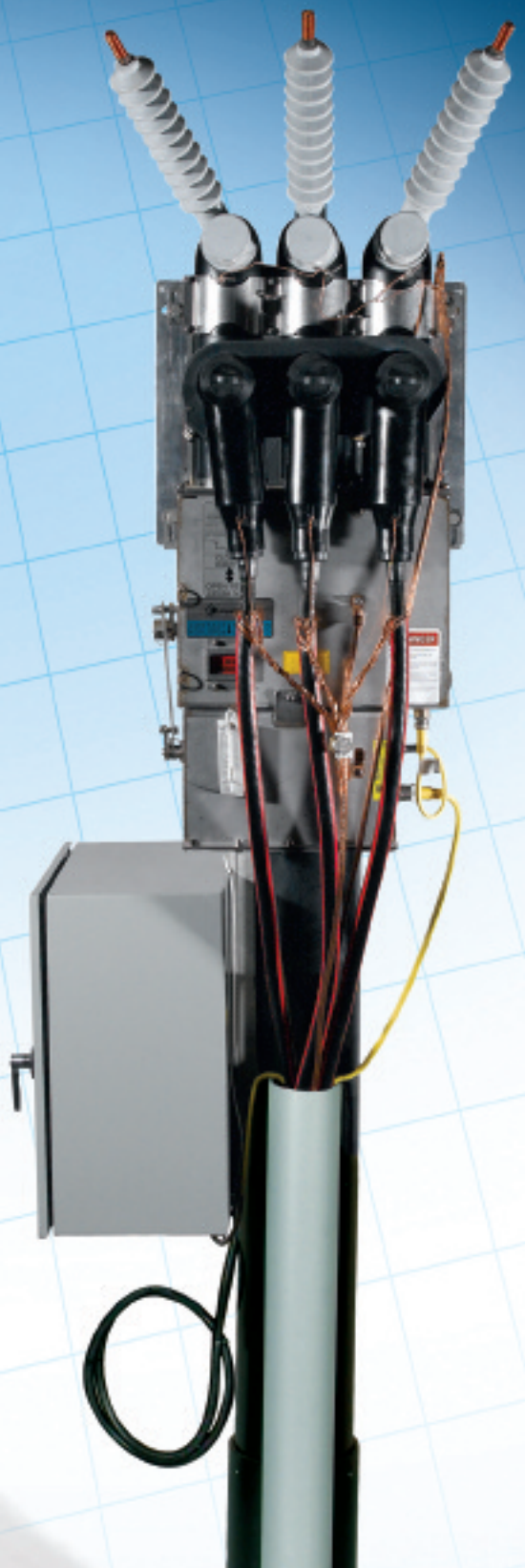
elastimold®

Underground Distribution Switchgear

Molded Fuse Products

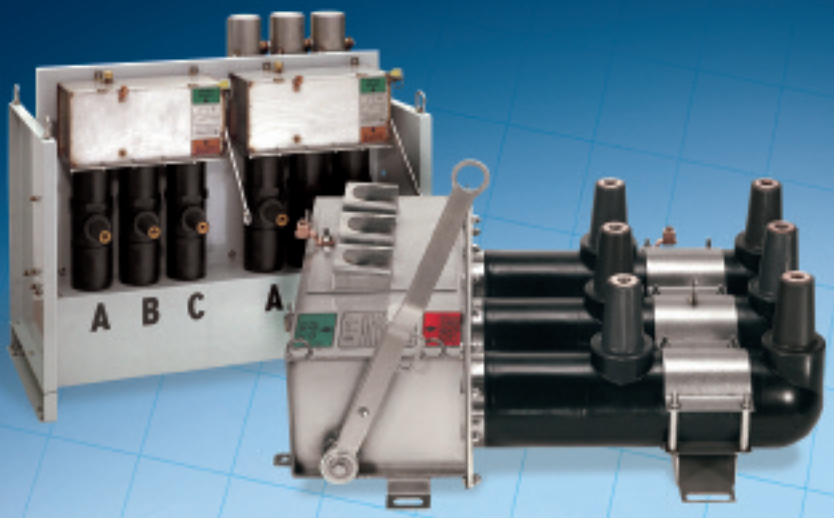
Surge Arresters

Quality components that help reduce the frequency and duration of downtime.



Thomas & Betts' Elastimold® brand is the worldwide recognized leader in premolded cable accessory components, providing innovative connector designs as well as vacuum switches and interrupters, arresters and fused elbows.

elastimold®



QUICK REFERENCE

Elastimold® Underground Distribution Switchgear

page(s)

elastimold®

Reduce power interruptions with underground distribution switchgear.

Downtime — you know it's going to happen. But with Elastimold® Switchgear, you can help decrease the duration and frequency of outages and fluctuating line conditions. Choose from a wide variety of products for switching, sectionalizing, source transfer and overcurrent protection — so you can keep the power flowing.

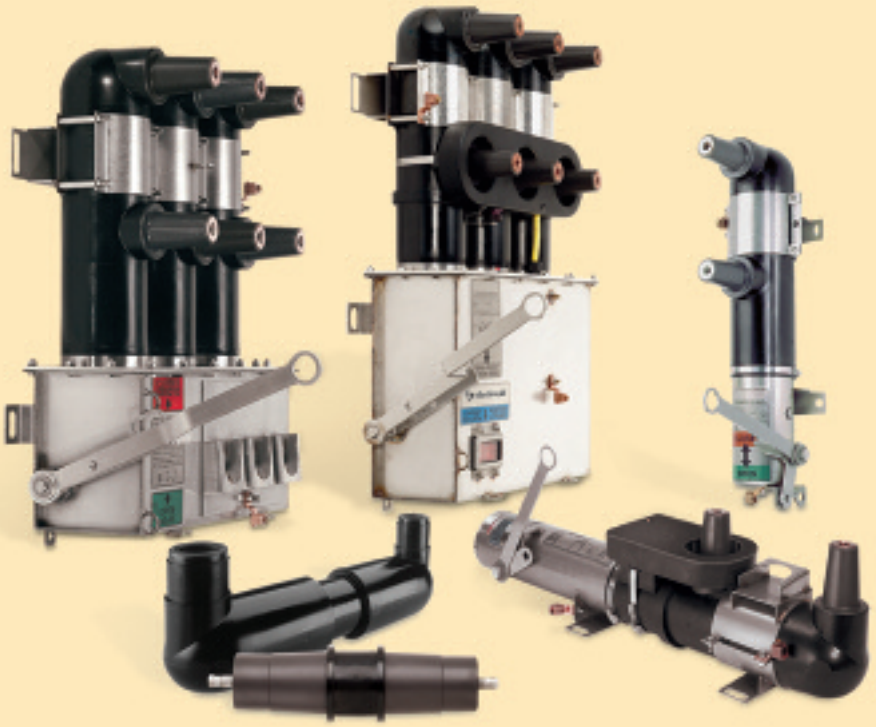
Use Switchgear Building Blocks to create standard configurations and custom designs that improve your distribution system's reliability.

Whether it is a standard or a custom application, Thomas & Betts has the right combination of components and expertise to fit your needs. The modularity and flexibility of Elastimold® Switchgear enable the user to combine the different individual components into products that improve the reliability and performance of distribution systems.

Three basic components form the basis of Elastimold® Switchgear:

- **Single-Phase and Three-Phase Molded Vacuum Switches (MVS)**
- **Single-Phase and Three-Phase Molded Vacuum Interrupters (MVI)**
- **Current-Limiting Fuses**

These components — combined with electronic controls, motor operators and SCADA-ready controls — make the building blocks of Elastimold® Switchgear.



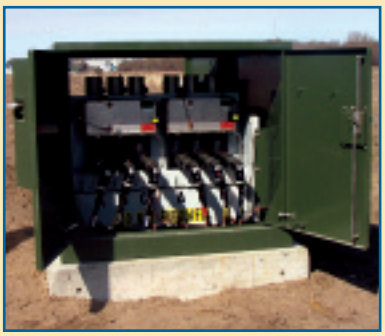
Features	Benefits/Descriptions
EPDM Molded Rubber Construction with Stainless Steel Hardware and Mechanism Boxes	All switchgear components are fully sealed and submersible.
Vacuum Switching and Vacuum Interrupting	Switchgear components are maintenance-free and require no gas or oil.
Deadfront Construction	Insulates, shields and eliminates exposed live parts.
Compact and Lightweight Components	Small footprint enables components to fit in tight padmount, subsurface, vault or riser pole installations.
Non-Position Sensitive	Can be installed almost anywhere and in any position (e.g. hanging from ceilings, wall mounted, mounted at an angle, riser pole mounted).
Modular Construction	Allows for any combination of fused, switched and interrupter ways on one piece of switchgear up to 35kV.
Electronic Controls for Protection and Automatic Source Transfer Applications	With self-powered controls and customized protection curves, you get flexibility of settings and operation in different locations throughout the distribution system.
Motor Operators for Remote/Local Open/ Close Operation of Three-Phase Switched or Interrupter Ways	Enable remote configuration of loops, sectionalizing of feeders and automatic or manual source transfer with a wide variety of RTUs and communication devices.

Configure Switchgear Building Blocks to solve challenges in your distribution system.

Elastimold® Switchgear products are classified in three categories according to the function they perform:

- **Switching and Sectionalizing Equipment**
- **Automatic Source Transfer Equipment**
- **Overcurrent Protection Equipment**

Switchgear products can be used in padmount, subsurface/wet or dry vaults and riser pole installations. The switching or manual sectionalizing of loads can be accomplished with the use of Molded Vacuum Switch (MVS) modules. The simplest manual sectionalizer is a single MVS switch, which can be installed in a vault, on a pole or inside a padmount enclosure. One of the most popular applications of this sectionalizer is as a replacement for existing oil fuse cutouts. Two-, three- and four-way units are also available in vault and padmount styles. Switches also aid in the manual reconfiguration of distribution loops by installing them at the open point in the circuit.


Padmount

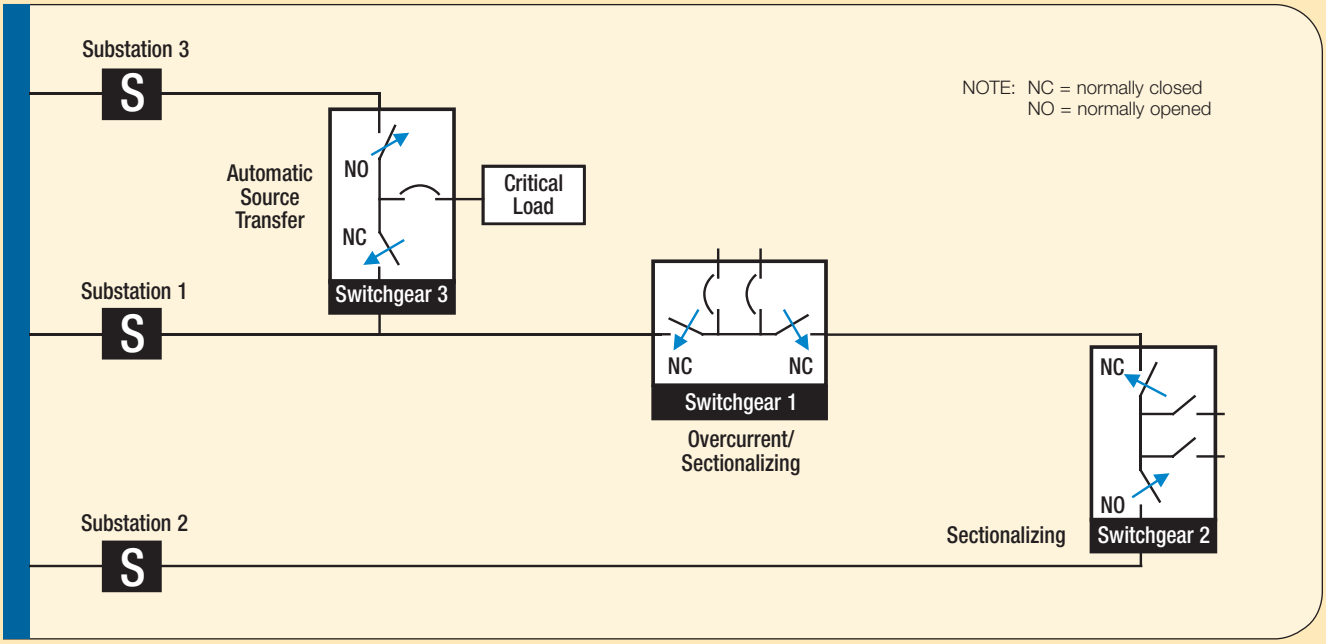

Subsurface


Riser Pole


Vault

Overcurrent protection is accomplished using Molded Canister Fuse (MCAN) or Molded Vacuum Interrupter (MVI) modules. These can be used in combination with MVS modules. The simplest product is a single MVI unit, which can be installed in a vault, on a pole or inside a padmount enclosure. A common application for this configuration is as a replacement for existing oil fuse cutouts. Two-, three- and four-way units are also available in any combination of MVI, MCAN and MVS modules, and in vault and padmount styles. Fuses and interrupters are applied in underground loops to aid in the sectionalizing of the main feeder, and by providing protection to the loads along the loop. For more information on canister fuses, see pages 43–50.

Underground Distribution Switchgear Applications

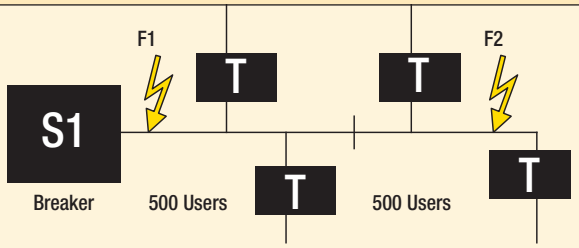


Load switching is required when:

- A load needs to be isolated to perform maintenance
- A load needs to be isolated to repair a fault
- A loop needs to be reconfigured to feed a certain load from a different substation and isolate the faulted portion of the loop

In any case, the use of a manual sectionalizer contributes to reduce the length of time that unfaulted or unaffected portions of the system are exposed to an outage. This results in improved reliability of the system as the duration of outages is reduced (i.e. the SAIDI and CAIDI reliability indices). Switching products can be applied as replacements for existing oil fuse cutouts or as manual sectionalizers for loops or radial feeders. Depending on the application, these sectionalizers may be installed in a vault or inside a padmount enclosure. Pole installations are also available.

Without Manual Sectionalizing

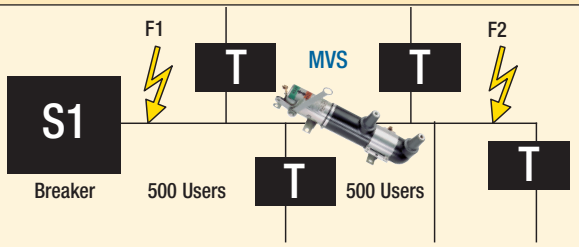


No Manual Sectionalizing Unit
Permanent Faults F1 and F2
Interruption Duration: F1 = 1 hr.; F2 = 2 hr.
Evaluation Period = 1 yr.

SAIDI = [(1 hr.) x (1000) + (2 hr.) x (1000)]/1000 = 3 hr./yr.
SAIFI = [1000 + 1000]/1000 = 2 interruptions/yr.

In this example, a radial feeder is exposed to two failures in one year. Without any manual sectionalizing, all customers are subject to both failures and are out of power until failures are restored. Assuming that the duration of outage one (F1) is 1 hour, and outage 2 (F2) is 2 hours, the calculation of SAIDI shows 3 hours of interruption duration per year.

With MVS Manual Sectionalizing — Improved Reliability!



MVS Manual Sectionalizing Unit = Shorter restoration time for 500 customers
Permanent Faults F1 and F2
Interruption Duration: F1 = 1 hr.; F2 = 2 hr. for 500 users; F2 = 1 hr. for 500 users
Evaluation Period = 1 yr.

SAIDI = [(1 hr.) x (1000) + (1 hr.) x (500) + (2 hr.) x (500)]/1000 = 2.5 hr./yr.
SAIFI = [1000 + 1000]/1000 = 2 interruptions/yr.

With the use of an MVS at the midpoint of the feeder, the restoration time is reduced. Once the fault is located, the MVS is open to isolate the faulted portion of the feeder. At this point, the other half of the feeder can be energized, reducing the outage duration or SAIDI from 3 hours to 2.5 hours per year (16.6%).

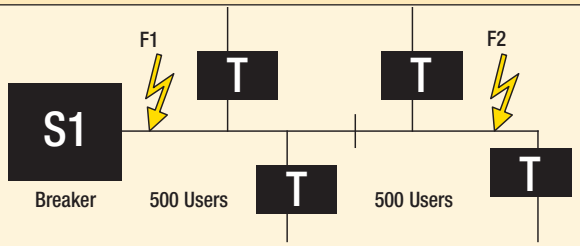
Similar application of MVS switches in loop configurations contribute to significantly reduce the outage duration. In these cases, single- or multi-way switch configurations can be applied.

Fault-interrupting devices are used on:

- Feeders to sectionalize, so that if there is a fault, only a small section of the load is affected
- Radial taps deriving from a main feeder or loop, so that a fault on a tap is isolated from the main circuit
- Network transformers to isolate the devices in case of overcurrent, excessive pressure/temperature, etc.

While a switching device contributes to decrease the duration of outages, fault interrupters contribute to decrease the duration AND frequency of outages (i.e. SAIDI, CAIDI, SAIFI, CAIFI reliability indices).

Without Manual or Automatic Sectionalizing

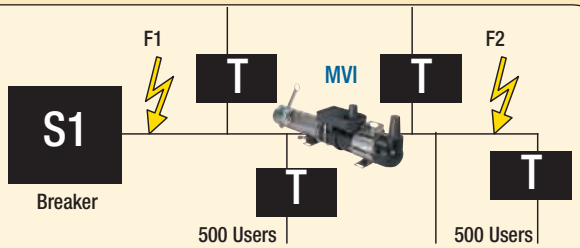


No Automatic Sectionalizing Unit
Permanent Faults F1 and F2
Interruption Duration: F1 = 1 hr.; F2 = 2 hr.
Evaluation Period = 1 yr.

SAIDI = [(1 hr.) x (1000) + (2 hr.) x (1000)]/1000 = 3 hr./yr.
SAIFI = [1000 + 1000]/1000 = 2 interruptions/yr.

In this example, a radial feeder is exposed to two failures in one year. Without any automatic sectionalizing (overcurrent protection), all customers are subject to both failures and are out of power until failures are restored. Assuming that the duration of outage one (F1) is 1 hour, and outage two (F2) is 2 hours, the calculation of SAIDI shows 3 hours of interruption duration per year. The calculation of the frequency of interruptions (SAIFI) shows two interruptions per year.

With MVI Automatic Sectionalizing — Improved Reliability!

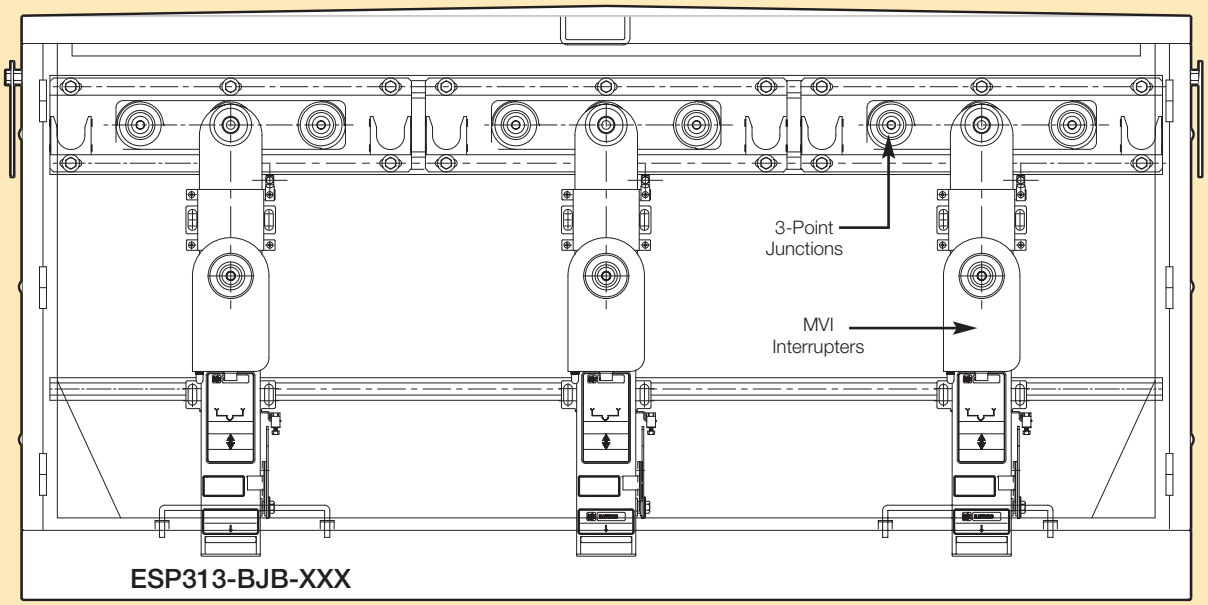


MVI Automatic Sectionalizing Unit = Eliminate one interruption for 500 users
Permanent Faults F1 and F2
Interruption Duration: F1 = 1 hr.; F2 = 2 hr. for 500 users
Evaluation Period = 1 yr.

SAIDI = [(1 hr.) x (1000) + (2 hr.) x (500)]/1000 = 2 hr./yr.
SAIFI = [1000 + 500]/1000 = 1.5 interruptions/yr.

With the use of an MVI overcurrent fault-interrupting device at the midpoint of the feeder, failure F2 only affects half of the load. Proper protection coordination between the MVI and the substation breaker enables the MVI to clear the fault before any customers between the MVI and the breaker are affected. Frequency and duration of interruption are significantly reduced. SAIDI is reduced from 3 to 2 hours of interruption per year (33%), and SAIFI is reduced from 2 to 1.5 interruptions per year (25%).

Automatic Sectionalizing Switchgear



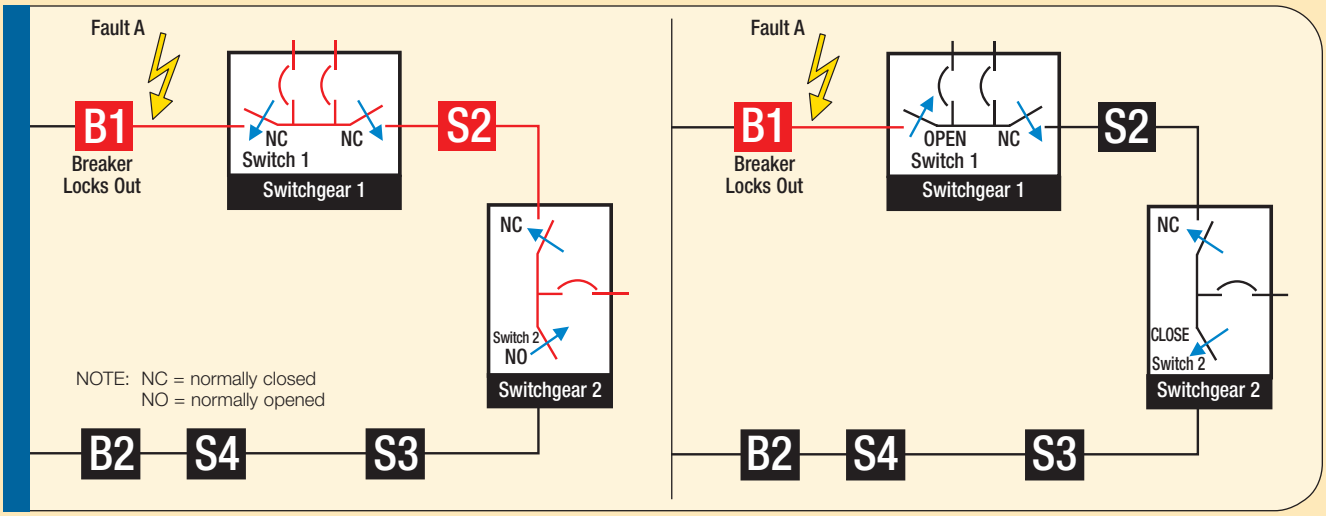
Similar improvements can be accomplished with the use of MVIs in loop systems. A typical example of the use of radial protection off the main feeder to improve reliability is the use of single-phase MVIs in sectionalizing cabinets. These cabinets can be installed with no tap protection at the beginning of a construction project, and MVIs can be added as the loads come online.

Underground Loop Systems

In the case of underground loops, the switching devices along the loop can be used to reconfigure the loop. Thus, regardless of the location of the fault, the switches will operate to isolate the faulted portion of the loop and restore service to the remaining customers.

In the following example, permanent Fault A will cause the breaker to lock out, and all customers up to the open point will be subjected to an outage. The next step is to locate the fault. After the fault is located, it is necessary to reconfigure the loop to isolate the faulted portion. This is done by opening Switch 1 and closing Switch 2. These operations can be done manually or via SCADA.

Example: Underground Loop System



Automatic Source Transfer

The main application of source transfer packages is to transfer a load from one power source to another. In some cases, when the load is not critical, this is done manually using a switching device. In the case of critical loads for hospitals, financial institutions, manufacturing facilities or any other load that would have computerized equipment, a fast transfer is required between the main (preferred) source and the backup (alternate) source. It is important for the automatic source transfer not to affect the operation of the load because any interruption of the business process translates into costly lost production and setup time. The preferred and backup sources are normally utility feeders, but in some cases the backup source may be a generator.

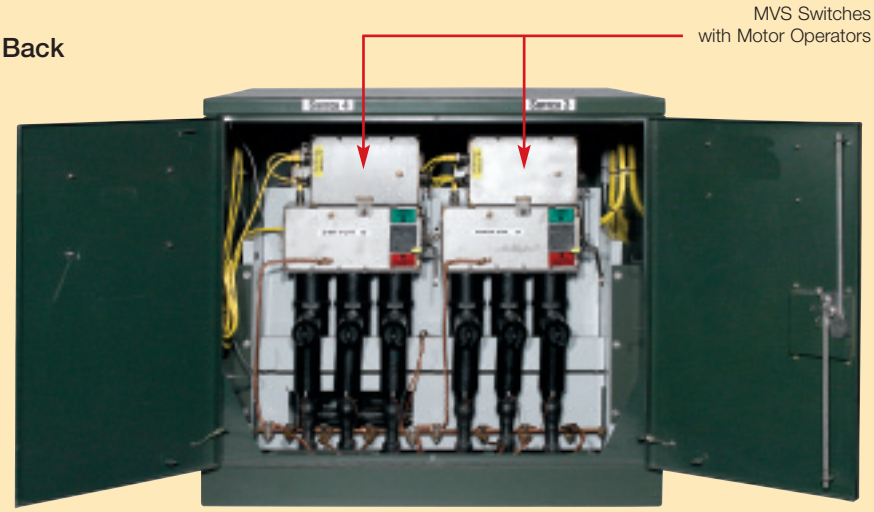
Elastimold® Switchgear offers automatic transfer (AT) packages capable of performing a full transfer in less than two seconds. The system monitors the voltage on the preferred source and initiates a transfer when the voltage is below the acceptable level for the customer. At this point, the preferred source is disconnected and the alternate source is connected.

AT Packages Include:

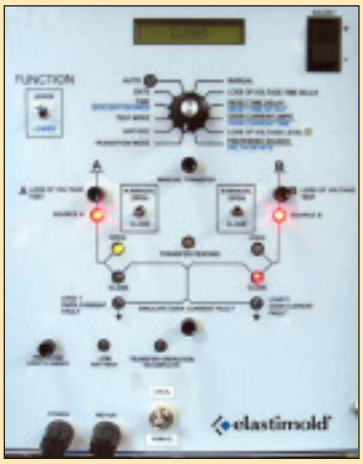
- Two three-phase MVS Switches with motor operators (one for the preferred source and one for the alternate source).
- Six voltage sensors (one for each phase of the MVS switches). These sensors monitor voltage on every phase and feed their output to the AT control.
- AT control, which receives the output from the voltage sensors and determines if there is a loss of voltage. If there is a loss of voltage, the AT control sends an OPEN signal to the preferred source MVS and a CLOSE signal to the alternate source MVS. When the voltage is restored, the system transfers back to its normal state, either automatically or at a set time.
- One or two protected taps, either MCAN or MVI modules, which protect the critical load against overcurrent. Solid taps are also available.

Padmount Automatic Source Transfer*

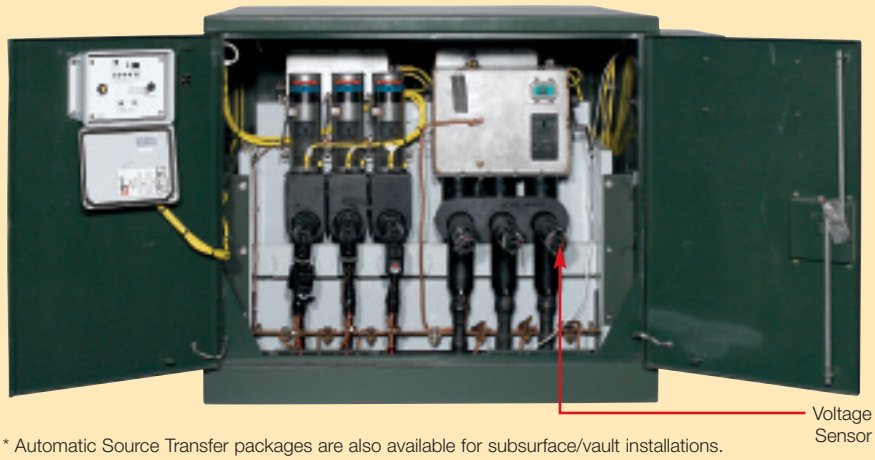
Back



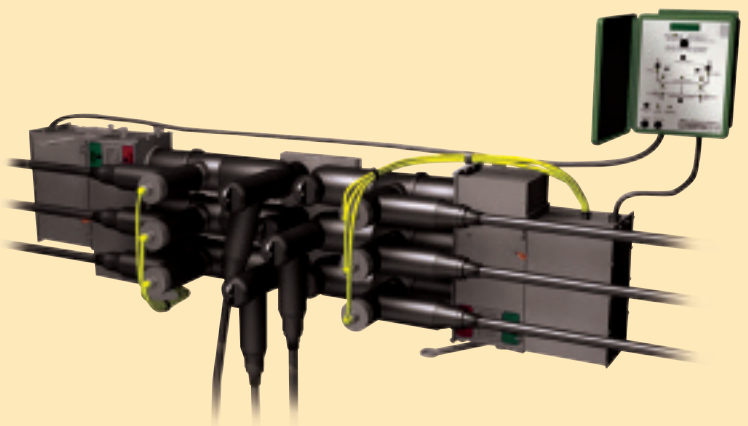
Control Panel



Front



* Automatic Source Transfer packages are also available for subsurface/vault installations.



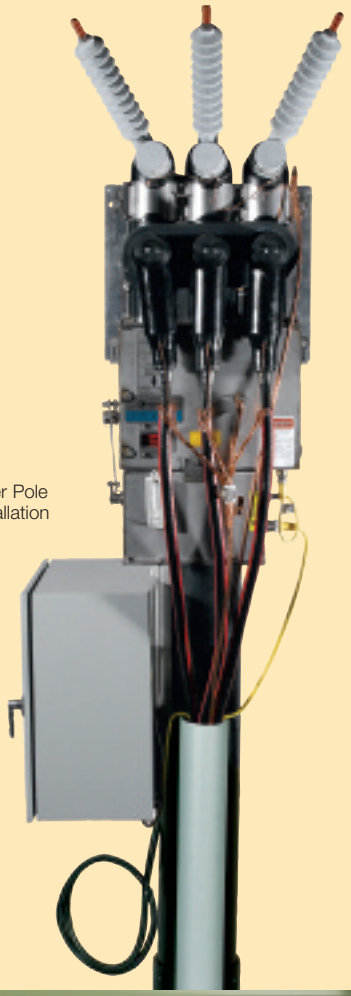
Distribution Automation

Elastimold® distribution automation products are designed for interoperability and rapid automation implementation. These products can provide a supervisory control and data acquisition (SCADA) system interface and enable feeder automation with or without communications. Elastimold distribution automation products will help to strengthen existing distribution systems and provide a strong foundation for building a fully implemented scheme in the future. Here are some of the benefits of distribution automation implementation:

- Early detection and correction of abnormal line conditions
- Reduced frequency and duration of outages
- Remote control and automatic restoration
- Improved dispatcher decision making and field manpower savings
- Automation packages can be added or upgraded as the system requirements change

Elastimold® Modular Switchgear offers the ability to add automation to existing or new installations. DC or AC motor operators can be added to switches or interrupters in vault, riser pole or padmount installations. The motors are submersible, and the same automation package can be used in all applications. The motors can either be operated from a short distance using a handheld device, as is the case with some vault installations, or they can be outfitted with fully automated controls containing:

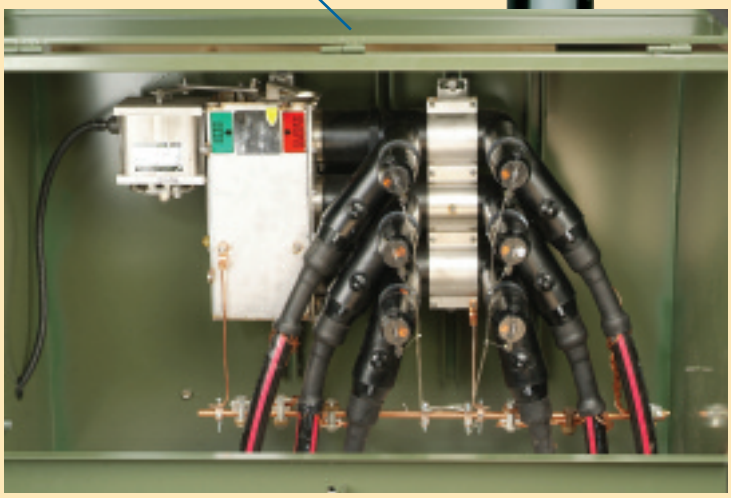
- Battery
- Power supply
- Customer-selected RTU
- Customer-selected communications protocol
- Customer-selected communications device



Riser Pole Installation

Automated Units

Motor Control



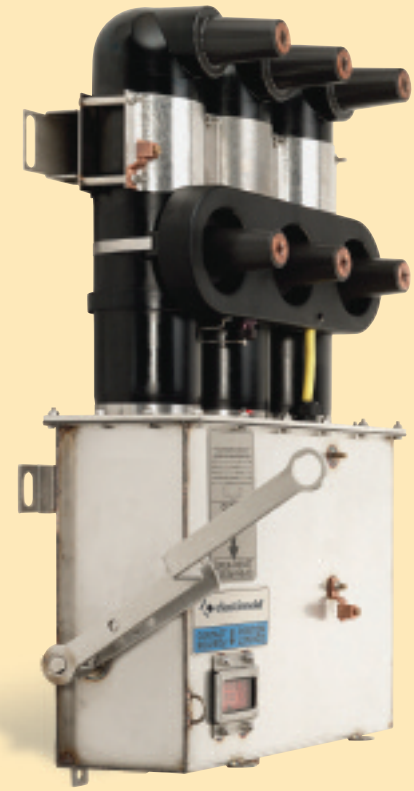
Motor Operated Switch

NOTE: Consult your local representative on specific distribution automation packages and configurations available.

Network Transformer Protection

The reliability of conventional radial or looped underground distribution circuits is measured in terms of the number and/or frequency of interruptions. These measurements cannot be directly applied to a network system. A typical network system has built-in redundancy. During most events, the continuity of power supplied to the end user is not affected by fault conditions on the high side of the network transformers. So, from the point of view of customer interruptions, network systems are reliable.

However, transformer failures have been known to result in catastrophic fires, explosions and even loss of lives. The failure or overload of multiple transformers within a network may ultimately result in the interruption of service to the end user.



Loss of Redundancy

Loss of redundancy is a method that highlights the increased vulnerability of the system every time a network transformer is lost. Loss of redundancy indices are calculated as follows:

$$\text{Duration of Loss of Redundancy (hours/year)} = \frac{\text{S (No. Hours a Transformer is Disconnected x No. of Transformers in the Circuit)}}{\text{No. of Transformers in the Circuit}}$$

$$\text{Frequency of Loss of Redundancy (times/year)} = \frac{\text{Total No. of Transformer De-Energizations}}{\text{No. of Transformers in the Circuit}}$$

The number of transformers in the circuit is the number of transformers energized by the same feeder.

The loss of redundancy indices are calculated in the following example.

Example 1: No High-Side Transformer Protection

Consider one substation breaker and one exclusive feeder out to the network. Five transformers are energized by the same feeder. Assume one permanent fault on one transformer in one year. Also assume the faulted transformer is de-energized for six hours:

$$\text{Duration of Loss of Redundancy (hours/year)} = \frac{(6 \times 5)}{5} = 6 \text{ hours/year}$$

$$\text{Frequency of Loss of Redundancy (times/year)} = \frac{5}{5} = 1 \text{ time/year}$$

Because there is only one breaker for five transformers, a failure in one transformer translates to the interruption of power to five transformers for six hours.

Loss of redundancy can occur as a consequence of:

- Transformer fire
- Transformer overheating
- Transformer pressure build-up
- Overcurrent condition

While the substation breaker may detect most overcurrent faults, faults caused by excessive pressure/heat or fires cannot be detected by the breaker. One method that automatically isolates a network transformer from the primary side, regardless of the type of failure, is the installation of an MVI fault interrupter on the high side of the transformer. This MVI can isolate based on overcurrent conditions, but also can be wired to isolate the transformer in case of fire, excessive pressure/heat, emergency signal, etc.

Benefits of such a setup to the network system and the end users include:

- Minimization of fire damage
- Reduction or elimination of transformer damage due to pressure or temperature build-up
- Longer transformer life

The following example calculates the loss of redundancy to the same system used in Example 1, but adding protection to the primary side of the transformers.

Example 2: High-Side Transformer Protection

There is one substation breaker and one exclusive feeder out to the network. Five transformers are energized by the same feeder. Each transformer is equipped with a fault interrupter installed on the high side. Assume one permanent fault on one transformer in one year. Assume the transformer is de-energized for six hours:

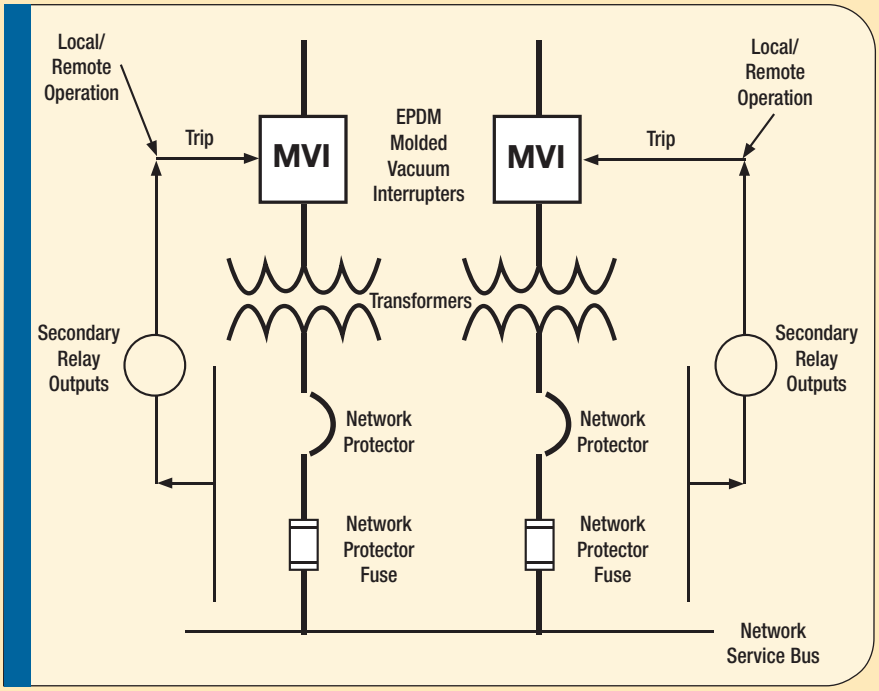
$$\text{Duration of Loss of Redundancy (hours/year)} = \frac{(6 \times 1)}{5} = 1.2 \text{ hour/year}$$

$$\text{Frequency of Loss of Redundancy (times/year)} = \frac{1}{5} = 0.2 \text{ time/year}$$

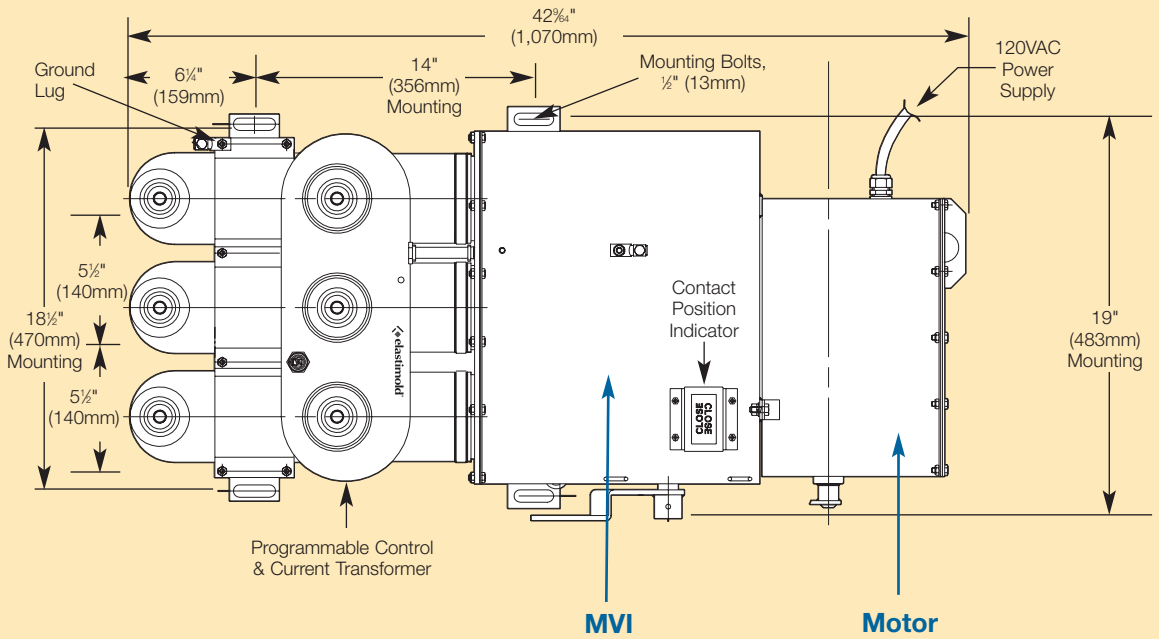
A failure in one transformer translates to the interruption of power to only one transformer for six hours.

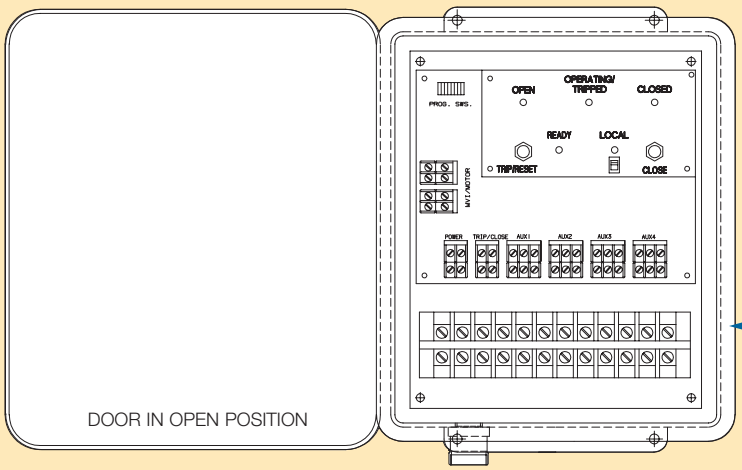
Once an MVI is installed, remote operation from the entrance of the vault or via SCADA is possible with the addition of a motor operator and control. Installation of panic/emergency push buttons at the entrance of the vault is also possible; pressing this emergency switch will instantaneously trip open one or all of the interrupters in a vault and isolate the transformers.

Transformer Network with Protection on the High Side of the Transformer



Elastimold® Switchgear Network Package (NMVI3)



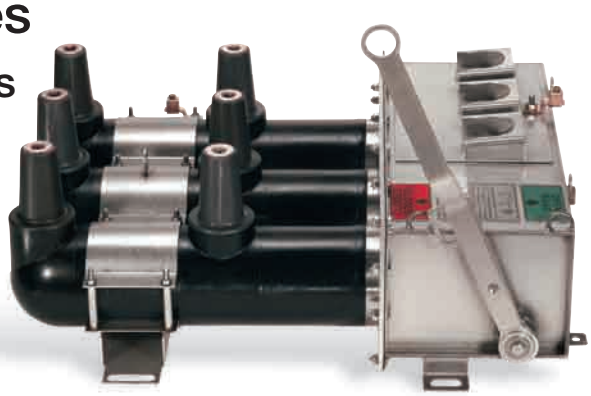


Product Selection

Function	Application	Installation	Elastimold Products	Part Number	Ordering Page(s)
Switching Sectionalizing pages 6–8	Oil Fuse Cutout Replacement	Subsurface/Vault	Molded Vacuum Switches	MVS	20
	Manual Underground Feeder or Loop Sectionalizing	Subsurface/Vault Padmount	Switching and Sectionalizing Switchgear	ESV PMVS, ESD	24
Source Transfer pages 8–10	Automatic Source Transfer	Subsurface	Automatic Source Transfer Packages	ATS	27
		Vault		ATV	
		Padmount		ATD	
Overcurrent Protection pages 11–12	Riser Pole	Pole	Molded Vacuum Interrupters	RMVI	21
	Network Transformer Protection Oil Fuse Cutout Replacement	Network Transformer Vault		MVI	
		Subsurface/Vault			
	Automatic Underground Feeder or Loop Sectionalizing	Subsurface/Vault	Overcurrent Protection Switchgear	ESV	25
	Underground Feeder or Loop Protection	Padmount		PMVI/ESD	

MVS Molded Vacuum Switches

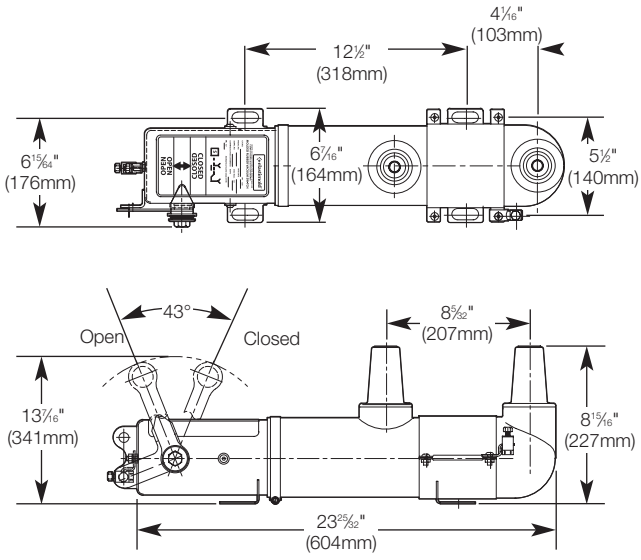
Spring-energy, load-switching devices that make, carry and interrupt load currents through 600A on 5 to 38kV distribution systems.



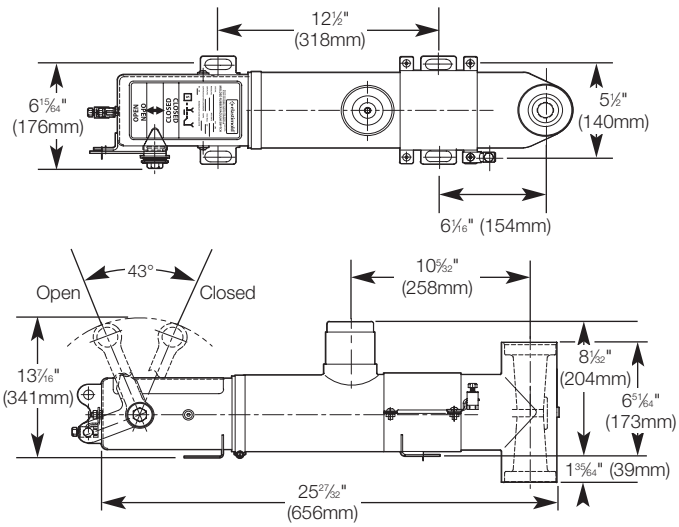
MVS Molded Vacuum Switches include molded-in elbow connection interfaces and spring-energy mechanisms. Available in both single- and three-phase models, units are manually operated with a hotstick. Motor operator, SCADA and auto-transfer control options are available.

Features	Benefits/Descriptions
EPDM Molded Rubber Insulation	MVSs are fully sealed and submersible.
Vacuum Switching and Vacuum Interruption	Components are maintenance-free and require no gas or oil.
Compact and Lightweight	Small footprint enables MVSs to fit in tight padmount, subsurface, vault or riser pole installations.

Single-Phase Switches
Approximate Weight: 30 lbs.



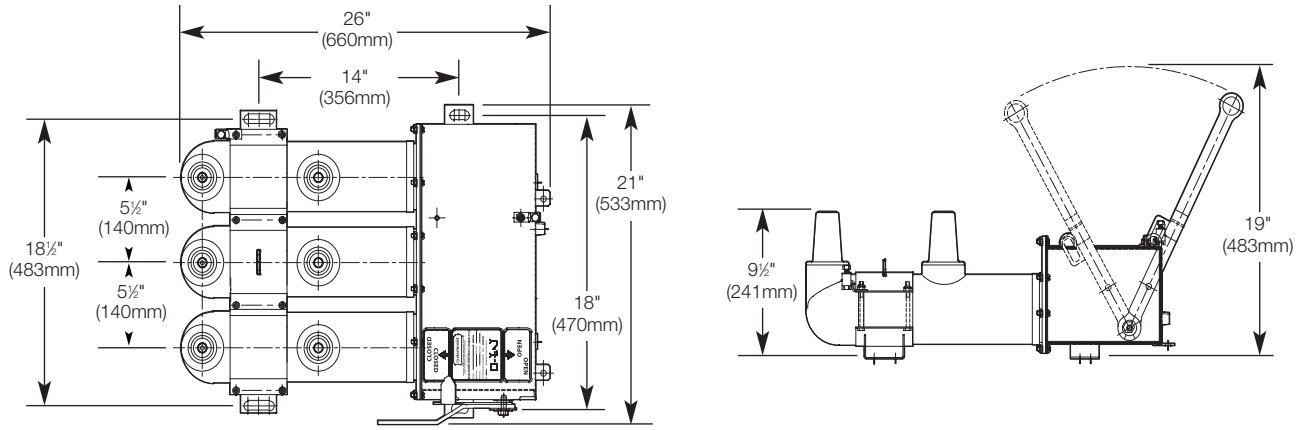
(4) Mounting Holes, ⅝" Dia. x ⅞" (16 x 22mm)



(4) Mounting Holes, ⅝" Dia. x ⅞" (16 x 22mm)

Available with 600A one-piece bushings or 200A wells on either/both terminals.

Three-Phase Switches
Approximate Weight: 135 lbs.



Available with 600A one-piece bushings or 200A wells on either/both terminals.

Ratings

Maximum Design Voltage (kV)	15.5	27	38
Frequency (Hz)	50/60	50/60	50/60
BIL Impulse (kV)	95	125	150
One-Minute AC Withstand (kV)	35	60	70
Fifteen-Minute DC Withstand (kV)	53	78	103
Load Interrupting & Loop Switching (Amp)	600	600	600
Transformer Magnetizing Interrupting (Amp)	21	21	21
Capacitor or Cable Charging Interrupting (Amp)	40	40	40
Asymmetrical Momentary and 3-Operation Fault Close (Amp)	20,000	20,000	20,000
Symmetrical One-Second Rating (Amp)	12,500	12,500	12,500
Continuous Current (Amp)	600	600	600
Eight-Hour Overload Current (Amp)	900	900	900

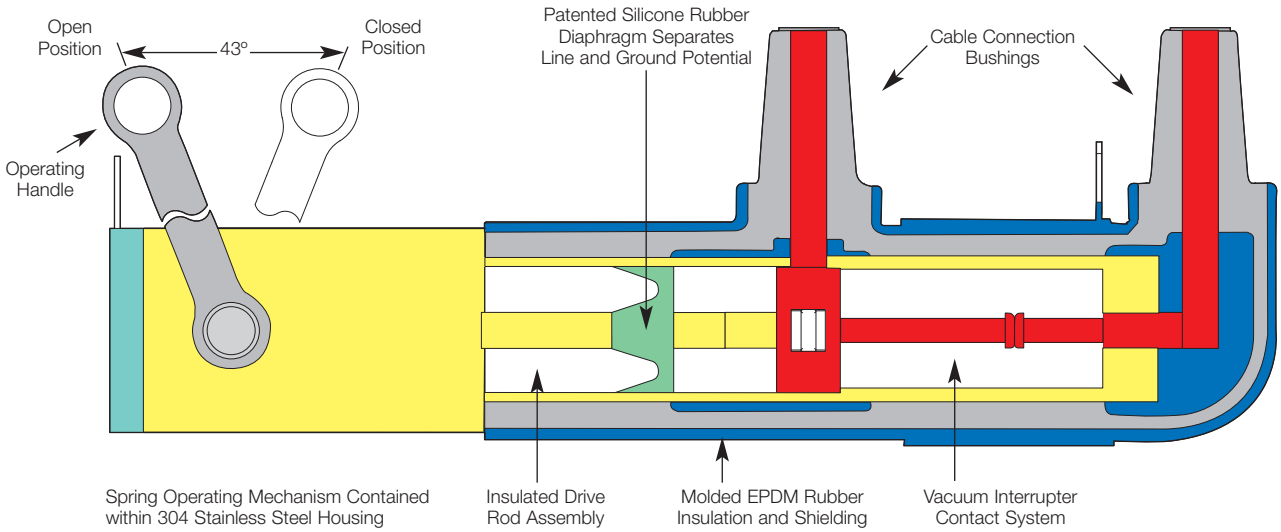
Application Information

Construction: Submersible, corrosion resistant, fully shielded
Ambient Temperature Range: -40° C to 65° C

Certified Tests

MVS loadbreak switches have been designed and tested per applicable portions of IEEE, ANSI, NEMA and other industry standards, including:

IEEE C37.74 Standard for Subsurface, Vault and Padmounted Load-Interrupting Switches
IEEE 386 Standard for Separable Connectors and Bushing Interfaces
IEC 265 International Standards for Load-Interrupting Switches
ANSI C57.12.28 Standard for Padmount Enclosures

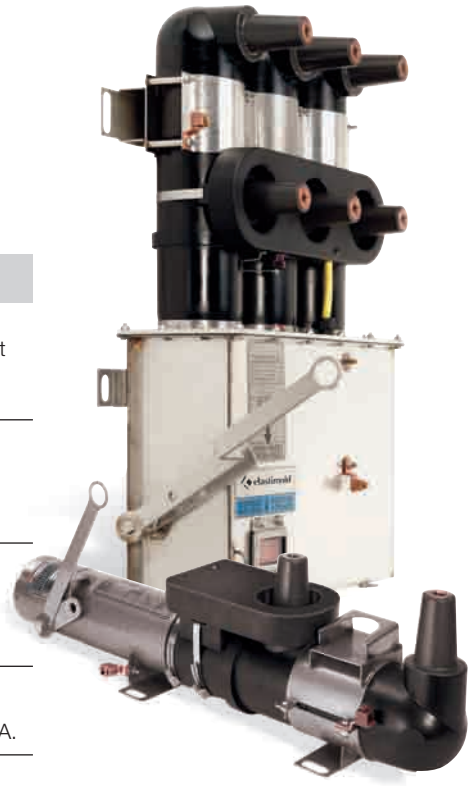


MVI Molded Vacuum Fault Interrupters

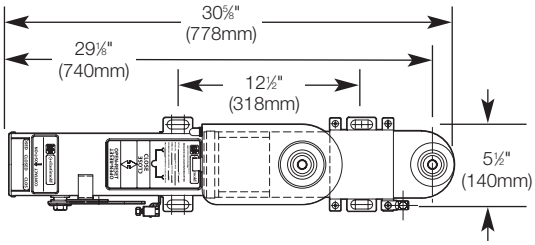
Make, carry and automatically interrupt currents through 25,000A symmetrical on 5 to 38kV distribution systems.

MVI Molded Vacuum Fault Interrupters include molded-in elbow connection interfaces and trip-free mechanisms. They are available in single- and three-phase models. Units are self-powered and include current-sensing and electronic control.

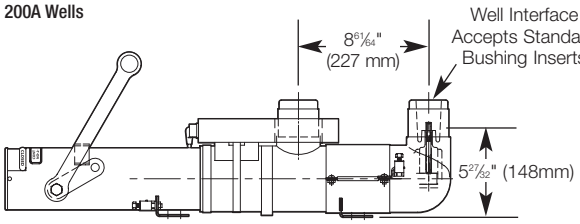
Features	Benefits/Descriptions
Combines Vacuum Interrupters, Programmable, Electronic, Self-Powered Controls and EPDM Rubber Insulation	Components provide compact, lightweight and submersible overcurrent protection.
Field Programmable with a Wide Range of Time-Current Characteristic (TCC) Curves and Trip Settings	TCC curves provide predictable tripping for ease of coordination with upstream and/or downstream protective devices.
Control Monitors the Circuit Condition	When the programmed parameters are exceeded, a signal is sent to the tripping mechanism.
Motor Operators and Controls Available	Enable radial feeders or loops to be reconfigured, either manually or via SCADA.



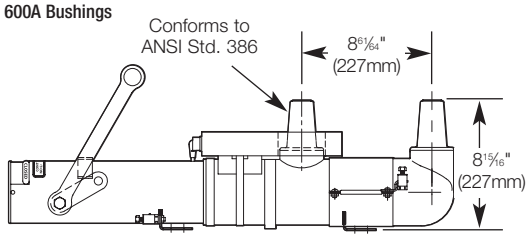
Front View Single-Phase



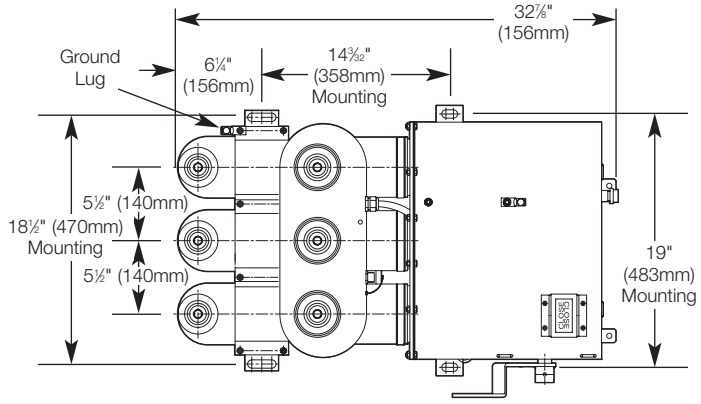
200A Wells



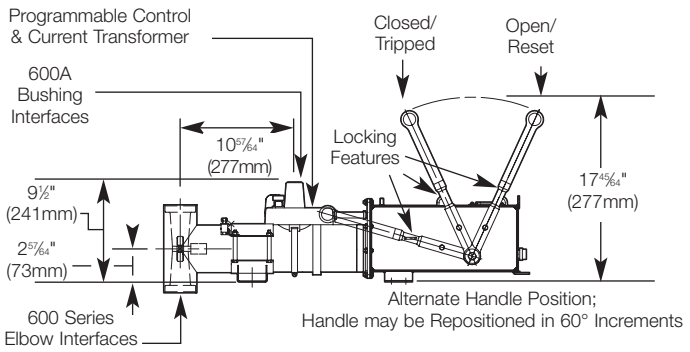
600A Bushings



Front View Three-Phase



600A T Elbow Interface



Ratings

Voltage Class (kV)	15.5	15.5	15.5	27	35	35
Maximum Design Voltage (kV)	17	17	15.5	29	38	38
Frequency (Hz)	50/60	50/60	50/60	50/60	50/60	50/60
BIL Impulse Withstand (kV)	95	95	95	125	150	150
One-Minute AC Withstand (kV)	35	35	35	60	70	70
Five-Minute DC Withstand (kV)	53	53	53	78	103	103
Continuous Current (Amp)	600	600	600	600	600	600
Load Interrupting & Loop Switching (Amp)	600	600	600	600	600	600
Transformer Magnetizing Interrupting (Amp)	21	21	21	21	21	21
Capacitor or Cable Charging Interrupting (Amp)	40	40	40	40	40	40
Symmetrical/Asymmetrical Interrupting Capability (kA)	12.5/20	16/25.6	20/32	12.5/20	12.5/20	25/40
Current Sensor Ratio	1,000:1	1,000:1	1,000:1	1,000:1	1,000:1	1,000:1

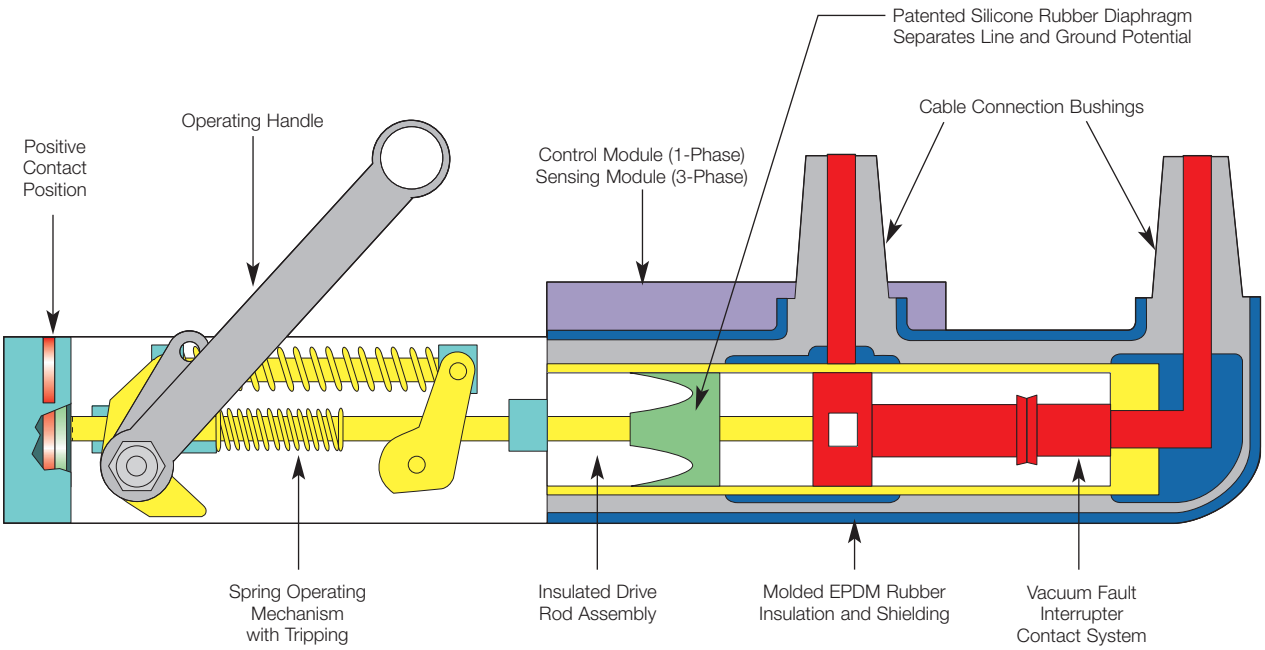
Application Information

Meets ANSI C37.60 requirements
Ambient Temperature Range: -40° C to 65° C

Certified Tests

MVI Molded Vacuum Fault Interrupters have been designed and tested per applicable portions of IEEE, ANSI, NEMA and other industry standards, including:

ANSI C37.60 Standard for Fault Interrupters
IEEE 386 Standard for Separable Connectors and Bushing Interfaces
ANSI C57.12.28 Standard for Padmounted Enclosures



MVI Molded Vacuum Interrupter Controls

Choose from five electronic control options to interrupt faults.

Molded Vacuum Interrupters are provided with self-powered electronic control packages requiring no batteries or external power. Depending on the application, five electronic control options are available for the MVI — see below and on following page.

Features	Benefits/Descriptions
Include Self-Powered Electronic Control Packages	No batteries or external power are required. Controls send a signal to the vacuum interrupters to trip open and interrupt the fault when an overcurrent condition is detected.
Field-Selectable Fuse or Relay Curves and Trip Settings	One device for many protection schemes.

Internal Control

This control is integral to the unit (no separate control box). It is accessible via a computer connection to view or modify settings. This control is used on ganged three-phase or single-phase MVI interrupters. Phase and ground trip, as well as inrush restraint, are available. The E-Set software enables the user to connect to the internal control, either in the shop or in the field, to program or change settings. An MVI-STP-USB programming connector is required to connect between the PC and the MVI. With a computer connected to the MVI control, the user can view real-time currents, the number of overcurrent protection operations, current magnitude of the last trip and the phase/ground fault targets. This is the standard control option.

NOTE: E-Set can be downloaded from www.elastimoldswitchgear.com.

External Control with Single-/Three-Phase Trip Selection (Style 10 and 310)

This control is mounted externally to the mechanism and provides the ability to select TCCs by setting DIP switches on the front panel. Each phase can be assigned a different minimum trip setting by means of manual rotary switches. This control is used on one, two or three single-phase MVI mechanisms.

External Control with Phase and Ground Trip (Style 20 and 320)

This control is mounted externally to the mechanism and provides the ability to select phase minimum trip (one for all three phases), time delay for phase tripping, ground trip as a percent of phase minimum trip and ground trip delay by means of manual rotary switches. This control may be used on ganged three-phase or three single-phase MVI mechanisms.

External Control with Three-Phase Trip Only (Style 30 and 330)

This control is mounted externally to the mechanism and provides the ability to select phase minimum trip (one for all three phases) by means of a manual rotary switch. It also has an RS-232 port for connection to a PC to view the last trip data. This control is used on ganged three-phase or three single-phase MVI mechanisms.

External Control with Selectable Single-/Three-Phase Trip Function (80 and 380 Control)

This control is mounted externally to the mechanism of the interrupter and provides the ability to select between a single-phase trip and a three-phase trip. The 80 and 380 Control can be used with one three-phase interrupter or with three single-phase interrupters. For three-phase applications, the ground trip function can be blocked from the front panel. Manual trip and reset target buttons are also located on the front panel. This control uses the E-Set software, which enables programming via a computer using the MVI-STP-USB adapter. E-Set features custom TCC curves and provides access to the last fault event information, as well as real-time current per phase.

Curves

Relay Curves (minimum trip 30–600A)		
Curve No.	**Curve Reference No.**	**Curve Type**
01	MVI-TCC-01	E Slow
02	MVI-TCC-02	E Standard
03	MVI-TCC-03	Oil Fuse Cutout
04	MVI-TCC-04	K
05	MVI-TCC-05	Kearney QA
06	MVI-TCC-06	Cooper EF
07	MVI-TCC-07	Cooper NX-C
08	MVI-TCC-08	CO-11-1
09	MVI-TCC-09	CO-11-2
10	MVI-TCC-10	T
11	MVI-TCC-11	CO-9-1
12	MVI-TCC-12	CO-9-2
13	MVI-TCC-13	Cooper 280ARX
14	MVI-TCC-14	F
16	MVI-TCC-16	Kearney KS
17	MVI-TCC-17	GE Relay
18–23	MVI-TCC-18–23	CO-8-1–CO-8-6
24–27	MVI-TCC-24–27	CO-9-3–CO-9-6
28–31	MVI-TCC-28–31	CO-11-3–CO-11-6
Fuse Curves (minimum trip 10–200A)		
54	MVI-TCC-54	E Slow
55	MVI-TCC-55	E Standard
56	MVI-TCC-56	Oil Fuse Cutout
57	MVI-TCC-57	K
58	MVI-TCC-58	Kearney QA
59	MVI-TCC-59	Cooper NX-C
60	MVI-TCC-60	T

Ordering Information for Elastimold® Molded Vacuum Switches and Interrupters

The following diagram shows how to construct a catalog number for Molded Vacuum Switches and Interrupters. Catalog numbers are shown below and on the following page.

EXAMPLE: The catalog number for a Molded Vacuum Interrupter on a three-phase, 27kV system, with 600A terminal and parking stands between bushings is MVI3-21-27-66-PS.

☐ Indicates field that must be filled in to complete order.

☐ M V ☐ ☐ - 2 1 - ☐ - ☐ ☐ ☐ - SUFFIX

Switch Type

R	Riser Pole
N	Network
Blank	Subsurface

Device

S	Switch
I	Interrupter

Phases

1	Single-Phase
3	Three-Phase

Voltage Class

15	15.0kV
27	27.0kV
38	38.0kV

End Interface

2	200A Bushing Well
6	600A Bushing

Interface

E	600A T Body
R	End Interface Rotated 180°
AB	Air Bushings (for Riser Pole)

Main Interface

2	200A Bushing Well
6	600A Bushing

Controls and Accessories

CAT. NO. SUFFIX	Description
20	External 20 Control with Phase and Ground Trip (to be used on ganged three-phase MVI mechanism)
30	External 30 Control with Three-Phase Trip Only (to be used on ganged three-phase MVI mechanism)
80	External 80 Control with Selectable Single-/Three-Phase Trip Function (to be used on ganged three-phase MVI mechanism)
110	External 10 Control with Single Trip Selection (to be used on one single-phase MVI mechanism)
310	External 10 Control with Single-/Three-Phase Trip Selection (to be used on three single-phase MVI mechanisms)
320	External 20 Control with Phase and Ground Trip (to be used on three single-phase MVI mechanisms)
330	External 30 Control with Three-Phase Trip Only (to be used on three single-phase MVI mechanisms)
380	External 80 Control with Selectable Single-/Three-Phase Trip Function (to be used on three single-phase mechanisms)
MO120A	120VAC Motor Operator and Controller for MVS3 or MVI3 Units
MO12D	12–24VDC Motor Operator and Controller for MVS3 or MVI3 Units
PS	Parking Stand for MVS or MVI (between bushings for single- or three-phase units)
MPS	Parking Stand for MVS3, MVI3 or RMVI3 on Mechanism Cover
PS6	Double Parking Stand for MVS3, MVI3 or RMVI3 (between bushings and on mechanism cover)
BT	Bail Tab Plate Installed for Three-Phase Units Only
P	Customer Settings to Be Programmed at the Factory

NOTE: Leave suffix blank for internal (self-contained) control.

Ordering Information for Elastimold® MVS Molded Vacuum Switches

CAT. NO.	Description	Width in. (mm)	Height in. (mm)	Depth in. (mm)	Weight lb. (kg)	Diagram
Single-Phase Vacuum Switches						
MVS1-21-15-XX	15kV 2-Way 1-Phase Switch	6 (152)	24 (610)	14 (356)	30 (14)	
MVS1-21-15-6EX	15kV 2-Way 1-Phase Switch — Elbow Interface	6 (152)	24 (610)	15 (381)	30 (14)	*
MVS1-21-27-XX	25kV 2-Way 1-Phase Switch	6 (152)	24 (610)	14 (356)	30 (14)	
MVS1-21-27-6EX	25kV 2-Way 1-Phase Switch — Elbow Interface	6 (152)	24 (610)	15 (381)	30 (14)	
MVS1-21-38-XX	35kV 2-Way 1-Phase Switch	6 (152)	24 (610)	14 (356)	30 (14)	
Three-Phase Vacuum Switches						
MVS3-21-15-XX	15kV 2-Way 3-Phase Switch	21 (533)	26 (660)	19 (483)	135 (61)	*
MVS3-21-27-XX	25kV 2-Way 3-Phase Switch	21 (533)	26 (660)	19 (483)	135 (61)	**
MVS3-21-38-XX	38kV 2-Way 3-Phase Switch	21 (533)	26 (660)	19 (483)	135 (61)	

* Height includes handle. ** 3-Phase Vacuum Switches are motor-ready.

Ordering Information for Elastimold® MVI Molded Vacuum Interrupters***

CAT. NO.	Description	Width in. (mm)	Height in. (mm)	Depth in. (mm)	Weight lb. (kg)	Diagram
Riser Pole (Three-Phase Installations Only)						
RMVI3-21-15-6ABX-YY	15kV 2-Way 3-Phase Interrupter with Air Bushings on Top Terminals	30 (762)	45 (1,143)	25 (635)	150 (68)	
RMVI3-21-27-6ABX-YY	25kV 2-Way 3-Phase Interrupter with Air Bushings on Top Terminals	30 (762)	45 (1,143)	25 (635)	150 (68)	
RMVI3-21-38-6ABX-YY	38kV 2-Way 3-Phase Interrupter with Air Bushings on Top Terminals	30 (762)	45 (1,143)	25 (635)	150 (68)	
RMVI1-21-15-6ABX-3YY	15kV 2-Way 3-Phase Interrupter with Air Bushings on Top Terminals, 1-Phase Trip Selectable	30 (762)	45 (1,143)	25 (635)	150 (68)	
RMVI1-21-27-6ABX-3YY	27kV 2-Way 3-Phase Interrupter with Air Bushings on Top Terminals, 1-Phase Trip Selectable	30 (762)	45 (1,143)	25 (635)	150 (68)	
RMVI1-21-38-6ABX-3YY	38kV 2-Way 3-Phase Interrupter with Air Bushings on Top Terminals, 1-Phase Trip Selectable	30 (762)	45 (1,143)	25 (635)	150 (68)	
Subsurface Single-Phase Vacuum Switches						
MVI1-21-15-XX	15kV 2-Way 1-Phase Interrupter	6 (152)	31 (787)	9 (229)	45 (20)	
MVI1-21-15-6EX	15kV 2-Way 1-Phase Interrupter, Elbow Interface	6 (152)	31 (787)	11 (279)	45 (20)	
MVI1-21-27-XX	27kV 2-Way 1-Phase Interrupter	6 (152)	31 (787)	9 (229)	45 (20)	
MVI1-21-27-6EX	27kV 2-Way 1-Phase Interrupter, Elbow Interface	6 (152)	31 (787)	11 (279)	45 (20)	
MVI1-21-38-XX	38kV 2-Way 1-Phase Interrupter	6 (152)	31 (787)	9 (229)	45 (20)	
MVI1-21-38-6EX	38kV 2-Way 1-Phase Interrupter, Elbow Interface	6 (152)	31 (787)	11 (279)	45 (20)	
Subsurface Three-Phase Vacuum Switches						
MVI1-21-15-XX-3YY	15kV 2-Way 3-Phase Interrupter, 1-Phase Trip Selectable Ext. Control	20 (508)	31 (787)	9 (229)	145 (66)	
MVI1-21-27-XX-3YY	27kV 2-Way 3-Phase Interrupter, 1-Phase Trip Selectable Ext. Control	20 (508)	31 (787)	9 (229)	145 (66)	
MVI1-21-38-XX-3YY	38kV 2-Way 3-Phase Interrupter, 1-Phase Trip Selectable Ext. Control	20 (508)	31 (787)	9 (229)	145 (66)	
MVI3-21-15-XX-YY	15kV 2-Way 3-Phase Interrupter	20 (508)	33 (838)	10 (254)	145 (66)	
MVI3-21-27-XX-YY	27kV 2-Way 3-Phase Interrupter	20 (508)	33 (838)	10 (254)	145 (66)	
MVI3-21-38-XX-YY	38kV 2-Way 3-Phase Interrupter	20 (508)	33 (838)	10 (254)	145 (66)	

***Air bushings on top terminal.

Ordering Information for Accessories (order separately)

CAT. NO.	Description
MVI-STP-USB	Adapter for Connection between MVI Units with Internal Control and a Computer for Programming/Viewing Settings
MV1PMB	Pole-Mounting Bracket for 1-Phase Units Only
MV3PMB	Pole-Mounting Bracket for 3-Phase Units Only
MV3HPMB	Horizontal Pole-Mounting Bracket for 3-Phase Units Only
MV13PMB	Pole-Mounting Bracket for Three 1-Phase Units Only
35AL-11	Connector Bare Wire Type ¾"–16 Rod for Riser Pole Units; Qty. of 1 Needed per Phase
35AL-12	Connector 2-Hole Spade Type ¾"–16 Rod for Riser Pole Units; Qty. of 1 Needed per Phase
MVI-TESTER	Tester for Electric Control Style 80

NOTE: Weights and dimensions are approximate.
X = 6 for 600A or 2 for 200A or 6E for 600A T interface.
Y = 10, 20, 30, 80 for different electronic controls.
Leave blank for internal (self-contained) control.

Accessories should be added as suffix to the main catalog number unless otherwise noted.
Other configurations are available. Please consult your local representative on configurations not shown here.
The 3-Phase Vacuum Interrupters are motor-ready.

Multi-Way Unit Construction

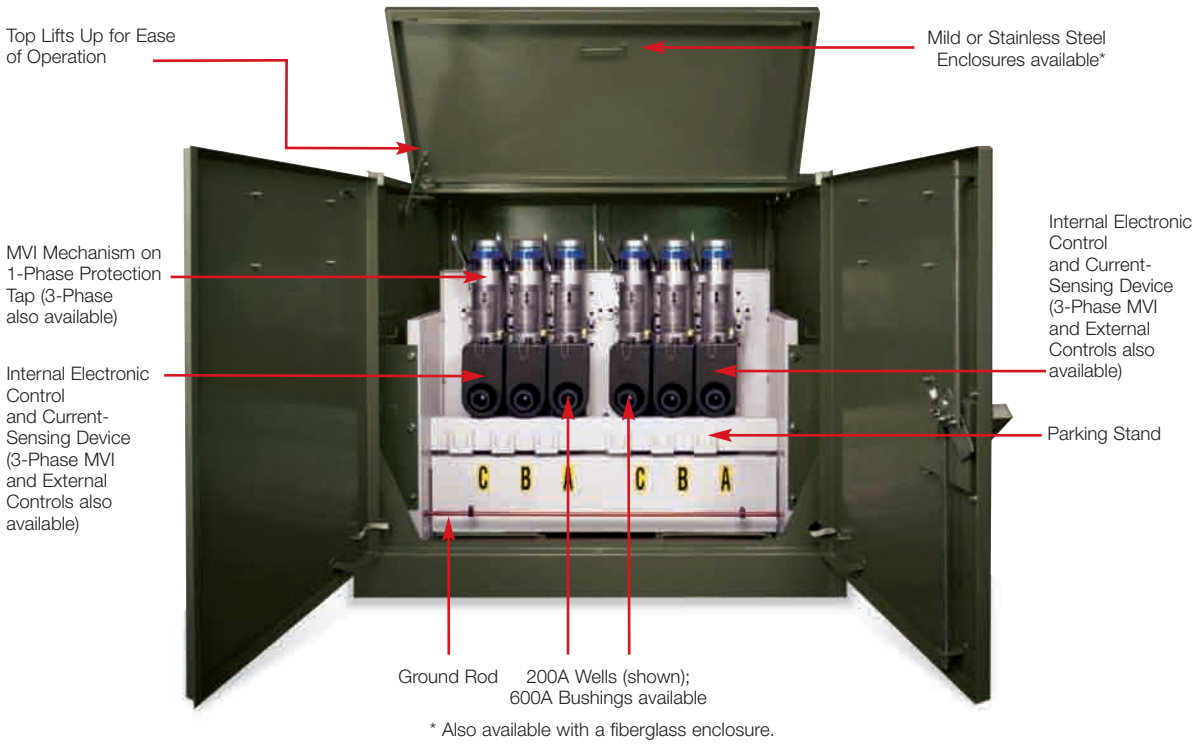
Multi-way vault and padmount units are built using MVS, MVI and MCAN modules as required by the application. These are mounted onto the ES multi-way common bus system and assembled on a free-standing, floor-mounted frame. At this stage, the product is ready to be used in vault installations.

For padmount installations, a double-sided, drop-over, painted, mild steel enclosure is provided. Munsell Green 7GY 3.29/1.5 is the standard enclosure color. Other colors are available upon request. Painted stainless steel or fiberglass enclosures are available as options.

Common Bus Assembly

Vault-Style Unit

Padmount Unit: Tap (Load) Side



* Also available with a fiberglass enclosure.

Ordering Information for Elastimold® Multi-Way Switchgear or Transfer Package

The following diagram shows how to construct a catalog number for Multi-Way Switchgear or Transfer Packages. Catalog numbers are shown on pages 24–25 and 27 for the most common configurations.

Indicates field that must be filled in to complete order.

EXAMPLE: The catalog number for an auto-transfer package for padmount installation on a 3-phase, 27kV system, with two MVI protected taps, 600A terminals and standard mild steel enclosure is ATD324-AAPP-6666.

Switch Type

AT	Auto Transfer
ES	Multi-Way Switch

Type

V	Vault
S	Subsurface
D	Double-Side Padmount
P	Single-Side Padmount

Phases

1	1-Phase
3	3-Phase

Voltage Class

1	15.0kV
2	27.0kV
3	38.0kV

Number of Ways

2	2-Way
3	3-Way
4	4-Way

Components by Way

A	3-Phase Switch Motor Operator Auto Transfer
B	Solid Tap/Direct Bus Connection (600A or 200A)
C	3-Phase MVI Fault Interrupter, 20 Control
D	3-Phase MVI Fault Interrupter, 30 Control
J	1-Phase Fault Interrupter
K	1-Phase Fault Interrupter, 10 Control
L	1-Phase Fault Interrupter, 80 Control
M	1-Phase Fault Interrupter, 20 Control
N	1-Phase Fault Interrupter, 30 Control
O	3-Phase MVI Fault Interrupter, 80 Control
P	3-Phase MVI Fault Interrupter
Q	3-Phase MVS Switch with UAD Control
R	3-Phase MVI Fault Interrupter Motor Operator, 12–24VDC
S	1-Phase MVS Switch
T	3-Phase MVS Switch
U	3-Phase MVS with 12–24VDC Motor
V	3-Phase MVS with 120VAC Motor
W	3-Phase MVI Fault Interrupter Motor Operator, 120VAC
Z	3-Phase MVI Fault Interrupter with UAD Control

Enclosure Material

Blank	Mild Steel
S	Stainless Steel

Cabinet Depth Padmount

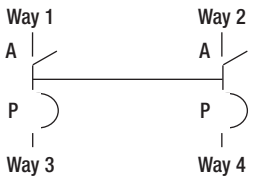
Blank	54"

Interface by Way

2	200A Bushing Well
6	600A Bushing

Example: ATD324-AAPP-6666

Custom padmount enclosure dimensions are available.
Parking stands are standard on padmount units.
Consult your local representative on multi-way configurations that include 38kV MVIs.
3-Phase MVS and MVI are motor-ready.
Auto-transfer ways 1 and 2 are always “A.”

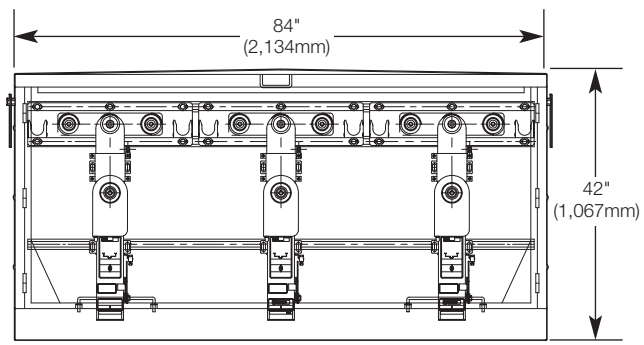


Ordering Information for Elastimold® Switching and Sectionalizing Switchgear

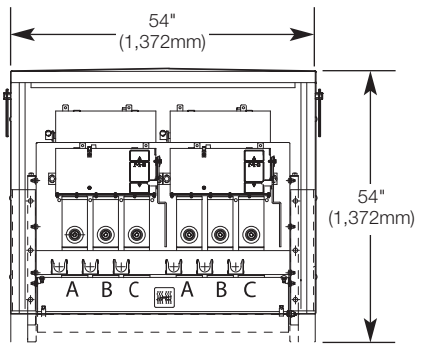
CAT. NO.	Description	Width in. (mm)	Height in. (mm)	Depth in. (mm)	Weight lb. (kg)	Diagram
Vault						
ESV313-TTT-XXX	15kV 3-Way 3-Phase Switch	48 (1,219)	36 (914)	22 (559)	750 (340)	
ESV323-TTT-XXX	27kV 3-Way 3-Phase Switch	48 (1,219)	36 (914)	22 (559)	750 (340)	
ESV333-TTT-XXX	38kV 3-Way 3-Phase Switch	48 (1,219)	36 (914)	22 (559)	750 (340)	
ESV314-TTTT-XXXX	15kV 4-Way 3-Phase Switch	48 (1,219)	36 (914)	22 (559)	880 (399)	
ESV324-TTTT-XXXX	27kV 4-Way 3-Phase Switch	48 (1,219)	36 (914)	22 (559)	880 (399)	
ESV334-TTTT-XXXX	38kV 4-Way 3-Phase Switch	48 (1,219)	36 (914)	22 (559)	880 (399)	
Padmount						
PMVS1-21-15-XX	15kV 2-Way 3-Phase Switch	36 (914)	30 (762)	30 (762)	310 (141)	
PMVS1-21-27-XX	27kV 2-Way 3-Phase Switch	36 (914)	30 (762)	30 (762)	310 (141)	
PMVS1-21-38-XX	38kV 2-Way 3-Phase Switch	36 (914)	30 (762)	30 (762)	310 (141)	
ESD312-T-XX	15kV 2-Way 3-Phase Switch	36 (914)	48 (1,219)	42 (1,067)	680 (308)	
ESD322-T-XX	27kV 2-Way 3-Phase Switch	36 (914)	48 (1,219)	42 (1,067)	680 (308)	
ESD332-T-XX	38kV 2-Way 3-Phase Switch	36 (914)	48 (1,219)	42 (1,067)	680 (308)	
ESD313-TTT-XXX	15kV 3-Way 3-Phase Switch	54 (1,317)	48 (1,219)	54 (1,317)	1,250 (567)	
ESD323-TTT-XXX	27kV 3-Way 3-Phase Switch	54 (1,317)	48 (1,219)	54 (1,317)	1,250 (567)	
ESD333-TTT-XXX	38kV 3-Way 3-Phase Switch	54 (1,317)	48 (1,219)	54 (1,317)	1,250 (567)	
ESD314-TTTT-XXXX	15kV 4-Way 3-Phase Switch	54 (1,317)	48 (1,219)	54 (1,317)	1,380 (626)	
ESD324-TTTT-XXXX	27kV 4-Way 3-Phase Switch	54 (1,317)	48 (1,219)	54 (1,317)	1,380 (626)	
ESD334-TTTT-XXXX	38kV 4-Way 3-Phase Switch	54 (1,317)	48 (1,219)	54 (1,317)	1,380 (626)	

NOTE: X = 6 for 600A or 2 for 200A.
Other configurations are available. Consult your local representative for configurations not shown here.

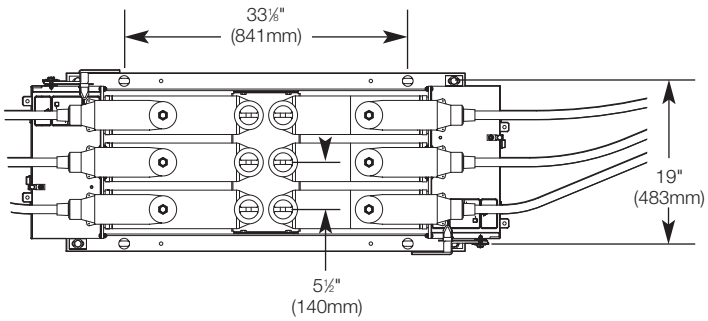
Single-Side Padmount ESP313-BJB-626



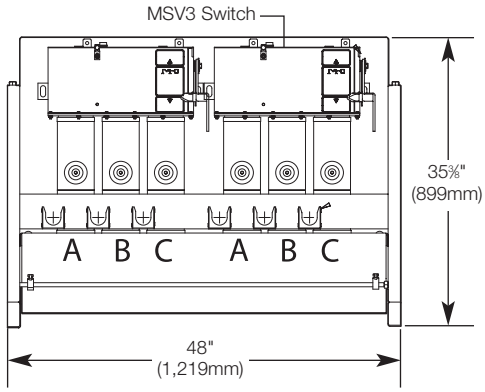
Double-Side Padmount ESD3X4-IIPP-6622-S



Subsurface ESS3X2-TT-66

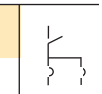
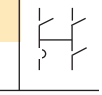


Vault ESV3X4-TTTT-2222



Stainless Steel Bottom Rails

Ordering Information for Elastimold® Overcurrent Protection Switchgear

CAT. NO.	Description	Width in. (mm)	Height in. (mm)	Depth in. (mm)	Weight lb. (kg)	Diagram
Vault						
ESV313-TPP-XXX	15kV 3-Way 3-Phase (1) Source Switch, (2) Vacuum Interrupter Taps	40 (1,016)	48 (1,219)	22 (559)	660 (299)	
ESV323-TPP-XXX	27kV 3-Way 3-Phase (1) Source Switch, (2) Vacuum Interrupter Taps	40 (1,016)	48 (1,219)	22 (559)	660 (299)	
ESV313-TTP-XXX	15kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	40 (1,016)	48 (1,219)	22 (559)	660 (299)	
ESV323-TTP-XXX	27kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	40 (1,016)	48 (1,219)	22 (559)	660 (299)	
ESV314-TPPP-XXXX	15kV 4-Way 3-Phase (1) Source Switch, (3) Vacuum Interrupter Taps	40 (1,016)	48 (1,219)	22 (559)	880 (399)	
ESV324-TPPP-XXXX	27kV 4-Way 3-Phase (1) Source Switch, (3) Vacuum Interrupter Taps	40 (1,016)	48 (1,219)	22 (559)	880 (399)	
ESV314-TTPP-XXXX	15kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	40 (1,016)	48 (1,219)	22 (559)	880 (399)	
ESV324-TTPP-XXXX	27kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	40 (1,016)	48 (1,219)	22 (559)	880 (399)	
ESV314-TTTP-XXXX	15kV 4-way 3-Phase (3) Source Switches, (1) Vacuum Interrupter Tap	40 (1,016)	48 (1,219)	22 (559)	880 (399)	
ESV324-TTTP-XXXX	27kV 4-Way 3-Phase (3) Source Switches, (1) Vacuum Interrupter Tap	40 (1,016)	48 (1,219)	22 (559)	880 (399)	
Padmount						
PMVI1-21-15-XX	15kV 2-Way 1-Phase Interrupter	36 (914)	30 (762)	30 (762)	310 (141)	
PMVI1-21-27-XX	27kV 2-Way 1-Phase Interrupter	36 (914)	30 (762)	30 (762)	310 (141)	
PMVI1-21-38-XX	38kV 2-Way 1-Phase Interrupter	36 (914)	30 (762)	30 (762)	310 (141)	
PMVI1-21-15-XX-3YY	15kV 2-Way 3-Phase Interrupter 1-Phase Trip Selectable Ext. Control	48 (1,219)	42 (1,067)	30 (762)	680 (308)	
PMVI1-21-27-XX-3YY	27kV 2-Way 3-Phase Interrupter 1-Phase Trip Selectable Ext. Control	48 (1,219)	42 (1,067)	30 (762)	680 (308)	
PMVI1-21-38-XX-3YY	38kV 2-Way 3-Phase Interrupter 1-Phase Trip Selectable Ext. Control	48 (1,219)	42 (1,067)	30 (762)	680 (308)	
ESD312-P-XX	15kV 2-Way 3-Phase (1) Vacuum Interrupter Tap	36 (914)	48 (1,219)	42 (1,067)	680 (308)	
ESD322-P-XX	27kV 2-Way 3-Phase (1) Vacuum Interrupter Tap	36 (914)	48 (1,219)	42 (1,067)	680 (308)	
ESD332-P-XX	38kV 2-Way 3-Phase (1) Vacuum Interrupter Tap	36 (914)	48 (1,219)	42 (1,067)	680 (308)	
ESD313-TPP-XXX	15kV 3-Way 3-Phase (1) Source Switch, (2) Vacuum Interrupter Taps	54 (1,372)	48 (1,219)	54 (1,372)	1,160 (526)	
ESD323-TPP-XXX	27kV 3-Way 3-Phase (1) Source Switch, (2) Vacuum Interrupter Taps	54 (1,372)	48 (1,219)	54 (1,372)	1,160 (526)	
ESD333-TPP-XXX	38kV 3-Way 3-Phase (1) Source Switch, (2) Vacuum Interrupter Taps	72 (1,829)	54 (1,372)	72 (1,829)	1,500 (680)	
ESD313-TTP-XXX	15kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	54 (1,372)	48 (1,219)	54 (1,372)	1,160 (526)	
ESD323-TTP-XXX	27kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	54 (1,372)	48 (1,219)	54 (1,372)	1,160 (526)	
ESD333-TTP-XXX	38kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	72 (1,829)	54 (1,372)	72 (1,829)	1,500 (680)	
ESD314-TPPP-XXXX	15kV 4-Way 3-Phase (1) Source Switch, (3) Vacuum Interrupter Taps	54 (1,372)	48 (1,219)	54 (1,372)	1,380 (626)	
ESD324-TPPP-XXXX	27kV 4-Way 3-Phase (1) Source Switch, (3) Vacuum Interrupter Taps	54 (1,372)	48 (1,219)	54 (1,372)	1,380 (626)	
ESD334-TPPP-XXXX	38kV 4-Way 3-Phase (1) Source Switch, (3) Vacuum Interrupter Taps	72 (1,829)	54 (1,372)	72 (1,829)	1,500 (680)	
ESD314-TTPP-XXXX	15kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	54 (1,372)	48 (1,219)	54 (1,372)	1,380 (626)	
ESD324-TTPP-XXXX	27kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	54 (1,372)	48 (1,219)	54 (1,372)	1,380 (626)	
ESD334-TTPP-XXXX	38kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	72 (1,829)	54 (1,372)	72 (1,829)	1,500 (680)	
ESD314-TTTP-XXXX	15kV 4-Way 3-Phase (3) Source Switches, (1) Vacuum Interrupter Tap	54 (1,372)	48 (1,219)	54 (1,372)	1,380 (626)	
ESD324-TTTP-XXXX	27kV 4-Way 3-Phase (3) Source Switches, (1) Vacuum Interrupter Tap	54 (1,372)	48 (1,219)	54 (1,372)	1,380 (626)	
ESD334-TTTP-XXXX	38kV 4-Way 3-Phase (3) Source Switches, (1) Vacuum Interrupter Tap	72 (1,829)	54 (1,372)	72 (1,829)	1,500 (680)	

NOTE: X = 6 for 600A or 2 for 200A.
YY = 10, 20, 30, 80 for different electronic controls.
Consult your local representative on 38kV multi-way configurations.

Automatic Source Transfer

The main application of source transfer packages is to transfer a load from one power source to another. In some cases, when the load is not critical, this is done manually using a switching device. In the case of critical loads for hospitals, financial institutions, manufacturing facilities or any other load that would have computerized equipment, a fast transfer is required between the main (preferred) source and the backup (alternate) source. It is important for the automatic source transfer not to affect the operation of the load because any interruption of the business process translates into costly lost production and setup time. The preferred and backup sources are normally utility feeders, but in some cases the backup source may be a generator.

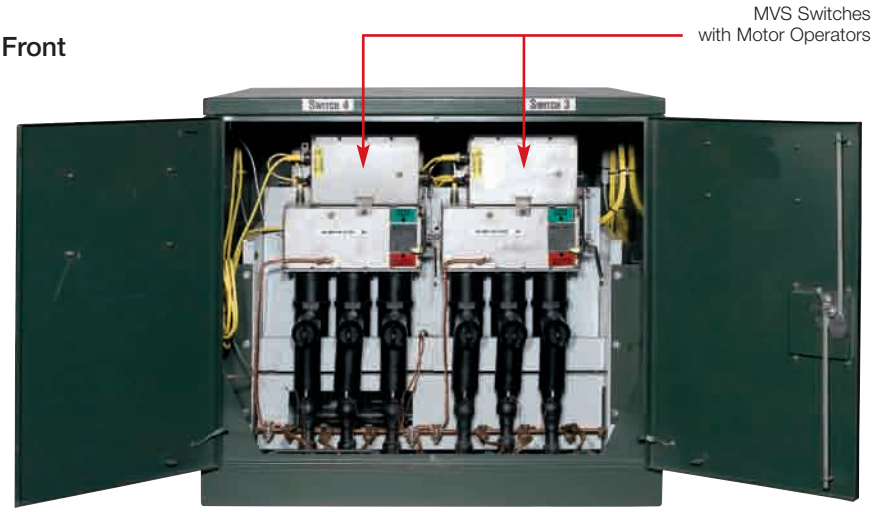
Elastimold® Switchgear offers automatic transfer (AT) packages capable of performing a full transfer in less than two seconds. The system monitors the voltage on the preferred source and initiates a transfer when the voltage is below the acceptable level for the customer. At this point, the preferred source is disconnected and the alternate source is connected.

AT Packages Include:

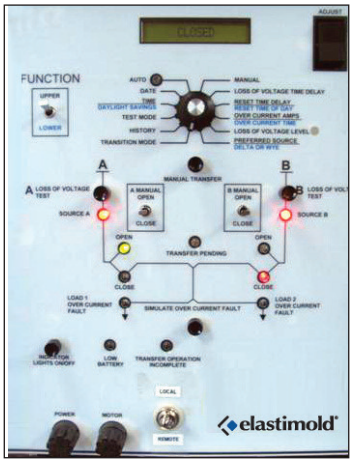
- Two three-phase MVS Switches with motor operators (one for the preferred source and one for the alternate source).
- Six voltage sensors (one for each phase of the MVS switches). These sensors monitor voltage on every phase and feed their output to the AT control.
- AT control, which receives the output from the voltage sensors and determines if there is a loss of voltage. If there is a loss of voltage, the AT control sends an OPEN signal to the preferred source MVS and a CLOSE signal to the alternate source MVS. When the voltage is restored, the system transfers back to its normal state, either automatically or at a set time.
- One or two protected taps, either MCAN or MVI modules, which protect the critical load against overcurrent. Solid taps are also available.

Padmount Automatic Source Transfer*

Front



Control Panel



Back

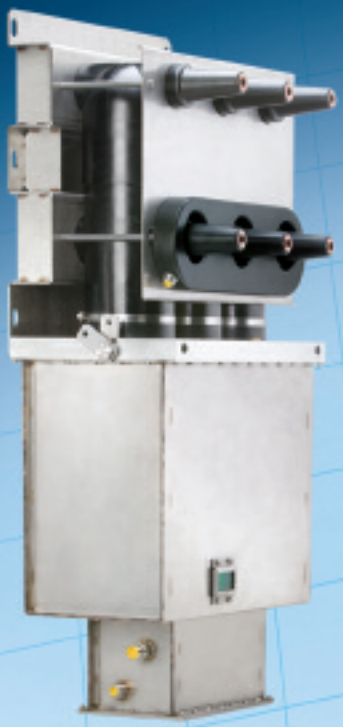
* Automatic Source Transfer packages are also available for subsurface/vault installations.

Ordering Information for Elastimold® Automatic Source Transfer Packages

CAT. NO.	Description	Width in. (mm)	Height in. (mm)	Depth in. (mm)	Weight lb. (kg)	Diagram
Subsurface (2-MVS3 interconnected with multi-point junctions. For wall/floor mounting.)						
ATS312-AA-XX	15kV 2-Way 3-Phase (2) Source Switches, Customer Connected Tap	21 (533)	19 (483)	26 (660)	60 (27)	
ATS322-AA-XX	25kV 2-Way 3-Phase (2) Source Switches, Customer Connected Tap	21 (533)	19 (483)	26 (660)	60 (27)	
ATS313-AAB-XXX	15kV 3-Way 3-Phase (2) Source Switches, (1) Solid Tap	22 (559)	79 (2,007)	21 (533)	300 (136)	
ATS323-AAB-XXX	25kV 3-Way 3-Phase (2) Source Switches, (1) Solid Tap	22 (559)	79 (2,007)	21 (533)	300 (136)	
ATS314-AABB-XXXX	15kV 4-Way 3-Phase (2) Source Switches, (2) Solid Taps	22 (559)	79 (2,007)	21 (533)	300 (136)	
ATS324-AABB-XXXX	25kV 4-Way 3-Phase (2) Source Switches, (2) Solid Taps	22 (559)	79 (2,007)	21 (533)	300 (136)	
ATS313-AAP-XXX	15kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	22 (559)	79 (2,007)	21 (533)	450 (204)	
ATS323-AAP-XXX	25kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	22 (559)	79 (2,007)	21 (533)	450 (204)	
ATS314-AAPP-XXXX	15kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	22 (559)	79 (2,007)	21 (533)	600 (272)	
ATS324-AAPP-XXXX	25kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	22 (559)	79 (2,007)	21 (533)	600 (272)	
Vault (All ways mounted onto a common bus and supported by a free-standing frame. For floor mounting.)						
ATV313-AAB-XXX	15kV 3-Way 3-Phase (2) Source Switches, (1) Solid Tap	48 (1,219)	36 (914)	22 (559)	620 (281)	
ATV323-AAB-XXX	25kV 3-Way 3-Phase (2) Source Switches, (1) Solid Tap	48 (1,219)	36 (914)	22 (559)	620 (281)	
ATV313-AAP-XXX	15kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	48 (1,219)	36 (914)	22 (559)	750 (340)	
ATV323-AAP-XXX	25kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	48 (1,219)	36 (914)	22 (559)	750 (340)	
ATV314-AAPP-XXXX	15kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	48 (1,219)	36 (914)	22 (559)	880 (399)	
ATV324-AAPP-XXXX	25kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	48 (1,219)	36 (914)	22 (559)	880 (399)	
Padmount						
ATD313-AAP-XXX	15kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	54 (1,317)	48 (1,219)	54 (1,317)	1,160 (526)	
ATD323-AAP-XXX	25kV 3-Way 3-Phase (2) Source Switches, (1) Vacuum Interrupter Tap	54 (1,317)	48 (1,219)	54 (1,317)	1,160 (526)	
ATD314-AAPP-XXXX	15kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	54 (1,317)	48 (1,219)	54 (1,317)	1,380 (626)	
ATD324-AAPP-XXXX	25kV 4-Way 3-Phase (2) Source Switches, (2) Vacuum Interrupter Taps	54 (1,317)	48 (1,219)	54 (1,317)	1,380 (626)	

* Dimensions for one switch.
** Dimensions for 2-MVS3 interconnected with Multi-Point Junctions. MVIs are mounted elsewhere in the vault.
NOTE: X = 6 for 600A or 2 for 200A.
Other configurations are available. Please consult your local representative on configurations not shown here.

New Elastimold® Switchgear Products!



38kV 25kA Molded Vacuum Interrupter (MVI)

The new 38kV 25kA Molded Vacuum Interrupter (MVI) incorporates Elastimold's proven combination of EPDM molded insulation with a vacuum interrupter. This latest addition to our solid-dielectric family of switchgear utilizes a 25kA symmetrical vacuum bottle interrupter and a magnetic actuator mechanism, along with our current sensor and a broad line of control options, ranging from internal E-Set software to our 80 Control or the SEL-351 Relay. The small, lightweight unit is maintenance-free and environmentally friendly, containing no gas or oil, and is available for subsurface, vault, tower, padmount or riser-pole applications.

38kV 25kA Current-Limiting Molded Vacuum Interrupter (MCLVI)

The new 38kV 25kA Current-Limiting Molded Vacuum Interrupter (MCLVI) incorporates Elastimold's proven combination of EPDM molded insulation with a current-limiting fuse and vacuum interrupter. This addition to our solid-dielectric family of switchgear utilizes a vacuum interrupter to clear low-magnitude faults in series with a Hi-Tech® current-limiting fuse to clear higher-magnitude faults, substantially reducing energy let-through. The unit includes our current sensor and internal control. If a single current-limiting fuse clears a fault, the MVI will sense an imbalance and trip to prevent single phasing. The small, lightweight unit is maintenance-free and environmentally friendly, containing no gas or oil, and is available for subsurface, vault, tower, padmount or riser-pole applications. Choose a stacked (shown), linear or back-to-back arrangement. When used for transformer protection, the fuses can be coordinated with the vacuum interrupter so that the fuses will only operate in the event of a transformer failure.

For more information on these new Elastimold Switchgear products, contact your T&B Sales Representative.

elastimold®

QUICK REFERENCE

Elastimold® Molded Fuse Products

page(s)

elastimold®

Elastimold® molded fuses improve system reliability and provide full-range current-limiting protection.

Give your system the full-range current-limiting protection of Elastimold® molded fuse products. Our Fused Elbows provide protection for radial taps, junctions and transformers. Our Molded Current-Limiting Fuses and Molded Canister Fuses are suitable for single-phase tap/load protection in a variety of installations.

Capable of interrupting in elevated ambient temperature, Elastimold® fuses are built tough to take the heat!

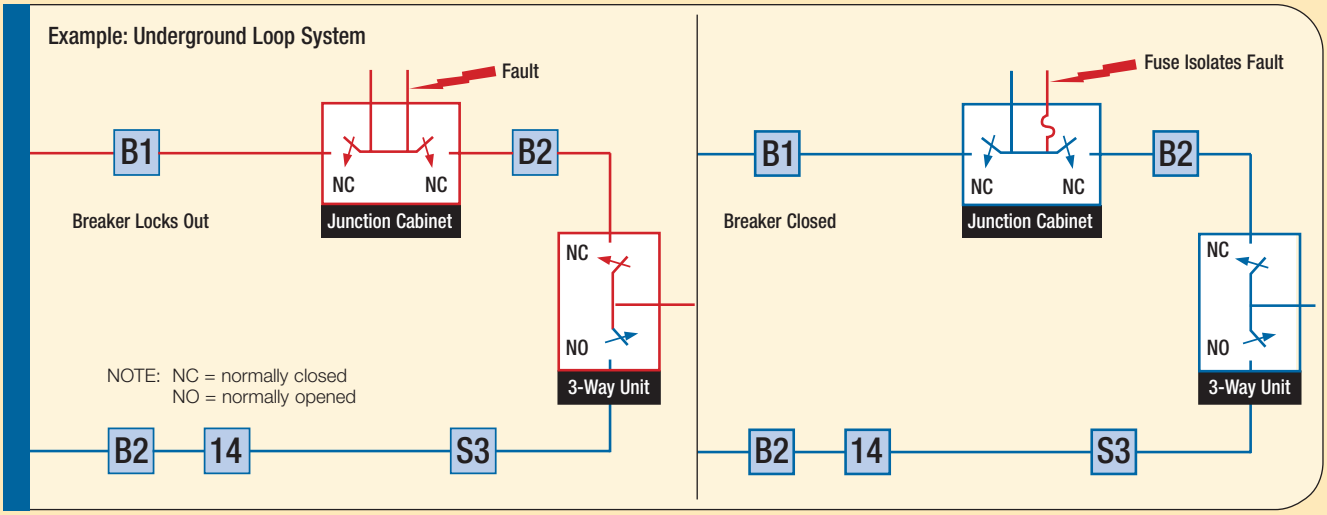
Elastimold® Fused Products cover a wide range of applications and ratings. Fused Elbows (FLR), Molded Current-Limiting Fuses (MCLF) and Molded Canister Fuses (MCAN) provide full-range protection through 50kA using Hi-Tech® full-range fuses. The fuses in these products can easily be replaced with minimal downtime. Fused load-break elbows provide low-cost, convenient protection for radial taps, junctions, transformers and other equipment. They combine the advantages of full-range current-limiting fusing with the convenience of 15/25kV, 200A hotstick-operable, loadbreak elbow switching. MCLF and MCAN are suitable for single-phase tap/load protection and can be used in vault, subsurface or padmount installations.

Elastimold® Fused Products provide the benefits of current-limiting protection, with fault clearing occurring in less than one-half cycle, thereby limiting the let-through fault current and dramatically reducing stresses on equipment. They also provide both overload and fault current protection for distribution equipment in a single fuse body. As full-range fuses, they are capable of interrupting any continuous current between the minimum current that can cause melting of the elements and its rated maximum interrupting current (50,000A). All fuses are capable of interrupting in elevated ambient temperatures. Hi-Tech® fuse design features include:

- **A patented damage sensor that significantly reduces the risk of fuse failure should the fuse be subjected to an element-damaging current surge (e.g. lightning).**
- **Hermetically sealed construction ensures that no gases escape from the fuse during current interruption.**
- **All fuses are helium mass spectrometer leak tested to ensure sealing system integrity.**
- **Rugged machined-brass end caps used for greater ferrule strength, resulting in less distortion and a more secure fuse attachment.**

Elastimold® FLR, MCLF and MCAN fused products constitute some of the fastest and easiest ways to improve system reliability.

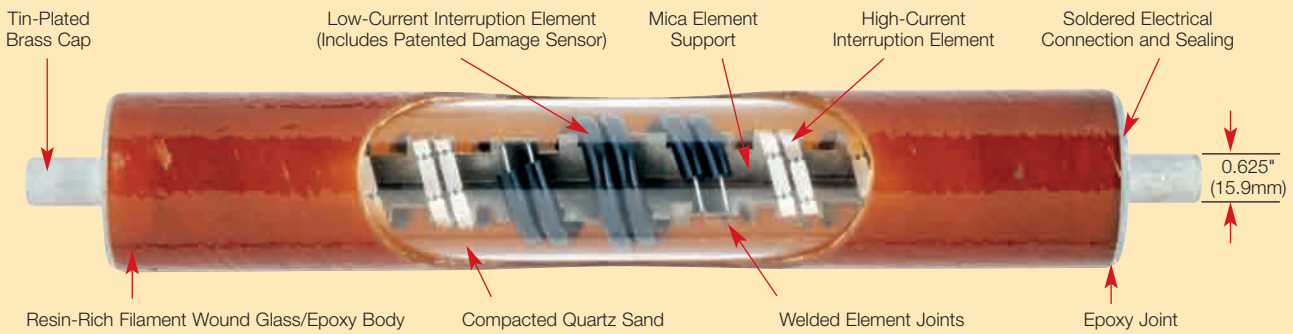
Improve Loop System Reliability by Adding Protection to a Tap.



Loop system without tap protection: A fault on the tap will lock out the substation breaker and create an outage for all customers to the open point.

Loop system with tap protection: A fault on the tap will be isolated by the fuses. This reduces the number of customers affected by the outage, thus improving the System Average Interruption Frequency Index (SAIFI).

Full-Range Current-Limiting Fuse



Elastimold® Fused Elbows

The fastest, most cost-effective way to improve a distribution system's reliability.

Replace existing 200A tap elbows with Elastimold® Fused Elbows to protect light-duty underground distribution systems, including sub-loops, radial taps, junctions, transformers and other equipment.

Elastimold® Fused Elbows provide full-range current-limiting fusing with 50kA interrupting capability. They are rated for 5kV ungrounded to 28kV grounded Wye. Plus they provide 15/25kV hotstick-operable, loadbreak elbow switching.

Features	Benefits/Descriptions
Combined Full-Range Current-Limiting Fusing 15/25kV Hotstick-Operable, Loadbreak Elbow Switching	Quickly improve the distribution system's reliability without the expense of adding a separate piece of switchgear or replacing existing sectionalizing cabinets.
High Fault Close Rating	Current-limiting fuses improve the fault close rating of the elbow (10kA) to that of the fuse, thereby reducing the risk of component damage or personnel injury.
EPDM Molded Rubber Deadfront Construction	Elbows are fully sealed and submersible, and they insulate, shield and eliminate exposed live parts.
Two-Piece Housing	Enables easy fuse replacement.

Ratings

System Voltage Class (kV)	15	25*	25/28*
Nominal Fuse Voltage (kV)	8.3	15.5	17.2
Rated Maximum Fuse Voltage (kV)	8.8/10	15.5	17.2
Frequency (Hz)	50/60	50/60	50/60
BIL Impulse Withstand (kV)	95	125	140
One-Minute AC Withstand (kV)	34	40	45
Fifteen-Minute DC Withstand (kV)	53	78	78
Corona Extinction (kV)	11	19	21.5
Symmetrical Interrupting Capability (Amp)	50,000	50,000	50,000
Current Rating (Amp)	3–80	6–20	3–45

Application Information

Construction: Submersible, non-venting, deadfront, corrosion resistant
Ambient Temperature Range: -30° C to 65° C

* The 15.5kV L-G rated fuse requires 75% grounded load to be applied on a 25kV system.
The 17.2kV L-G rated fuse requires at least 75% grounded load to be applied on a 28kV system.

NOTE: Fuses are only suitable for the system voltage class shown if the recovery voltage across the fuse will not exceed its rated maximum voltage.
For three-phase applications, this generally requires that protected transformers be gndY–gndY and have at least 50% grounded load.
Fuse replacement requires the elbow to be de-energized.

Certified Tests

Elastimold® Fused Elbows have been designed and tested per applicable portions of IEEE, ANSI and other industry standards, including:

ANSI C37.40 Standard for Current-Limiting Fuse Service Conditions
ANSI C37.41 Standard for Current-Limiting Fuse Design & Testing
ANSI C37.47 Standard for Current-Limiting Fuse Ratings & Specifications
IEEE 386 Standard for Separable Connectors

Electrical Characteristics of Elastimold® EFX-E Elbow Fuses

System Voltage Class (kV)	Nominal Fuse Voltage Rating (kV)	Current Rating (Amps)	Fuse CAT. NO.	Rated Maximum Voltage (kV)	Maximum Continuous Current (2) (6)			Peak Arc Voltage (kV) (5)	Minimum Melt I²t (AMP²-SEC)	Maximum Total I²t (AMP²-SEC) (3) (4)
					25° C	40° C	65° C			
15	8.3	3	EFX083003-E	10.0	4.3	4.2	3.9	30	100	350
		6	EFX083006-E		9.5	9.0	8.5	32	620	2,700
		8	EFX083008-E		11.5	11.0	10.5	28	800	4,000
		10	EFX083010-E		14.0	13.5	13.0	28	800	4,000
		12	EFX083012-E		19.0	18.5	17.5	26	920	8,000
		18	EFX083018-E		21.0	20	19.0	26	1,310	9,500
		20	EFX083020-E		26.0	25	24.0	26	1,620	11,000
		25	EFX083025-E		34.0	33.0	31.0	26	3,660	22,000
		30	EFX083030-E		37.5	36.5	34.5	26	5,250	30,000
		40	EFX083040-E		43.0	42.0	40.0	26	8,700	50,000
		45	EFX083045-E		49.0	47.0	45.0	26	12,800	70,000
		65	EFX083065-E	8.8	70.0	68.0	64.5	23	34,000	200,000
		80	EFX083080-E		80.0	77.5	73.5	22	51,200	280,000
25	15.5	6	EFX155006-E	15.5	8.5	8.0	7.7	52	620	3,000
		8	EFX155008-E		10.5	10.0	9.5	40	800	4,300
		10	EFX155010-E		13.0	12.5	12.0	40	800	4,300
		12	EFX155012-E		16.0	15.5	15.0	38	920	8,000
		18	EFX155018-E		20.0	19.5	18.5	38	1,620	13,000
		20	EFX155020-E		23.5	22.5	21.5	38	2,200	16,500
25/28	17.2	3	EFX172003-E	17.2	4.3	4.2	3.9	51	100	510
		6	EFX172006-E		9.5	9.0	8.5	54	620	3,250
		8	EFX172008-E		11.5	11.0	10.5	46	800	4,600
		10	EFX172010-E		14.0	13.5	13.0	46	800	4,600
		12	EFX172012-E		18.0	17.5	16.5	43	920	8,500
		18	EFX172018-E		20.0	19.5	18.5	45	1,310	10,000
		20	EFX172020-E		24.0	23.0	22.0	45	1,620	12,500
		25	EFX172025-E		31.5	30.5	29.0	45	3,660	27,500
		30	EFX172030-E		35.5	34.5	32.5	45	5,250	37,500
		40	EFX172040-E		41.0	40.0	38.0	45	8,700	62,500
		45	EFX172045-E		46.0	45.0	42.5	45	12,800	87,500

NOTE:
1. Designs have a 50,000A RMS Symmetrical Rating (except 3A, 17.2kV — which was tested at 44kA maximum).
2. Fuses have a Rated Maximum Application Temperature (RMAT) of 65° C. RMAT is the maximum temperature of the air, in contact with the elbow housing, at which fuses have been shown to be suitable for use.
3. Tabulated Maximum Total I²t values are for currents of 50,000A at the nominal voltage of the fuse. Values for 8.3kV fuses at 10kV are approximately 30% higher. Values for 17.2kV fuses at 15.5kV are approximately 20% lower.
4. Maximum total I²t values are reduced for currents below 50,000A. For example, at 10,000A, maximum total I²t values are approximately 15% less than the published values.
5. Peak arc voltages listed are for 50,000A currents at the rated maximum voltage listed. Reduced currents and voltages will reduce the peak arc voltage. Consult the factory for further information.
6. Maximum continuous currents at ambient temperatures other than those listed may be determined by derating the fuses by 0.2% per degree C over 25° C. For example: At 40° C the derating would be 15 x 0.2 = 3%, making the maximum continuous current of a 17.2kV, 25A fuse 31.5 x 0.97 = 30.5A.
7. Time-current characteristic curves are published at 25° C. Reduction in the long time melting current of the fuses (approximately one hour and longer) due to higher ambient temperatures is the same as described above for “maximum continuous currents.”

Recommended Elastimold® EFX-E Elbow Fuse at 40° C Ambient Temperature

Recommended Fuse Current Ratings (Amperes)

Fuse Voltage	8.3kV										15.5kV (17.2kV)					
	Transformer 1-Phase Voltage Rating (kV), Phase to Ground															
1-Phase	2.4		4.16		4.8		7.2		7.62		12		14.4		16	
Transformer kVA	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
10	—	6	—	6[a]	—	3	—	3	—	3	—	6[a]	—	6[a]	—	(3[a])
15	—	10	—	6	—	6[a]	—	3	—	3	—	6[a]	—	6[a]	—	(3[a])
25	12	20	—	8	—	8	—	6	—	6	—	6[a]	—	6[a]	—	(3)
37.5	20	25	—	12	—	12	—	8	—	6	—	6	—	6[a]	—	(6[a])
50	25	40	18	20	12	20	10	12	—	10	—	6	—	6	—	(6[a])
75	45	65	20	30	20	25	12	20	12	18	—	10	—	8	—	(8)
100	65	80	30	45	25	40	18	25	18	25	12	18	10	12	—	(10)
167	—	—	65	80	45	65	25	45	25	45	18	(25)	18	20	(12)	(20)
250	—	—	80	—	80	—	45	65	45	65	(25)	(45)	20	(30)	(20)	(30)
333	—	—	—	—	—	—	65	—	80	—	(40)	—	(30)	(45)	(25)	(45)
500	—	—	—	—	—	—	—	—	—	—	—	—	(45)	—	(45)	—

Recommended Elastimold® EFX-E Elbow Fuse at 40° C Ambient Temperature

Recommended Fuse Current Ratings (Amperes)

Fuse Voltage	8.3kV														15.5kV (17.2kV)			
3-Phase	Transformer 3-Phase Voltage Rating (kV), Phase to Phase																	
gndY-gndY	2.4		4.16		4.8		7.2–7.96		8.32		12.47		13.2–14.4		20.8		22.9–24.9	
Transformer kVA	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
15	—	6	—	3	—	3	—	3[a]	—	3[a]	—	6[a]	—	6[a]	—	6[a]	—	(3[a])
22.5	—	8	—	6[a]	—	6[a]	—	3	—	3	—	6[a]	—	6[a]	—	6[a]	—	(3[a])
30	10	12	—	6	—	6	—	6[a]	—	3	—	6[a]	—	6[a]	—	6[a]	—	(3[a])
45	12	20	—	10	—	8	—	6	—	6[a]	—	6[a]	—	6[a]	—	6[a]	—	(3[a])
75	20	30	12	20	—	12	—	8	—	8	—	6	—	6	—	6[a]	—	(3)
100	30	45	18	25	18	20	—	12	—	10	—	8	—	8	—	6[a]	—	(6[a])
112.5	40	65	20	25	18	25	—	12	—	12	—	8	—	8	—	6	—	(6[a])
150	45	80	25	40	20	30	18	20	12	20	10	12	10	12	—	6	—	(6)
200	65	80	40	65	30	45	20	25	18	25	12	18	12	18	8	10	—	(8)
225	80	—	45	65	40	65	20	30	20	25	12	20	12	18	8	10	—	(10)
300	—	—	65	80	45	80	30	45	25	40	18	25	18	25	12	18	—	(12)
500	—	—	—	—	80	—	65	80	45	80	30	45	30	45	18	(25)	(18)	(25)
750	—	—	—	—	—	—	80	—	80	—	45	65	45	—	(25)	(45)	(25)	(40)
1,000	—	—	—	—	—	—	—	—	—	—	80	—	—	—	(40)	—	(40)	—

NOTE:
1. Column A = 140–200% of transformer rating and Column B = 200–300% of transformer rating.
2. Ratings in parenthesis are 17.2kV fuses.
3. 8.3kV, 3–45A fuses and 15.5kV, 6–20A fuses are used in the small (size 1) elbow housing; 8.3kV, 65–80A fuses and 17.2kV, 3–45A fuses are used in the large (size 3) elbow fuse housing.
4. Recommended fuses meet inrush criteria of 12 times transformer full-load current for 0.1 second and 25 times transformer full-load current for 0.01 second. Fuses also meet cold-load pickup criteria of 6 times transformer full-load current for 1 second and 3 times transformer full-load current for 10 seconds.

a. Fuse allows greater than 300% of transformer rating.

Ordering Information for Elastimold® Fuse Housings

The following diagram shows how to construct a catalog number for Fuse Housings.

☐ Indicates field that must be filled in to complete order.

☐ ☐ **FLR** ☐ - ☐ **Ø** ☐

Nominal Fuse Voltage Rating

	Code
8.3kV	**168**
15.5kV	**274**
17.2kV	**274**

Housing

	Code
Small*	**1**
Large**	**3**

Fuse Test Port

	Code
Two Direct Test Ports	**A**
Two Capacitive Test Points	**Blank**

Cable Insulation Diameter (in.)

		Code
0.575"–0.740"	15–19mm	**A**
0.635"–0.905"	16–23mm	**B**
0.805"–1.060"	20–27mm	**C**
0.890"–1.220"	25–31mm	**D**

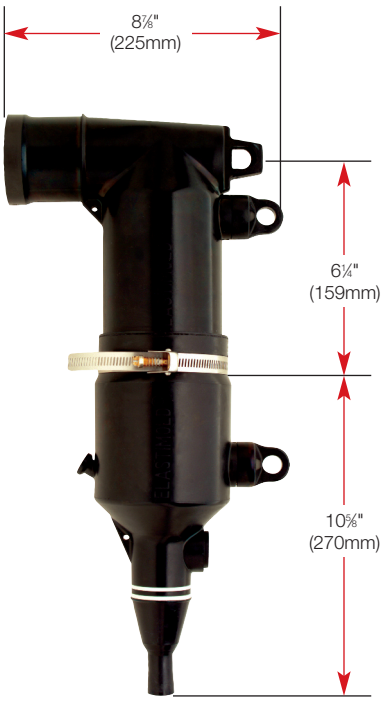
Conductor Size

Size (AWG) Stranded/ Compressed	Solid/ Compact	Connector Code
6	—	**180**
—	4	**190**
4	—	**200**
—	2	**210**
2	1	**220**
1	1/0	**230**
1/0	2/0	**240**
2/0	3/0	**250**
3/0	4/0	**260**
4/0	—	**270**

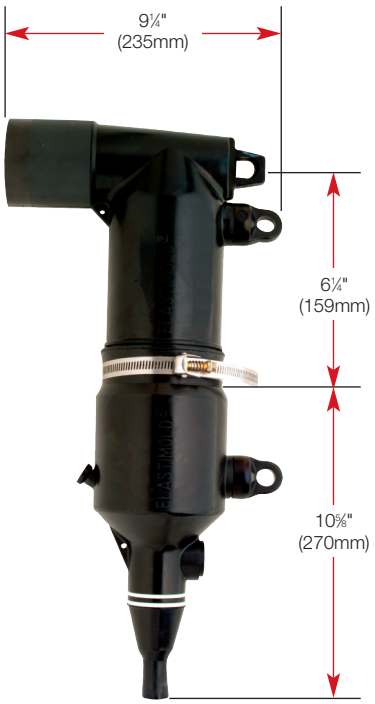
* Small Housing is used with 8.3kV (3–45A) and 15.5kV (6–20A) rated fuses.

** Large Housing is used with 8.3kV (65A and 80A) and 17.2kV (3–45A) rated fuses.

168FLR1

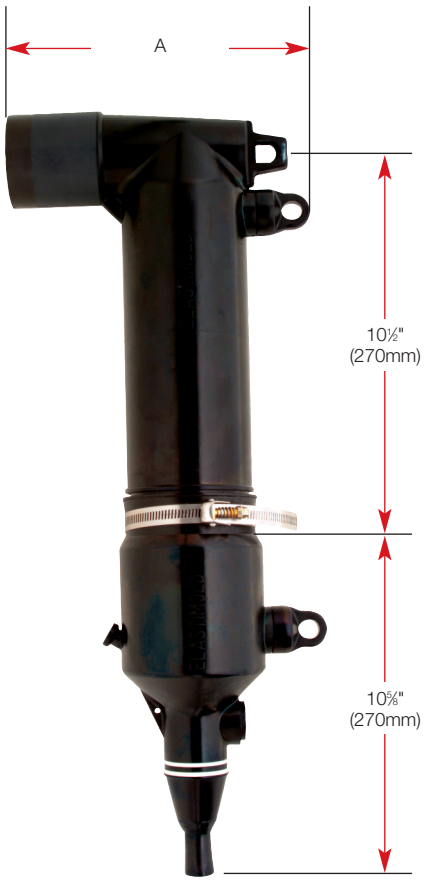


274FLR1



168FLR3 A = 8⅞" (225mm)

274FLR3 A = 9¼" (235mm)



NOTE: 1. All dimensions rounded up to the nearest eighth inch.
2. Also available with direct test port.
3. Dimensions with Direct Test Port units are 10¼" (260mm) or 10⅝" (270mm).
4. 168FLR3 uses a large housing with a 15kV, 200A elbow interface.

Ordering Information for Elastimold® Full-Range Current-Limiting Fuses

The following diagram shows how to construct a catalog number for Full-Range Current-Limiting Fuses.

Indicates field that must be filled in to complete order.

E F X [ ] [ ] **- E**

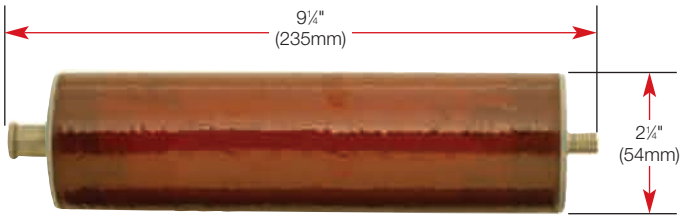
Voltage Rating

	Code
8.3kV	**083**
15.5kV	**155**
17.2kV	**172**

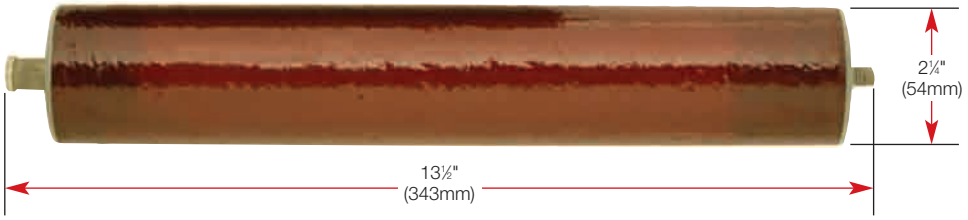
Amperage Rating

		Code
3A	8.3/17.2kV	**003**
6A	8.3/15.5/17.2kV	**006**
8A	8.3/15.5/17.2kV	**008**
10A	8.3/15.5/17.2kV	**010**
12A	8.3/15.5/17.2kV	**012**
18A	8.3/15.5/17.2kV	**018**
20A	8.3/15.5/17.2kV	**020**
25A	8.3/17.2kV	**025**
30A	8.3/17.2kV	**030**
40A	8.3/17.2kV	**040**
45A	8.3/17.2kV	**045**
65A	8.3kV	**065**
80A	8.3kV	**080**

8.3kV (3–45A)/15.5kV (6–20A) Fuse



8.3kV (65–80A)/17.2kV (3–45A) Fuse



NOTE: All dimensions rounded up to the nearest eighth inch.

Molded Current-Limiting Fuses

You're covered. These fuses provide full-range protection through 50kA interrupting current.

Molded Current-Limiting Fuses feature modular construction with a center replaceable fuse section and interchangeable end fittings for elbow connection or direct attachment to equipment-mounted bushings. The various end fittings enable fuses to be applied throughout the system, including switchgear, junctions, transformers, cable runs and taps.

Elastimold® Molded Current-Limiting Fuses are available in:

- 80A through 180A ratings for applications on 5kV systems
- 6A through 115A ratings for applications on 15kV grounded Wye systems
- 6A through 100A ratings for applications on 25kV grounded Wye systems
- 6A through 50A ratings for applications on 35kV grounded Wye systems

Features	Benefits/Descriptions
EPDM Molded Rubber Deadfront Construction	Insulates, sheilds and eliminates exposted live parts. Lightweight fuses are fully sealed and submersible.
Specially Designed Fuse Elements with Built-In Low- and High-Current Interrupting Capability	Provide full-range fault current protection through 50kA.
Current-Limiting Protection — Fault Clearing Occurs in Less than One-Half Cycle	Limits the system available fault current and dramatically reduces stresses on equipment.
Internal Fuse Shield	Prevents corona and deterioration of the fuse element.
Modular Construction with a Center Replaceable Fuse Section and Interchangeable End Fittings	Enables elbow connection or direct attachment to equipment-mounted bushings on junctions, transformers, cable runs and taps.
Compact	Suitable for padmount, subsurface or vault installations.
304 Stainless Steel Brackets and Hold-Down Straps Available	Accommodate a wide variety of mounting arrangements.

Ratings

System Voltage Class (kV)	5	15	25/28*	35
Rated Maximum Fuse Voltage (kV)	5.5	8.3/10**	15.5/17.2**	23
Frequency (Hz)	50/60	50/60	50/60	50/60
BIL Impulse Withstand (kV)	60	95	125/140	150
One-Minute AC Withstand (kV)	34	34	40–45	50
Fifteen-Minute DC Withstand (kV)	53	53	78	103
Corona Extinction (kV)	11	11	19/21.5	26
Symmetrical Interrupting Capability (Amp)	50,000	50,000	50,000	50,000
Current Rating (Amp)	80–180	10–115	10–100	10–50

Application Information

Construction: Submersible, non-venting, deadfront, corrosion resistant

Ambient Temperature Range:
-30° C to 65° C for 6–50A fuses;
-30° C to 40° C for >50A fuses.

* 15.5kV L-G rated fuses require 75% grounded load to be applied on a 25kV system.
**17.2kV L-G rated fuses require at least 75% grounded load to be applied on a 28kV system.
NOTE: Fuse replacement requires the MCLF to be de-energized.
Fuses are only suitable for the system voltage class shown if the recovery voltage across the fuse will not exceed its rated maximum voltage. For three-phase applications, this generally requires that protected transformers be gndY-gndY and have at least 50% grounded load.

Certified Tests

Elastimold® Molded Current-Limiting Fuses have been designed and tested per applicable portions of IEEE, ANSI, NEMA and other industry standards, including:

ANSI C37.40 Standard for Current-Limiting Fuse Service Conditions
ANSI C37.41 Standard for Current-Limiting Fuse Design & Testing
ANSI C37.47 Standard for Current-Limiting Fuse Ratings & Specifications
ANSI/IEEE 386 Standard for Separable Connectors and Bushing Interfaces

Interchangeable Molded Rubber End Fittings

Replaceable Molded Rubber Current-Limiting Fuse

Assembled Fuse Unit

Assembled Fuse Unit with Optional Wall-Mounting Bracket

Electrical Characteristics of Encapsulated Fuses Used in MCLF

Nominal Fuse Voltage Rating (kV)	Current Rating (Amps)	Fuse Catalog Number	Rated Maximum Voltage (kV)	Maximum Continuous Current (2) (6)		Peak Arc Voltage (kV) (5)	Minimum Melt I^2t (AMP^2-SEC)	Maximum Total I^2t (AMP^2-SEC) (3) (4)
				25° C	40° C			
5.5	80	M05CLF080	5.5	86	84	15	22,100	110,000
	100	M05CLF100		108	105	15	56,700	280,000
	125	M05CLF125		137	133	15	109,200	530,000
	150	M05CLF150		159	154	15	176,000	860,000
	180	M05CLF180		185	180	15	259,000	1,270,000
8.3	10	M15CLF010	10.0	14	13	28	800	4,000
	20	M15CLF020		23	22	26	1,620	11,000
	30	M15CLF030		35	33	26	5,250	30,000
	40	M15CLF040		43	41	26	8,700	50,000
	50	M15CLF050		51	47	26	12,800	70,000
	65	M15CLF065	8.3	73	71	25	25,200	100,000
	80	M15CLF080		87	84	25	47,000	185,000
	100	M15CLF100		106	103	25	78,300	330,000
	115	M15CLF115		120	116	25	115,150	480,000
15.5	10	M25CLF010	17.2	14	13	46	800	3,700
	20	M25CLF020		23	22	45	1,620	10,000
	30	M25CLF030		35	33	45	5,250	30,000
	40	M25CLF040		43	41	45	8,700	50,000
	50	M25CLF050		47	45	45	12,800	70,000
	65	M25CLF065	15.5	68	66	40	25,200	110,000
	80	M25CLF080		88	84	40	54,400	255,000
	100	M25CLF100		100	100	40	80,000	380,000
23.0	10	M35CLF010	23.0	14	13	61	800	4,800
	20	M35CLF020		23	22	60	1,620	13,000
	30	M35CLF030		35	33	60	5,250	38,000
	40	M35CLF040		41	40	60	8,700	61,000
	50	M35CLF050		47	46	60	12,800	82,000

NOTE:
1. Designs have a 50,000A all U/CERMSs Symmetrical Rating.
2. 10–50A fuses have a Rated Maximum Application Temperature of 65° C, and 65–180A fuses have a Rated Maximum Application Temperature of 40° C. (RMAT is the maximum temperature of the air in contact with the MCLF housing at which the fuses have been shown suitable for use.)
3. Tabulated Maximum Total I^2t values are for currents of 50,000A at the nominal voltage of the fuse. Fuses that have a Rated Maximum Voltage higher than their Nominal Voltage Rating will have a higher I^2t let-through when applied at voltages up to these higher values. For example, Maximum Total I^2t values are increased by approximately 30% when 8.3kV fuses are applied at 10kV and approximately 25% when 15.5kV fuses are used at 17.2kV.
4. Maximum total I^2t values are reduced for currents below 50,000A. For example, at 10,000A, I^2t values are approximately 15% less than the published values.
5. Peak arc voltages quoted are for 50,000A currents at the rated maximum voltage listed. Reduced currents and voltages will reduce the peak arc voltage. Consult the factory for further information.
6. Maximum continuous currents at higher ambient temperatures may be determined by derating the fuses by 0.2% per degree C over 25° C. For example: At 40° C, the derating would be 15 x 0.2 = 3%, making the maximum continuous current of a 20A fuse 23.0 x 0.97 = 22A.

Recommended MCLF at 40° C Ambient Temperature

Fuse Voltage	Recommended Fuse Current Ratings (Amperes)																	
	(5.5kV) 8.3kV										15.5kV						23kV	
	Transformer 1-Phase Voltage Rating (kV), Phase to Ground																	
1-Phase	2.4		4.16		4.8		7.2		7.62		12		14.4		16		19.9	
Transformer kVA	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
10	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]
15	—	10	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]
25	—	20	—	10	—	10	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]
37.5	20	30	—	20	—	20	—	10	—	10	—	10[a]	—	10[a]	—	10[a]	—	10[a]
50	30	40	20	30	—	20	—	10	—	10	—	10[a]	—	10[a]	—	10[a]	—	10[a]
75	50	65	30	40	20	30	—	20	—	20	—	10	—	10	—	10	—	10[a]
100	65	(80)	40	50	30	50	20	30	20	30	—	20	—	10	—	10	—	10
167	(100)	(150)	65	(80)	50	65	30	50	30	50	20	30	20	30	—	20	—	20
250	(150)	—	(100)	(125)	(80)	(100)	50	65	50	65	30	50	30	40	20	30	20	30
333	(180)	—	(125)	(180)	(100)	(150)	65	100	65	100	50	65	30	50	30	50	20	40
500	—	—	(180)	—	(150)	—	115	—	115	—	65	100	65	80	50	—	40	—
750	—	—	—	—	—	—	—	—	—	—	100	—	80	100	—	—	—	—
1,000	—	—	—	—	—	—	—	—	—	—	—	—	100	—	—	—	—	—

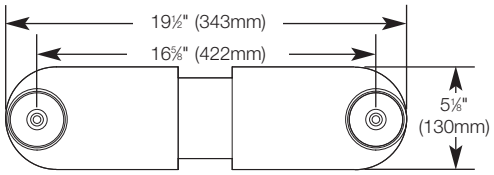
Recommended MCLF at 40° C Ambient Temperature

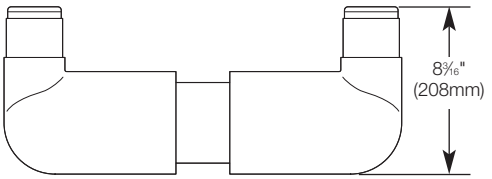
Fuse Voltage	Recommended Fuse Current Ratings (Amperes)																			
	(5.5kV) 8.3kV														15.5kV				23kV	
3-Phase	Transformer 3-Phase Voltage Rating (kV), Phase to Phase																			
gndY-gndY	2.4		4.16		4.8		7.2–7.96		8.32		12.47		13.2–14.4		20.8		22.9–24.9		34.5	
Transformer kVA	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
15	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]
22.5	—	10	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]
30	—	10	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]
45	—	20	—	10	—	10	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]
75	30	40	—	20	—	20	—	10	—	10	—	10[a]	—	10[a]	—	10[a]	—	10[a]	—	10[a]
100	40	50	20	30	20	30	—	20	—	10	—	10	—	10	—	10[a]	—	10[a]	—	10[a]
112.5	40	65	20	30	20	30	—	20	—	20	—	10	—	10	—	10[a]	—	10[a]	—	10[a]
150	50	(80)	30	50	30	40	20	30	—	20	—	10	—	10	—	10[a]	—	10[a]	—	10[a]
200	65	(100)	40	65	40	50	20	30	20	30	—	20	—	20	—	10	—	10	—	10[a]
225	(80)	(125)	50	65	40	65	30	40	30	50	—	20	—	20	—	10	—	10	—	10[a]
300	(100)	(150)	65	(100)	65	(80)	40	50	30	50	20	30	20	30	—	20	10	20	—	10
500	(180)	—	(100)	(150)	(100)	(125)	65	(80)	50	80	30	50	30	50	20	30	20	30	—	20
750	—	—	(180)	—	(125)	(180)	(80)	(125)	80	115	50	80	50	65	30	50	30	40	20	30
1,000	—	—	—	—	(180)	—	(125)	(180)	115	—	65	100	65	100	50	65	40	65	30	40
1,500	—	—	—	—	—	—	(180)	—	—	—	100	—	100	—	65	100	65	80	40	—
2,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	100	—	80	—	50	—

NOTE: 1. Column A = 140–200% of transformer rating and Column B = 200–300% of transformer rating.
2. Ratings in parentheses are 5.5kV fuses.
3. Recommended fuses meet inrush criteria of 12 times transformer full-load current for 0.1 second and 25 times transformer full-load current for 0.01 second. Fuses also meet cold-load pickup criteria of 6 times transformer full-load current for 1 second and 3 times transformer full-load current for 10 seconds.

a. Fuse allows greater than 300% of transformer rating.

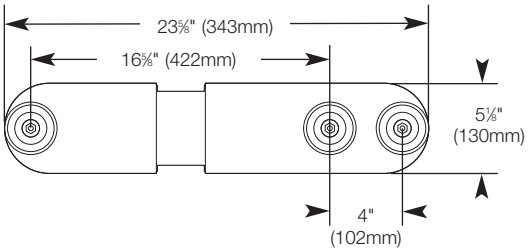
Model 22

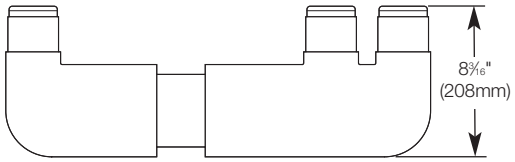




Approx. Weight 30 lb. (13.6kg)

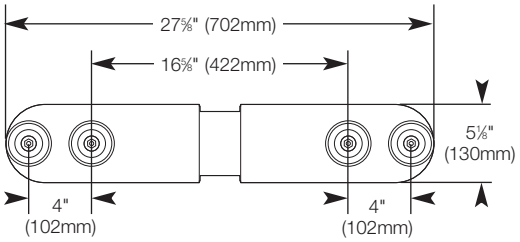
Model 222

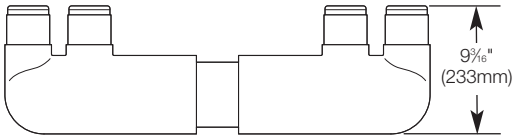




Approx. Weight 35 lb. (15.9kg)

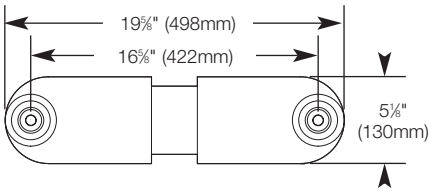
Model 2222

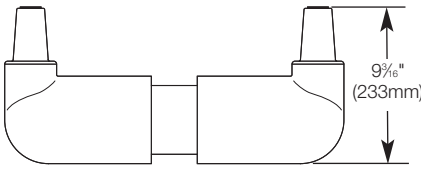




Approx. Weight 30 lb. (13.6kg)

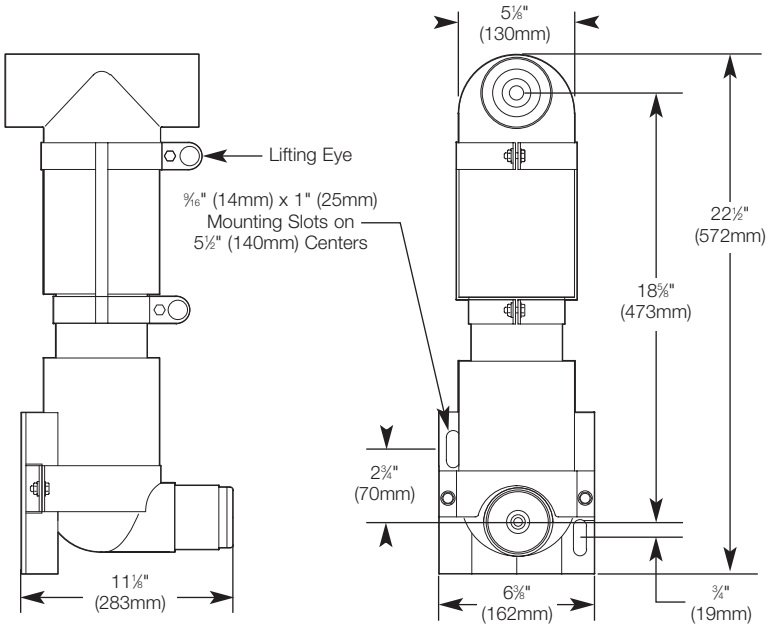
Model 66





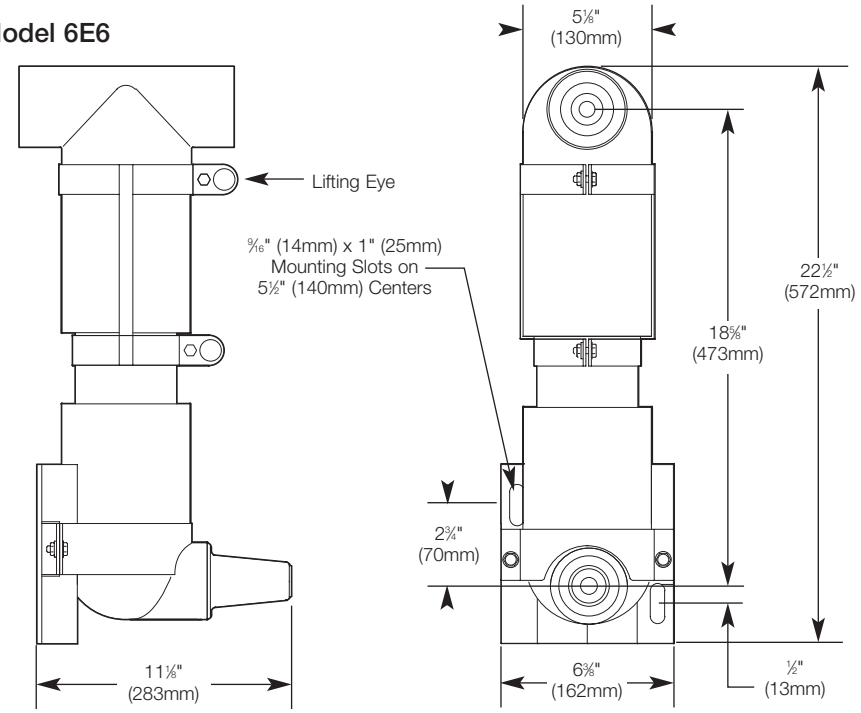
Approx. Weight 40 lb. (18.1kg)

Model 6E2



Approx. Weight 30 lb. (13.6kg)

Model 6E6



NOTE: Other models are available such as 26.

Approx. Weight 30 lb. (13.6kg)

Ordering Information for Elastimold® Molded Current-Limiting Fuses

The following diagram shows how to construct a catalog number for a Molded Current-Limiting Fuse:

Indicates field that must be filled in to complete order.

M [ ] CLF [ ] - [ ] - [ ]

Voltage Class

	kV Code
5.0kV	**5**
15.0kV	**15**
25.0kV	**25**
35.0kV	**35**

See page 38 for additional options.

Amperes

Voltage Class 5kV	15kV	25kV	35kV	Amperage Code
—	10	10	10	**10**
—	20	20	20	**20**
—	30	30	30	**30**
—	40	40	40	**40**
—	50	50	50	**50**
—	65	65	—	**65**
80	80	80	—	**80**
100	100	100	—	**100**
—	115	—	—	**115**
125	—	—	—	**125**
150	—	—	—	**150**
185	—	—	—	**185**

See page 38 for additional options.

Mounting Brackets

	Bracket Code
Wall Mounting Bracket with Parking Stands and Bolted Style Hold Down Straps (HDS)	**WMB**
Wall Mounting Bracket with Parking Stands and Quick Release Style Hold Down Straps (QRS)	**WMBQ**

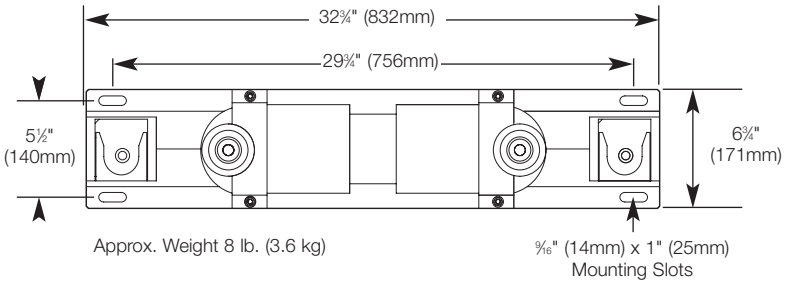
See page 42 for additional options.

Bushings

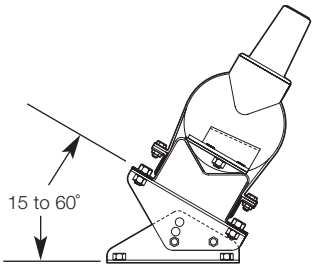
	Bushing Code
200A Bushing Wells both ends	**22**
200A Bushing Well on one end and two 200A Bushing Wells on the other end	**222**
Two 200A Bushing Wells on both ends	**2222**
600A Bushings on both ends	**66**
600A Elbow Connector on one end and a 200A Bushing Well on the other end; this arrangement is not available at 35kV	**6E2**
600A Elbow Connector on one end and a 600A Bushing on the other end; this arrangement is not available at 35kV	**6E6**

See outline drawings preceding this chart for additional details.

Mounting Options



Optional WMB Mounting Bracket with Adjustable Parking Stands for Vertical Mounting and Fuse Hold-Down Strips



Optional — TMA Universal Tilt Mounting

Optional Fuse Mountings

OPTION NO.	Description
HDS	Bolted-Style Hold-Down Strap (Qty: 1 required per end fitting)
QRS	Quick-Release Style Hold-Down Strap (Qty: 1 required per end fitting)
WMB	Wall-Mounting Bracket with Parking Stands and Bolted-Style Hold-Down Straps
WMBQ	Wall-Mounting Bracket with Parking Stands and Quick-Release Style Hold-Down Straps
SMB	Support Mounting Bracket for use with Models 6E2 or 6E6 end-fitting arrangements; includes Bolted-Style Hold-Down Strap
TMA-EM	Tilt Mounting Adapter; bolts to bottom of Wall-Mounting Bracket WMB or WMBQ to enable up to 60° angle mounting (Qty: 2 required per installation)

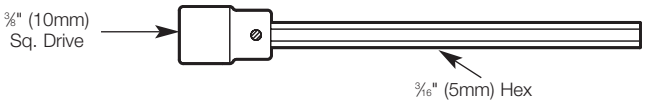
NOTE: The option number may be added as a suffix to the MCLF catalog number.

End Fitting Catalog Numbers

OPTION NO.	Description	System Voltage Class	IEEE 386-1995 Interface Reference
EF2	200A Bushing Well End Fitting	5, 15, 25, 35	Figure 3
EF22	Double 200A Bushing Well End Fitting	5, 15, 25, 35	Figure 3
EF6	600A Bushing End Fitting	5, 15, 25, 35	Figures 11 and 13
EF6E	600A Elbow Connector End Fitting	5, 15, 25	Figure 11

NOTE: EF6E is equipped with a standard through-hole spade lug (Type 03700). Use this table only if end fittings are to be ordered and shipped separately from the fuse. See pages 40–41 for assembled units.

MCLF-ADT
Assembly/Disassembly Tool



Other Options

CAT. NO.	Description
MCLF-ADT	Hex Wrench for set screw removal and replacement when disassembling end fittings. Supplied as standard with replacement fuses.

MCAN Molded Canister Fuse

Completely sealed and insulated for padmount, subsurface or vault applications through 35kV gndY–gndY.

The MCAN Molded Canister Fuse is a compact, lightweight EPDM molded rubber fuse enclosure package. MCAN fuse canisters are maintenance-free, completely sealed and submersible. Designs are deadfront, using molded rubber to insulate, shield and eliminate exposed live parts. Units are ideally suited for padmount, subsurface or vault applications, for systems through 35kV gndY–gndY. The MCAN Molded Canister Fuse will accommodate and has been thoroughly tested with Hi-Tech® Trans-Guard® FX fuses. Contact Thomas & Betts before using fuses from other manufacturers.

Features	Benefits/Descriptions
EPDM Molded Rubber Deadfront Construction	Insulates, shields and eliminates live parts. Fuses are fully sealed and submersible.
Compact	Suitable for padmount, subsurface or vault installations.
Modular Construction	Enables elbow connection or direct attachment to equipment-mounted bushings.
Neon Voltage Indicators (V2)	Attached to elbow test points to provide quick and convenient blown-fuse indication.
Various End Fittings and Bushings	Make for flexible installation on switchgear, junctions, transformers, cable runs and taps.
Replaceable Fuse Section	Ease of fuse replacement without full removal from installation.
Current-Limiting Protection — Fault Clearing Occurs in Less than One-Half Cycle	Limits the system available fault current and dramatically reduces stresses on equipment.
304 Stainless Steel Mounting Brackets and Wall-Mounted Parking Stands Available	Accommodate a wide variety of mounting arrangements.

Fuse Canister Ratings

System Voltage Class (kV)	15	25/28	35
Maximum Line-to-Ground Voltage (kV)	8.8/10.0	15.5/17.2	23
BIL Impulse Withstand (kV)	95	125/140	150
One-Minute AC Withstand (kV)	34	40–45	50
Fifteen-Minute DC Withstand (kV)	53	78	103
Corona Extinction (kV)	11	19–21.5	26
Maximum Continuous Current (Amps)	200*	200*	200*
Momentary Current (kA)	10*	10*	10*

Fuse Ratings

Nominal Voltage Rating (kV)	8.3	15.5	23.0
Rated Maximum Voltage (kV)	8.8/10.0	15.5/17.2**	23.0
Frequency (Hz)	50–60	50–60	50–60
Current Rating (Amps)	3–80	3–65	6–50
Rated Maximum Interrupting Current (Sym. Amps)	50,000	50,000	50,000

Application Information

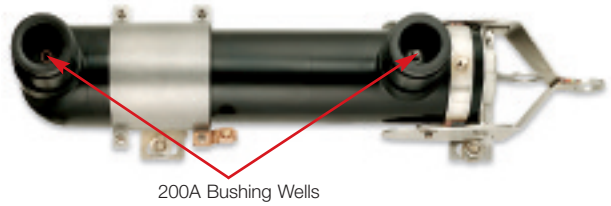
Construction: Submersible, corrosion resistant, fully shielded
Ambient Temperature Range: -30° C to 65° C

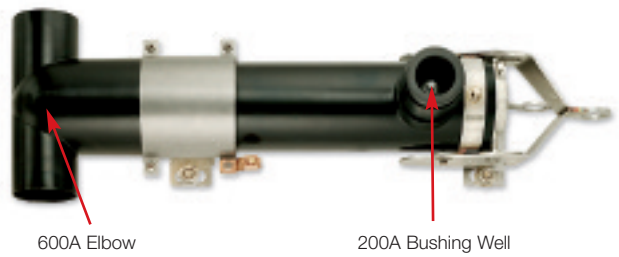
* Without fuse.
** The 15.5kV L-G rated fuses require at least 75% grounded load to be applied on a 25kV system.
NOTE: Fuse replacement requires the MCAN to be de-energized.

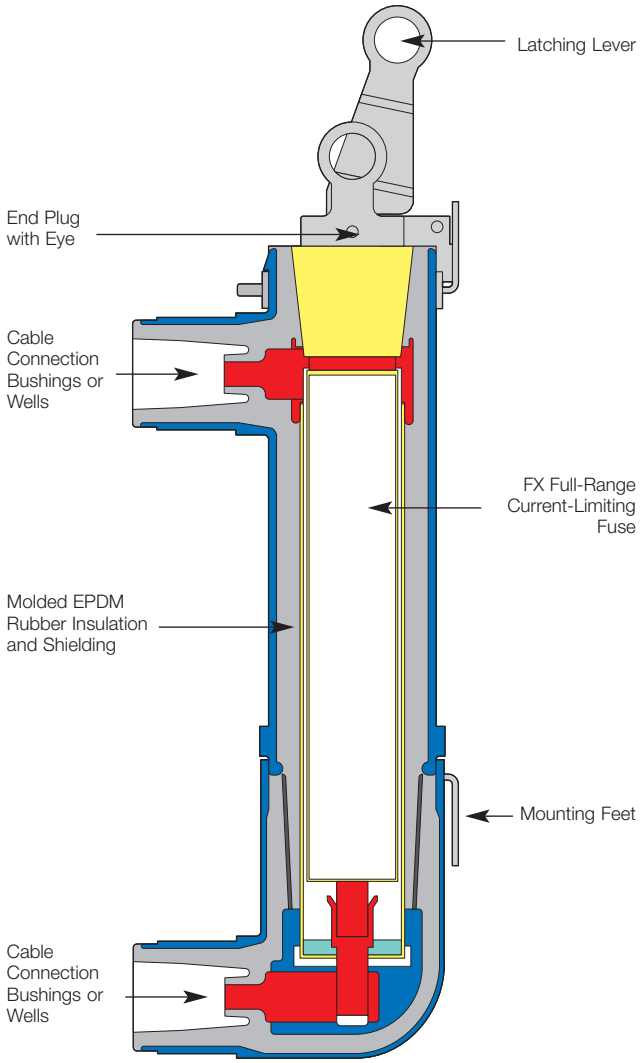
Certified Tests

Elastimold® Molded Canister Fuses have been designed and tested per applicable portions of IEEE, ANSI, NEMA and other industry standards, including:

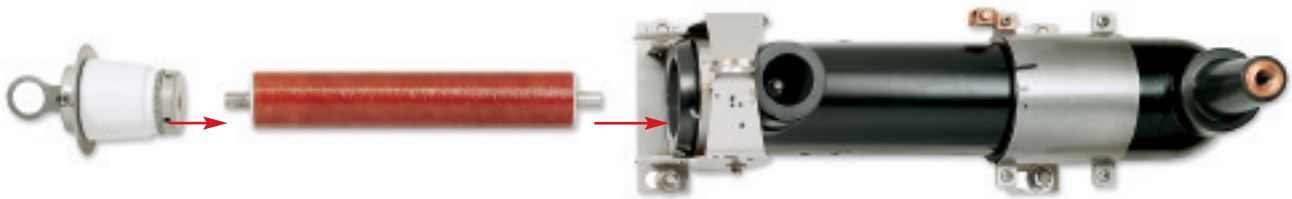
ANSI C37.40 Standard for Current-Limiting Fuse Service Conditions
ANSI C37.41 Standard for Current-Limiting Fuse Design & Testing
ANSI C37.47 Standard for Current-Limiting Fuse Ratings & Specifications
ANSI/IEEE 386 Standard for Separable Connectors & Bushing Interfaces

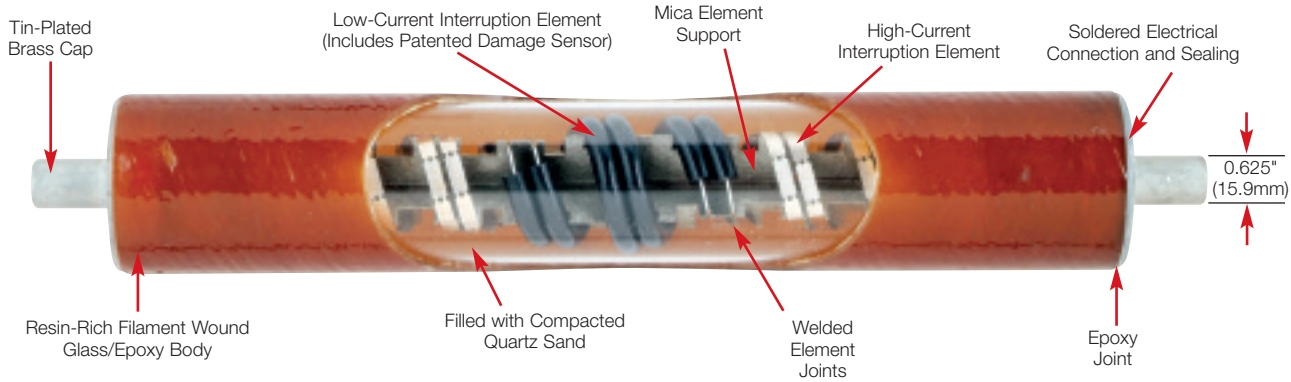






FX Current-Limiting Fuse





Recommended FX: in MCAN at 40° C Ambient Temperature

Fuse Voltage	Recommended Fuse Current Ratings (Amperes)																	
	8.3kV										15.5kV						23kV	
	Transformer 1-Phase Voltage Rating (kV), Phase to Ground																	
1-Phase	2.4		4.16		4.8		7.2		7.62		12		14.4		16		19.9	
Transformer kVA	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
10	–	6	–	6[a]	–	3	–	3[a]	–	3[a]	–	3[a]	–	3[a]	–	3[a]	–	6[a]
15	–	10	–	6	–	6[a]	–	3	–	3	–	3[a]	–	3[a]	–	3[a]	–	6[a]
25	12	20	8	10	–	8	–	6	–	6	–	3	–	3	–	3	–	6[a]
37.5	20	30	12	18	–	12	–	8	–	8	–	6[a]	–	6[a]	–	6[a]	–	6[a]
50	25	50	18	25	12	20	10	12	–	10	–	6	–	6	–	6[a]	–	6[a]
75	50	65	25	40	20	30	12	20	12	20	–	10	–	8	–	8	–	6
100	65	80	30	50	25	50	18	25	18	25	–	12	10	12	–	10	–	8
167	–	–	65	80	65	80	30	50	30	50	18	25	18	25	12	20	–	12
250	–	–	–	–	80	–	65	80	50	65	25	50	25	40	20	30	18	25
333	–	–	–	–	–	–	80	–	65	–	50	65	30	65	25	50	20	30
500	–	–	–	–	–	–	–	–	–	–	65	–	65	–	50	–	40	–

Recommended FX: in MCAN at 40° C Ambient Temperature

Fuse Voltage	Recommended Fuse Current Ratings (Amperes)																	
	8.3kV														15.5kV		23kV	
3-Phase	Transformer 3-Phase Voltage Rating (kV), Phase to Phase																	
gndY-gndY	2.4		4.16		4.8		7.2–7.96		8.32		12.47		13.2–14.4		20.8		22.9–24.9		34.5	
Transformer kVA	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
15	–	6	–	3	–	3	–	3[a]	–	3[a]	–	3[a]	–	3[a]	–	6[a]	–	3[a]	–	6[a]
22.5	–	8	–	6[a]	–	6[a]	–	3	–	3	–	3[a]	–	3[a]	–	6[a]	–	3[a]	–	6[a]
30	10	12	–	6	–	6	–	6[a]	–	3	–	3[a]	–	3	–	6[a]	–	3[a]	–	6[a]
45	12	20	–	10	–	8	–	6	–	6[a]	–	3	–	3	–	6[a]	–	3[a]	–	6[a]
75	25	40	12	20	12	18	–	8	–	8	–	6	–	6	–	6[a]	–	3	–	6[a]
100	30	50	18	25	18	25	–	12	–	10	–	8	–	8	–	6[a]	–	6[a]	–	6[a]
112.5	40	65	20	30	18	25	–	18	–	12	–	8	–	8	–	6[a]	–	6[a]	–	6[a]
150	65	80	25	50	25	40	12	25	12	18	–	10	–	10	–	6	–	6	–	6[a]
200	80	–	40	65	30	50	18	30	18	25	12	18	–	12	–	8	–	8	–	6
225	–	–	50	65	40	65	20	40	20	30	12	20	12	20	–	10	–	8	–	6
300	–	–	65	80	65	80	25	50	25	50	18	25	18	25	–	12	–	12	–	8
500	–	–	–	–	–	–	30	80	65	80	30	50	30	50	18	25	18	25	–	12
750	–	–	–	–	–	–	65	–	80	–	65	80	50	–	25	50	25	50	18	25
1,000	–	–	–	–	–	–	–	–	–	–	80	–	–	–	40	65	40	–	25	30
1,500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	65	–	–	–	40	–

NOTE: 1. Column A = 140–200% of transformer rating and Column B = 200–300% of transformer rating.
2. 8.3kV, 3–50A fuses are used in mounting code 4 canisters; 8.3kV 65–80A fuses and 15.5kV 3–50A fuses are used in mounting code 5 canisters; 15.5kV 65A fuse and 23kV 3–50A fuses are used in mounting code 6 canisters.
3. Recommended fuses meet inrush criteria of 12 times transformer full-load current for 0.1 second and 25 times transformer full-load current for 0.01 second. Fuses also meet cold-load pickup criteria of 6 times transformer full-load current for 1 second and 3 times transformer full-load current for 10 seconds.

a. Fuse allows greater than 300% of transformer rating.

Electrical Characteristics of Hi-Tech® FX Fuses inside MCAN Canisters

Nominal Fuse Voltage Rating (kV)	Current Rating (Amps)	Fuse CAT. NO.	Rated Maximum Voltage (kV)	Maximum Continuous Current (2) (6) 25° C	40° C	65° C	Peak Arc Voltage (kV) (5)	Minimum Melt I²t (AMP²-SEC)	Maximum Total I²t (AMP²-SEC) (3) (4)
8.3	3	HTFX230003	10	4.3	4.2	3.9	30	100	350
	6	HTFX230006		9.5	9	8.5	32	620	2,700
	8	HTFX230008		11.5	11	10.5	28	800	4,000
	10	HTFX230010		13.5	13	12.5	28	800	4,000
	12	HTFX230012		17.5	17	16	26	920	8,000
	18	HTFX230018		19.5	19	18	26	1,310	9,500
	20	HTFX230020		24	23	21.5	26	1,620	11,000
	25	HTFX230025		29.5	28.5	27	26	3,660	22,000
	30	HTFX230030		34	33	31	26	5,250	30,000
	40	HTFX230040		40	39	36.5	26	8,700	50,000
	50	HTFX230050		45.5	44	42	26	12,800	70,000
	65	HTFX230065	8.8	70	68	64.5	23	34,000	200,000
	80	HTFX230080		80	77.5	73.5	22	51,200	280,000
15.5	3	HTFX240003	17.2	4.3	4.2	3.9	51	100	510
	6	HTFX240006		9.5	9	8.5	54	620	2,600
	8	HTFX240008		11.5	11	10.5	46	800	3,700
	10	HTFX240010		13.5	13	12.5	46	800	3,700
	12	HTFX240012		17.5	17	16	43	920	6,500
	18	HTFX240018		19.5	19	18	45	1,310	8,000
	20	HTFX240020		24	23	21.5	45	1,620	10,000
	25	HTFX240025		29.5	28.5	27	45	3,660	22,000
	30	HTFX240030		34	33	31	45	5,250	30,000
	40	HTFX240040		40	39	36.5	45	8,700	50,000
	50	HTFX240050		44.5	43	40	45	12,800	70,000
	65	HTFX240065	15.5	57.6	56	54.5	39	28,300	164,000
23	6	HTFX250006	23	9.5	9	8.5	67	620	3,100
	8	HTFX250008		11.5	11	10.5	61	800	4,800
	10	HTFX250010		13.5	13	12.5	61	800	4,800
	12	HTFX250012		17.5	17	16	60	920	8,300
	18	HTFX250018		19.5	19	18	60	1,310	11,200
	20	HTFX250020		24	23	21.5	60	1,620	13,000
	25	HTFX250025		29.5	28.5	27	60	3,660	28,000
	30	HTFX250030		34	33	31	60	5,250	38,000
	40	HTFX250040		38.5	37	35	60	8,700	61,000
	50	HTFX250050		44.5	43	40	60	12,800	82,000

NOTE: 1. Designs have a 50,000A rms Symmetrical Rating (except for 3A, 15.5kV which was tested at 44kA maximum).

2. Fuses have a Rated Maximum Application Temperature of 65° C. (RMAT is the maximum temperature of the air in contact with the MCAN housing, at which fuses have been shown to be suitable for use.)

3. Tabulated Maximum Total I²t values are for currents of 50,000A at the nominal voltage of the fuse. Fuses that have a Rated Maximum Voltage higher than their Nominal Voltage Rating will have a higher I²t let-through when applied at voltages up to these higher values. For example, Maximum Total I²t values are increased by approximately 30% when 8.3kV fuses are applied at 10kV and approximately 25% when 15.5kV fuses are used at 17.2kV.

4. Maximum total I²t values are reduced for currents below 50,000A. For example, at 10,000A, maximum total I²t values are approximately 15% less than the published values.

5. Peak arc voltages quoted are for 50,000A currents at the rated maximum voltage listed. Reduced currents and voltages will reduce the peak arc voltage. Consult the factory for further information.

6. Maximum continuous currents at higher ambient temperatures may be determined by de-rating the fuses by 0.2% per degree C over 25° C. For example: At 65° C, the de-rating would be 40 x 0.2 = 8%, making the maximum continuous current of a 30A fuse 34 x 0.92 = 31A.

7. Reduction in the long time melting current of the fuses (approximately one hour and longer) due to higher ambient temperatures is the same as described above in Note #6. See time-current characteristics for melting characteristics in this time region.

Ordering Information for FX Fuses and MCAN Fuse Canisters

To specify and order an FX fuse and an MCAN fuse canister:

1. Select the Fuse Catalog Number from the Electrical Characteristics of the Hi-Tech® FX Fuses Inside MCAN Canisters chart on page 46, based on the amperage and "Rated Maximum Voltage (kV)" column.
2. Based on selected fuse, select canister from the "Canister Catalog Number" column of the Elastimold® FX Fuses with MCAN table on page 48. See weights and dimensions table on page 49 for additional MCAN Fuse Canister information. (Make sure that the Canister Mounting Code and Diameter Code correspond to the Fuse selected.)
3. Select options and accessories (if required) from page 50.

EXAMPLE:

To order a 15.5kV, 50A fuse, a fuse canister for this fuse with a 200A bushing well and no options or accessories, specify: Catalog No. HTFX240050 and MCAN-5B25-22.

Ordering Information for MCAN Fuse Coding System

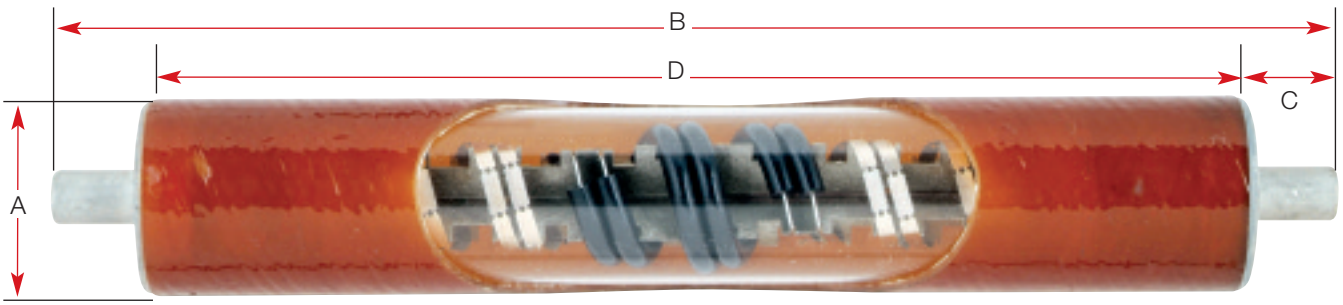
Mounting Code	Maximum Fuse Overall Length	Diameter Code	Maximum Fuse Overall Diameter
4	10.00" (254mm)	B	2.25" (57mm)
5	14.31" (363mm)	B	2.25" (57mm)
6	17.12" (435mm)	B	2.25" (57mm)

NOTE: Lower Mounting Codes (shorter) fuses may be applied in canisters of higher Mounting Codes by using an adapter. See Mounting Code Adapters on page 50.

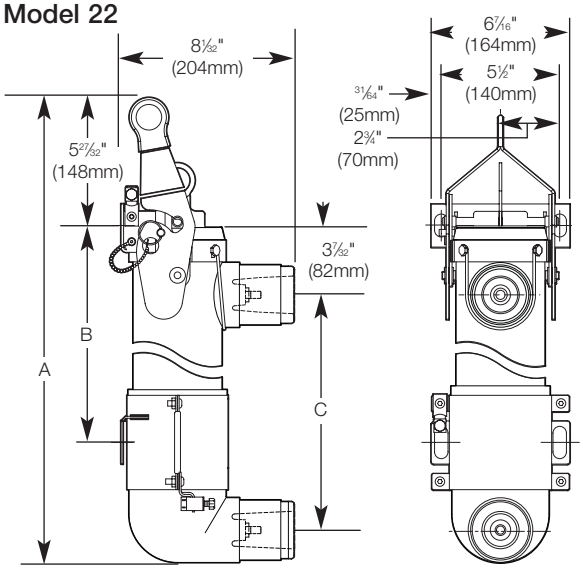
Ordering Information for Hi-Tech® FX Fuses with MCAN

Nominal Fuse Voltage Rating (kV)	Current Rating (Amps)	Fuse CAT. NO.	Rated Maximum Voltage (kV)	Mounting Code	Diameter Code	(A) Overall Diameter in. (mm)	(B) Overall Length in. (mm)	(C) Contact Length in. (mm)	(D) Body Length in. (mm)	Canister CAT. NO.	Fuse Weight lb. (kg)
8.3	3	HTFX230003	10.0	4	B	2.25 (57)	10.0 (254)	1.02 (26)	7.96 (202)	MCAN-4B15-22 MCAN-4B15-66 MCAN-4B15-6E2 MCAN-4B15-6E6	3.00 (1.3)
	6	HTFX230006									
	8	HTFX230008									
	10	HTFX230010									
	12	HTFX230012									
	18	HTFX230018									
	20	HTFX230020									
	25	HTFX230025									
	30	HTFX230030									
	40	HTFX230040									
	50	HTFX230050									
	65	HTFX230065	8.8	5	B	2.25 (57)	14.31 (363)	1.02 (26)	12.27 (312)	MCAN-5B15-22 MCAN-5B15-66 MCAN-5B15-6E2 MCAN-5B15-6E6	4.25 (1.9)
	80	HTFX230080									
15.5	3	HTFX240003	17.2	5	B	2.25 (57)	14.31 (363)	1.02 (26)	12.27 (312)	MCAN-5B25-22 MCAN-5B25-66 MCAN-5B25-6E2 MCAN-5B25-6E6	4.25 (1.9)
	6	HTFX240006									
	8	HTFX240008									
	10	HTFX240010									
	12	HTFX240012									
	18	HTFX240018									
	20	HTFX240020									
	25	HTFX240025									
	30	HTFX240030									
	40	HTFX240040									
	50	HTFX240050									
	65	HTFX240065	15.5	6	B	2.25 (57)	17.12 (435)	1.02 (26)	15.09 (383)	MCAN-6B25-22	4.75 (2.2)
23.0	6	HTFX250006	23.0	6	B	2.25 (57)	17.12 (435)	1.02 (26)	15.09 (383)	MCAN-6B35-66	4.75 (2.2)
	8	HTFX250008									
	10	HTFX250010									
	12	HTFX250012									
	18	HTFX250018									
	20	HTFX250020									
	25	HTFX250025									
	30	HTFX250030									
	40	HTFX250040									
	50	HTFX250050									

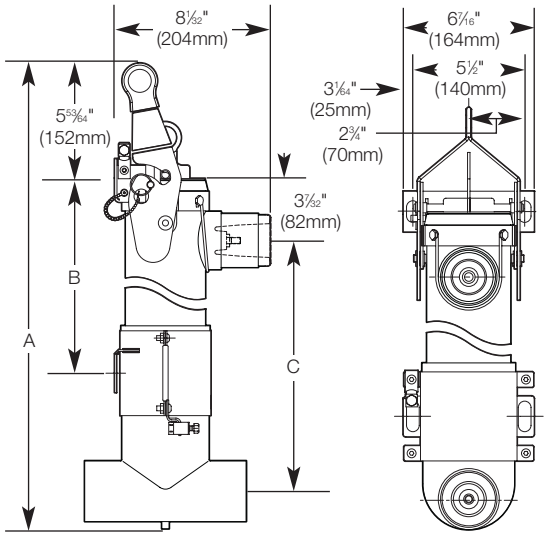
NOTE: For 5kV systems, use the 8.3kV rated fuses.



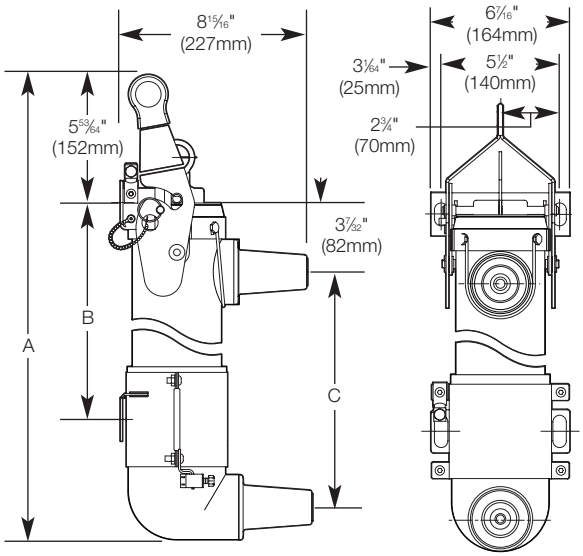
Model 22



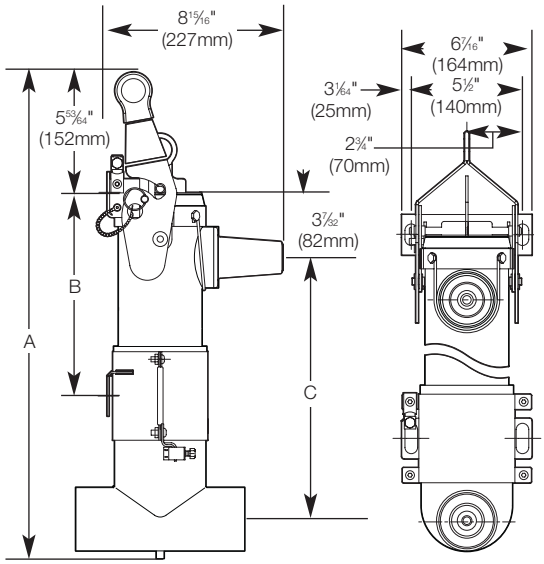
Model 6E2



Model 66



Model 6E6



Weights and Dimensions

CAT. NO.	A in. (mm)	B in. (mm)	C in. (mm)	Approx. Weight lb. (kg)	End Bushing	Main Bushing
MCAN-4B15-22	21.49 (546)	10.06 (256)	10.91 (277)	19 (8.6)	200A Bushing Well	200A Bushing Well
MCAN-5B25-22	25.80 (655)	14.37 (365)	15.22 (387)	21 (9.5)	200A Bushing Well	200A Bushing Well
MCAN-5B15-22	25.80 (655)	14.37 (365)	15.22 (387)	21 (9.5)	200A Bushing Well	200A Bushing Well
MCAN-4B15-66	21.49 (546)	10.06 (256)	10.91 (277)	21 (9.5)	600A Bushing	600A Bushing
MCAN-5B25-66	25.80 (655)	14.37 (365)	15.22 (387)	23 (10.4)	600A Bushing	600A Bushing
MCAN-5B15-66	25.80 (655)	14.37 (365)	15.22 (387)	23 (10.4)	600A Bushing	600A Bushing
MCAN-6B35-66	28.68 (728)	17.25 (438)	18.10 (460)	24 (10.8)	600A Bushing	600A Bushing
MCAN-4B15-6E2	23.90 (607)	10.06 (256)	12.91 (328)	20 (9)	600A Elbow Connector	200A Bushing Well
MCAN-5B25-6E2	28.21 (717)	14.37 (365)	17.22 (437)	22 (10)	600A Elbow Connector	200A Bushing Well
MCAN-5B15-6E2	28.21 (717)	14.37 (365)	17.22 (437)	22 (10)	600A Elbow Connector	200A Bushing Well
MCAN-4B15-6E6	23.90 (607)	10.06 (256)	12.91 (328)	20 (9)	600A Elbow Connector	600A Bushing
MCAN-5B25-6E6	28.21 (717)	14.37 (365)	17.22 (437)	22 (10)	600A Elbow Connector	600A Bushing
MCAN-5B15-6E6	28.21 (717)	14.37 (365)	17.22 (437)	22 (10)	600A Elbow Connector	600A Bushing

MCAN Molded Canister Fuse Options and Accessories

Voltage Indicators

Neon voltage indicators provide quick and convenient indication of an energized circuit when they are mounted to the test-point provision on MCAN elbow connectors. The voltage indicator illuminates with a flashing neon light when the elbow connector is energized. If the fuse blows, the neon lights on the load-side elbows stop flashing.

Ordering Information for Elastimold® Voltage Indicators

CAT. NO.	Description
V2	Capacitive Test Point, Voltage Indicator

Mounting Code Adapters

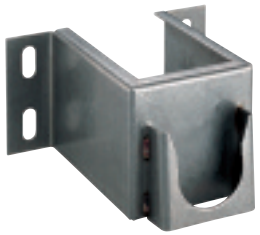
A mounting code adapter is used to extend the fuse end cap ferrule so that a shorter fuse may be installed in a higher-number coded canister. For example, a 4B size fuse can be used in a 5B canister when an MCAN 4-5 adapter is used.

Ordering Information for Elastimold® Mounting Code Adapters

CAT. NO.	Description
MCAN 4-5	Code 4B Size Fuse to a Code 5B Canister
MCAN 4-6	Code 4B Size Fuse to a Code 6B Canister
MCAN 5-6	Code 5B Size Fuse to a Code 6B Canister

Parking Stands

Parking stands can be mounted adjacent to an MCAN Fuse Canister, enabling attachment of additional accessories to ground, isolate and test the elbow cable connectors.

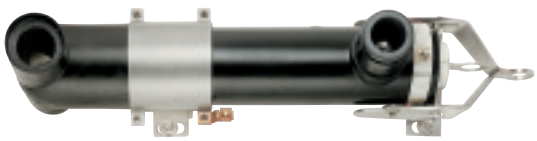


Ordering Information for Elastimold® Parking Stands

CAT NO.	Description
160WMPS	Wall-Mount Parking Stand
SUFFIX NO.	**Description**
-PS	Parking Stand between Bushings

Switchgear Assemblies

Elastimold® multi-point junctions can be utilized to create custom switchgear lineups consisting of MVS switches, MVI fault interrupters, MCLF current-limiting fuses, MCAN fuse canisters, fused elbows, elbow arresters and other molded products. The junction enables easy assembly and interconnection of components into fully shielded, submersible, compact arrangements.



elastimold®

QUICK REFERENCE

Elastimold® Surge Arresters

page(s)

When lightning strikes, be sure your system is protected by MOV Underground Surge Arresters.

Our Metal Oxide Varistor (MOV) Surge Arresters provide high-voltage lightning and switching surge protection for transformers, cables and other components in underground power distribution systems. They minimize damaging surges by improving protective margins.

Metal Oxide Varistor (MOV) Surge Arresters

Fully shielded, fully submersible for convenient energized connection with 200A loadbreak or deadbreak components up to 35kV.

Voltage surges that exceed the BIL rating of the distribution system components will cause damage to the installed equipment. To protect against these surges, overhead surge arresters are widely used. Their application is understood since overhead lines and equipment are directly affected by voltage surges (e.g. lightning). However, the use of overhead arresters alone will not guarantee proper protection of the insulation in the underground portion of an electrical distribution system. The let-through surge from the riser pole arresters into the underground systems could be enough to cause damage to the aging equipment insulation.

Elastimold® MOV Surge Arresters provide high-voltage lightning and switching surge protection of transformers, cable, equipment and other components typically located on underground power distribution systems. Proper placement, voltage selection and coordination with riser pole arresters minimize damaging surge voltages by improving protective margins.

Typical applications include installing an arrester at the end of a radial system or at both ends of an open point on a loop system. Additional arresters can be added at strategic locations upstream from the end point for optimum protection.

Metal Oxide Varistor (MOV) Surge Arresters are available in three styles: Elbow (ESA), Parking Stand (PSA) and Bushing (BSA). The PSA and BSA arresters permit direct connection, eliminating the need for additional accessories. ESA Elbow Arresters are also available with a 200A deadbreak interface for mating with other deadbreak accessories.

The following page highlights the different installation options using Bushing and Parking Stand Arresters where Elbow Arresters are normally used. Using BSAs and PSAs will contribute to saving space inside transformers and improving operability.

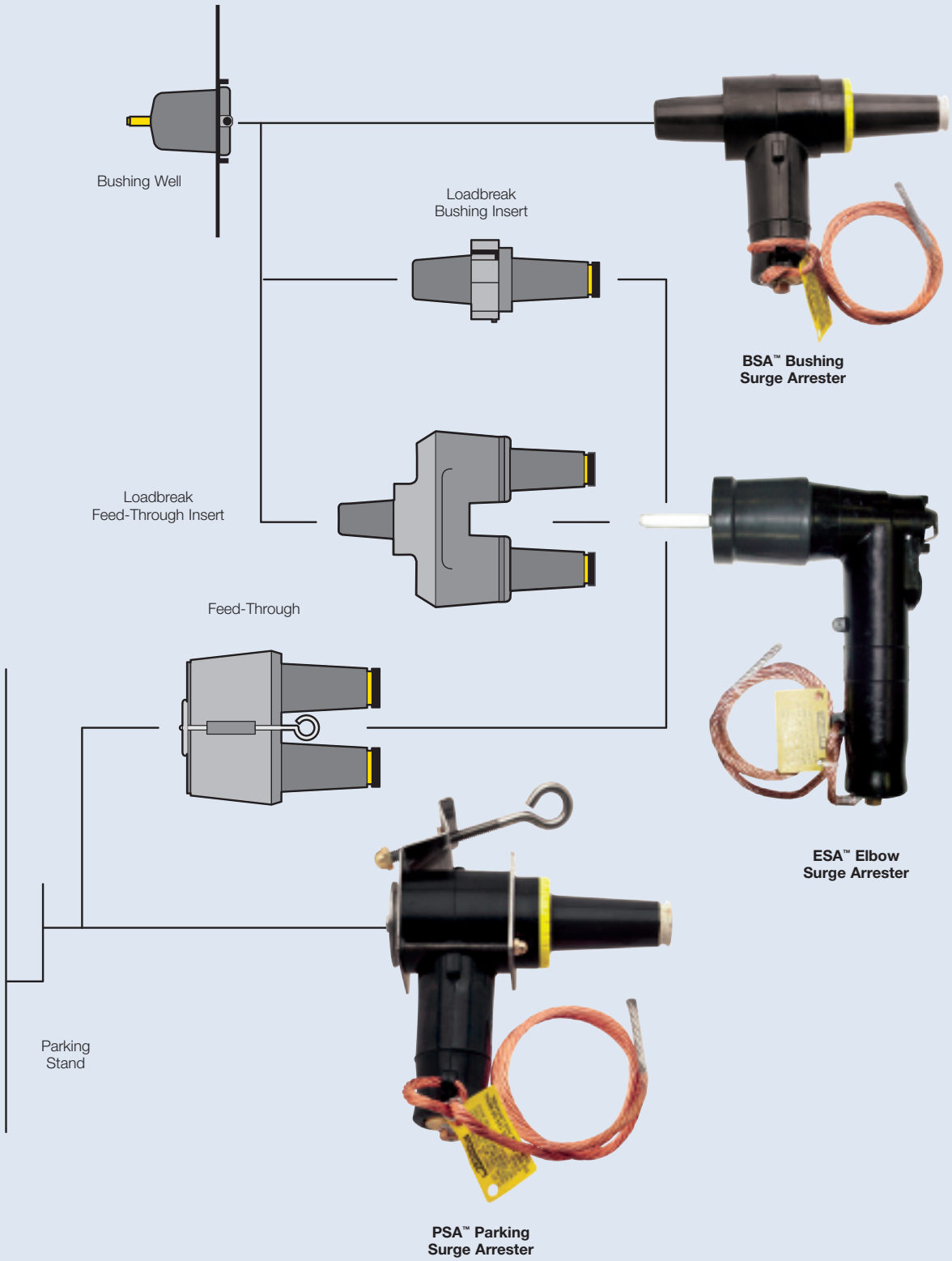
Features	Benefits/Descriptions
IEEE 386 Interfaces; IEEE C62.11	Provide convenient energized connection with other 200A loadbreak or deadbreak components.
EPDM Molded Rubber Construction	Fully shielded and fully submersible for a variety of applications.
Compact Size	Enables installation in your existing cabinetry, saving you money.
Three Styles of Arresters Available	Surge arresters fit your application and are easy to install.
Direct Connection on PSA and BSA Versions	Eliminates the need for additional accessories, saving even more money.
#4 AWG Ground Lead Tethered to the Jacket	Withstands 10,000 amps for 10 cycles without fusing. Controls end plug when ejected, preventing uncontrolled trajectory. Maintains the housing shield ground connection after failure.

Ratings

for Metal Oxide Varistor (MOV) Surge Arresters	
High Current, Short Duration	All MOV Arresters withstand two discharges of 40kA crest
Low Current, Long Duration	All MOV Arresters withstand 20 surges of 75A/2,000 microseconds duration
Duty Cycle Test	All MOV Arresters withstand 22 operations of 5kA crest at 8 x 20 microseconds duration while energized at rated voltage for the initial 20 operations and at maximum continuous operating voltage (MCOV) for the final two operations

Following each of the preceding tests, MOV Arresters demonstrate thermal recovery at MCOV.

Installation Options



Loop-Feed Circuit (Type 2 Transformer)

Two Elbow Arresters and a Feed-Through

This is one approach using elbow arresters only. (One of the elbow arresters could be mounted on the H_{1A} bushing if operating procedures permit.)

Elbow Arrester and Parking Stand Arrester

This approach can reduce overcrowding (by eliminating the feed-through device). This is desirable in a mini-pad transformer.

Bushing Arrester and Parking Stand Arrester*

This approach is best for increasing operability and reducing transformer overcrowding.

The bushing arrester enables the source cable to be positioned on H_{1A}, which conforms with some operating practices.

A bushing arrester mounted on H_{1A} can be directed downward without interference.

Potential interference between an elbow arrester on H_{1B} and a cable parked on P is eliminated.

The bushing arrester requires significantly less space than an elbow arrester used with a feed-through insert.

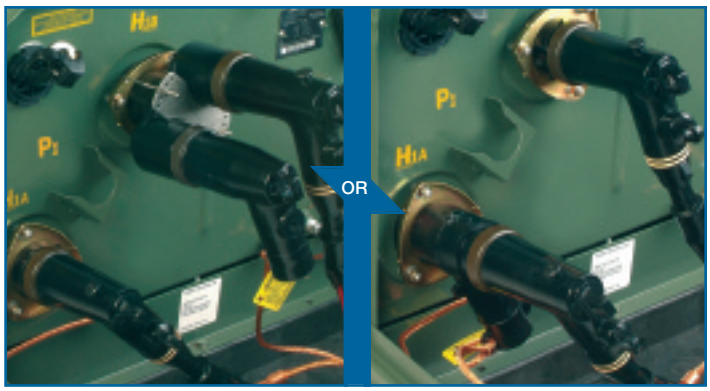
Operability is enhanced because the open point can be closed by moving the parked cable to H_{1B} without removing an arrester.

* Transformers must be specified with bushing wells.

Additional Margin of Protection

An additional margin of protection may be gained by adding an arrester at the next transformer upstream on each side of the open point. This application is dependent on the system voltage and condition of the cable.

If an additional arrester is added in the circuit, it can be an elbow arrester in combination with a feed-through insert or it can be a bushing arrester. Use of a bushing arrester will reduce transformer faceplate overcrowding.



Other Configurations

Other configurations are possible, such as specifying a bushing arrester on every transformer. This enables the open point to be quickly and easily moved to any point in the circuit while maintaining the surge protection (without moving all of the portable surge arresters).

The externally mounted bushing arrester provides the surge protection benefits without the negative factors of an under-oil arrester.

Radial-Feed Circuit (End Point)

Single-Bushing Transformer

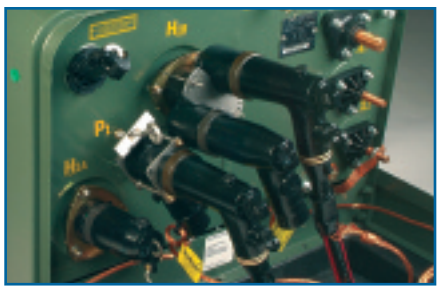
To add surge protection to a single-bushing transformer, utilize a bushing arrester or an elbow arrester with a feed-through insert.

Two-Bushing Transformer

To add surge protection to a two-bushing transformer at the end point of a radial-feed circuit, add an elbow arrester to the unoccupied bushing or utilize a bushing arrester.

Conversion of a Radial-Feed Transformer to a Loop-Feed, Open-Point Transformer

To convert a single-bushing transformer to a loop-feed, open-point transformer, add a parking stand arrester and an elbow arrester in combination with a feed-through insert.



Protective Characteristics

Class	MCOV* (kV RMS)	Duty Cycle Rating (kV RMS)	Maximum Discharge Voltage (kV Crest) 8 x 20 microsecond currentwave 1.5kA	3kA	5kA	10kA	20kA
15kV	2.55	3	10.5	11.0	11.5	13.0	14.5
15kV	5.1	6	20.5	21.5	23.0	25.5	30.0
15kV	8.4	10	30.5	32.5	34.5	38.5	43.5
15kV	10.2	12	40.0	42.5	45.0	50.0	56.5
15kV	12.7	15	48.0	51.0	54.0	60.0	68.0
15kV	15.3	18	56.5	60.0	64.0	71.0	80.5
25kV	8.4	10	30.5	32.5	34.5	38.5	43.5
25kV	10.2	12	40.0	42.5	45.0	50.0	56.5
25kV	12.7	15	48.0	51.0	54.0	60.0	68.0
25kV	15.3	18	56.5	60.0	64.0	71.0	80.5
25kV	17.0	21	65.5	69.5	74.0	82.5	93.2
35kV	19.5	24	78.5	83.5	89.0	99.0	112.0
35kV	22.0	27	87.5	93.0	99.0	110.0	124.5
35kV	24.4	30	98.5	101.5	108.0	120.0	136.0

* MCOV = Maximum Continuous Operating Voltage

Ordering Information for MOV Surge Arresters

To specify and order an MOV Surge Arrester:

1) Determine the appropriate Maximum Continuous Operating Voltage (MCOV) for your system voltage using the Arrester Application Table below.

2) Specify the appropriate Elastimold® catalog number from the Selection Chart.

Arrester Application Table

	System Line-to-Line Voltage kVrms		MCOV* kV RMS	
	Nominal	Maximum	Solidly Grounded Neutral Circuits	3-Wire Ungrounded Circuits
15kV Class	2.40	2.54	2.55	2.55
	4.16	4.40	2.55	5.10
	4.80	5.08	5.10	5.10
	6.90	7.26	5.10	8.40
	8.32	8.80	5.10	8.40
	12.47	13.20	8.40	15.30
	13.20	13.97	8.40	15.30
	13.80	14.50	8.40**	15.30
	13.80	14.50	10.20	15.30
25kV Class	6.90	7.26	5.10	8.40
	8.32	8.80	5.10	8.40
	12.47	13.20	8.40	15.30
	13.20	13.97	8.40	15.30
	13.80	14.50	8.40**	15.30
	13.80	14.50	10.20	15.30
	20.78	22.00	12.70	—
	20.78	22.00	15.30**	—
	23.00	24.34	15.30	—
	24.94	26.40	15.30	—
	24.94	26.40	17.00**	—
	28.00	29.80	17.00	—

* MCOV = Maximum Continuous Operating Voltage.
** Preferred arrester MCOV for this system voltage.

Selection Chart

Picture	Description	Voltage Class	CAT. NO.	MCOV kV RMS
	BSA Bushing Surge Arrester (includes assembly tool) See Notes 1–4	15kV	167BSA-3	2.55
		15kV	167BSA-6	5.10
		15kV	167BSA-10	8.40
		15kV	167BSA-12	10.20
		15kV	167BSA-15	12.70
		15kV	167BSA-18	15.30
		25kV	273BSA-10	8.40
		25kV	273BSA-12	10.20
		25kV	273BSA-15	12.70
		25kV	273BSA-18	15.30
		25kV	273BSA-21	17.00
	ESA Elbow Surge Arrester See Notes 1, 2, 5	15kV	167ESA-3	2.55
		15kV	167ESA-6	5.10
		15kV	167ESA-10	8.40
		15kV	167ESA-12	10.20
		15kV	167ESA-15	12.70
		15kV	167ESA-18	15.30
		25kV	273ESA-10	8.40
		25kV	273ESA-12	10.20
		25kV	273ESA-15	12.70
		25kV	273ESA-18	15.30
		25kV	273ESA-21	17.00
	PSA Parking Stand Arrester See Notes 1–3	15kV	167PSA-3	2.55
		15kV	167PSA-6	5.10
		15kV	167PSA-10	8.40
		15kV	167PSA-12	10.20
		15kV	167PSA-15	12.70
		15kV	167PSA-18	15.30
		25kV	273PSA-10	8.40
		25kV	273PSA-12	10.20
		25kV	273PSA-15	12.70
		25kV	273PSA-18	15.30
		25kV	273PSA-21	17.00

NOTE: 1. Elastimold® PSA and BSA Arresters are equipped with a fully rated 200A switching and fault-close loadbreak bushing.
2. Elastimold® Arresters use high-strength, silver epoxy-bonded MOV blocks and shunted spring connections for the best circuit connection.
3. A 36" 4 AWG ground lead is provided with each unit.
4. BSA installed by turning internal hex bolt (accessed through the 200A bushing interface) with a 5/16" hex wrench and bent-wire torque wrench supplied with each unit.
5. For 15kV and 25kV class deadbreak system Elbow Arresters, use catalog number 156ESA with the appropriate duty cycle rating.

Ordering Information for MOV Surge Arresters

To specify and order an MOV Surge Arrester:

1) Determine the appropriate Maximum Continuous Operating Voltage (MCOV) for your system voltage using the Arrester Application Table below.

2) Specify the appropriate Elastimold® catalog number from the Selection Chart.

Arrester Application Table

	System Line-to-Line Voltage kVrms		MCOV* kV RMS	
	Nominal	Maximum	Solidly Grounded Neutral Circuits	3-Wire Ungrounded Circuits
35kV Class	23.00	24.34	—	22.00
	34.50	36.51	22.00**	—
	34.50	36.51	24.40	—

* MCOV = Maximum Continuous Operating Voltage.
** Preferred arrester MCOV for this system voltage.

Selection Chart

Picture	Description	Voltage Class	CAT. NO.	MCOV kV RMS
	BSA Bushing Surge Arrester See Notes 1–4	35kV	375BSA-24	19.50
		35kV	375BSA-27	22.00
		35kV	375BSA-30	24.40
	ESA Elbow Surge Arrester See Notes 2–3	35kV	375ESA-24	19.50
		35kV	375ESA-27	22.00
		35kV	375ESA-30	24.40
	PSA Parking Stand Arrester See Notes 1–3	35kV	375PSA-24	19.50
		35kV	375PSA-27	22.00
		35kV	375PSA-30	24.40

NOTE: 1. Elastimold® PSA and BSA Arresters are equipped with a fully rated 200A switching and fault-close loadbreak bushing.
2. Elastimold® Arresters use high-strength, silver epoxy-bonded MOV blocks and shunted spring connections for the best circuit connection.
3. A 36" 4 AWG ground lead is provided with each unit.
4. BSA installed by turning internal hex bolt (accessed through the 200A bushing interface) with a ⅝" hex wrench and bent-wire torque wrench supplied with each unit.
5. For 15kV and 25kV class deadbreak system Elbow Arresters, use catalog number 156ESA with the appropriate duty cycle rating.

elastimold®

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