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SOLUTIONS GUIDE

# Medium Voltage Controllable Fuse

## Intelligent Fuse Technology


MERSEN

# Introducing the Next Generation of Medium Voltage Arc-Flash Protection


Mersen's new Medium Voltage Controllable Fuse (MVCF) System is designed to mitigate the Arc-Flash hazard on the low-voltage side of a medium voltage transformer. The industry's first fuse to provide normal short-circuit and overload protection while having the capability to open on command, this fuse is a cost effective arc flash solution with minimal installation downtime.

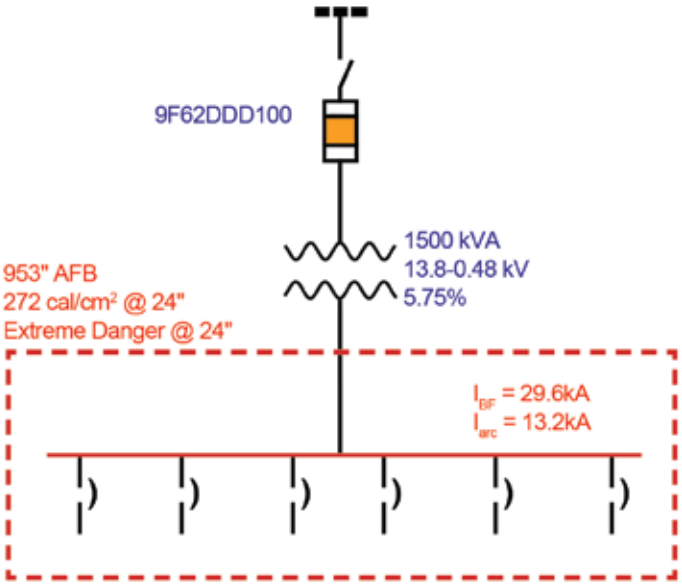
## Why Mersen developed the MVCF

OSHA Code 29 CFR-1910 Subpart S requires employers to:

- Identify and analyze arc-flash hazards
- Provide adequate personal protective equipment (PPE).
- For many installations, the arc-flash energy is over 40 cal/cm$^2$, which is too high for most PPE, requiring owners to prevent access to those areas unless power is disconnected. This is typically unworkable and does not mitigate the hazard.

## The problem the MVCF solves:

The line-sides of the main Low Voltage breakers have potential for arc-flash energies well beyond the capabilities of any PPE. The reason for this is that the closest upstream protective device is usually a Medium Voltage fuse on the primary side of the transformer. This fuse is designed to provide short circuit and overload protection without opening during the normal transformer in-rush current.




The turns-ratio of the transformer hampers the MV fuse or breaker from seeing the intensity of an arcing event occurring on the secondary such that the fuse will not open quickly-enough to prevent injury. In the example on the left, an arc-flash of 13,200A on the line-side of one of the breakers would be seen as only 459A through the primary fuse. The fuse would open, but it would take 6 seconds, which is far too long to prevent injury.

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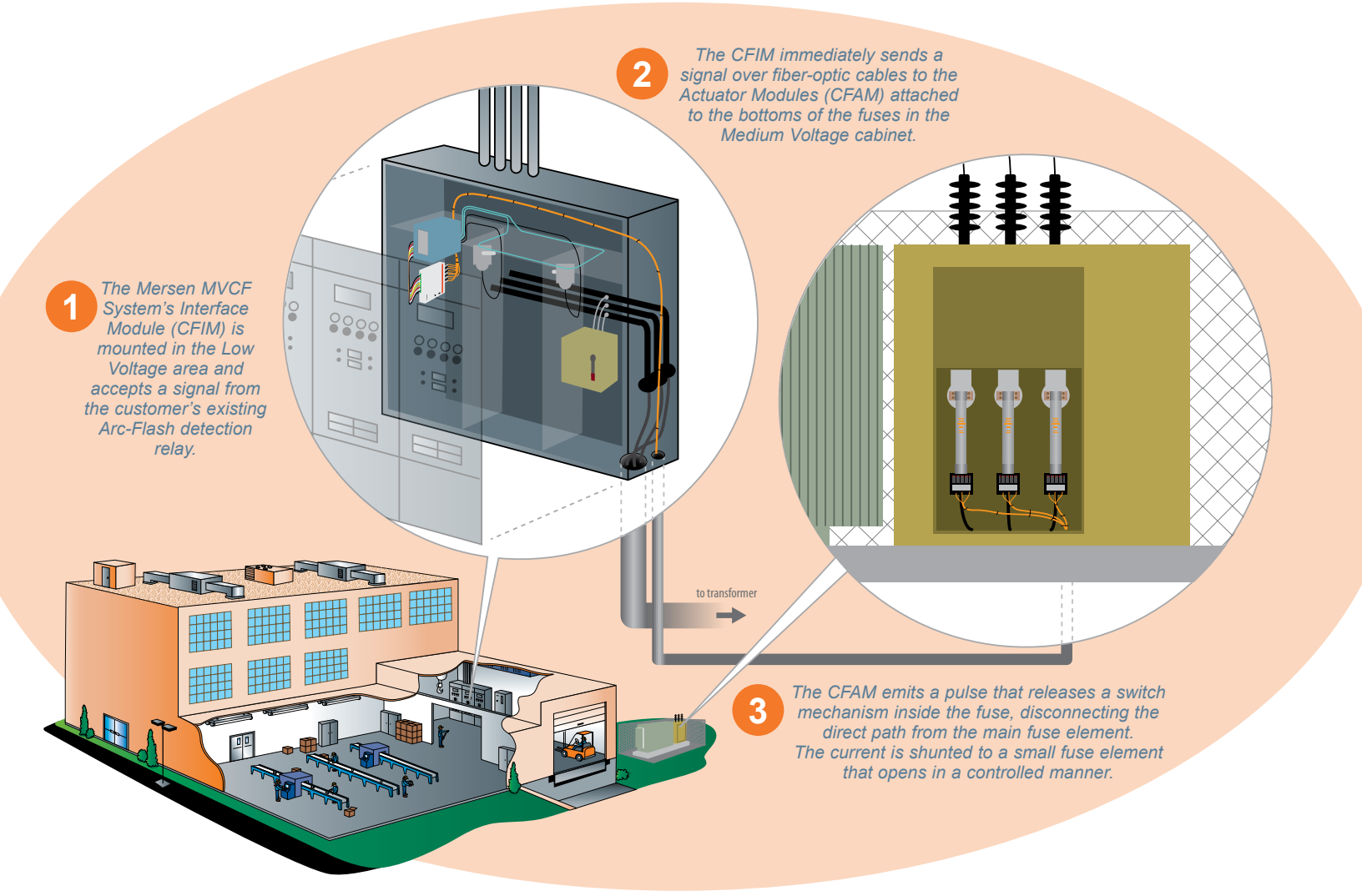
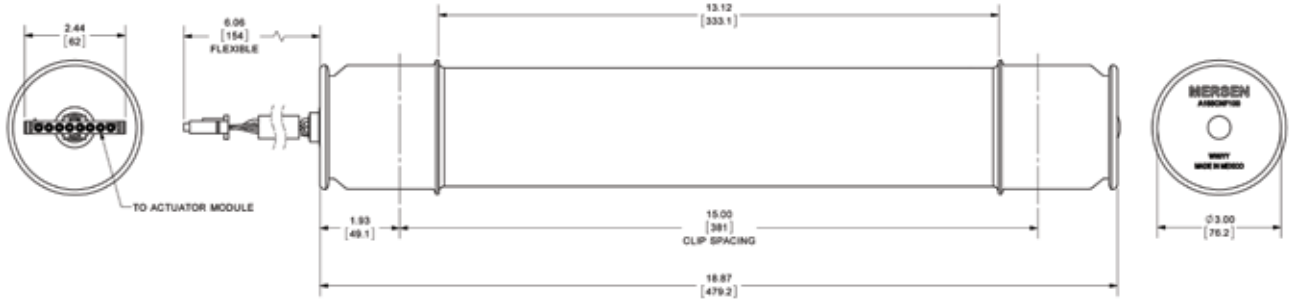
# How does the Intelligent Fuse System Work?




## Features and Benefits

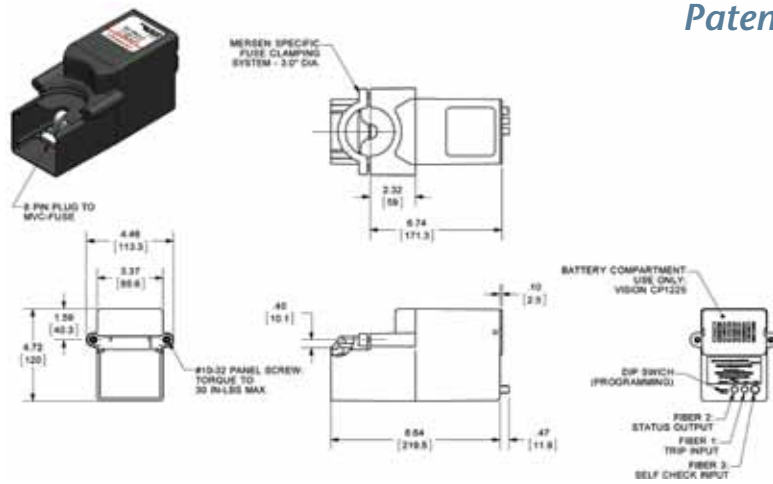
- **Fuses fit into existing clips and space** – The retrofit can be completed in minutes, provided fiber optic cable is already in place.
- **Lowest-cost Arc-Flash Mitigation Solution** – A turnkey installation of the MVCF will cost a fraction of other available alternatives
- **Exceptional Performance** -
  - 50kA short circuit interrupt rating
  - Fast response time mitigates the arc-flash energy to less than 8 cal/cm²
- **Low Maintenance** – Fuses are designed to last 20 years with no maintenance intervals; the battery lasts for 3 years
- **Flexible Design Interface** – Designed to be used with a variety of conventional protective relays
- **No Nuisance-tripping -** Actuator modules are programmed to ignore trip signals when primary current is below the fuse rating.
- **Corrosion-resistant -** Special heavy tin-nickel-copper plating offers the best whiskering and oxidation mitigation in the industry.
- **Automatically performs a system check every week -** Confirms continuity on all FO lines.
- **Minimal stress on other devices** – The fuse element softens the voltage spike that occurs when opening. Alternatives may generate an excessive spike that could damage transformer insulation or upstream devices
- **Small Back-up Power Cells** – The MVCF utilizes small batteries that fit inside the CFAM versus other solutions requiring multiple large lead-acid batteries
- **SAFE** – Conforms to: IEEE C37.40-2003 Std for High Voltage Fuses, IEEE C37.41-2008 Std for HV Fuse Testing, IEEE C37.46-2010 Std for Fuse Disconnecting Switches, IEEE C37.90.1-2012 Std for Surge Withstand, IEEE C37.90.2-2004 (R2010) Std for RF Interference on Relays, IEEE C37.90.3-2004 (R2012) Std for ESD for Relays

# Medium Voltage Controllable Fuse (A155CNF100)

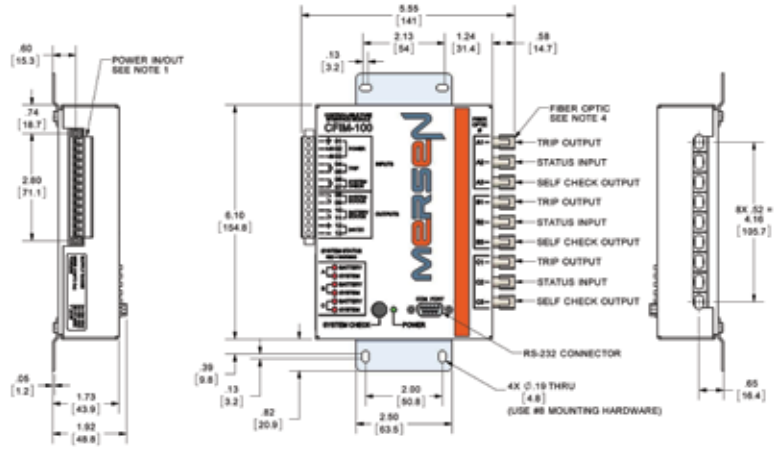



## Controllable Fuse Actuator Module (CFAM-100)

*Patents Pending*




## Controllable Fuse Interface Module (CFIM-100)




## Specifications

| Fuse | |
|---|---|
| Catalog Number | A155CNF100 |
| Rated Current @ 40 C | 100A |
| Rated Maximum Voltage | 15.5 kV |
| Minimum Melting $I^2t$ | 56 $kA^2s$ |
| Maximum Total Clearing $I^2t$ | 280 $kA^2s$ |
| Rated Minimum Interrupting Current | 160A |
| Rated Minimum Interrupting Current, Controlled | 100A |
| Rated Maximum Interrupting Current | 50kA |
| Rated Maximum Interrupting Current, Controlled | 1000A |
| Maximum Peak Arc Voltage | 42kV |
| Nominal Watts Loss @ Rated Curernt | 150W |
| Operating Temperature | -40° C to +50° C |

| Actuator Module | |
|---|---|
| Catalog Number | CFAM-100 |
| Input Power | Derived from Fuse |
| Battery | Vision CP1225 |
| Battery Voltage | 12V nominal |
| Fiber Optic Connections | ST-ST Fiber Patch Cable Multimode 62.5/125 OM1 |
| Fiber Optic Range | 300 meters |

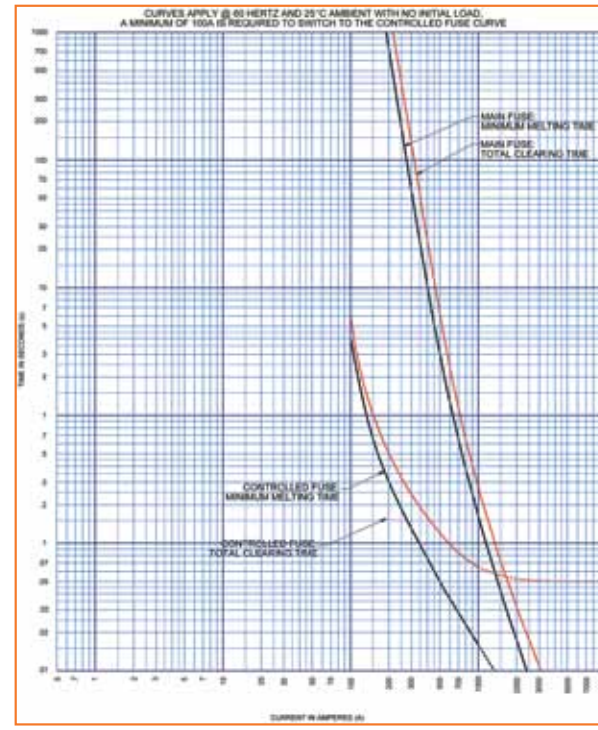
| Interface Module | |
|---|---|
| Catalog Number | CFIM-100 |
| Input Power | 24-125 VDC, 24-120VAC |
| Wire Range | #14-26 AWG Stranded or Solid, #12 AWG Stranded |
| Wire Strip Length | 0.310 inches |
| Fiber Optic Connections | ST-ST Fiber Patch Cable Multimode 62.5/125 OM1 |
| Fiber Optic Range | 300 meters |

# MERSEN'S MVCF IS THE TECHNOLOGY-LEADING SOLUTION

## Minimal Downtime

The MVCF fits into existing fuse cabinets, typically using the existing MV clips:

- ✓ Panels do not need to be replaced, reducing site work and man hours needed for installation
- ✓ Shut-down time can be minimized to less than a few hours in some cases
- ✓ Installation can be completed by normal personnel




## Low Risk

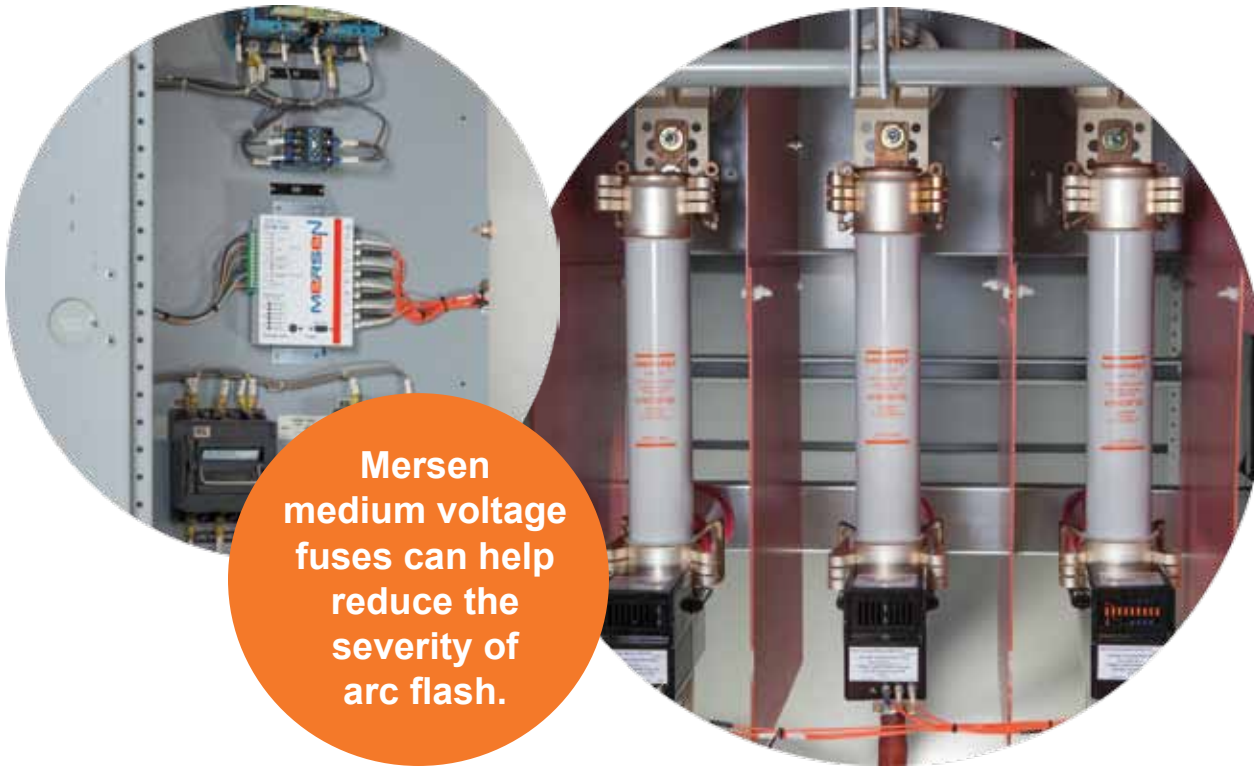
It provides the same short-circuit and overload protection as the fuse it replaced.

## Safe

It will limit the energy to a PPE Category 2 (8 cal/cm²) or less by accepting a signal from the standard arc flash detection equipment currently utilized in the industry.

## Low Cost

Comparing the installation costs of the MVCF to a conventional MV Circuit Breaker will clarify the huge difference in site-work, logistics of equipment removal and replacement, liability of sub-contractors, overall man-hours and total downtime. The installed cost of the MVCF can be as little as 20% of that of the MV Circuit breaker, with a corresponding reduction in downtime. This cost and time saving will allow more installations to be protected sooner, thus increasing worker safety and lowering the plant's liability.




**Mersen medium voltage fuses can help reduce the severity of arc flash.**


MERSEN

*Expertise, our source of energy*

## A WORLD LEADER
**in safety & reliability for electrical power.**

## A GLOBAL PLAYER

A global expert in materials and solutions for extreme environments as well as in the safety and reliability of electrical equipment, Mersen designs innovative solutions to address its clients' specific needs to enable them to optimize their manufacturing process in sectors such as energy, transportation, electronics, chemical, pharmaceutical, and process industries.