

Low Voltage Motor Control and Power Distribution Solutions

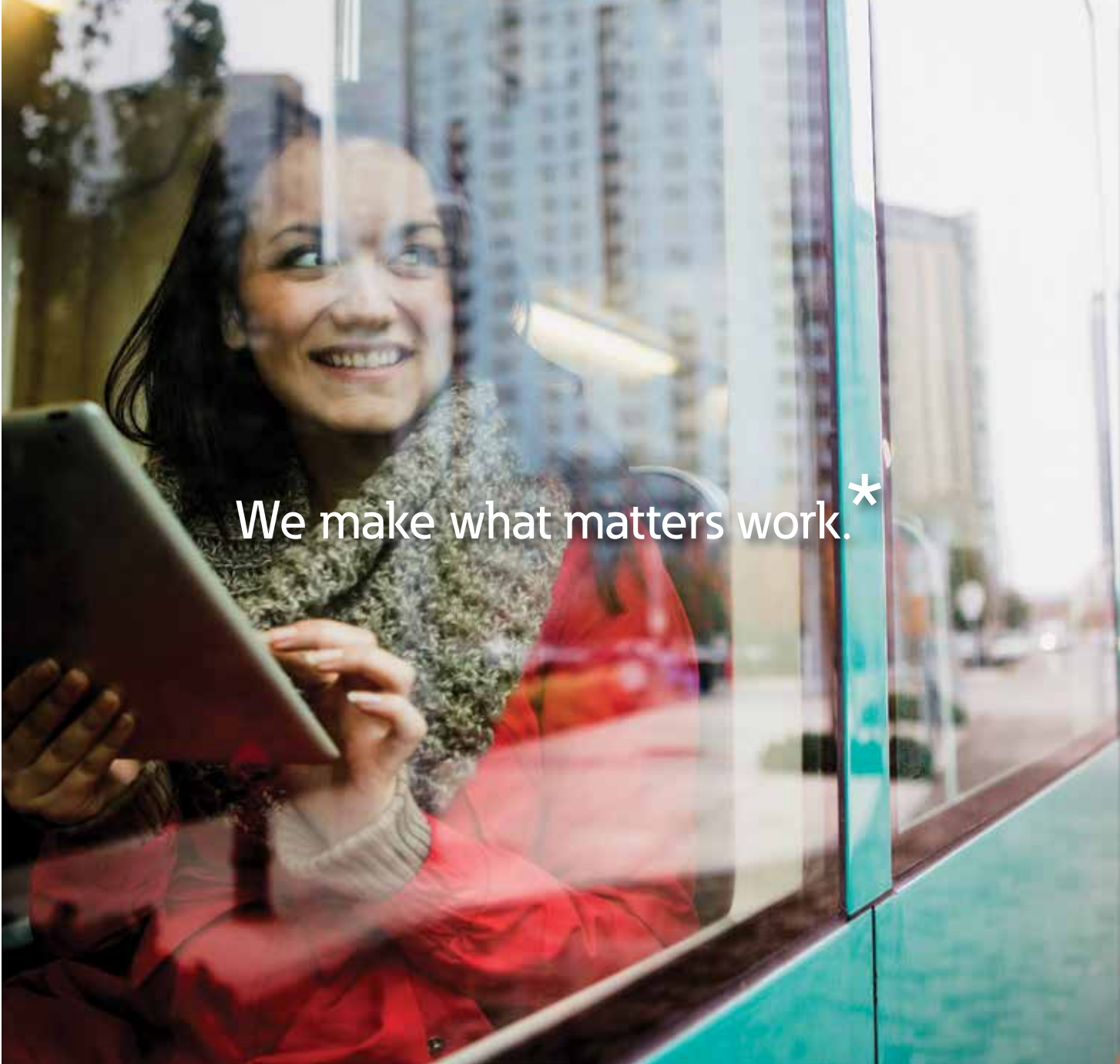
xEnergy Elite

Motor Control and Power
Distribution Solutions

Verified by testing, IEC 61439-2

EATON

Powering Business Worldwide



We make what matters work.*

* Every day, people depend on things like technology, transportation, energy and infrastructure to keep their daily lives on track. But without power, none of it would be possible. That's why companies around the world turn to Eaton. We're dedicated to improving people's lives and the environment with innovative technologies that help manage power more safely, reliably and sustainably. To meet today's challenges, and tomorrow's. Because this is what really matters. And we're here to make sure it works.

To learn more go to: Eaton.com/whatmatters

EATON
Powering Business Worldwide

We make what matters work.



Eaton has been providing solutions to your challenges for over a century

Look around. Everything we touch, do, or experience in our modern world is made possible by **POWER**.

Hospitals. Factories. Data centers. Vehicles. Planes. The electrical grid. These are things people depend on every day. And the companies behind them depend on Eaton to solve some of their toughest power management challenges.

For centuries, simply finding, generating and harnessing that power was one of humankind's greatest challenges. But today, the challenges that we face are even greater.

As one of the world's leading global technology companies, Eaton is committed to positively impacting the environment while helping to solve the world's most pressing power management challenges. By giving people tools to use power more efficiently. Helping companies do business more sustainably. And by encouraging each and every employee at Eaton to think differently about our business, our communities - and the positive impact we can have on the world.

Eaton helps leading companies across critical markets gain a competitive advantage by managing power more efficiently, effectively and sustainably.

In commercial and residential buildings, industrial machinery, heavy equipment, aircraft, data centers, mining operations, utilities, car, trucks and commercial vehicles - Eaton's products and solutions help our global customers do more with less. Our businesses are ready to provide you with the right solutions to meet your power management challenges.

xEnergy Elite: Eaton's high-performance IEC motor control center

xEnergy Elite protects people and assets, guaranteeing business continuity, durable and scalable

xEnergy Elite is Eaton's low voltage motor control and power distribution solution which offers performance data, arc risk mitigation, and continuous switchgear health checks that optimizes safety, reliability and efficiency.

With The xEnergy Elite motor control and power distribution solutions you can optimize your processes and minimize risk.



Applications



Energizing operational performance to excel in the most challenging environments

Oil & Gas



Energizing industry for optimum performance and safety

Industry



Energizing mining operations for maximum performance and minimum risk

Mining

Advantages

Protecting people and assets

- Certified arc fault protection in accordance with IEC TR 61641 criteria 1-7
- Fully insulated arc-free main and distribution busbars
- Elite contact system provides complete ingress protection in all drawer unit positions, Disconnect - Test - Connected
- Genuine personnel protection with ARCON® - Arc Fault Protection System
- Reduced energy levels and hazards during service operations with Arcflash Reduction Maintenance System™ (ARMS)
- Zone Selective Interlocking (ZSI) for reducing thermal and dynamical load
- Diagnose - 24/7 Temperature Monitoring System

Business continuity

- Verified and tested to IEC 61439-2
- Modification without system shutdown
- Servicing of functional units during operating conditions
- "Maintenance-free" busbar connection and racking system
- Elite contact system design reducing maintenance and downtime
- Continuous switchboard monitoring for fault prevention
- Eaton C445 motor management relays with industry-leading diagnostic capabilities and analytics
- Breaker Health diagnostics
- Global supported platform with worldwide standardized industrialization processes

Durable and scalable

- Robust galvanized frame based system
- Non-sliding motor starters and feeders
- Elite contact system for 1000+ operations
- Up to 32 drawers in a single section
- 1/4, 1/2 and full width drawers up to 315 kW
- Drawers individually connected to distribution busbar system
- Fused and breaker-based technology
- Standard arc fault protection up to 'Open door arc fault safety'

A high-performance solution for low voltage motor control and power distribution

A design for reduced maintenance and costs

Reliable power control and distribution is critical. xEnergy Elite was engineered to address the typical failure points of traditional motor control centers. It is increasing uptime and eliminating costly maintenance.



Safety first

Innovation to protect your people and equipment

Eaton's philosophy is that the best way to mitigate the risks of internal arcing is to prevent the arc from happening in the first place. While xEnergy Elite is designed for prevention with arc-free and arc-proof zones, you can never be too safe. So, should human error lead to an arc flash event, the design will confine the impact to a single functional unit. Providing the highest level of operational and maintenance safety available and exceeding IEC TR 61641 standards.

The intelligence to increase your uptime

Motor failure is costly in more ways than one. xEnergy Elite equipped with the Power Xpert C445 motor management relay gives you the intelligence to monitor and protect your system with unrivaled accuracy.



Ensuring maximum uptime



Flexibility in a small footprint

Flexibility in a small footprint

Space is at a premium. xEnergy Elite makes the most of it with a design focused on helping you maximize your space savings. All maintenance can be carried out from the front or top of the panel. So xEnergy Elite can sit "flush" against a wall. Standard and high density drawer configurations can be used in the same compartment. Maximum efficiency. Minimum space.

Basic design

The construction of xEnergy Elite is modular in nature. It is built custom to application parameters and has a broad feature-set that can be tailored to meet your reliability and safety requirements.

xEnergy Elite sections are designed with three major compartments:

1 The main busbar compartment

Located at the back or top of the frame where the horizontal main busbar and vertical connections to distribution busbars are found.

2 The equipment section

At the front where the functional units are fitted.

3 The cable way area

Located in a separate fully segregated cable way for housing both control and power cable terminations. xEnergy Elite is designed for added flexibility. The system can be placed in the middle of a switch room, either as a 'single line of structures' giving all-around access to panels and cabling, or flush against a wall (a 5 cm clearance is required for ventilation).



1 Air circuit breaker (ACB) incoming section

2 Main busbar compartment

3 Cable way

4 MCC and distribution section

5 Micro drawers

6 Standard drawers

7 Horizontal wireway (Top or bottom)

8 Power Xpert C445 motor management relay

Safety first

With proven technologies that offer best-in-class safety to protect people and assets, xEnergy Elite is designed with safety in mind.



Arc flash hazards are among one of the many safety concerns faced in industrial environments. When it comes to protecting your personnel, equipment and process, you don't want to simply mitigate the risk of injury, you want to prevent it.

To that end, xEnergy Elite was designed to comply by default to the IEC TR 61641 requirements and goes far beyond the requirements of IEC 61439-2. Its fully segregated IP4X, arc ignition protected distribution busbars, and segregated power path, including optional insulated main busbars, was specifically designed to eliminate the threat of arc flash.

While xEnergy Elite was designed for prevention, you can never be too cautious when lives are at risk. So, should human error lead to an arc flash event, xEnergy Elite has advanced features designed to **confine the impact to a single functional unit.**

The IEC TR 61641 standard addresses arc flash hazards when working on or near energized electrical equipment, but it doesn't cover the same hazards when undertaking maintenance to the system.

In the design of the xEnergy Elite, not only was 'normal operation' of the system considered, but it was also designed to address the dangers personnel face during and after maintenance operations.

Racking behind closed doors

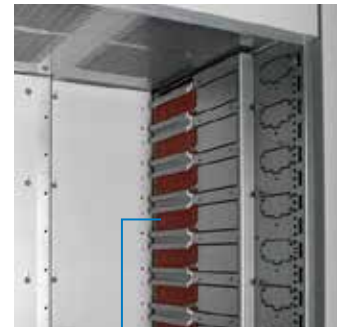
xEnergy Elite drawers have three operating positions: disconnect, test and connect.

In the disconnect position all power, auxiliary and network connections are isolated.

The xEnergy Elite contact system enables you to move from one position to the other behind closed doors. The power connection from the drawer unit to the distribution busbar is an IP4X arc ignition protected zone and can only be established with the door closed. Perfectly safe.

Arc ignition protected distribution busbar

The distribution busbar of sections carrying the withdrawable motor starters and feeders are offering full arc flash protection due to the IP4X design. This is the area where, on a daily base people, interact with switchgear and this is where we offer the highest degree of protection possible.



**Distribution busbar
Arc ignition protected**

Safety through withdrawable technology

In the xEnergy Elite withdrawable design, all power, auxiliary and network connections are plugged. This enables xEnergy Elite to respond fast on changing requirements. Many accidents happen after people interact with switchgear, for example when maintenance is completed and the equipment is put back in place and powered up for operation.

The withdrawable units of xEnergy Elite can be reinserted safely into the "live" panel without making any connections. After the door is closed and locked, connections can be made safe, protecting people and equipment during every step.

Plug-and-play exchange of withdrawable units.



Control and communication Load Power

Other safety features

Error-free installation supports personnel safety

xEnergy Elite is designed to protect personnel and ensure correct equipment installation.

xEnergy Elite uses an optional coding system to ensure that withdrawable units can only be placed in the correct compartment. Each drawer is assigned to a particular compartment with three fixable metal rollers that are located both on the shelf and on the drawer unit. Affixed to the appropriate positions, the drawer can only be inserted into its rightful place, making it impossible to position equal-height withdrawable units incorrectly protecting people and the process.



Passive interlocking

Mechanical interlocking of doors and operating handles prevent unauthorized use and ensures safe positions for operation, disconnect and testing. Drawers can only be inserted when the protective device handle is turned OFF. Switching the protective device ON is only possible with the door closed and with the drawer in the connect position.

Insulation of main busbars and incoming terminals of the ACB (optional)

The main busbars and droppers to incoming and outgoing feeders can be insulated with a powder coating layer to offer additional arc fault protection and reduce the risk of an arc occurring to the absolute minimum.

Drawer test position

In test position, the function of the unit can be tested without the main power on and with the incoming and outgoing main contacts isolated. This means that whilst the drawer is not connected to the distribution busbar, the control and communication wires are connected for testing.



The operator can bring the drawer unit with a key (1) from disconnected to the test position. The position of the drawer is clearly indicated with a color coding (2).



The operator can bring the drawer unit with a key (3) from disconnected to the connect position. The position of the drawer is clearly indicated with a color coding (4). The mechanical interlocking does not allow the operator to insert the key unless the door is closed and the protective device is in the OFF position. The key needs to be taken out before operation of the protective device.

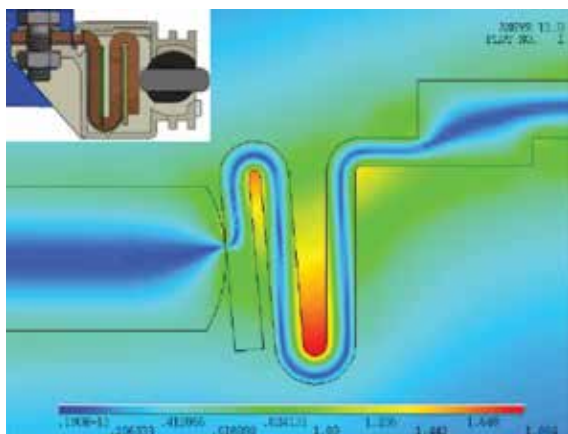


Business continuity

Safety is critical to uptime, but so is the reliability of your control and power distribution equipment. As a part of the design for xEnergy Elite, our engineers identified the possible failure points of traditional motor control centers and set their sights on designing a platform with features that focus on improving uptime and eliminating costly maintenance.

Prevent contact wear

The unique patented Elite contact system with silver-plated contacts, used for the connection of the outgoing units to the distribution busbar, eliminate contact wear on the bus itself. This design ensures and optimum electrical connection, increasingly strengthened by parallel magnetic forces when currents raise during operation. In case of a short circuit stress on the contacts and distribution busbar is eliminated due to this design securing your operations.



Safe maintenance without power shutdown

The withdrawable units of xEnergy Elite can be modified without a shut-down or power-off. Even under live conditions, the design provides maximum protection for personnel and enables rapid interchange ability of the functional units, without requiring isolation of the entire system. This means replacements and additions to the system can be carried out without stopping your process.

Control and high speed communication

Control, communication and auxiliary connections for the withdrawable motor starters and feeders are an integrated part of the Elite contact system as well. In the Test and Connect position, connections from withdrawable unit to the cable way can be established without the need for additional intermediate cabling securing safe, robust and reliable communication and control.

The Elite contact system can be equipped with standard conventional connection terminals up to category 6A shielded network connection for Ethernet communication.

Decrease maintenance frequency

The low resistance contact for distribution busbar connection and the drawer unit means that heat dissipation won't lead to hot spots and subsequent system failures. Rated for 1,000 mechanical and electrical drawer operations xEnergy Elite withdrawable technology is designed to last the lifetime of the equipment.

The xEnergy Elite drawers are tested to 1,000 connections to the distribution busbars for enhanced reliability.



Operate after short circuit faults

xEnergy Elite meets Type 1 and Type 2 coordination for contactors and motor starters. With Type 2, certifying that the device is able to continue operation after a short circuit fault for improved uptime of your system.

The xEnergy Elite distribution bar (1) is showing hardly any physical movement during short circuits thanks to the phase to phase fully encapsulated busbar design. Operate, maintain, exchange and change safe, under all circumstances.



Intelligence is uptime

Because motor failure has the potential to cause production downtime, costly repair bills and numerous safety concerns for plant personnel, motor protection is a core element of a reliable and safe system.

Equipped with the intelligence of the Power Xpert C445 motor management relay, the xEnergy Elite MCC enables you to look inside your system, giving you the information, you need to keep your process running smoothly.

The C445 provides the highest level of monitoring accuracy and protection for your system—from the incoming power source feeding the motor all the way to the individual load. It enables upstream networking for process control, monitoring and preventative maintenance. And with a breadth of network options, including EtherNet/IP, Modbus[®] TCP, Modbus[®] RTU and PROFIBUS[®], it is designed to fit into your existing schema, not redefine it.

Take a closer look at the Power Xpert C445



With integrated power quality and energy usage analytics, Power Xpert C445 was designed to give you the data you need to better manage your energy consumption, save significant energy costs and keep personnel safe.

With advanced diagnostics like performance trending, fault analysis and high-accuracy data monitoring, you can prioritize your maintenance schedule to address your most critical energy management challenges—before a failure occurs—reducing unscheduled downtime and the potential for personnel injury.

- 0.3–800 A, up to 690 Vac (20–80 Hz)
- Full line, load and motor system coverage, including advanced monitoring and protection algorithms
- Separate monitoring and control functionality modules enable custom mounting configuration for application flexibility
- Small size enables easy retrofitting into existing systems
- Eaton's Power Xpert inControl programming software for easy configuration and parameter setting
- Access, monitor and configure data parameters within the device without opening the panel door via a standard USB port on the front of the user interface or remotely through network operations for enhanced operator safety

System design

The xEnergy Elite motor control and power distribution centers are offering great flexibility to design and configure according to your specific needs helping to ensure it is built for your application. The complete design is based on a very robust galvanized frame. This base frame offers high stability and superior earthing capabilities and will last for a lifetime.

You can specify different sizes of copper or aluminum busbars; air insulation or epoxy coating; top or bottom cable entry; internal degree of protection; and fuse or breaker solutions. Plus, its optimized footprint helps improve your overall bottom line. Space inside buildings and industrial facilities is at a premium. We understand that you would rather use that valuable space for your process, so we looked at the best ways to design our electrical equipment to maximize your space savings.

Front access configuration



xEnergy Elite P section

- Incoming feeder, outgoing feeder and bus coupler up to 6300 A
- Operational voltage up to 690 V AC
- Fixed and withdrawable molded case or air circuit breakers
- Form 2b and 4b
- Top and bottom entry, cable or busbar trunking



xEnergy Elite W section

- Up to 32 withdrawable feeders and starters
- Motor starters up to 315 kW
- Feeders up to 630 A
- Operational voltage up to 690 V AC
- Conventional and intelligent motor protection
- Form 4b
- Top and bottom cable entry



xEnergy Elite RP section

- Up to 27 removable feeders
- PIFT fused switch disconnecter up to 630 A
- Operational voltage up to 690 V AC
- Form 4b
- Top and bottom cable entry



xEnergy Elite RM section

- Up to 15 removable modules
- Motor starters up to 90 kW, 500 V AC
- Feeders up to 630 A, 415 V AC
- Form 2b
- Top and bottom cable entry



xEnergy Elite G and C section

- Sections for general purpose
 - Width 400 up to 1200 mm
 - Depth 600 or 800 mm
- Corner section for L - and U-shape line-ups

Main components for MCC and distribution

xEnergy Elite uses only the best components. The quality of the individual components determines the performance and quality of the system as a whole.

Eaton power control and protection components are among the best in the world. xEnergy Elite is designed with the option of Eaton air or molded case circuit breakers or a fused combination switch.

Understanding the interaction of each individual component and how they operate within a complete system is essential to delivering a fully design verified, reliable and efficient power distribution and motor control system. All the critical components used in xEnergy Elite are proven Eaton components - from the main incoming feeders to the pushbuttons and indicator lights.

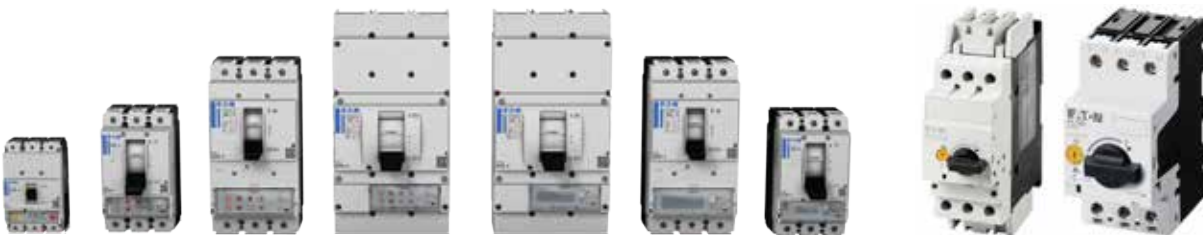
Air circuit breakers



Magnum and Series NRX air circuit breakers

- Tested according the IEC 60947-2
- Ranging up to 6300 A through 105 kA / 1 s
- Comprehensive and innovative electronic PXR20, PXR25 and Digitrip™ trip unit range
- Fixed and withdrawable mounting
- Complete with extensive range of accessories
- Zone selective interlocking
- Arcflash Reduction Maintenance System™

Molded case circuit breakers for cable, system and motor protection



NZM molded case circuit breakers

- Fixed and withdrawable mounting
- Zone selective interlocking
- Arcflash Reduction Maintenance System™
- Only 4 frame sizes cover up to 1600 A
- Switching capacities up to 150 kA
- Operational voltages up to 690 V
- Complete with extensive range of accessories
- Thermomagnetic and comprehensive and innovative electronic PXR trip unit range

PKZM0 - PKZM4 - PKE breakers

- The most compact breaker family for motor and system protection
- PKZM0 - PKZM4 from 0.1 A up to 63 A
- Switching capacity up to 50 kA, up to 100 kA with current limiter
- PKE with electronic overload protection up to 65 A
- Switching capacity up to 100 kA

Contactors and switch-disconnectors



Eaton type DILM contactors

- Tested according to IEC 60947-2 for a complete range of motor starter combinations, including direct on-line, forward-reverse and star-delta
- Type 2 coordination motor starter combination with PKZ, PKE and NZM circuit breakers



Dumeco switch-disconnectors

- Compact, robust, switch-disconnector ranges
- Available 3P, 3P+SN and 4P configurations
- Type DMM, frame rating 125–160 A, 690 VAC
- Short circuit rating up to 50 kA
- Type DMV, frame rating 160–2000 A, 690 VAC
- Short circuit rating up to 100 kA at 415 VAC

Fuse-switch disconnectors and fuses



PIFT Fuse switch disconnectors

- Tested according to IEC60947-3
- 4 frame sizes covering up to 630 A
- IP40 degree of protection
- High load and short-circuit making capacity
- Constant touch protection for contacts enables safe installation



Bussmann fuses

- Tested according to IEC 60269
- Up to 690 VAC
- Up to 120 kA breaking capacity
- NH DIN industrial fuse links
- British standard (BS) fuse links
- IEC Cylindrical fuse links
- Standard general purpose low voltage fuse links gG
- Motor protection fuse links gM and aM
- Variations to suit local markets

C400 series electronic overload relays



C440 electronic overload relay

- 0.3 to 1500 A, up to 690 VAC (50/60 Hz)
- Selectable trip class (10A, 10, 20, 30), earth fault and phase imbalance protections
- Flexible communication options for both monitoring and control
- PROFIBUS, Modbus RTU, Modbus TCP, EtherNet/IP, and DeviceNet™



Power Xpert C445 electronic overload relays

- 0.3 to 800 A, up to 690 VAC (20 to 80 Hz)
- Full line, load and motor system coverage including advanced monitoring and protection algorithms
- Multiple predefined operating modes with corresponding control station options reduces complexity
- Modbus RTU, PROFIBUS, Modbus TCP, and EtherNet/ IP

Enhanced Safety for Personnel and Process

Eaton provides solutions that greatly improve switchgear and staff safety solutions that cut the risk of an operational failure and any related costs potentially threatening the survival of a company.

Eaton has always been a pioneer in personal and plant protection. Our established protective circuit breakers and many innovations in this field are further improving safety for operating personnel.

We provide assemblies that offer maximum availability and safety with minimum downtime.

xEnergy Elite offers next level arc fault mitigation for **highest safety** and **process integrity**

ARCON® Arc Fault Protection



Arc faults represent some of the risks to a reliable supply of electrical energy. Even today, they still occur in electrical power distribution systems, despite all the precautionary measures that are given due consideration and implemented in advance. They are caused by human error when work is carried out on the switchboard, as well as by contamination, overvoltages or similar occurrences.

This type of event occurs more often than you would expect, and any damage caused has serious consequences. Using ARCON® restricts the effects of the arc fault to a minimum. After the cause of the fault has been rectified, the system can be made ready for operation in the shortest possible time in order to ensure the required availability of power.



xEnergy Elite offers scalable solutions for arc flash protection. From standard conventional protection to next level 'Open door' arc fault mitigation for highest safety and process integrity.

xEnergy Elite is compliant to the IEC TR 61641, criteria 1 to 7, arcing class C and offers arc fault protection up to 690 V AC / 100 kA.

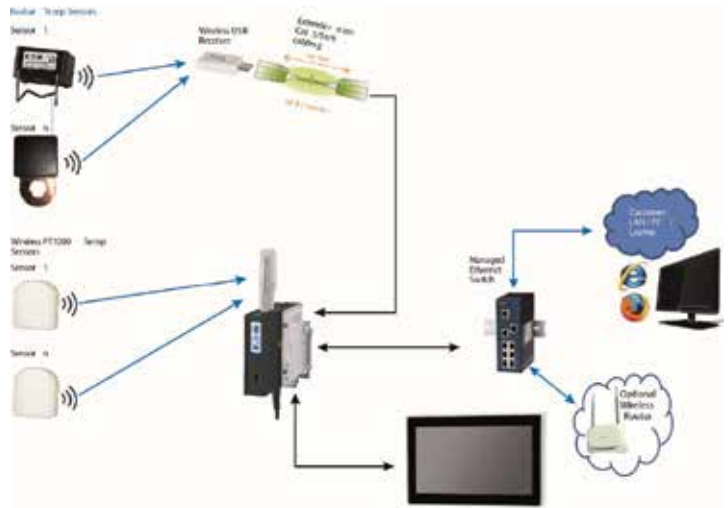
More security to your switchboard

Diagnose System

Over temperature within a switchboard can be the cause of insulation breakdown and eventual arcing faults that can lead to a catastrophic failure of the switchgear and possible injury to personnel. Occasional random checking of temperature by the use of thermography is not the ultimate solution. The Eaton Diagnose System makes a permanent continuous thermal monitoring of the low voltage main distribution boards possible.

Any emerging problems can be detected as they originate and can therefore easily be remedied before a dangerous incident occurs. Preventive maintenance is always better and ultimately less costly than maintenance after a potentially serious incident.

Another advantage of the Eaton Diagnose System is that sensors can also be installed in areas of the switchgear that are otherwise difficult to access or not accessible at all. As covers no longer need to be dismantled for thermal scanning, personal safety and system availability increase because the system is continuously being monitored under live conditions. The only time the power needs to be disconnected is when a potential problem is detected by the Eaton Diagnose System.



Arc flash mitigation through breaker design

The circuit breakers in the xEnergy Elite equipped with Eaton's unique Arcflash Reduction Maintenance System™, will reduce fault clearing time significantly. Because it is enabled only for the time required to perform maintenance, it preserves overcurrent coordination under normal operating conditions.

The system can be controlled by a door-mounted lockable switch, or through network communications to the breaker's trip unit, which activates a separate circuit for faster tripping times and reduces the incident energy level of downstream equipment. A step that, if added to your lock-out-tag-out procedure, maximizes operator safety.

Eaton's NRX Series air circuit breaker equipped with PXR trip units with the Arcflash Reduction Maintenance System™.



Earthquake protection

Earthquake protection is a top priority at Eaton. xEnergy Elite has a robust construction which has undergone seismic testing to the most stringent standards. xEnergy Elite is designed in such a way that without any additional measure it can be used in earthquake hazardous areas.




Technical Highlights

xEnergy Elite	
Rated operational voltage	400 V, 415 V, 525 V, 690
Rated frequency	50 Hz / 60 Hz
Standards	IEC 61439-1, IEC 61439-2 IEC TR 61641 criteria 1 to 7 IEC 60068-3-3, seismic level AG2 - AG5

Main Busbar Data	
Rated insulation voltage	1000 V AC – 1200 V DC
Rated current	800 A - 6300 A
Rated short-time withstand current	Up to 120 kA / 1s
Rated peak withstand current	264 kA

Distribution Busbar Data	
Rated insulation voltage	1000 V
Application Withdrawable	1600 A
Rated short-time withstand current	80 kA / 1s
Rated peak withstand current	175 kA
Application Removable	1800 A
Rated short-time withstand current	65 kA / 1s
Rated peak withstand current	143 kA

Enclosure Data	
Degree of protection	IP30 / IP31 / IP40 / IP41 / IP42 / IP54
Form of separation	Up to Form 4b
Entry of cables	Top and / or bottom
Access	Front or rear
Standard Colour	RAL 7035



Eaton's mission is to improve the quality of life and the environment through the use of power management technologies and services. We provide sustainable solutions that help our customers effectively manage electrical, hydraulic, and mechanical power – more safely, more efficiently, and more reliably. Eaton's 2020 revenues were \$17.9 billion, and we sell products to customers in more than 175 countries. We have approximately 94,000 employees.

For more information, visit [Eaton.com](https://www.eaton.com)

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