ANSI Low Voltage—Motor Control Center

Freedom 2100

Product Offering

- Voltage rating: 600 V
- Bus bracing: 65, 100 kAIC
- Main incoming options:
  - Molded case circuit breaker through 2500 A)
  - MagnumE DS power circuit breaker (fixed and drawout through 3200 A)
- Main lugs (through 3200A)
- Main fused switches (through 1200A)
- Horizontal bus options: 800, 1200, 1600, 2000, 2500, 3200A
- Vertical bus options: 300, 600, 800, 1200 A — fully rated
- Control Units:
  - NEMAT starters (FVNR,FVR) through Size 7
  - 2-Speed, autotransformer, and wye-delta
  - Reduced voltage soft starters through 1000 A
  - Adjustable frequency drives through 1100 hp
- Enclosure ratings:
- NEMA 1A, 3R (non walk-in, walk-in, aisle), 12
- Power integrity options:
  - Automatic transfer switches
  - Main-tie-main configurations
  - TVSS protection
  - Active harmonic correction
  - Power factor correction capacitors

- Distribution options:
  - MCCB (plug-in through 400 A)
  - Power circuit breakers (fixed and drawout)
  - Fused switches (through 1200A)
  - Panelboards single and three phase
  - Dry-type transformers single and three phase
- Communication options:
  - Device Net E
  - ModbusT RTU
  - Modbus TCP/IP

Standard

- ULT 845 NEMA ICS 3 Part 1 and NECT Section 430 Part H

Customer Value

- **Improved Uptime:** Quick ship capability for new and aftermarket from eight service centers. Wide range of TVSS protection available.
- **Improved Maintainability:** Strong support for vintage products more than 80 years worth of support. Draw-out power circuit breaker option.
- **Increased Reliability:** Self aligning stabs for solid connection to vertical bus. Main-tie-main configurations for incoming power.
- **Increased Safety:** Shutter mechanism that automatically closes over open vertical bus connections. 24 Vdc technology for control.
- **Reduced Installation Cost**: Smallest footprint for highest featured products (soft-starters, IT. EM starters, drives). 21 inch true back-to-back design.

Industry Applications

- Project/commercial construction
- Waste/water treatment
- Industrial: automotive, manufacturing, petrochemical, oil & gas, pulp & paper, pharmaceutical
- Institutional: universities, hospitals
- Utility: power generation

Freedom Arc-Resistant

An arc flash is a dangerous condition associated with the explosive release of energy caused by an electrical arc due to either a phase-to-ground or a phase-to-phase fault. This fault can result from many factors, including dropped tools, accidental contact with electrical systems, buildup of conductive dust, corrosion and improper work procedure. An arc-flash event releases a tremendous amount of energy in the form of thermal heat, toxic fumes, pressure waves, blinding light, sound waves and explosions that can result in serious injury, including critical burns, collapsed lungs, loss of vision, ruptured eardrums, puncture wounds and even death.

Standards and Certifications

Eaton's Freedom arc-resistant MCC has been tested and verified per the criteria found in the Institute of Electrical and Electronics Engineers (IEEE) guideline C37.20.7 titled "IEEE Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults."

The MCC also meets the criteria found in Canadian Standards Association (CSA) standard C22.2 No.0.22-11, titled "Evaluation Methods for Arc Resistance Ratings of Enclosed Electrical Equipment." This standard was originally published in 2012 and is currently the only official North American standard or guideline that contains low voltage MCCs within the scope of coverage. CSA C22.2 No.0.22-11 was based in large part on the guidelines and testing criteria found in IEEE C37.20.7.

Freedom Arc-Resistant

Features and Benefits

No Exhaust Plenums or Roof Flaps Required

Eaton's arc-resistant Freedom MCC requires no exhaust plenums or roof flaps. This aids in the ease of installation, as additional clearance or venting ductwork is not required above the assembly.

12 Gauge Steel Doors, Side Sheets and Back Sheets

Usage of 12 gauge steel on all MCC doors, side sheets and back sheets serve to increase the structural integrity of the MCC and aid in the containment of arc blast energy, further enhancing personnel safety should an arc flash event

4 Inch Sections

A four-inch section is added to the first andlast structures of the MCC lineup, regardless of the number of structures. These sections increase the structural integrity of the MCC lineup, further ensuring it can withstand the arc blast energy.

Enhanced Door Hinges and Latches

Hinges and door latches play a vital role in the containment of arc blast energy during an arc flash event. The design and implementation of enhanced door hinges and latches on the Freedom arc-resistant MCC serves to keep doors closed and latched securely during an arc flash event, further preventing the propagation of arc As an additional measure, the quantity of door hinges and latches applied to the MCC unit doors has also been increased.

Insulated Horizontal and Vertical Buses

Insulation of the horizontal and vertical buses aids in the prevention of arc flash incidents. When an arc flash incident does occur, the insulation serves to prevent further propagation of the arc fault throughout the entire MCC. Automatic vertical bus shutters are included.

Isolation Barriers Between Adjacent Structures

Isolation barriers placed between adjacent structures serve to isolate the arc blast energy to a single area within the MCC.

Specifications

Item	Description
Freedom arc-resistant MCC	
Applicable guidelines and standards	Tested and verified per IEEE guideline C37.20.7 and CSA standard 22.2 No. 0.22-11
Agency approvals	UL and cUL per UL845
Voltage rating	600V maximum
Interrupting rating	Maximum 65kA @ 480V and 600V
Arc duration rating	100ms @ 480V / 50ms @ 600V
Accessibility type [4]	Type 2 (contains arc-resistant protection designs or features on the front, sides, and rear of the equipment)
Main incoming breaker (required)	2500A frame (1200A-2500A trip range), 80% rated 1200A frame (400A-1200A trip range), 80% rated
Structure environmental ratings	NEMA 1 and 2 available
Structure depth	21 inches
Horizontal bus	Minimum 800A, maximum 2500A[1]
Vertical bus	Maximum 1200A
Bus insulation	Horizontal and vertical buses both insulated
Available units, assemblies and options	
Interrupting devices [2]	Thermal magnetic circuit breakers and motor circuit protectors
Main breakers [3]	2500A frame (800A - 2500A range) 1200A frame (320A - 1200A range)
Starters	NEMA size 1-5 full voltage non-reversing (FVNR), full voltage reversing (FVR), and multi-speed All overload options available, including bimetallic and solid state
Feeders	Maximum 600A, 80% rated
Variable frequency drives (VFDs[4])	Maximum 150hp
Soft starters	Maximum 450hp
Other units and assemblies available	Relay panels Relay structures Meters Transformers Panelboards Surge protective devices Power factor correction capacitors Active harmonic correction units
Communications	Communications on all major fieldbus protocols, including Modbus, Modbus TCP, Ethernet/IP, DeviceNet, and Profibus

[1] 2500A maximum with 65°C temperature rise bus, 2000A maximum with 50°C temperature rise bus

[2] Fused switches and air circuit breakers not available

[3] An incoming main breaker is required to be configured in the lineup. Incoming main lugs, fused switches, and air circuit breakers not available as main devices.

[4] Bypass and isolation not available for FR8 150HPVT

ANSI Low Voltage—Motor Control Center

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 laby rinth 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

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)

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 NEMAT
- and A200 contactors

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

Removing voltages dangerous to life

- In “Disconnected” position, no voltage present

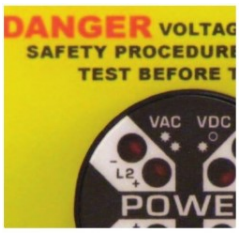
FlashGard MCC benefits

- The minimization of impact and exposure to higher PPE levels in industrial environments
  - Increases uptime
  - Decreases direct cost of employee incidences
  - ncreases 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. FlashGard RemoteRacking Accessory

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

2. Voltage Presence Indicator (Voltage Vision)



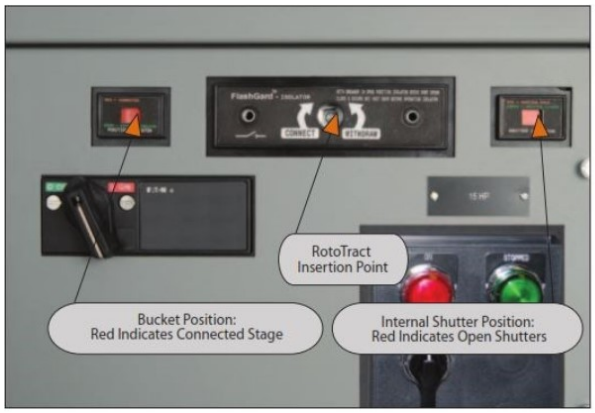
- Hardwired voltage detector connected to load side of disconnect
- Enables operator to “pre-verify” voltage presence with unit door closed
- Installable in a 30 mm pilot device knockout
- Dual redundant circuitry for reliability
- Phase insensitive

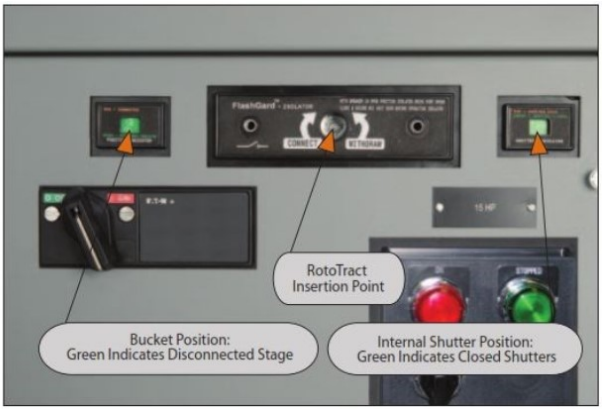
3. FlashGard Locking Accessory

- Locks out RotoTract operation during maintenance
- Allows operation of FlashGard units by authorized personnel only
- Heavy-gauge steel construction

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.





Background

Over 50 years ago, Cutler-Hammer® and Westinghouse® low voltage motor control centers were introduced, enabling the group mounting of low voltage (600 V class) electrical controls. This allowed for supervision and safe operation of motor starter units, feeder tap units and auxiliary equipment in a flexible structure arrangement at a centralized location. The foundation for today's MCCs is a modular plug-in combination motor controller assembly with components of proven electrical and mechanical integrity. These assemblies are enclosed in metal structures that prevent accidental contact with live electrical parts. The MCC structure consists of structural steel, horizontal and vertical wireways for conduit and load cable entry and exit, and vertical and horizontal bus systems for distributing power throughout the MCC. The starter unit consists

Aftermarket Service

Eaton's MCCs are manufactured with high quality structural parts designed to provide many years of service. Eaton is dedicated to providing replacement units or add-on units to handle additional loads for motor control centers manufactured since 1935 for both the Westinghouse and Cutler Hammer product lines. The following descriptions and needed order entry information will be useful in identifying and processing a vintage MCC aftermarket unit.

1. Motor control center type:(11-300, Type W, 5-Star, Advantage, 9800, F-10, Freedom FlashGard, Freedom, Freedom arc-resistant IT, XT and XT FlashGard)
2. Class of unit (Non-reversing, Reversing, Two Speed)
3. Service voltage
4. Control voltage
5. Starter size or horsepower rating
6. Disconnect type (HMCP, Fusible)
7. Clip size and type (if Fusible)
8. Unit modifications (Lights, Pushbuttons, etc.)
9. Catalog Number (if available)

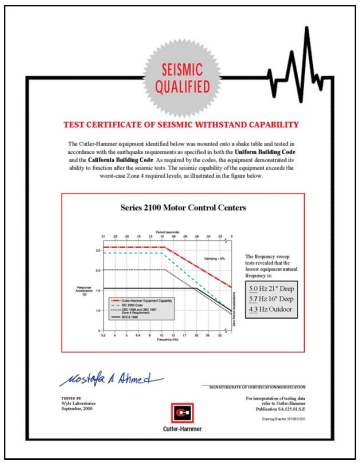
Product Availability

Replacement units for the 5-Star, Series 2100, Advantage, 11-300, 9800, Type W, F-10, F2100, Freedom FlashGard, Freedom, Freedom arc-resistant IT, IT FlashGard, XT and XT FlashGard motor control center lines may be obtained from the Fayetteville manufacturing plant or any of the regionally located Customer Manufacturing and Solution Centers (CMSCs).Competitive MCC units can be obtained from the Fayetteville manufacturing plant or CMSCs.

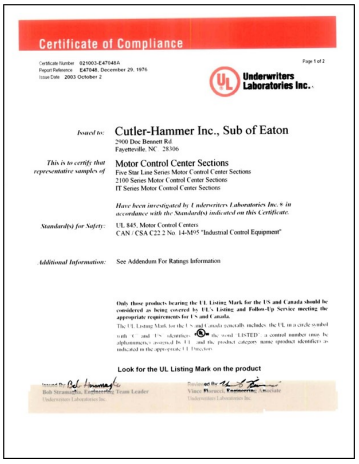
MCC Renewal Parts

MCC Type	Dates	Eaton's Cutler-Hammer Renewal Parts Publication
XT	2012–present	—
XT FlashGard	2012–present	—
IT.	2002–2011	—
IT. FlashGard	2007–2011	—
Freedom	1995–present	RP04304001E
Freedom FlashGard	2008–present	—
Advantage	1992–2011	RP04304002E
Series 2100	1987–1995	RP04304003E
5 Star	1975–1987	RP04304003E
Freedom Unitrol	1988–1994	RP04304004E
F10 Unitrol	1972–1989	RP04304005E
Type W	1965–1975	RP04304006E
9800 Unitrol	1956–1974	RP04304007E
11-300	1935–1965	RP04304008E

Certificate



Seismic Test Certificate by Wyle Laboratory



UL Certificate F2100

Success Story

NO	Project Name	Customer	Market Application
1	Penggantian Substation 63 - Pertamina RU IV Cilacap	PT. Timas Suplindo	Oil & Gas
2	IPAL Pertamina UP IV Cilacap	PT. ELNUSA	Oil & Gas
3	Tangki Pertamina RU IV Cilacap	PT. WIJAYA KARYA	Oil & Gas
4	Chevron Yakin North Bravo, Kalimantan	PT. Indokomas Buana Perkasa	Oil & Gas
5	Chevron Balikpapan	PT. Indokomas Buana Perkasa	Oil & Gas
6	PT. Kangean Energy Indonesia	CV. Artha Nirmala Mandiri	Oil & Gas
7	Pertamina UP IV Cilacap	PT. Fajar Mas Murni	Oil & Gas
8	Chevron Sepinggan	PT. Indokomas Buana Perkasa	Oil & Gas
9	Husky-Cnooc-Madura	PT. PAL Indonesia	Oil & Gas
10	Sipc Complex At Jubil, Overseas Project	Woojin Mechanical and Electrical	Oil & Gas
11	Debottlenecking Project	PT. Patra SK	Oil & Gas