

Solid-insulated ring main unit

XIRIA Plus

Compact and environmentally
friendly ring main unit



EATON

Powering Business Worldwide



Automotive



Aerospace



Truck



Hydraulics



Electrical

Powering business worldwide

Eaton delivers the power inside hundreds of products that are answering the demands of today's fast changing world.

We help our customers worldwide manage the power they need for buildings, aircraft, trucks, cars, machinery and entire businesses. And we do it in a way that consumes fewer resources.

Next generation transportation

Eaton is driving the development of new technologies – from hybrid drivetrains and emission control systems to advanced engine components – that reduce fuel consumption and emissions in trucks and cars.

Higher expectations

We continue to expand our aerospace solutions and services to meet the needs of new aviation platforms, including the high-flying light jet and very light jet markets.

Building on our strengths

Our hydraulics business combines localised service and support with an innovative portfolio of fluid power solutions to answer the needs of global infrastructure projects, including locks, canals and dams.

Powering Greener Buildings and Businesses

Eaton's Electrical Group is a leading provider of power quality, distribution and control solutions that increase energy efficiency and improve power quality, safety and reliability. Our solutions offer a growing portfolio of "green" products and services, such as energy audits and real-time energy consumption monitoring. Eaton's Uninterruptible Power Supplies (UPS), variable-speed drives and lighting controls help conserve energy and increase efficiency.



MV switchgear technology is in our DNA

Eaton Corporation is a worldwide leader in the design, manufacture, and sale of safe, reliable and high-performance medium voltage power distribution equipment in accordance with IEC, ANSI and GB / DL standards

Complete Global Medium Voltage Switchgear Solutions

Eaton, a premier leader in designing and manufacturing power distribution and protection equipment in the electrical industry, offers a comprehensive range of medium voltage (MV) solutions to meet the needs of virtually every application. From products that feature cutting-edge design that allow for easy access, maintenance and space savings, to arc-resistant products that enhance safety, Eaton's medium voltage solutions provide a variety of products for every need. Additionally, Eaton's global service network provides maximum customer support in all regions of the world.

As one of the few completely vertically integrated and diversified industrial manufacturers in the world, Eaton designs not only MV assemblies, but also the key components that comprise the MV solutions – from steel housing and circuit breaker compartments to vacuum interrupters, circuit breakers, bus systems and fuses.

Eaton's MV heritage, strengthened by acquisitions such as Westinghouse DCBU, Cutler Hammer, MEM and Holec, has resulted in breakthrough MV technologies and numerous international patents over the years.

Part of Eaton's complete electrical PowerChain Solutions – which help businesses minimize risks while realizing greater reliability, cost efficiencies, capital utilization and safety – Eaton's medium voltage equipment meets all applicable standards and certifications such as IEC, NEMA / ANSI, GB / DL, UL, IEEE, KEMA and CSA.

When it comes to medium voltage solutions, you can trust the one name with a long history of proven performance: Eaton.

Eaton's range of
SF₆ free switchgear
for Medium Voltage



An Eaton Green Solution



XIRIA Plus

Solid insulated RMU for smart grid application



XIRIA Plus is the name of Eaton's new solid insulated RMU for smart grid applications. The system is characterised by its high level of operational safety and is suitable for applications up to 12kV.

The XIRIA Plus RMU is designed around Eaton's proven vacuum interrupters, which require no maintenance and are certified for 10,000 operation cycles.

All live parts in the available panels are single pole insulated. The used materials are shaped specifically to provide optimum insulation combined with excellent thermal characteristics. In addition, the insulation is configured to provide effective control over electric fields around the used components, thereby minimizing any risk of internal arcing.

Within the XIRIA Plus panels both the primary parts and the mechanisms are housed in a fully enclosed housing which protects the whole system against environmental influences. The use of vacuum interrupters and solid insulation means that the XIRIA Plus is environmentally friendly. These technologies ensure that this system is a conservational alternative to switchgear systems using Sulfur

Hexafluoride (SF6) gas for insulation. The cost of ownership is also significantly reduced, as no regular testing of gas pressure or other routine maintenance is needed and there is no high end-of-life cost associated with ultimately disposing of the equipment.

With a compact design and a provision for cable connection from the front, the XIRIA Plus system is economical in its use of valuable floor space, and easy to accommodate in even the most restricted environments.

When it comes to the safety of the operating personnel the XIRIA Plus design leaves nothing to chance.

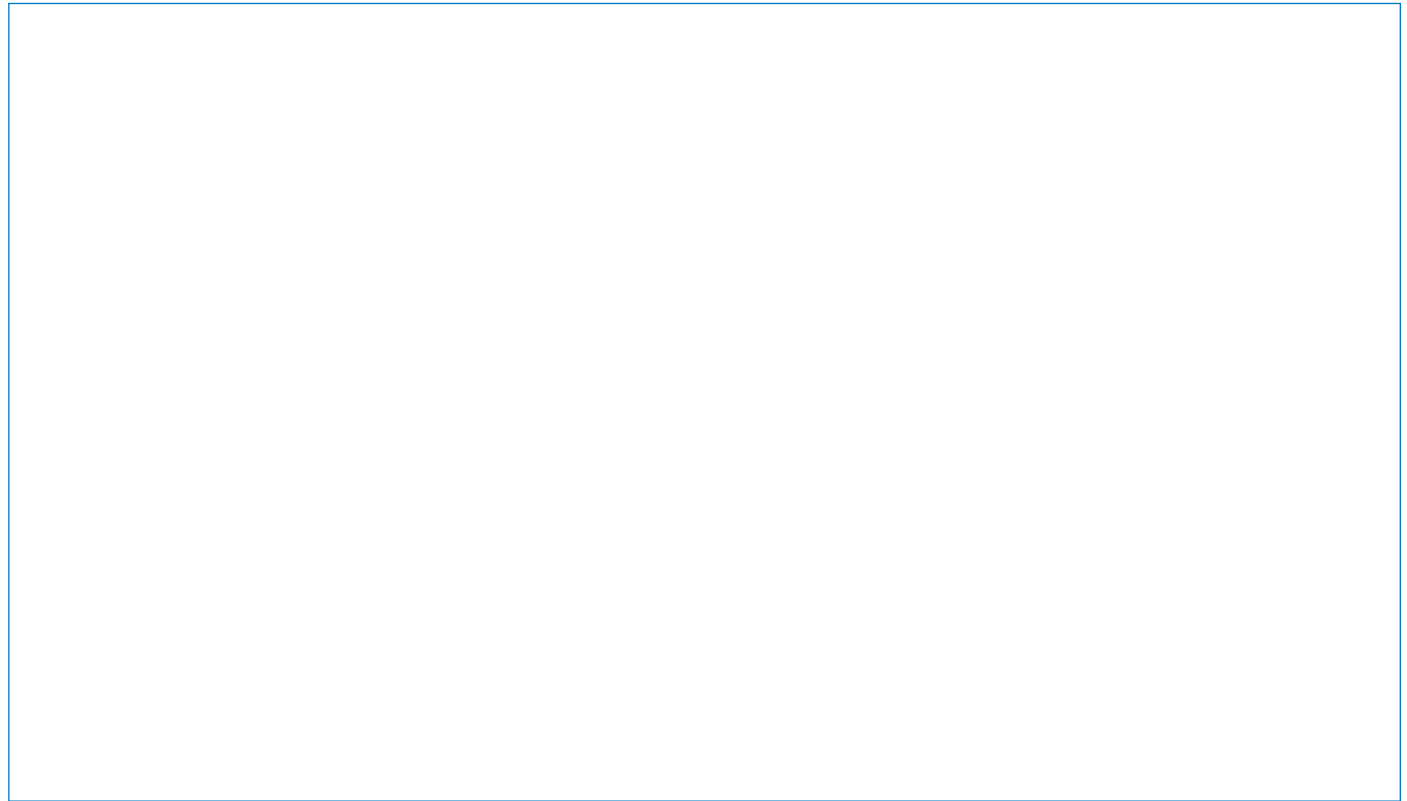
All parts are fully enclosed by an internal arc tested safe metal housing.

The panels in the system are provided with direct visible indication of the integrated earthing and ON/OFF-position by means of inspection windows in the front.



XIRIA Plus

Safe reliable and efficient solutions for all applications in the medium voltage secondary distribution network.



Smart grid readiness

Designed to integrate solutions for sensing, monitoring and remote control for feeder automation and load management purposes.

Safe in use

- Visible isolation by means of inspection windows in the front
- Compartments protected against penetration of objects
- Capacitive voltage detection system for verification of safe isolation from supply
- Logical mechanical and electrical interlocks prevent misoperation

Environmentally friendly

- Minimized number of components
- Environmental-friendly design with respect to the materials used
- No use of SF6-gas for switching and insulation
- Minimal number of transition points in primary design enable low energy loss during operation
- Only re-usable and / or recyclable materials used

User friendly

- Cable connection and user interfaces for operation on the same front side of the panel
- Ergonomic cable connection height
- A customized low voltage compartment is optional
- Clear and simple straightforward operation panels

Low total cost of ownership

Low initial costs due to:

- Panels with only 350mm or 450mm width depending on function
- Cable connection from the front / wall standing arrangement

No costs during service due to:

- Robust design with minimum number of parts (routine tested in factory)
- Long-life solid insulated components as insulation medium
- Maintenance free vacuum circuit-breaker and loadbreak switch
- Primary parts and mechanism installed in a fully sealed for life enclosed housing
- No SF6 pressure checks

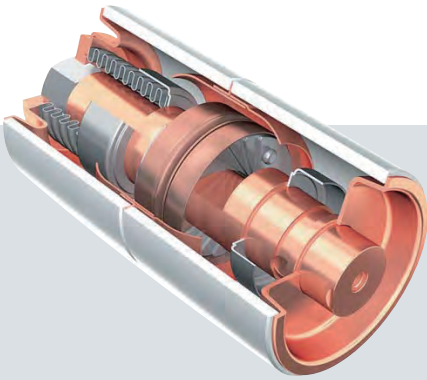
Low end of life disposal cost due to:

- Vacuum switching technology
- Solid insulation with air as isolating medium
- Recycling or re-use of materials

Operation

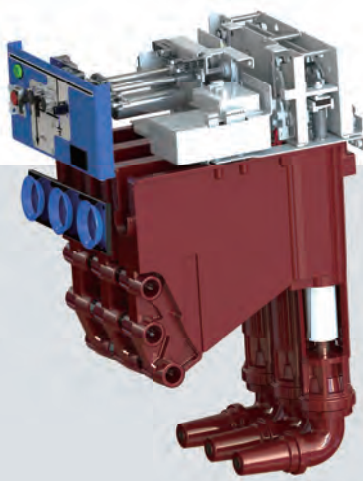
- Complete design certified in accordance with GB standards
- Arc fault tested according GB 3906-2006
- Quality assurance in accordance with ISO 9001
- Single pole insulated primary parts within one compartment
- Primary parts and mechanism in sealed for life fully enclosed housing
- Configurations up to 6 functions in one tank
- Field extensible for projects requiring more than six functions

Main construction



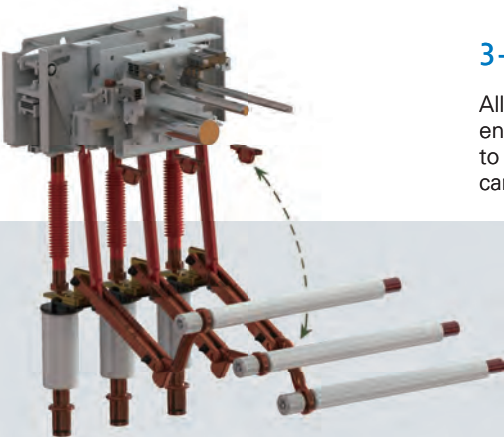
Vacuum technology features

- Eaton has an unsurpassed leadership in vacuum technology supported by a strong heritage of innovation from companies such as Westinghouse and Holec
- Pioneers in vacuum technology for over 90 years. First vacuum interrupter supplied at 15kV-12kA in 1967
- Eaton was the first one to develop and patent copper-chromium alloy content for contacts and center shields
- Our vacuum interrupters for contactor applications can perform up to 2.5 million mechanical operations
- More than 5 million units delivered worldwide, operating safely and reliably in all types of networks, medium voltage applications and environments
- High end certified supplier to almost all major electrical manufacturers worldwide



Solid insulation system

- More than 60 years experience in solid insulation technology with hundreds of thousands of functions successfully operating worldwide in all kinds of environment without any ageing concern
- Full encapsulation capability in the 1990's
 - High thermal conductivity
 - High electrical resistivity
 - Low moisture absorption
 - High creepage current resistance
 - High mechanical strength
 - Optimized electrical field control
- Fully insulated busbars to prevent any phase to phase and phases to earth faults
- Optional extensible busbars



3-position disconnector

All panels are equipped with a disconnector positioned in the same sealed for life enclosure as the circuit-breaker. The disconnector consists of three shafts connected to the busbars or earthing points. Since it is mechanically interlocked the disconnector can only be operated when the circuit breaker is in the open position.

- Manual-operated switch with 3-position (service / isolated / earthed)
- Maintenance free
- Housed in sealed for life enclosure
- Auxiliary contacts for service / isolated / earthed
- Position indication by means of inspection windows and mechanical indicators
- Mechanically interlocked with the vacuum circuit-breaker

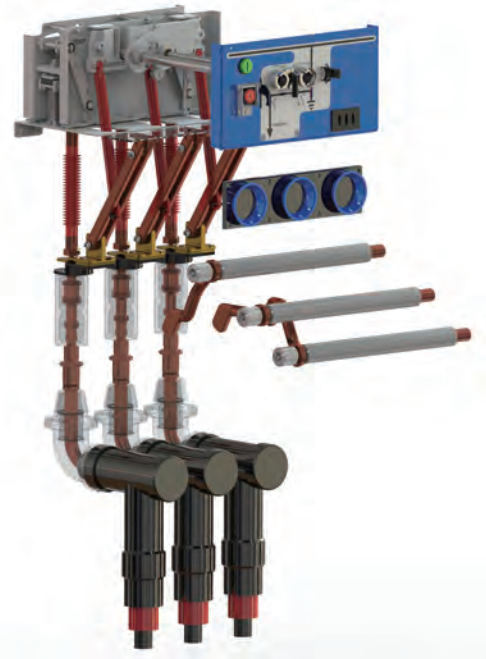
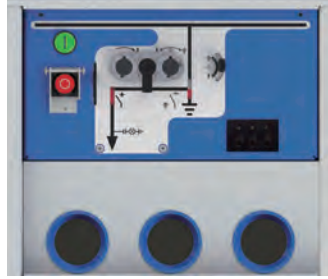
Safe in use

The XIRIA Plus design contains some special features that guarantee the operator to work safely with the different panel types.

What you see is what you get!

Visible isolation by means of inspection windows in the front

When carrying out operational actions and work on the cables, it is vital to have unambiguous status indications. When it comes to the safety of operating personnel Eaton leaves nothing to chance. That is why the XIRIA Plus design is fitted with directly visible isolation by means of inspection windows in the front which makes the isolating distance between the cable and busbar system directly visible. A visible, shortcircuit proof earthing can take place via the load-break switch or circuit-breaker.



Capacitive voltage detection system for verification of safe isolation from supply

Each panel type within the XIRIA Plus family is equipped with a standard three phase Voltage Detection System for voltage testing. The VDS shows the operator if the panel is isolated from supply or not.

Logical mechanical and electrical interlocks prevent incorrect operation

Within the XIRIA Plus design misoperation by an operator is prevented by using different interlocks. The interlocks are mechanical and electrical. For example electrical and mechanical interlocks prevent operation of the change-over switch when the circuit-breaker is switched on. All mechanical interlocks are constructed in such a way that they directly block the mechanism.

Switching to service position is only possible with closed cable compartment

As standard, the door of the cable compartment can only be opened when the circuit-breaker is in the earthed

position. After the door is removed it is possible to switch off the circuit-breaker for cable testing. Switching on to service position is only possible with the door positioned back again.

Compartments protected against penetration of objects

Within the XIRIA Plus design it is not possible to accidentally penetrate the switchgear by part of a body or a tool.

All high voltage compartments are designed according to IP65 degree.

Smooth contemporary design

All compartments of the XIRIA Plus panels are designed in such a way that the system is safe to touch from the outside. By using a smooth and smart design it is not possible for the operator to injure himself by moving parts or by parts that stick out of the switchgear when moving in front of the switchgear.

Routine tests

Various prescribed routine tests are carried out during the production of the switchgear. To assure quality, all processes are in accordance with ISO 9001. This means that at every stage of production the components, circuit-breakers and current transformers are inspected for correct functionality. When the entire installation has been assembled, a thorough visual inspection is carried out, together with mechanical, functional and electrical checks.

Philosophy on internal arcs

Eaton always puts extra focus on creating safe switchgear for operators at all times. One of the biggest potential threats to operators is an internal arc in switchgear.

Engineers therefore did everything necessary in design and construction to prevent internal arcs.

Eaton supports the philosophy that it is best to avoid internal arcs than to cure, in line with the relevant standard GB3906-2006. Within the XIRIA Plus design a double prevention philosophy is used. Firstly, the design is constructed in such a way that an internal arc is prevented. In the unlikely case that an internal arc could occur, the XIRIA Plus is equipped to provide maximum safety to the operator, and to control and minimise damage to the rest of the switchgear and room.



Environmentally friendly



Like all Eaton medium voltage switchgear, XIRIA Plus is designed to be an environmentally friendly product throughout the whole value chain.

One of the key strategic initiatives of Eaton is to provide environmentally friendly products. Eaton achieves this by looking at the total product chain, from design to dismantling and recycling. The optimal situation is that for each phase there is no damage to the environment and at the end, all materials can be re-used again in the same product (the Cradle-to-Cradle principle). The product chain can be divided into four main blocks. These blocks are the design (materials used) of the product, the assembly of the product, the usage phase of the product and finally the dismantling of the product.

Environmentally friendly design

With respect to the design of switchgear, the vision "the less number of components the better" applies. This because every part must be manufactured and therefore impacts on the environment. Next, applies the affect of different materials on the environment.

Use of minimized number of components

XIRIA Plus is designed to use the minimum of materials and resources, without affecting the strength of the system. For example, Eaton reduced the number of components dramatically, compared to conventional switchgear, by using a simple spring charging mechanism and integrated compartments. This also ensures straight forward assembly with low labor cost.

Materials with no/less impact on the environment

Eaton selects materials with care. It is essential that they are safe for personnel and the environment - not just during use, but at the end of service life too.

Within XIRIA Plus a combination of solid (cast resin) insulation and air as insulation medium is used. The solid insulation technology, in combination with electrical field calculations, provides a very compact, environmentally friendly design for the switchgear. As the

switching medium, vacuum technology is used within the interrupters of the XIRIA Plus circuit-breakers. XIRIA Plus can be completely recycled at the end of its life.

No use of SF₆ gas for insulation or switching

Emissions of SF₆-gas from switchgear contribute significantly to the threat of the greenhouse effect and associated climate change. SF₆ is on the list of greenhouse gasses in the Kyoto protocol.

SF₆ is the most potent of the six main greenhouse gasses, with a Global Warming Potential (GWP) of 23,000.

Eaton made a fundamental choice not to use SF₆ as a switching and insulation medium for medium voltage equipment. The main reason for not using any SF₆ in medium voltage equipment was the complexity of the treatment required for the toxicity of the gasses that have been in contact with an arc, and the need for additional safety measures when used in public locations such as residential areas and shopping centers.

Efficient use of materials

Besides the energy sources, special focus was placed on the efficient use of material during assembly. For example, sheet steel plates are cut with as little waste material as possible. Residual material is used within other product components.

Minimal energy loss during operation

To prevent energy loss by the system itself, XIRIA Plus uses a minimum number of primary change-over points. All the available change-over points use optimal surface contacts and by this, prevent extra energy losses over these points.

No service checks on site

Because XIRIA Plus is designed for a lifetime of at least 30 years, the system needs no energy usage for maintenance activities during this long period. Due to the green insulation and switching technology, there is also no leakage of the SF₆-gas during its lifetime and no need for extra maintenance activities on SF₆ pressure checks.

Re-use or recycling of materials

During dismantling, XIRIA Plus switchgear is demounted into parts and thereafter categorized per material. Next the parts will be recycled or re-used. Because XIRIA uses no SF₆, there is no loss of this gas during dismantling of the switchgear.



Features and benefits

The benefit of a sealed for life tank

A "sealed for life" steel enclosure contains all primary parts and driving mechanisms

- Maintenance free
- Internal arc proof

The benefit of a compact design

- Minimal floor space
- Low building costs
- Easy to install
- Up to 6 feeders in one tank

Extensibility

- Safe and reliable field extensible solution for projects requiring more than six functions
- Epoxy extensible busbar bushing
- Single phase insulating
- Self-pluggable contacts design
- Easy to install on site

Product range for highest flexibility in use

- Flexible combination to build configurations up to 6 functions in one tank.

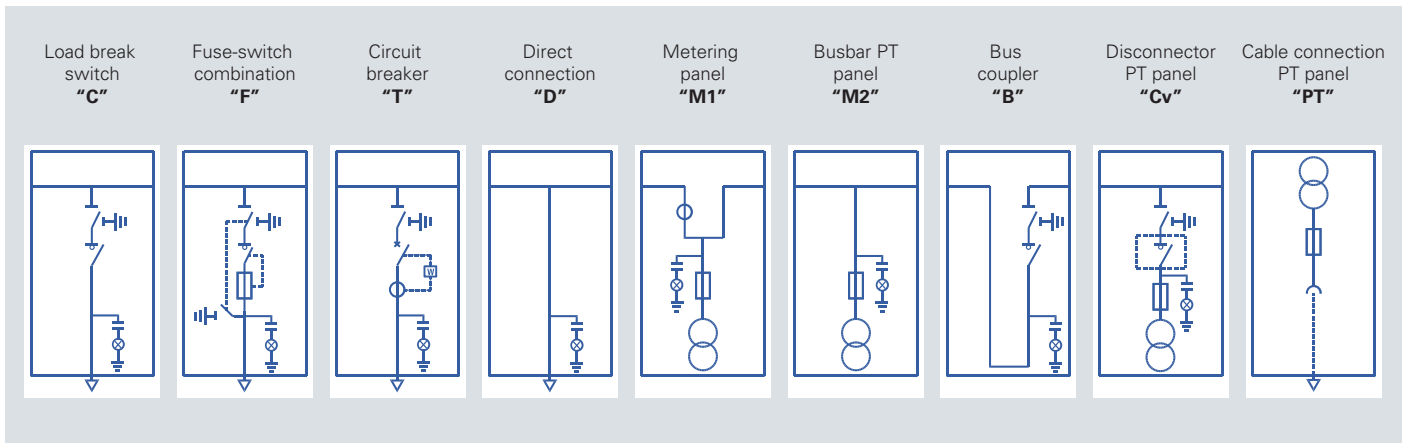
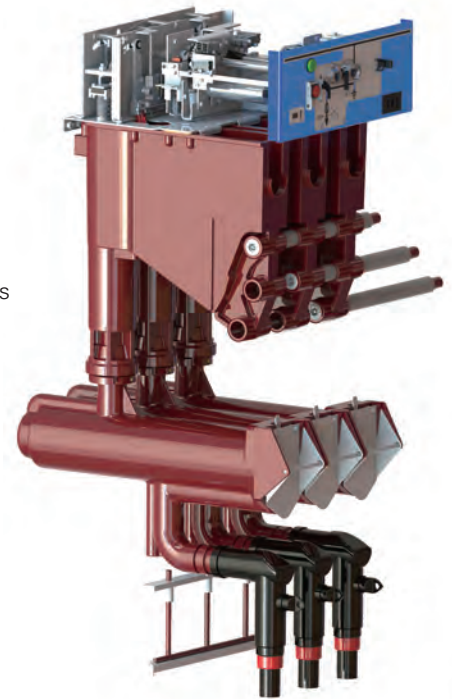
Smart grid readiness

Automation upgrading

- Remote close/open
- Auxiliary contacts for each position local or remote indications
- Measuring CT and current signal

Option

- Trip indicator with auxiliary contacts
- Fault indicator
- Current meter

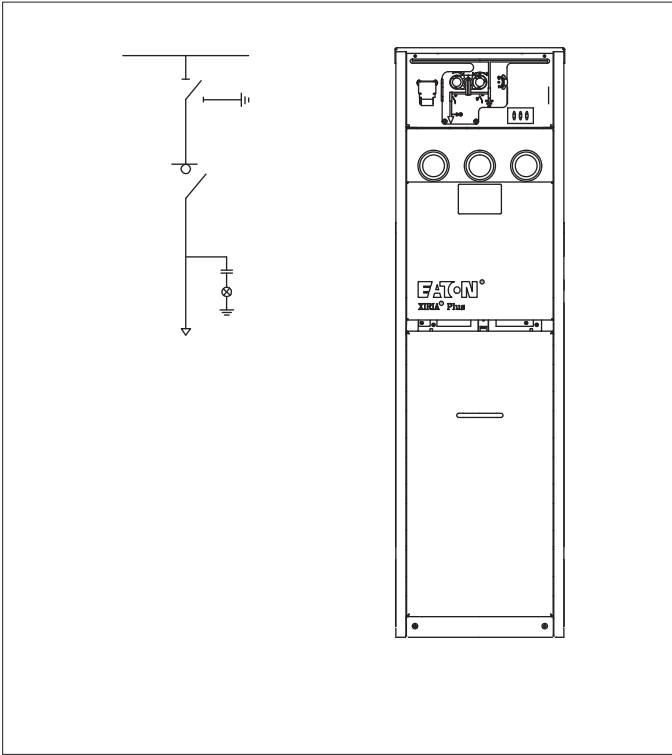


- Any combination of load break switches and circuit-breakers can be placed in a 2- 3- 4- 5 or 6 panel unit.



Configuration information

LBS function, type C panel



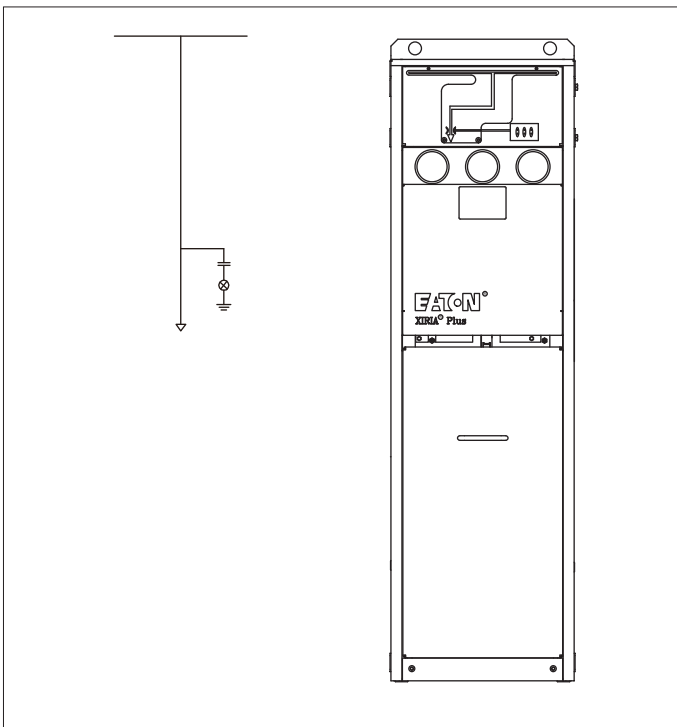
Standard

630A vacuum LBS
 Three-position disconnect
 Voltage indicator
 630A bushing

Options

Motor operation
 Fault indicator
 Current meter

Type D panel



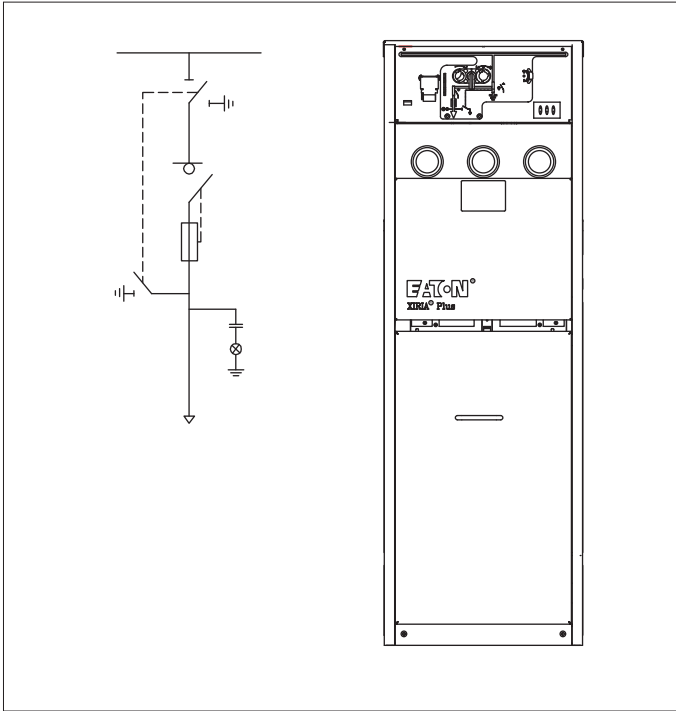
Standard

Voltage indicator
 630A bushing
 Padlock for cable compartment cover

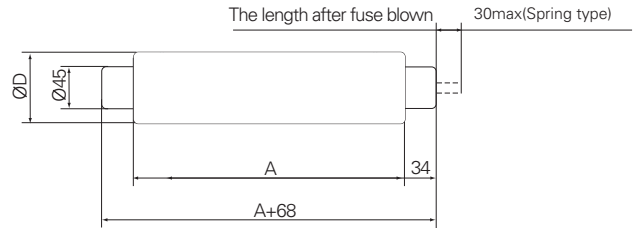
Options

Fault indicator
 Current meter

Fuse-switch function, type F panel



The fuse dimension



Fuse striker:
Medium type (according GB15166.2, alternating current switch-fuse combinations).

Standard

630A vacuum LBS
Three-position disconnecter
Voltage indicator
Type C bushing
Fuse blown indication

Options

Motor operation
Fault indicator
Current meter
Fuse
Type A bushing

The guide for fuse selection

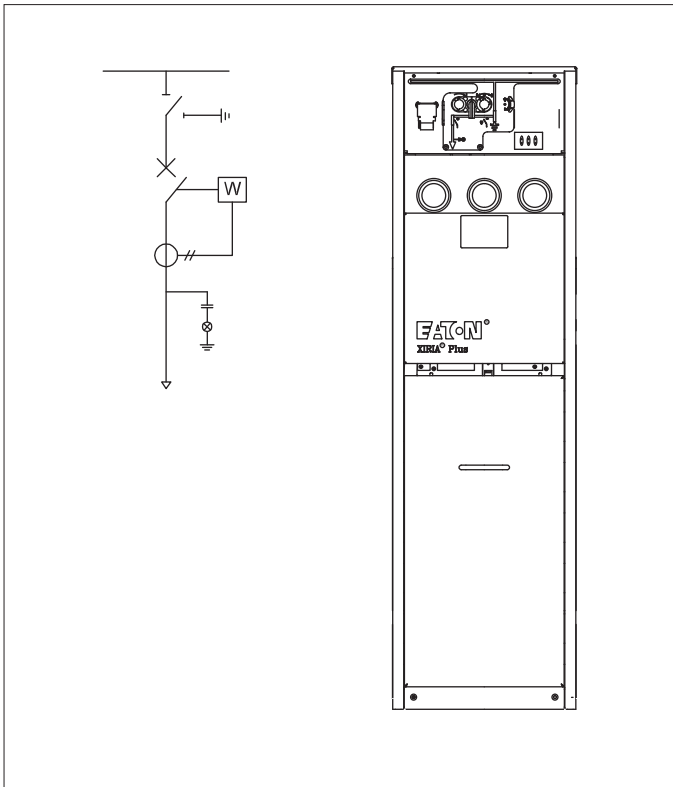
General type	Preferred type	Rated voltage (kV)	Rated fuse current (A)	Length A (mm)	Diameter D (mm)
XRN-T/12	SDLJ	12	3.15、6.3、7.5、10、16、20、25、31.5、40	292	51
	SF(K)LDJ	12	50、63、80	292	66
			100、125	292	76

Fuse selection and transformer application

Rated voltage (12kV)

Transformer rated capacity (kVA)	50	100	125	160	200	250	315	400	500	630	800	1000	1250
Fuse rated current (A)	6.3	10	16	16	20	25	32	40	50	63	80	100	125

CB function, type T panel



TLF protection for circuit breaker function design

- Time limit fuse “TLF” protection is an alternative for the standard electronic protection relay.
- It ensures tripping of the circuit-breaker through a patented electronic circuit in the event of phase short-circuit and earth fault currents
 - High reliability
 - Compact design
 - Fully enclosed housing
 - Easy accessible fuses on the front
 - Easy selection of current setting
 - Compliance with ENA specification 12-6 issue 1:1973
 - Fully certified

Standard

630A vacuum CB
Three - position disconnecter
Voltage indicator
630A bushing
WI1 - SZ4 trip indicator

Options

Motor operation
Fault indicator
Current meter
WI1 - SZ5 trip indicator with auxiliary switches
WIC1 - PC2 adapter for relay setting

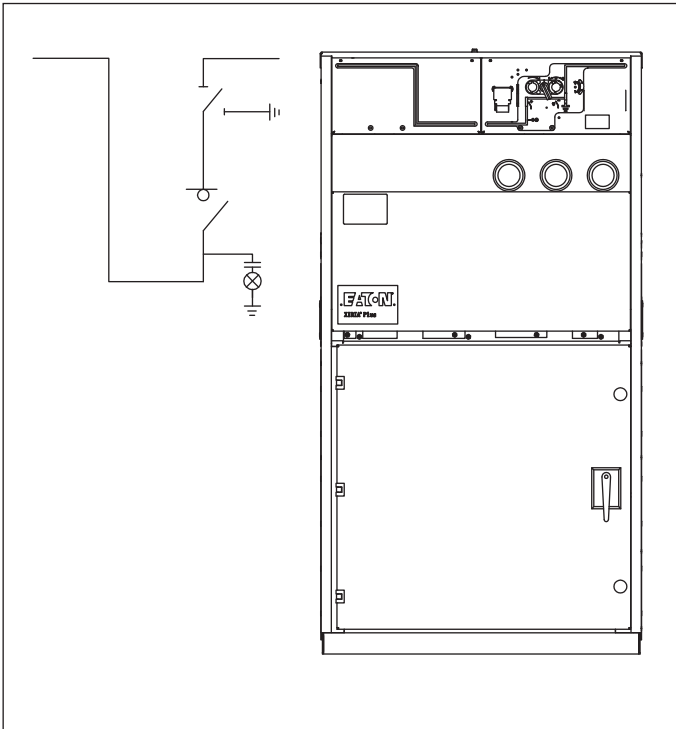
Protection relay and CT

WIC1-2PE (Standard)
WIC1-1PE (Optional)

Protection CT

Type	Primary current scope	Type	Primary current scope
WIC1-WE2	16-56A	WIC1-W4	64-224A
WIC1-W2	16-56A	WIC1-W5	128-448A
WIC1-W3	32-112A	WIC1-W6	256-896A

Type B panel



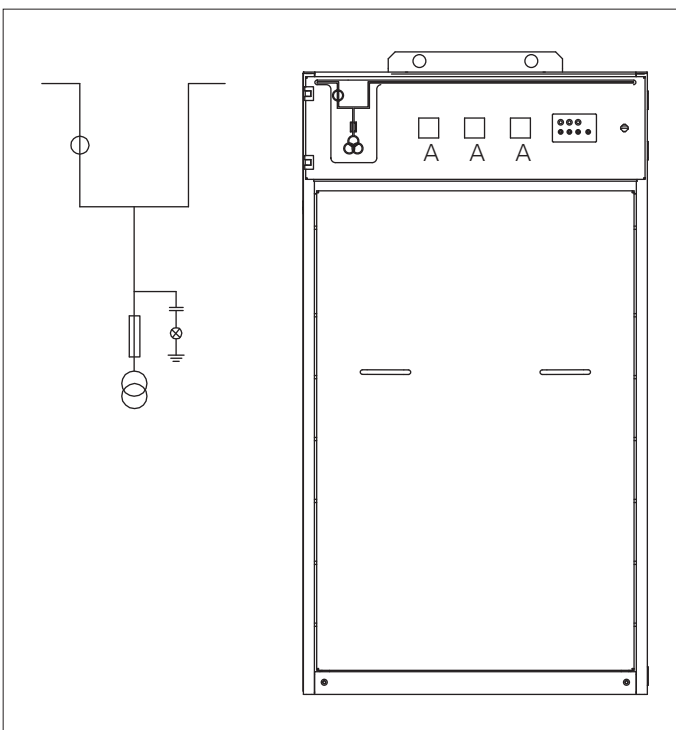
Standard

Voltage indicator
 630A LBS
 630A bushing
 Three-position disconnector

Options

630A CB
 Motor operation

Type M1 panel



Standard

Two 0.2s single phase metering PTs
 Two 0.2s single phase metering CTs
 The 500mm height low voltage compartment

Options

Moisture sensor and heater
 Electrical locking of energized cable compartment cover
 Voltage meter

XIRIA Plus ratings

Item		Ratings
General		
Rated voltage	kV	12
Impulse withstand voltage	kV	95 (phase to phase/earth), 110 (Isolation gap)
Power frequency withstand voltage	kV-1m	42 (phase to phase/earth), 48 (Isolation gap)
Rated frequency	Hz	50
Internal arc classification (IAC)	kA-s	AFLR 20-1
Degree of protection in service		IP4X
Degree of protection with doors/covers open		IP2X
Ambient air temperature range	°C	-25 - +40
Busbar system		
Rated normal current	A	630
Rated short-time withstand current	kA-s	20-4, 25-2
Rated peak withstand current	kA	50, 63
Load break switches		
Rated normal current	A	630
Rated short-circuit making current	kA	50, 63
Rated short-time withstand current	kA-s	20-4, 25-2
Rated cable charging breaking current	A	31.5
Mechanical endurance class		M2 10000 x
Mechanical endurance class as 3-position disconnecter		M1 3000 x
Electrical endurance class		E2 100 x
Circuit-breakers		
Rated normal current	A	630
Rated breaking current	kA	20
Rated short-circuit making current	kA	50
Rated capacitive switching current class		C2
Rated cable charging breaking current	A	31.5
Mechanical endurance class		M2 10000 x
Mechanical endurance class as 3-position disconnecter		M1 3000 x
Electrical endurance class		E2
Rated short-time withstand current	kA-s	20-4
Mechanism type		0 - 180S - CO - 180S - CO
Fuse-switch panel		
Rated normal current	A	100
Max. rated current of the optional fuse	A	125
Rated breaking current	kA	50
Rated short-circuit making current	kA	125
Rated transfer current	A	3150

For others, please contact local Eaton sales representative.

XIRIA Plus designed to GB standards

XIRIA Plus complies with the following standards:

GB/T 11022-2011 Common specifications for high-voltage switchgear and controlgear

GB 3804-2004 High voltage alternating-current switches for rated voltages above 3.6kV and up to and including 40.5kV

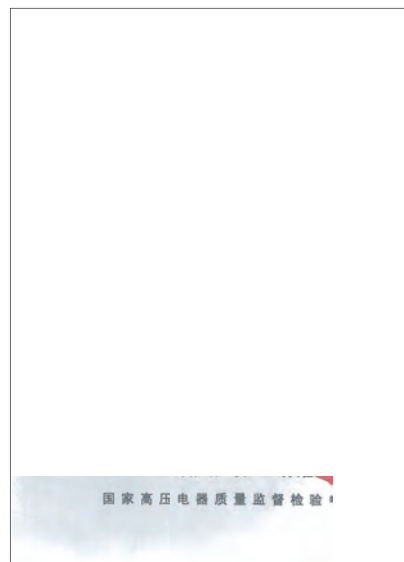
GB 311.1-1997 Insulation co-ordination for high voltage transmission and distribution equipment

GB 1985-2004 High-voltage alternating-current disconnectors and earthing switches

GB 3906-2006 Alternating-current metal-enclosed switchgear and controlgear for rated voltages above 3.6 kV and up to and including 40.5 kV

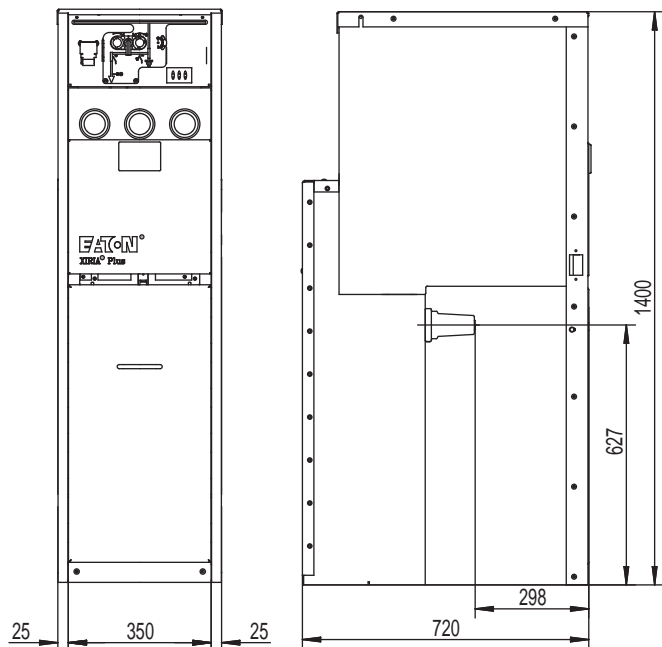
GB 1984-2003 High-voltage alternating-current circuit breakers

GB 16926-2009 High-voltage alternating current switch-fuse combinations

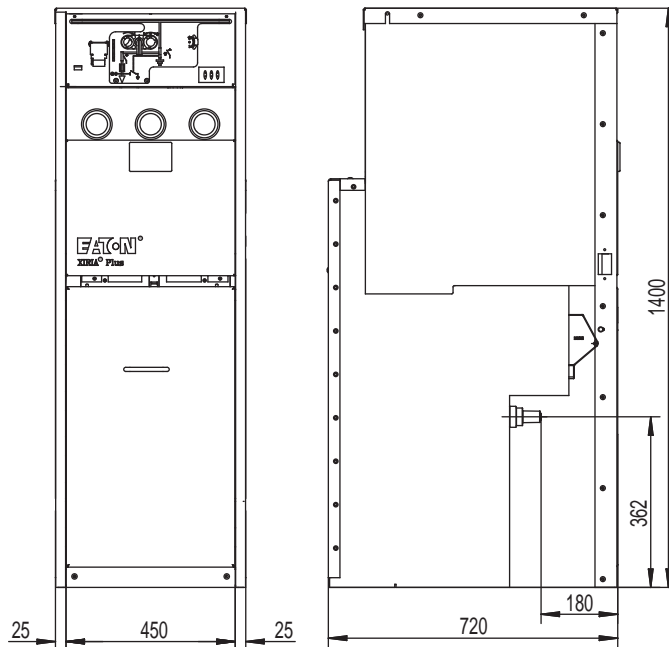


XIRIA Plus dimension

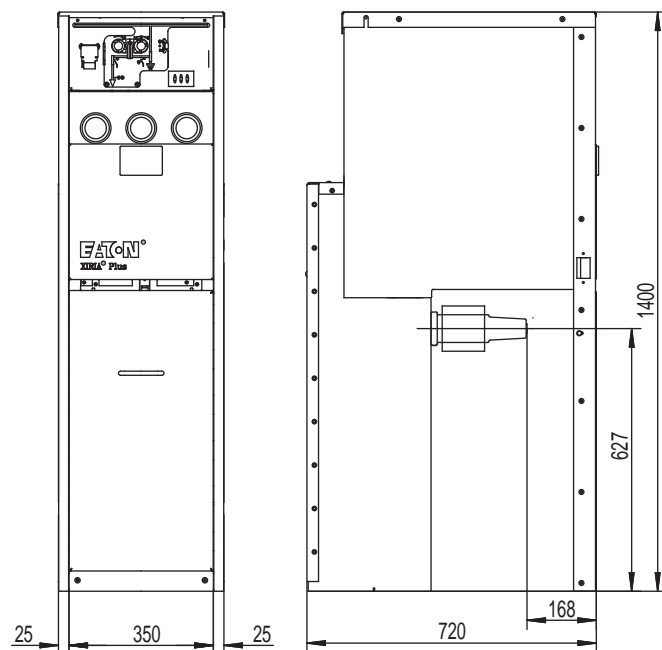
Type C panel dimension



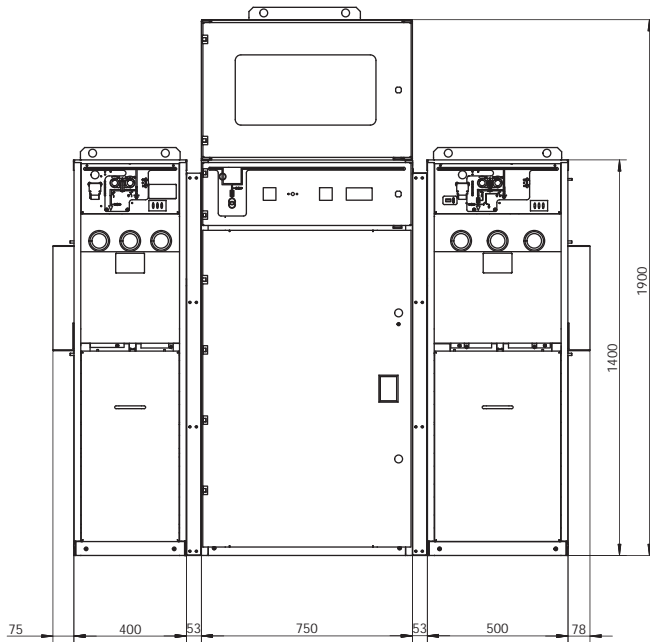
Type F panel dimension



Type T panel dimension



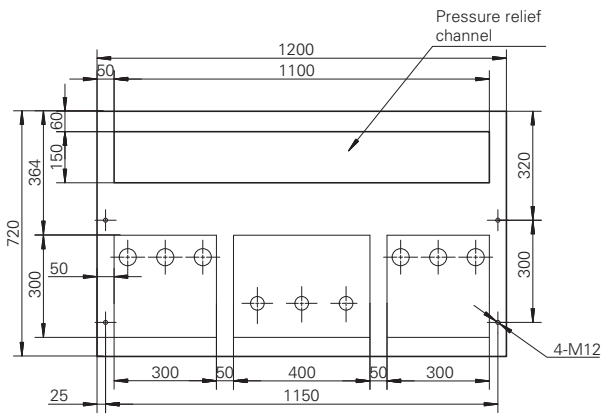
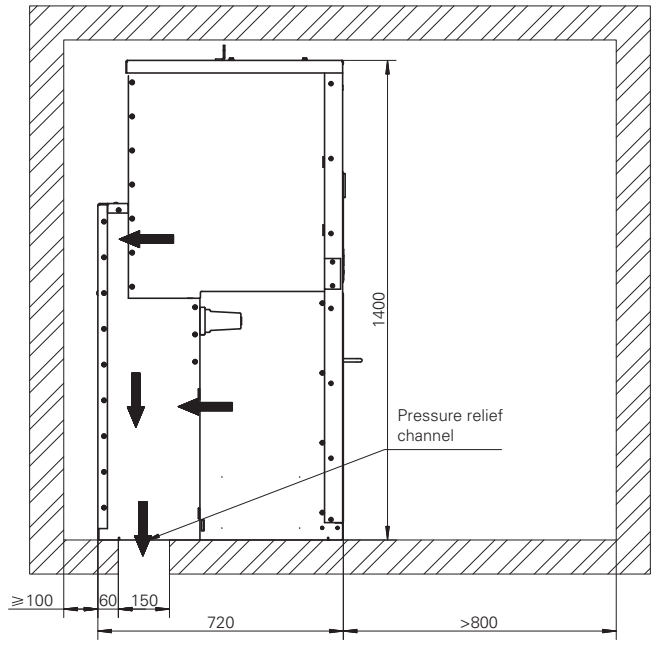
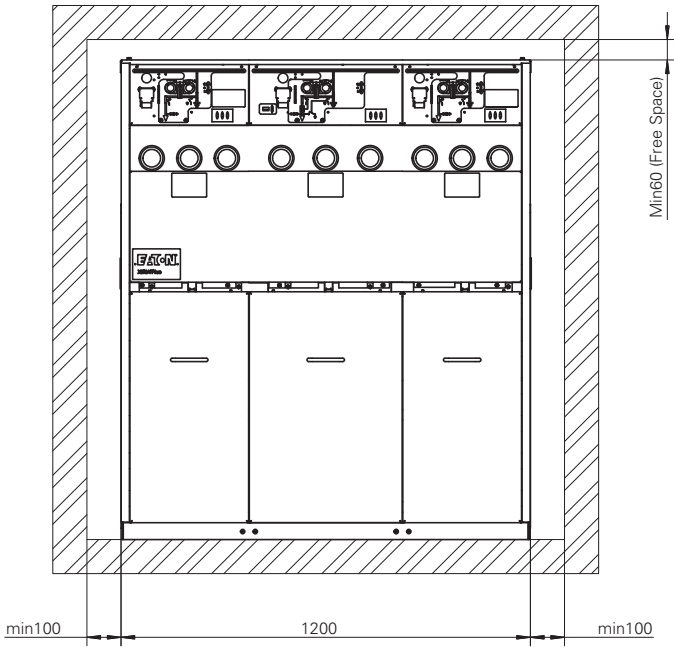
Metering panel and extension dimension (C+M1+F)



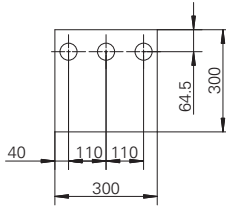
Example for combination dimension

	CFT configuration	C+M1+F
Width	= 350mm + 450mm + 350mm + 25mm + 25mm = 1200mm	= 75mm + 400mm + 53mm + 750mm + 53mm + 500mm + 78mm = 1909mm
Depth	= 720mm	= 720mm
Height	= 1400mm	= 1400mm (M1=1900mm)

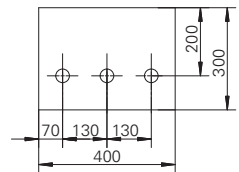
CFC floor plan



Cable type: 3X1 35-630MM2
 Cable cone type: C630A
 C (Load-break switch)



Cable type: 3X1 16-95MM2
 Cone type: A200A
 F (fuse combination unit)



Electrical power management by Eaton

Foundation for success

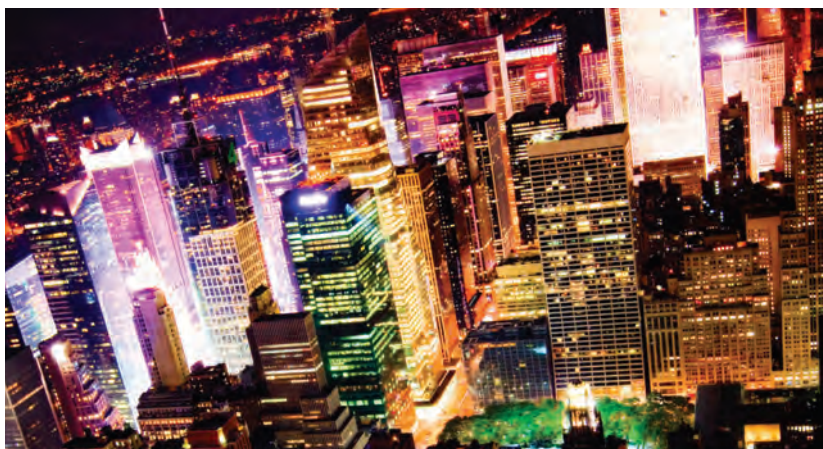
Electrical power. The most significant and pervasive energy source on earth. It runs businesses, fuels innovations and keeps the lights on.

When the power system is not designed or managed properly, it compromises success, resulting in lower productivity and increased costs.

Eaton takes the complexity out of power management with industry-leading innovation, expert services and holistic solutions.

And our customers realize powerful benefits:

improved reliability,
increased efficiency
and enhanced safety.



Customer critical

If it's critical to our customers, it's critical to us. In fact, we view it all as mission critical.



Expertise

With unparalleled knowledge of power management across industries, we provide the know-how for every application.



Support

Our people make the difference. Support is not just an extra benefit; it's at the heart of how we do business.

For energy challenges big and small, if it matters to you, it matters to us. **Our mission is to ensure your success, however you define it.**



为需求日益增长的世界 提供动力。

我们提供：

- 耗能更少，可改善动力可靠性，并让我们的生活和工作场所更加安全、舒适的电气解决方案
- 既提高机器生产效率，又节约能源的液压和电气解决方案
- 令飞机更轻、更安全、运营成本更低，和帮助机场更高效运营的航空解决方案
- 为汽车、卡车和巴士提供更多动力，同时减少燃油消耗与排放的车辆动力传动及动力总成解决方案

探索今天的伊顿

全球商业动力之源

作为一家全球性多元化动力管理公司，我们帮助世界各地的客户管理用于建筑、飞机、卡车、汽车、机器和业务的动力。

伊顿的创新技术可帮助客户更为可靠、有效、安全和可持续地管理电力动力、液压动力和机械动力。

我们提供综合的解决方案，可让各种形式的能源更为实用，更易于获取。

2014年，伊顿的销售额达226亿美元，在全球拥有约10.2万名员工，产品销往超过175个国家和地区。

EATON

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Eaton is a power management company with 2014 sales of \$22.6 billion. Eaton provides energy-efficient solutions that help our customers effectively manage electrical, hydraulic and mechanical power more efficiently, safely and sustainably. Eaton has approximately 99,000 employees and sells products to customers in more than 175 countries. For more information, visit www.eaton.com.cn/electrical.

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