

FlashGard
Motor control center (MCC)

Safety is critical



EATON

Powering Business Worldwide

... Than
 ... is Rated For Use On A Circuit Capable Of Delivering Not
 When Protected By A Current Limiting Main Device, A RMS Sym. Amperes, Volts Maximum.
 Maximum Class Fuse Or A Type Ampere
 Not More Than Amperes Must Be Used. Circuit Breaker Rated
 The Short Circuit Rating Of This Switchboard Section Is Equal
 To The Lowest Rating Of (1) Any Section Electrically Connected In Series
 Or (2) Any Installed Panelboard Having A Marked Short
 Circuit Rating Or (3) Any Device Installed Except As Noted In The
 Series Rating Information Manual Attached.
 If This Section Contains A Control Transformer, The Secondary
 Voltage Is 120V.
 If This Section Contains A Bonded Neutral, The Bonding Means
 Shall Only Be Removed For Test Purposes.
 Made in USA
 900P025H01 R2



WARNING

ARC FLASH HAZARD

11257-045

LINE SIDE FLASH PROTECTION BOUNDARY: 129 inches
of MAIN HAZARD RISK CATEGORY: 3
INCIDENT ENERGY RANGE: 8-25 cal/cm² at 18" WORKING DISTANCE

LOAD SIDE FLASH PROTECTION BOUNDARY: 106 inches
of MAIN HAZARD RISK CATEGORY: 3
INCIDENT ENERGY RANGE: 8-25 cal/cm² at 18" WORKING DISTANCE

0.48 kV

PSE TQS# 5860.2 Date Issued: JAN 2006

Study Rev.: 0

LOCATION: SWBD2

PROTECTIVE DEVICE: SWBD1 MAIN

FlashGard[®] motor control center

Safety is critical.

Protect your equipment and personnel
from the danger of arc flash.



Electrical safety standards

The Library of Construction, Occupation Safety & Health (LCOSH) describes electricity-related hazards as:

- Electric shock and burn
- Arc-flash burns
- Arc-blast impacts
- Falls

The National Fire Protection Association (NFPA®) 70 Article 340.7 states that an employer is responsible for providing training and supervision by qualified personnel to:

- Explain the nature of the hazard
- Develop strategies to minimize the hazard
- Provide methods to avoid and protect against the hazard
- Convey the necessity of reporting any hazardous incident

The most recent standards and design requirements (NFPA 70E) applicable to personnel who install, maintain or repair electrical systems are centered on marking equipment to inform personnel of the potential hazard and the appropriate personal protection equipment (PPE). In an attempt to address arc-flash hazards, the industry developed ANSI C37.20.7, which provides testing guidelines for “Arc Resistant Switchgear.”

Switchgear tested to this standard has proven to protect against the effect of abnormal internal pressure or “arc flash,” as long as all the doors and access areas are properly secured. However, motor control centers (MCCs) are routinely accessed for a variety of reasons:

- Connecting/disconnecting MCC starters/feeders
- Adjusting trip settings
- Replacing fuses
- Adding motor loads
- General troubleshooting

Access to the interior of the unit buckets is required to make such adjustments. Constructing a motor control center to pass the aforementioned ANSI testing guidelines does not address all of the electrical hazards and does not provide the highest level of personnel protection, prompting most accidents, especially with covers removed and breaker doors open. Maintaining a deadfront barrier, i.e., the unit door closed when connecting and disconnecting MCC starters/feeder units, and providing insulated components/connections, significantly reduces the possibility of an arc-flash incident.

Testing

Testing was conducted per IEEE® 1584P to verify that closed door operation provides a considerably lower risk category than the risk Category 3 assigned by NFPA 70E Table 130.7(c)(9)(a) for insertion and removal of MCC units. In addition to thermal hazards, the door closed provides better protection from shrapnel, noise, gases and blinding light. (An optional remote-operated racking device is also available so that an operator may advance and retract the stabs from a distance of up to 15 feet.)

What is an arc flash?

An arc flash is a dangerous condition associated with the explosive release of energy caused by an electrical arc. This fault can result from many factors, including dropped tools, accidental contact with electrical systems, buildup of conductive dust, corrosion and improper work procedures.

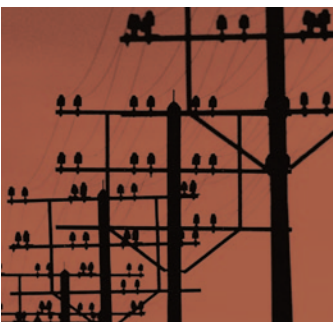
NFPA 70E 130.3 (B)


PPE for use with a Flash Hazard Analysis: Where it has been determined by the NFPA that work will be performed within the flash protection boundary, the hazard analysis shall determine, and employer shall document the energy exposure of the worker (in calories per square centimeter). Flame-resistant clothing and PPE shall be used by the employee based upon the energy exposure associated with the specific task.

The intent of NFPA 70E regarding arc flash is to provide guidelines, which will limit injury to the onset of second-degree burns (1.2cal/cm²).

Notes

- Although it is only referenced in OSHA, NFPA 70E is considered to be the recognized industry practice for electrical safety
- The heat reaching the skin of the worker is dependent primarily upon:
 - Power of the arc at the arc location
 - Distance of the worker to the arc
 - Time duration of the arc exposure





Arc Flash and Shock Hazard

| | |
|----------------------------|-------------------------|
| Flash Protection Boundary: | 2.9 ft |
| Incident Energy: | 2.3 Cal/cm ² |
| Working Distance: | 18 in |
| Required PPE Level: | 1 |
| Shock Hazard Voltage: | 3450 VAC |
| Limited Approach: | 10.0 ft |
| Restricted Approach: | 2.2 ft |
| Prohibited Approach: | 0.6 ft |

Equip. ID: Sub23



Frequently used arc-flash protection

- The medium voltage “arc-resistant” approach—enclose electrical gear in heavy-duty steel with chimney to redirect arc energy
- Flame-resistant protective clothing
 - Gloves and clothing made of inflexible materials limit manual dexterity for precision tasks
 - Flame-resistant clothing does not protect from excessive noise and/or shrapnel ejected at high velocities during a fault
 - The material used in flame-resistant clothing retains body heat, potentially causing heat exhaustion and fatigue

Critical flaw: Personnel are protected only when all covers and doors are closed. “Arc-resistant” gear does not take into consideration the most likely cause of arc flashes: human error.

Critical flaw: Arc-flash protection is dependent on actual settings and performance of the overcurrent device for the available arc-flash fault currents.

- Available arc-flash currents can be at a significantly lower level than the fixed fuse curves, which can thus undermine the arc-flash protection offered by the fuse
- In many situations, circuit breakers with configurable trip settings, along with instantaneous and ground fault trip capabilities, are a better choice for arc-flash protection than fuses

FlashGard MCC features and functions

FlashGard motor control centers use many features that exist today throughout the electrical industry that have proven to be a reliable and effective means of providing enhanced electrical safety.

Prevention: insulation and isolation

- Insulated horizontal and labyrinth vertical bus
- Shutters to isolate the vertical bus when a unit is removed
- Shutters on the unit to isolate the stabs when bucket is removed
- Finger-safe components inside the units

Reduction of time-available fault current

- Arcflash Reduction Maintenance System™
- Applied to breaker feeding MCC to reduce trip time during an arc flash
- Can reduce risk category from CAT3 to CAT0

Maintaining unit door closed

- Disconnect units from vertical bus with door closed
- Interlock preventing removal of unit from vertical bus
- Interlock preventing insertion of unit with stabs extended
- A more uniform and secure connection to the vertical bus
- Two-position retractable stabs:
 - Connected
 - Disconnected
- Visual indication that stabs are disconnected from vertical bus
- Optional through-the-voltage test station (VoltageVision™)

Removing voltages dangerous to life

- In “Disconnected” position, no voltage present

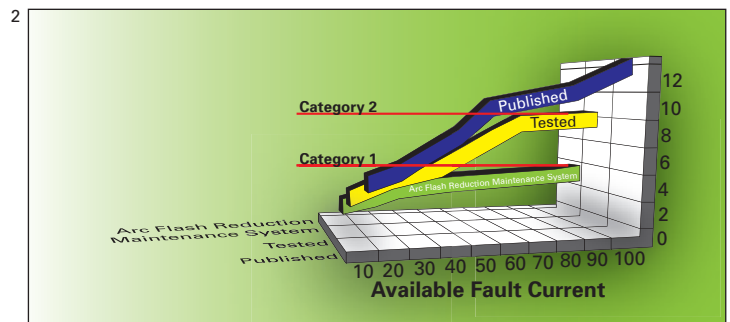
Enhanced features and functions

- Arc-free insulated bus and barriered bus system
- Through-the-door voltage presence indicator (VoltageVision)
- Arc-free bucket design—finger-safe components
- Remote connect/disconnect racking motor accessory
- Automatic insulation tester to monitor integrity of motor insulation (Motorguard™)
- Available with Freedom NEMA® and A200 contactors

1. Arcflash Reduction Maintenance System

Eaton’s Arcflash Reduction Maintenance System can improve safety by providing a method to reduce fault clearing time. The Arcflash Reduction Maintenance System can either be activated by a switch on the trip unit, by a lockable switch mounted to the metering panel, by a PowerNet™ communication system, or through use of the Infra Red port on a PDA.

2. Arcflash Reduction Maintenance System mitigation





1. Remote racking accessory
2. Voltage presence indicator (VoltageVision)

FlashGard MCC benefits

- The minimization of impact and exposure to higher PPE levels in industrial environments
 - Increases uptime
 - Decreases direct cost of employee incidences
 - Increases personnel safety
 - Reduces number of injury-related incidences
- Lowers the probability of the creation of a short circuit phase-to-phase or phase-to-ground
- Lowers the probability of electrical shock
- Proven to reduce incident arc-flash energy during maintenance ①

① As described by the IEEE testing method described in IEEE 1584.

RotoTract™ stab assembly

The FlashGard MCC provides a state-of-the-art remote racking mechanism that provides bus isolation, stab indications and lockout features. The RotoTract stab assembly has two distinct positions.

RotoTract features a 3/8-inch drive socket that can accept any standard driver or a 24-inch remote racking tool.

The stabs can be remotely operated with an optional remote motor, allowing the operator to access from outside the arc-flash boundary.

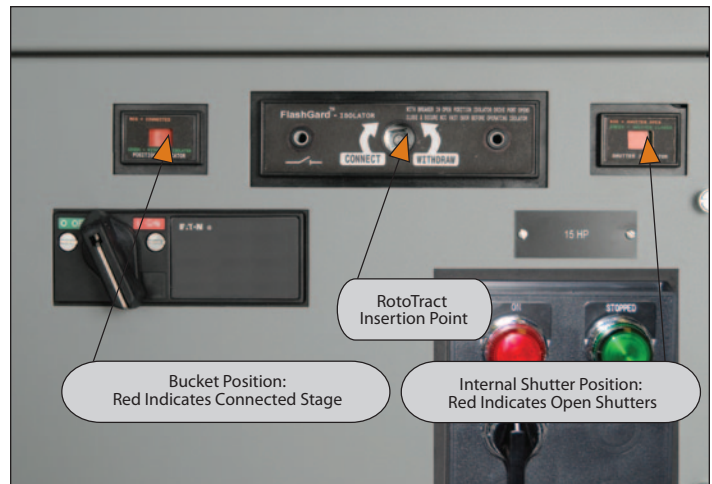
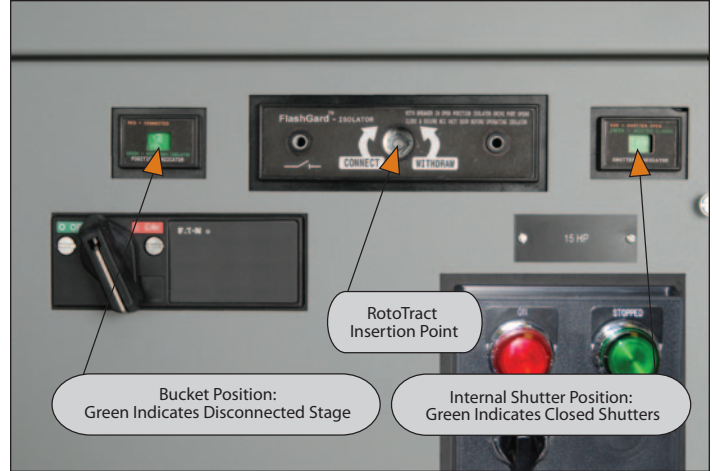
The drive socket is interlocked with the door to prevent opening while inserting the stab assembly. A manual shutter prevents operating the breaker when the stabs are not engaged. Plus, an interlock prevents accessing the 3/8-inch drive socket when the breaker is in the ON position.

RotoTract has a unit assembly latch to ensure that the unit remains in place while in the "Connected" mode.

An added benefit of RotoTract is that when the unit is placed in the structure with the stabs retracted, the stab alignment to the vertical bus is guaranteed.

Remote racking accessory

- Performs RotoTract racking safely behind NFPA arc-flash boundaries
- 120 Vac motor driven
- Mounts to RotoTract mechanism
- Wired pendant station for "rack-in"/"rack-out" operation
- Momentary jog
- Mounting offset bracket to clear device panel



3. Automatic insulation tester (Motorguard)

3

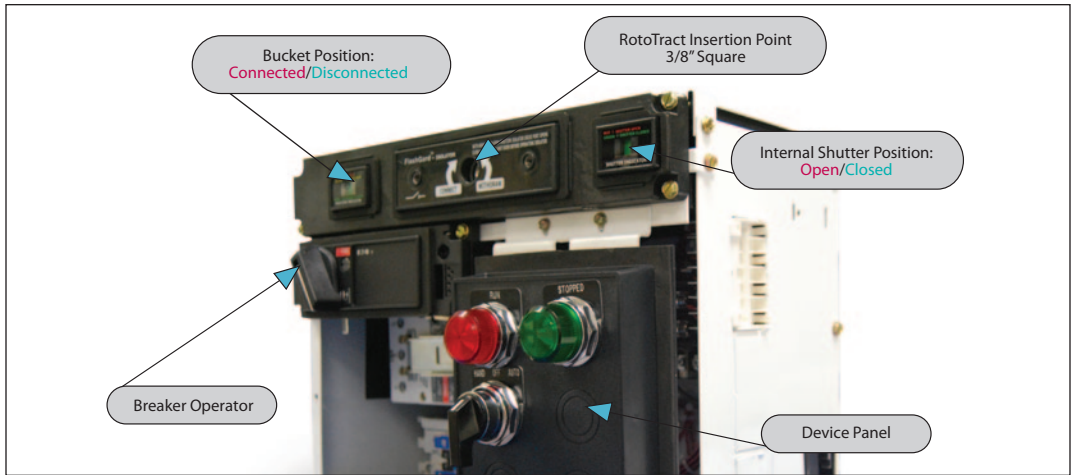


Voltage presence indicator (VoltageVision)

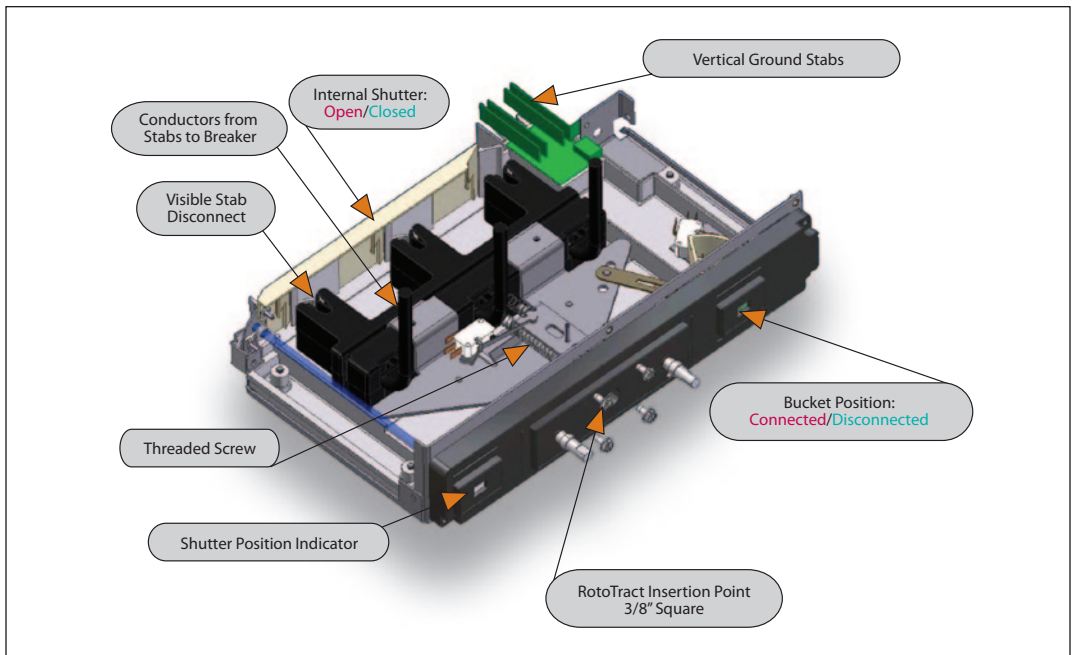
- Hardwired voltage detector connected to load side of disconnect
- Enables operator to “pre-verify” voltage presence with unit door closed
- Installable in a 30 mm pilot device knockout
- Dual redundant circuitry for reliability
- Phase insensitive

Automatic insulation tester (Motorguard)

- “Meggers” equipment motor insulation to continuously monitor integrity of insulation for the period that the equipment is de-energized
- Applies 500 Vdc potential at current-limited, operator-safe maximum amperage of 200 microamperes
- Alarms upon detection of a threshold leakage to ground current
- Visual alarm indication and lockout; Form C contact available for remote alarm status



FlashGard Bucket Top



FlashGard Bucket Top Shown Upside Down

Eaton is dedicated to ensuring that reliable, efficient and safe power is available when it's needed most. With unparalleled knowledge of electrical power management across industries, experts at Eaton deliver customized, integrated solutions to solve our customers' most critical challenges.

Our focus is on delivering the right solution for the application. But, decision makers demand more than just innovative products. They turn to Eaton for an unwavering commitment to personal support that makes customer success a top priority. For more information, **visit www.eaton.com/electrical**.

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