Medium-voltage switchgear product catalog

Eaton's medium-voltage switchgear provides centralized control and protection of medium-voltage power equipment and circuits in industrial, commercial, and utility installations involving generators, motors, feeder circuits, and transmission and distribution lines.

Kobi Lubaton
Medium Voltage Sales manger
054-7672183

Powering Business Worldwide

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the smart solution

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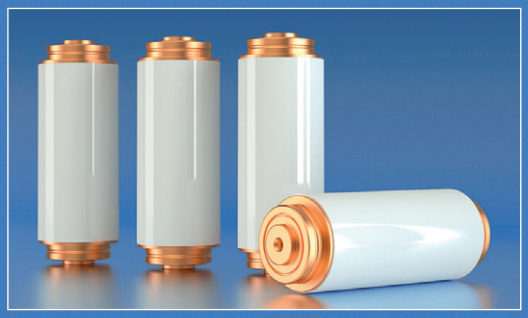
EATON
Powering Business Worldwide

Vacuum technology: safe, compact and reliable

Eaton vacuum interrupters consist of a ceramic cylinder, housing a fixed and movable contact. Movement of the contact under vacuum conditions is facilitated by a bellow. A shield surrounding the contacts prevents the insulators from becoming contaminated by metal vapour produced during current interruption. This shield also ensures good potential distribution over the insulator.



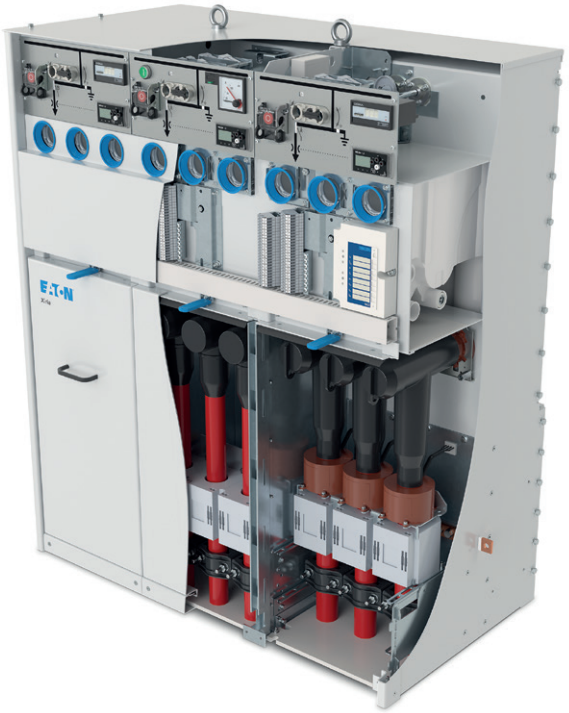
A typical feature of Eaton vacuum interrupters is that they are characterised by very low arc voltage and short arc times, resulting in very low arc energy. Contacts wear in a vacuum interrupter is therefore virtually negligible. Vacuum interrupters are maintenance free and are certified up to 30,000 operation cycles.

Xiria: the smart solution

Xiria is the name of a new generation of ring main units from Eaton. They are characterised by their high level of operational safety and are suitable for applications up to 24 kV. Xiria units are also very compact. Xiria units can be supplied in two-, three-, four- or five-panel versions. Both the primary part of the unit and the mechanisms are housed in a fully enclosed housing which protects the system against environmental influences.
There is a choice of two basic panel versions in our product range:

- A vacuum load break switch for ring cable connections.
- A vacuum circuit-breaker for protecting transformers and cable connections.

Both versions can be supplied in a unit in any desired combination and order.



Xiria is an extremely well designed and modern system. For example, when developing the system we intentionally opted for protection in the form of a circuit-breaker combined with an electronic relay. This is a modern, safe and flexible alternative to fuse protection.

In addition it also makes Xiria very easy to use in an automated distribution network. These specific features make Xiria an easy-to-use system that responds perfectly to changing electricity distribution requirements, both now and in the future.

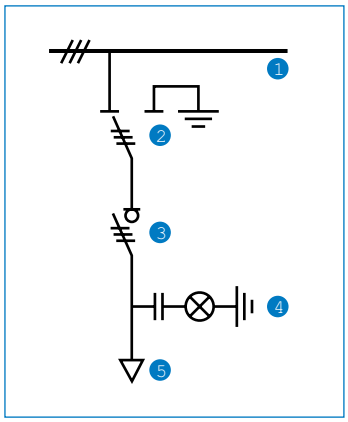
Maintenance-free

All the live primary parts and mechanisms in a Xiria unit are installed in a fully enclosed housing. This prevents dust, moisture and other environmental influences from affecting the operation of the unit. The switching mechanism has been designed with a minimum number of parts, and is specifically intended for switching after a long period of inactivity – precisely the way it happens in practice. What is more, the mechanism does not use any lubricants, which also benefits its operational safety. As it is maintenance-free, Xiria significantly cuts inspection and maintenance costs without adversely affecting the operational safety of your distribution network. Which is something to look forward to in today's liberalised energy market.

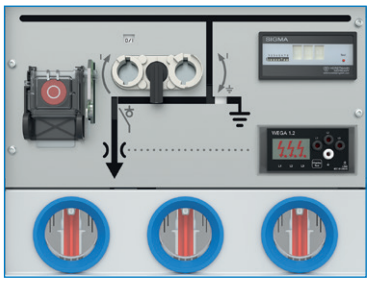
Sealed-for-life housing.

Intrinsically safe

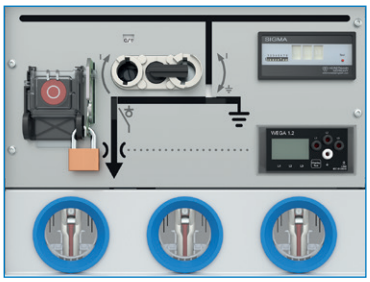
When carrying out operational actions and work on the cables, it is vital to have unambiguous status indications. When it comes to the safety of the operating personnel, Eaton leaves nothing to chance. That is why Xiria is fitted with directly visible isolation by means of inspection windows in the front which makes the isolating distance between the cable and the busbar system directly visible. A visible, short-circuit proof earthing can take place via the load break switch or circuit-breaker.
Xiria is designed with a fully enclosed metal housing combined with single-phase insulation of all primary live parts. This reduces the risk of an internal fault to an absolute minimum, thus providing a high degree of safety and availability. The KEMA-tested arc-proof housing also offers additional protection for operating personnel.



1. Busbar system
2. Busbar/earth disconnector
3. Vacuum load break switch or circuit-breaker
4. Voltage detector
5. Cable connection



Operating position.



Earth position.

Developments in electricity distribution

Electrical energy has become an indispensable part of modern society. Having a reliable, continuous supply of energy is becoming more and more important every day. From the point of view of energy companies and industry, this means that the distribution network has to meet ever more stringent demands. It goes without saying that safety and operational reliability play a major role.
As a result of the liberalisation of the energy market and the effect that this is having on the market, electricity is becoming an increasingly commercial product, with all that that entails. So when a distribution network is set

Compact

Xiria is one of the smallest ring main units of its kind. This high degree of compactness is a direct result of the combination of technologies used by Eaton – electrical field control, solid insulation and the use of extremely compact vacuum interrupters. This compactness offers direct financial benefits in new buildings and when refurbishing existing transformer stations because of the minimal floor area required.

Compact design.

Ready for automated networks

Xiria is completely ready for use in fully-automated networks. There are various options available for the system, depending on the level of remote signalling and remote control required. These options are modular, so they can be quickly and easily added in the future. In this way Xiria anticipates future developments in automation and operational control, so you can be sure that you will not be left with control, display and communication standards that are too specific or possibly even obsolete.

Easily adjustable electronic protection relay.

Clean and green

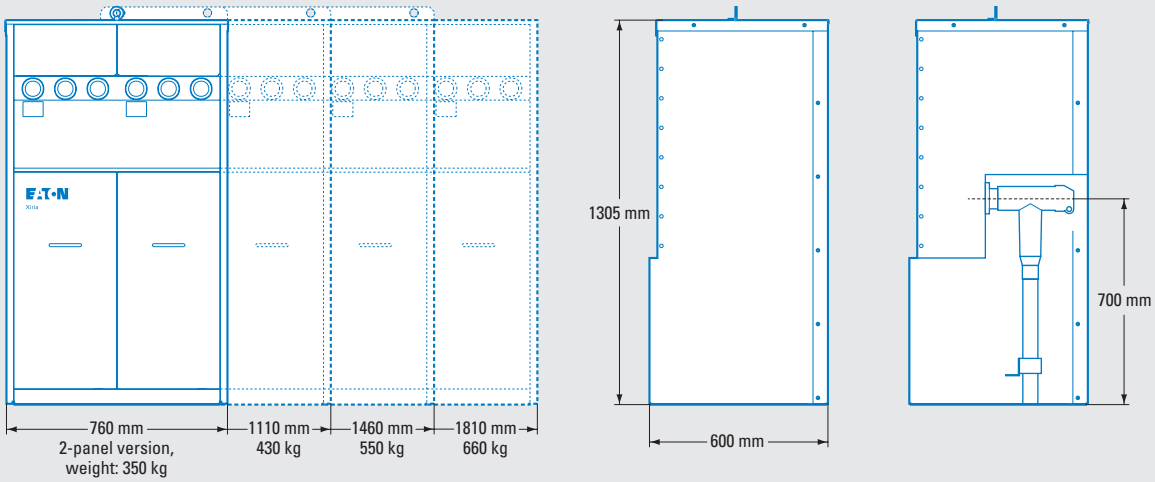
Xiria is made exclusively of environmentally-friendly materials. The insulation medium is clean, dry air and the switching medium is vacuum. Thus Xiria responds to the demand for sustainability in energy distribution. The unit is easy to dismantle at the end of its service life as the materials used are clearly labelled and can be reused. This facilitates recycling and avoids excessive costs and environmental taxes when the unit is decommissioned.

Clear coding for recycling.

Xiria units can be used in compact transformer stations for energy distribution and in accessible stations in utilities and industry. They are also ideal for use in decentralised power generation systems such as wind farms.

up, far more attention is paid to the total costs over the life span of the network than before. The maintenance-free Xiria system is Eaton's response to this. Sustainability and environmental friendliness are becoming more and more important in the choice of switch materials. Eaton has taken this criterion as a starting point for the design of its new generation of ring main units - both in terms of production and during the entire service life of the unit, including the reuse of the materials used.
Based on these developments, Eaton has launched Xiria, a system that responds to present and future developments in the liberalised energy market.

Dimensions (mm)



Technical data

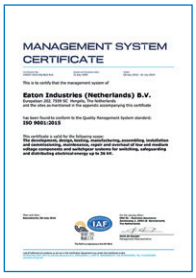
Xiria						
General						
Rated voltage	kV	3.6	7.2	12	17.5	24
Impulse withstand voltage	kV	40	60	75/95	95	125
Power frequency withstand voltage	kV	10	20	28	38	50
Rated frequency	Hz	50/60	50/60	50/60	50/60	50/60
Internal arc resistance	kA-s	20-1	20-1	20-1	20-1	20-1
Busbar system						
Rated normal current	A	630	630	630	630	630
Rated short-time withstand current	kA-s	20-3	20-3	20-3	20-3	20-3
Rated peak withstand current	kA	50	50	50	50	50
Circuit-breaker						
Rated normal current	A	630	630	630	630	630
Rated breaking current	kA	20	20	20	20	20
Rated short-circuit making current	kA	50	50	50	50	50
Rated short-time withstand current	kA-s	20-3	20-3	20-3	20-3	20-3
Load break switch						
Rated normal current	A	630	630	630	630	630
Rated mainly active load breaking current at cos. phi 0.7	A	630	630	630	630	630
Rated short-circuit making current	kA	50	50	50	50	50
Rated short-time withstand current	kA-s	20-3	20-3	20-3	20-3	20-3

Xiria complies with the following international standards	
IEC 62271-1	Common specifications
IEC 62271-200	Metal-enclosed switchgear
IEC 62271-304	Severe climatic conditions
IEC 62271-100	Circuit-breakers (M1/E2)
IEC 62271-103	Switches (M1/E3)
IEC 62271-102	Alternating current disconnectors and earthing switches (M0)
IEC 60529	Degree of protection
IEC 61869-1	Instrument transformers - Part 1: General requirements
IEC 61869-2	Instrument transformers - Part 2: Additional requirements for current transformers
IEC 61869-3	Instrument transformers - Part 3: Additional requirements inductive voltage transformers
EN50181	Plug-in type bushings above 1 kV up to 36 kV

Classification according to IEC 62271-200	
Loss of Service Continuity	LSC2
Partition Class	PM
Internal arc	IAC AFLR 20 kA-1 s

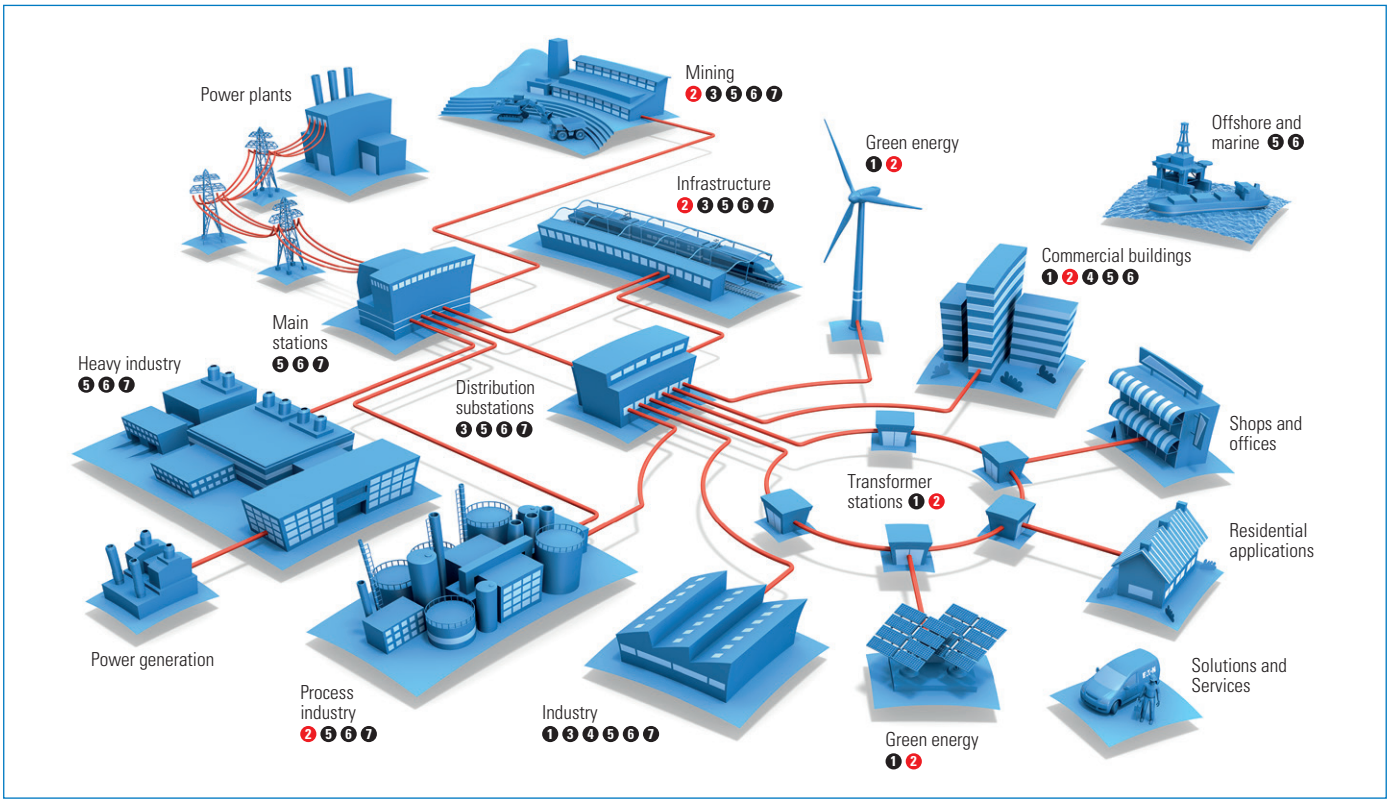
Quality standards	
ISO 9001-2015	Quality
ISO 14001	Environmental management

KEMA



Eaton's electrical business is a global leader with expertise in power distribution and circuit protection; backup power protection; control and automation; lighting and security; structural solutions and wiring devices; solutions for harsh and hazardous environments; and engineering services. Eaton is positioned through its global solutions to answer today's most critical electrical power management challenges.

Eaton medium voltage products in the energy chain



1 Magnefix

2 Xiria (blocktype)

3 Xiria E (extendable)

4 Xiria M (metering solutions)

5 Power Xpert® FMX

6 Power Xpert® UX

7 MMS

Eaton Industries (Netherlands) B.V.
P.O. Box 23
7550 AA Hengelo
The Netherlands

Tel.: +31 (0)74 - 246 40 10
Fax: +31 (0)74 - 246 40 25
info.electric@eaton.com
www.eaton.com/xiria

Form No. 994.153J
October 2022

Metal-enclosed single busbar, Solid and Air-Insulated switchgear
IEC Medium Voltage Switchgear up to 24 kV

Xiria E

Extendable switchgear for distribution substations and commercial / industrial applications

EATON
Powering Business Worldwide

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's knowledge and understanding of industries, applications, technology and products enables us to offer customers safe, reliable and high performance solutions. We have been part of the Medium Voltage switchgear technology creation and therefore carry what's needed with us – always!

Complete MV switchgear solutions

The series of Eaton Medium Voltage systems offers switchgear and components for applications in distribution networks (main stations, substations and transformer stations) and industrial power supplies. These technically high quality systems are air- or epoxy-resin insulated and are always equipped with circuit-breakers based on proprietary vacuum interrupters.

The medium voltage switchgear systems carrying Eaton's brand are based on the use of vacuum circuit-breakers combined with solid insulation material. This is an environmentally-friendly technology in comparison with the methods used by many other suppliers, which use SF_6 as an insulation medium.

Eaton thus has a wide range of switching systems and components that offer an environmentally friendly solution for every application. Additionally, Eaton's global service network provides maximum customer support in all regions of the world.

Industry leading vacuum and solid insulation technology

Through more than eighty years of innovation and experience, Eaton has developed environmentally friendly vacuum interrupters capable of reliably switching both normal load currents and high stress fault currents.

Eaton is one of the few companies in the world producing vacuum interrupters and has succeeded in developing world class products with international patents. This has been achieved through company acquisitions over the years of Westinghouse®, Cutler-Hammer®, MEM® and Holec®.

To increase the dielectric strength of the vacuum interrupter, Eaton has also designed vacuum interrupters that are encapsulated in epoxy resin material. The medium voltage IEC circuit breaker family utilizes this solid insulation technology that has been catering to a wide range of applications for more than 40 years.

Eaton's range of SF_6 free switchgear for Medium Voltage

Xiria

The Product Family

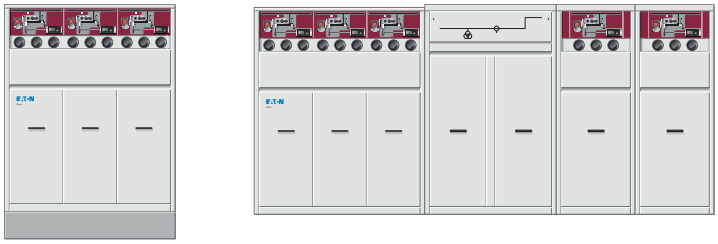
Xiria is the name of Eaton's product family for a new generation of medium voltage switchgear. The Xiria family started more than a decade ago with the introduction of the Xiria ring main unit.

This ring main unit consists of a block containing three panels. Due to the quick acceptance and worldwide interest in more configurations, Eaton consequently developed a four, five and two panel block. Due to the fact that the individual units cannot be coupled and are limited in the number of panels and protection and control equipment, the single panel version was developed. This single panel version is called Xiria E. E in this case stands for Extendable.

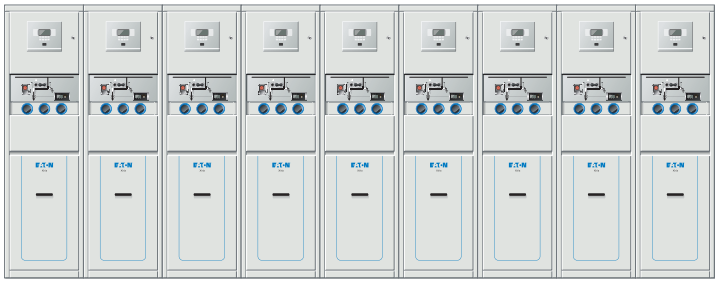
The Xiria family includes multiple possibilities and configurations for Power consumption metering. These configurations are indicated as Xiria M-versions. M stands for metering. The transformers for power consumption metering can be either integrated into the block-type Xiria switchgear or housed in a separate metering panel. This dedicated metering panel can be integrated with both the current block type switchgear and the new single extendable panels.

Xiria
(Block type)

Xiria M
(Metering)



Xiria E
(Extendable)

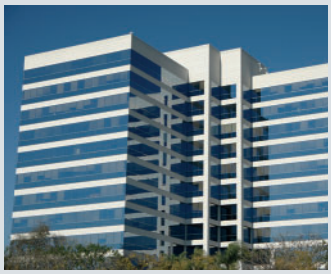


The complete solution

By adding the Xiria E panel to the current range of Xiria a complete family, based on the same and proven key technologies, is created. The Xiria block type system is already frequently used for transformers stations, small industries, heavy duty applications and commercial buildings. With the new Xiria E panel it is also possible to use the system in applications with higher specifications and a bigger number of panels.

Some applications are:

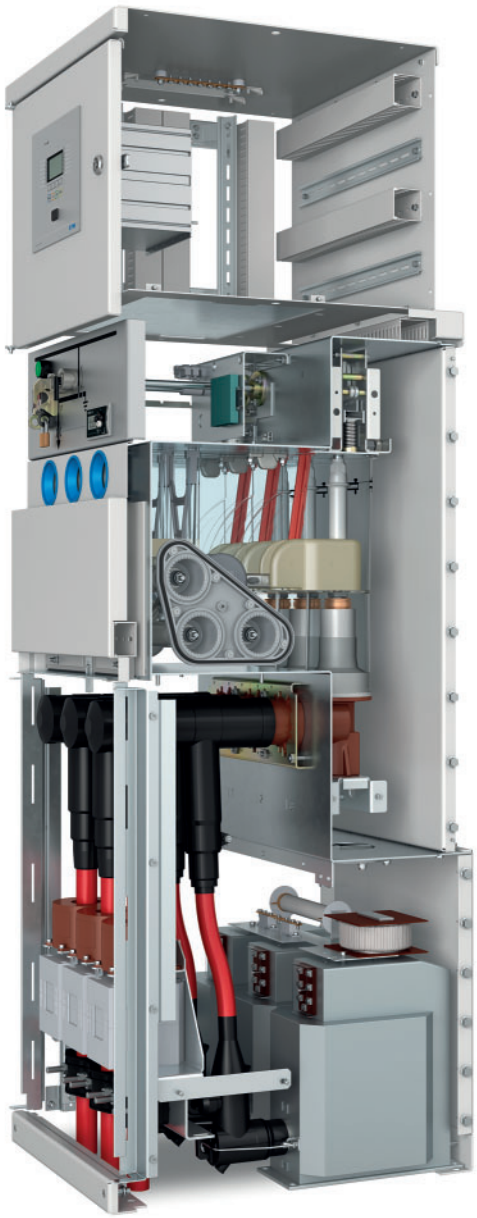
- Distribution substations for utilities
- Wind power plants
- Bigger industrial applications
- Hotels
- Shopping centres
- Office buildings
- Infrastructure projects (tunnels, subways, airports)
- Universities
- Hospitals
- Data centers



Xiria E

Modular Switchgear for Smart Grid Applications

Xiria E is the name of Eaton's new medium voltage switchgear for smart grid applications. The system is characterised by its high level of operational safety and suitable for applications up to 24 kV.



The Xiria E switchgear is designed around Eaton's proven vacuum interrupters, which require no maintenance and are certified for 30,000 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 E 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 E is environmentally friendly. These technologies ensure that this system is a conservational alternative to switchgear systems using Sulfur Hexafluoride (SF_6) 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 panel dimensions of only 500 mm width and a provision for cable connection from the front, the Xiria E system is economical in its use of valuable floor space, and easy to accommodate in even the most restricted environments. For locations where there is no possibility to exhaust an internal arc into cellar, the system has the possibility to exhaust into the room. This is realized by means of a special chimney at the back side with integrated arc absorbers.

When it comes to the safety of the operating personnel the Xiria E design leaves nothing to chance. All parts are fully enclosed by an internal arc tested safe metal housing. Besides that 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.

Features and Benefits
(quick overview)

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 formal operation
- Smooth contemporary design

Environmental Friendly

- Minimized number of components
- Environmental-friendly design with respect to the materials used
- No use of SF_6-gas for switching and insulation
- Energy efficient production and assembly with environmental energy sources
- Minimal number of transition points in primary design enable low energy loss during operation
- Only Re-usable and / or recyclable materials used

Low Total Cost of Ownership

Low initial costs due to:

- Panels with only 500 mm width
- Cable connection from the front / wall standing arrangement
- No need for external arc channel
- 12 kV and 24 kV panels in same housing

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 load-break switch
- Primary parts and mechanism installed in a fully sealed for life enclosed housing
- No SF_6 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

User Friendly

- Cable connection and user interfaces for operation on the same front side of the panel
- Ergonomic cable connection height
- Cable (secondary) entry points on both sides of the low voltage compartment top plate
- Secondary cable terminals positioned on a good reachable place in the low voltage compartment
- Clear and simple straight-forward operation panels

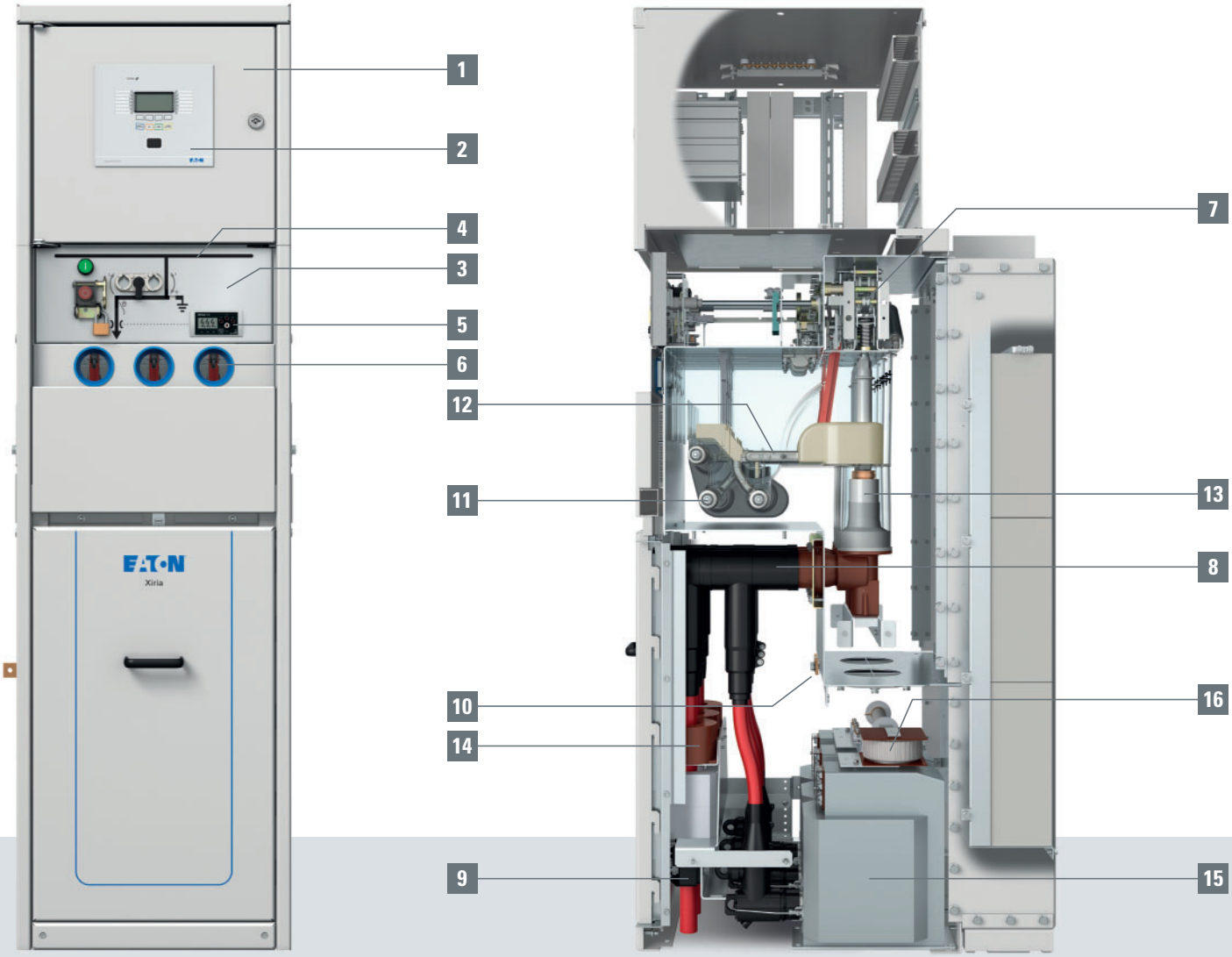
Reliable and Safe in Operation

- Complete design certified in accordance with IEC standards
- Arc fault tested according IEC 62271-200
- Quality assurance in accordance with DIN EN 9001
- Routine tested
- Single pole insulated primary parts within one compartment
- Primary parts and mechanism in sealed for life fully enclosed housing
- Protected voltage transformers

Basic Design

The Xiria E system is modular in construction. This ensures that any panel combination and sequence is possible.

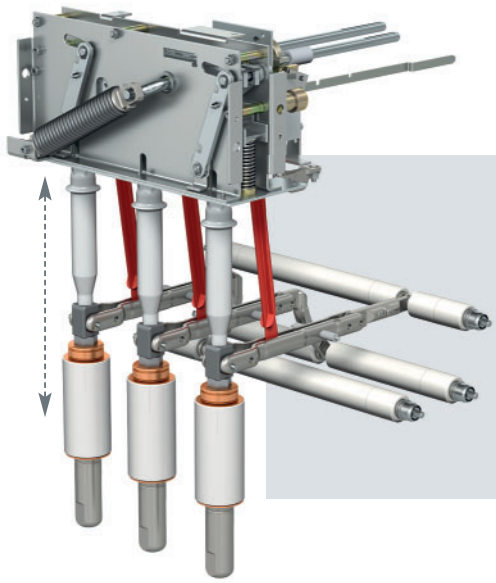
In addition, the number of panels capable of being used in an installation is unlimited as several sections can easily be connected. As the panels can be quickly assembled and connected, flexible commissioning of the switchgear is possible. The panels in the Xiria E system are compact (500 mm wide), resulting in considerable savings in costs and installation space.



Circuit-breaker panel (example)

1. Low Voltage compartment
2. Protection relay
3. Control panel with operation of the circuit-breaker and change-over switch
4. Mimic diagram
5. Voltage detection system
6. Inspection window
7. Mechanism
8. Cable cones
9. Cable clamps
10. Earth bar
11. Busbar
12. Change-over switch
13. Vacuum interrupter
14. Current transformers
15. Voltage transformers
16. Coil and resistor for protection against ferroresonance

Main Components

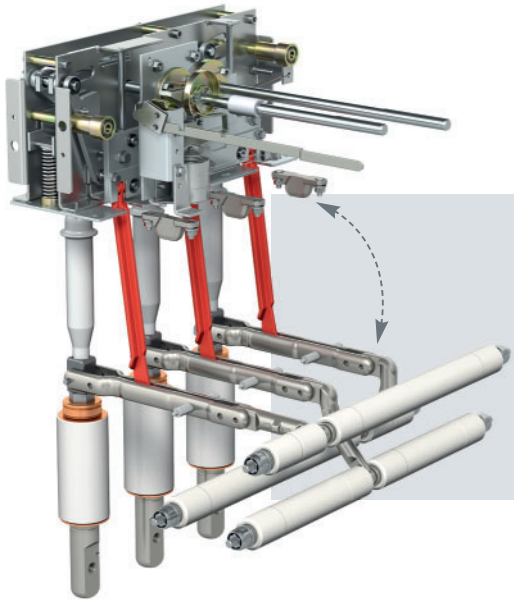


Vacuum circuit-breaker

The vacuum circuit-breaker uses a simple and reliable spring charging mechanism for operation of the vacuum interrupters. The mechanism contains a low number of moving parts and makes no use of lubricants. It is completely housed in a sealed for life enclosure and therefore needs no maintenance.

Features

- With environmental friendly vacuum interrupters
- Simple spring charging mechanism
- No use of lubricants
- Housed in a sealed for life enclosure
- Manual or motor-operated
- Position indication by means of inspection windows and mechanical indicators
- Auxiliary contacts for Open/Closed position

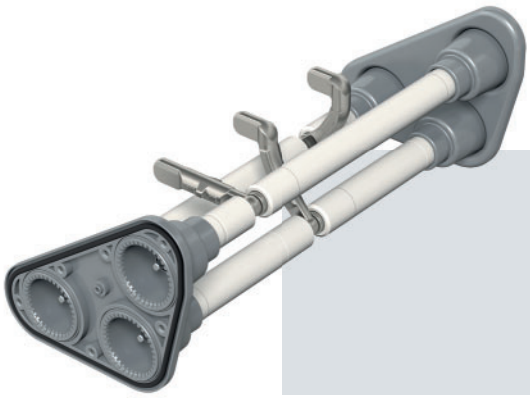


2-position change-over switch

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

Features

- Manual-operated switch with 2 positions (service / earthed)
- Maintenance free
- Housed in sealed for life enclosure
- Auxiliary contacts for service / earthed positions
- Position indication by means of inspection windows and mechanical indicators
- Mechanically interlocked with the vacuum circuit-breaker



Busbars

The busbars in the panel are housed in the same sealed for life enclosure as the circuit-breaker and change-over switch. To prevent a possible internal arc all busbars are single phase insulated.

Features

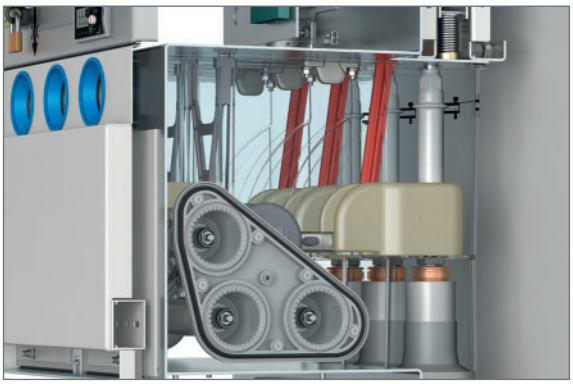
- Single phase insulated
- Air insulated
- Housed in a sealed for life enclosure
- Simple and robust construction
- Easy to couple

Eaton Core Technologies

Solid insulation

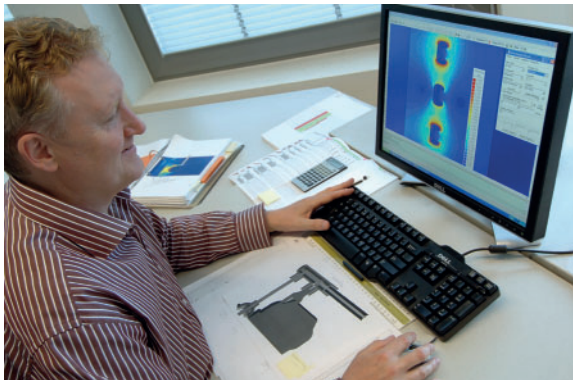
Polycarbonate and Thermo-plastic elastomer (TPE) is used as high-quality primary insulation materials around live parts.

By applying Polycarbonate and TPE for solid insulation our design engineers can shape the parts specifically for optimal insulation, robust construction and cooling purposes. In the many years of experience with design and manufacturing of insulation materials, we learned to construct smart single phase insulated constructions. Xiria utilizes optimal field control through the special design of all primary components.



Electrical field control

With conventional shapes for primary components like busbars and conductors, the electrical field between the phases and between phase and earth is non-uniformly distributed. In areas with high field, partial break-through can initiate avalanches resulting in flash-overs. In-depth knowledge about breakthrough phenomena and field steering techniques enable us to prevent flash over completely. The result is a particular compact design.



Vacuum technology: safe, compact and reliable

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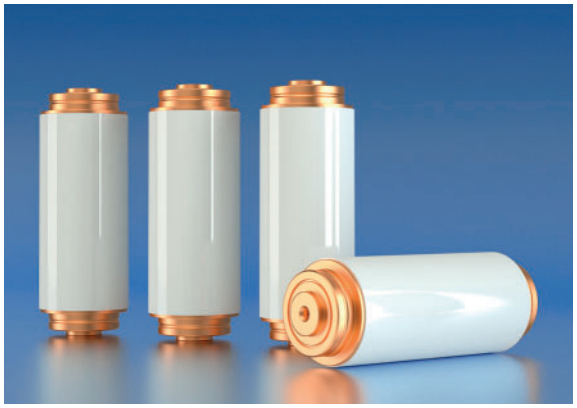


Reliable and Safe in Operation

Eaton's proven technologies have been integrated in the design and development of the Xiria in order to ensure that the switchgear is safe and has high operational reliability throughout its complete lifetime.

Experience and knowledge gained over many years in the areas of cast resin technology, vacuum technology and electrical field control have been implemented.

The system has been thoroughly arc fault tested according to the latest standard IEC 62271-200.

Preventing an internal arc

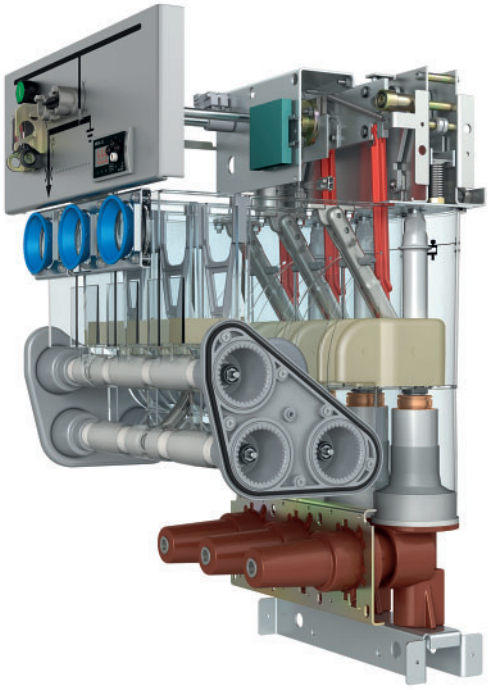
Within the Xiria design there are different technologies used to prevent an open arc.

Single pole insulated primary parts

All high voltage parts are single pole insulated. The insulation materials used for this are Polycarbonate and Thermo-plastic elastomer (TPE), both high-quality materials with optimal insulation characteristic resulting in minimised dimensions.

Use of Electrical Field control

Engineers designed the whole construction of primary parts, housed in the sealed for life tank, based on Eaton's key technology for electrical field control. By means of special shapes and dimensions the possibility of an open arc is minimized.



Sealed for life fully enclosed housing

Both the primary parts of the unit and the mechanisms are housed in a fully enclosed (sealed for life) housing which protects the whole system against environmental influences and therefore makes it maintenance free. This compartment can be classified as non-accessible and has an IP degree of IP55.

Protected Voltage transformers

Ferro resonance can cause that voltage transformers are damaged and consequently initiate an internal arc in the switchgear. Our design prevents that the voltage transformers are affected by ferroresonance. A resistor and a saturable coil are installed in the tertiary circuit of the voltage transformer.

Routine tests

Various prescribed routine tests are carried out during the production of the switchgear. To assure quality, all processes are in accordance with DIN EN 9001. This means that at every stage of production the components, circuit-breakers and current transformers are inspected for correct functioning. 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, despite the fact that it is very rare for an operator to be in front (without operating) of the switchgear at exactly the same time that an internal fault occurs.

Eaton supports the philosophy that it is best to avoid internal arcs than to cure, in line with the relevant standard IEC 62271-200. Within the Xiria 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 is equipped to provide maximum safety to the operator, and to control and minimise damage to the rest of the switchgear and room.

Controlling an internal arc

An internal arc in switchgear causes an overpressure supported by the release of fire and smoke.

By design, vacuum and air/solid insulated switchgear has the least environmental impact after an internal arc event. The impact of an arc is twofold: an internal impact (in the switchgear) and external impact (in the switch room).

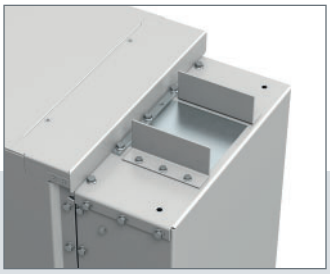
The overpressure created by an internal arc will, in standard switchgear, be guided out of the switchgear by means of a pressure relief duct. Next to the duct a complicated and expensive arc channel may be installed, that guides the arc output outside the switch room. The Xiria design is constructed in such a way that both impacts are significantly reduced and consequently a less complicated arc channel is needed.

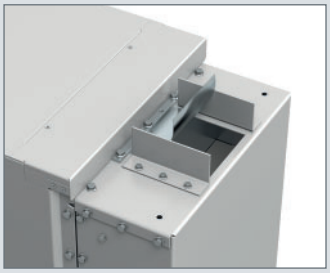
No phase-to-phase short circuits minimises pressure

Within the Xiria all high voltage parts are single pole insulated. The advantage of this single pole construction is that the only conceivable internal fault is a single-phase short circuit, e.g. due to a cable connection failure (when single core cables are connected, as is the normal practice nowadays).

Arc absorber reduces output impact

In case it is not possible to vent into the cable cellar or into an adjacent room, the Xiria design offers the possibility to safely vent into the switch room. In this case a special arc chimney is installed at the backside of the panel. This arc chimney contains integrated arc absorbers that break and filter gasses and fire significantly.





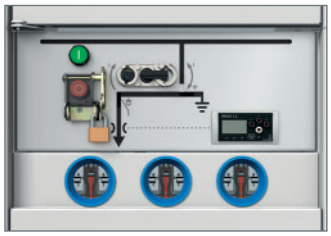
Safe in Use

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

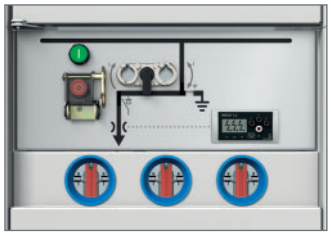
What you see is what you get!

Visible isolation by means of inspection windows in the front

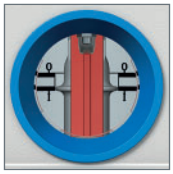
When carrying out operational actions and work on the cables, it is vital to have unambiguous status indications. When it comes to safety of the operating personnel Eaton leaves nothing to change. That is why the Xiria design is fitted with directly visible isolation by means of inspection windows in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

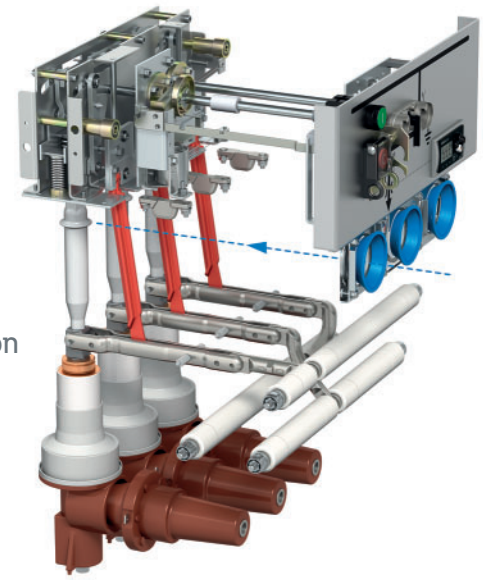


Earth position



Operating position





Capacitive voltage detection system for verification of safe isolation from supply

Each panel type within the Xiria family is equipped with a standard three-phase Voltage Detection System for voltage testing to IEC 61243-5. The VDS shows the operator if the panel is isolated from supply or not.

Logical mechanical and electrical interlocks prevent mal operation

Within the Xiria design mis-operation by an operator is prevented by using different interlocks. The interlocks are mechanical and electrical. For example electrical and mechanical interlocks prevent to operate 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

The door of the cable compartment can only be standard 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. Next switching on to service position is only possible with the door positioned back again.

Compartments protected against penetration of objects

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

For the latter all high voltage compartments have an IP55 degree.

Smooth temporary design

All compartments of the Xiria 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 parts that stick out of the switchgear when moving in front of the switchgear.

Low Total Cost of Ownership

The Xiria design guarantees very low costs related to owning the switchgear during its entire lifetime.

The life-time costs can be split in the initial costs, installation cost, service cost and finally, costs for disposal of the switchgear.

All costs of owning the switchgear are influenced by different features of the switchgear. Within Xiria all these features are constructed in such a way that the costs for the owner are as low as possible of course with no concessions to the quality of the switchgear.

Low initial costs

Initial costs consist of purchase, transport, building and installation costs.

Panel width only 500 mm

By using a combination of solid insulation technology, electrical field control and vacuum technologies, Eaton's engineers managed to construct Xiria E panels with a width of maximum 500 mm. Because a typical switchgear installation normally consists of a large number of panels, this compact design significantly reduces the switch room size. The compact design also makes Xiria E highly flexible and economically attractive when existing installations are being replaced.

Cable connection from the front (back-to-wall arrangement)

Cable connection from the front is a feature that saves building costs. Due to this front connection the rear of the Xiria E can be installed close to the wall of a building, again reducing building cost.

12 kV and 24 kV panels in same housing

The 12 kV and 24 kV versions are both accommodated in the same compact housing. This means substantial savings on building costs because the same switchroom can be used when the operating voltage is increased (upgrading).

Arc chimney with integrated arc absorbers

A standard option (in case there is no possibility to vent down or backwards) that reduces the switchroom dimension is the Xiria arc chimney with integrated arc absorbers. In normal switchgear, gasses caused by an internal arc are guided out of the switchroom by means of an extra duct and arc channel connected to the switchgear. These additions require extra switch room space and consequently increasing initial building cost.

Low service cost during operation

Service cost consists of maintenance, failure and consequential cost. Besides that the technical lifetime of parts or modules will determine the replacement cost of the equipment.

Robust "lean" design with minimum number of parts

Costs during service of a switchgear can be caused by damaged parts requiring replacement, or by maintenance parts that will not reach their expected lifetime if they are not serviced.

Within the Xiria design a minimal number of components are used. This robust design with only the necessary parts is designed based on experience of building switchgear for more than a century.

No SF_6-gas pressure checks

Switchgear that uses SF_6-gas as an insulation medium has a leakage rate. To maintain the isolation level within this type of switchgear, the pressure of the SF_6 tanks must be checked and refilled on a regular basis during the unit's lifetime. Within the Xiria, an owner does not have to incur the extra costs involved in checking and maintaining the required insulation level. The combination of vacuum interrupters for switching, solid insulation and clean air as the insulation medium, is environmentally friendly and maintains the same quality level during the complete lifetime of Xiria.

Primary parts and mechanism installed in a fully sealed for live enclosed housing

The biggest influence on the quality of the primary and moving parts in switchgear, has the environment in and outside the switchroom. These environmental influences could in the end cause damage to the switchgear that should be repaired. To prevent any environmental influence on the most critical parts in the Xiria, all of these parts are housed in a fully sealed for live enclosure (IP55).

Product quality guaranteed by prescribed routine testing in the factory

During production of the panels, various prescribed routine tests are carried out by specialists, making sure that the panels achieve the quality that they are designed for.

Low end of life disposal cost

Full recycling or re-use of materials

The primary parts of the Xiria have a lifetime of at least 30 years. Depending on the location where the system is installed the lifetime can be extended. If for what reason the decision is made not to use the switchgear anymore the Xiria can be handed over to Eaton again. Next the switchgear will be dismantled and the different materials can, and will, be categorised. Because no toxic materials are used in the Xiria, dismantling is a less complicated, more cost effective and environmentally friendly operation. The dismantled and categorised materials will be, depending on the material, recycled or re-used.

User friendly

First of all requirements is a safe and reliable installation. Number two is an installation that is convenient and efficient to operate.

The second aspect does not always get the attention it deserves, but for Xiria most certainly did. The Xiria panels are designed to be user friendly and are easy to operate.

Primarily, all operations can be carried out on the front side of the panel. This means that both cable connection and user interface for operation are positioned at the same front side of the panel. The logically arranged control panel enable operators to do their job as efficiently and safe as possible.

Easy and ergonomic connection of cables

Primary cables

The cable cones of Xiria are positioned on a height of 700 mm from floor level. This height makes it relatively easy for operators to connect the primary cables. There is also enough space in the cable compartment to connect the required number of cables with connectors available on the market.

Secondary cables

Connecting the secondary cables is carried out by entering the low voltage compartment of the Xiria E from the top. The low voltage cable terminals are positioned in such a way that the operator can connect the cables easily within the compartment whilst standing in front of the Xiria E.

Clear and simple control panel

The control panel on the Xiria is positioned on a convenient height for the operator. It is directly connected to the mechanism.

The mechanism is a hand operated or hand/motor operated spring charged mechanism, connected to the vacuum interrupters and the change-over switch. It is operated via two rotating shafts on the front provided with the necessary mechanical inter-locks to avoid wrong operation. For example an interlock is built-in that prevents operation of the change-over switch when the circuit-breaker or load-break switch is in the ON-position. Another standard feature on the control panel is the padlocking of the earthed position. For padlocking the position, the most common padlocks available in the market can be used.

Manual operation of the switchgear is achieved with one operating handle. This handle can be used for switching the circuit-breaker, load-break switch and change-over switch. Operation is done by inserting the handle in the access holes in the front. In case a motor-operated circuit-breaker is requested a push button will be installed in the control panel for achieving this function.

The mechanism is provided with viewing windows on the front for direct visual indication of the earthed position of the change-over switch and the ON/OFF-position of the main vacuum interrupter. The front operating panel is also provided with a black and white single line intuitive mimic, showing the positions of the vacuum interrupter and the Earth/Busbar position of the change-over switch.

Each panel is provided with a voltage detector mounted on the front. It is connected via internal wiring to capacitive sensors inside the cable connection cones. It shows the presence of the primary voltage on all three phases of the primary cables connected to the panel.

In case advanced protection and control equipment is requested, the low voltage compartment positioned on top of the panel, will house these.

Environmentally friendly

Like all Eaton's other medium voltage switchgear, Xiria is designed to be an environmentally friendly product throughout the whole chain.

One of the key strategic initiatives of Eaton is to provide environmentally friendly products. Eaton realises that for this they should look at their total product chain, from design to dismantling. 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.

Eaton's production plant in Hengelo (the Netherlands) acts entirely in accordance with the rules and procedures of ISO 14001 environmental certificate during development and production processes.

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 minimised number of components

Xiria 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 an simple spring charging mechanism and integrated compartments. This also ensures straight forward assembly with low labour 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 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 circuit-breakers. Xiria can be completely recycled at the end of its life without any problem.

No use of SF_6 gas for insulation or switching

Within medium voltage switchgear SF_6-gas is being used, because of its good insulating properties. Emissions of SF_6-gas from switchgear contribute significantly to the threat of the greenhouse effect and associated climate change. SF_6 is on the list of greenhouse gasses in the Kyoto protocol.

SF_6 is the most potent of the six main greenhouse gasses, with a Global Warming Potential (GWP) of 23,000.

In the 1980s, the Holec group, as it was then, made a fundamental choice not to use SF_6 as a switching and insulation medium for medium voltage equipment. In the 1980s, Holec had SF_6 technology available in-house. The main reason for not using any SF_6 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 centres.

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.

No service checks on site

Because Xiria 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 SF_6-gas during its lifetime and no need for extra maintenance activities on SF_6 pressure checks.

Minimal energy loss during operation

To prevent energy loss by the system itself, Xiria 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.

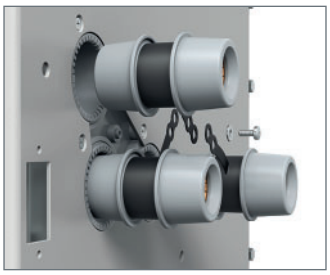
Re-use or recycling of materials

During dismantling Xiria switchgear is demounted into parts and thereafter categorized per material. Next the parts will be recycled or re-used. Because Xiria uses no SF_6, there is no loss of this gas during dismantling of the switchgear.

Exactly how you want it

Simple configuration, coupling and extension

Every application of this type of system is unique, so Eaton offers a large number of different panel types and field versions. If, in due course, the end-user needs additional capacity in the form of more panels, Xiria E can easily be extended to the right or left.



Flexible application of secondary apparatus, protection relays and substation automation

Eaton realises that end-users have their own direction with respect to the use of secondary apparatus, protection relays and substation automation within the switchgear. The need for customer specific apparatus and relays was taken into account during the development of the Xiria E. This resulted in a system that enables end-users to integrate apparatus according to their specification. Thanks to the large number of protection and control options, end-users will always be able to construct an Xiria E system that conforms exactly to your requirements.

Range of Voltage transformers

All Xiria E panels can be fitted with cast-resin insulated voltage transformers (of the requested transformer ratio and class) for the voltage measurement on the cable side, or on the busbar side. Both transformers can be (dis-)connected safely and easily.

Range of Current transformers

The epoxy resin insulated current transformers are of the ring core type. They are positioned around the primary conductors behind the cable cones or around the primary cables. All common transformer ratios, outputs, rated currents and classes are possible.

Protection and Control equipment

The protection and control equipment is located in the low voltage compartment. This compartment is completely separate and has its own access door. There is space on the door for equipment such as protection relays, test plugs, meters, etc.

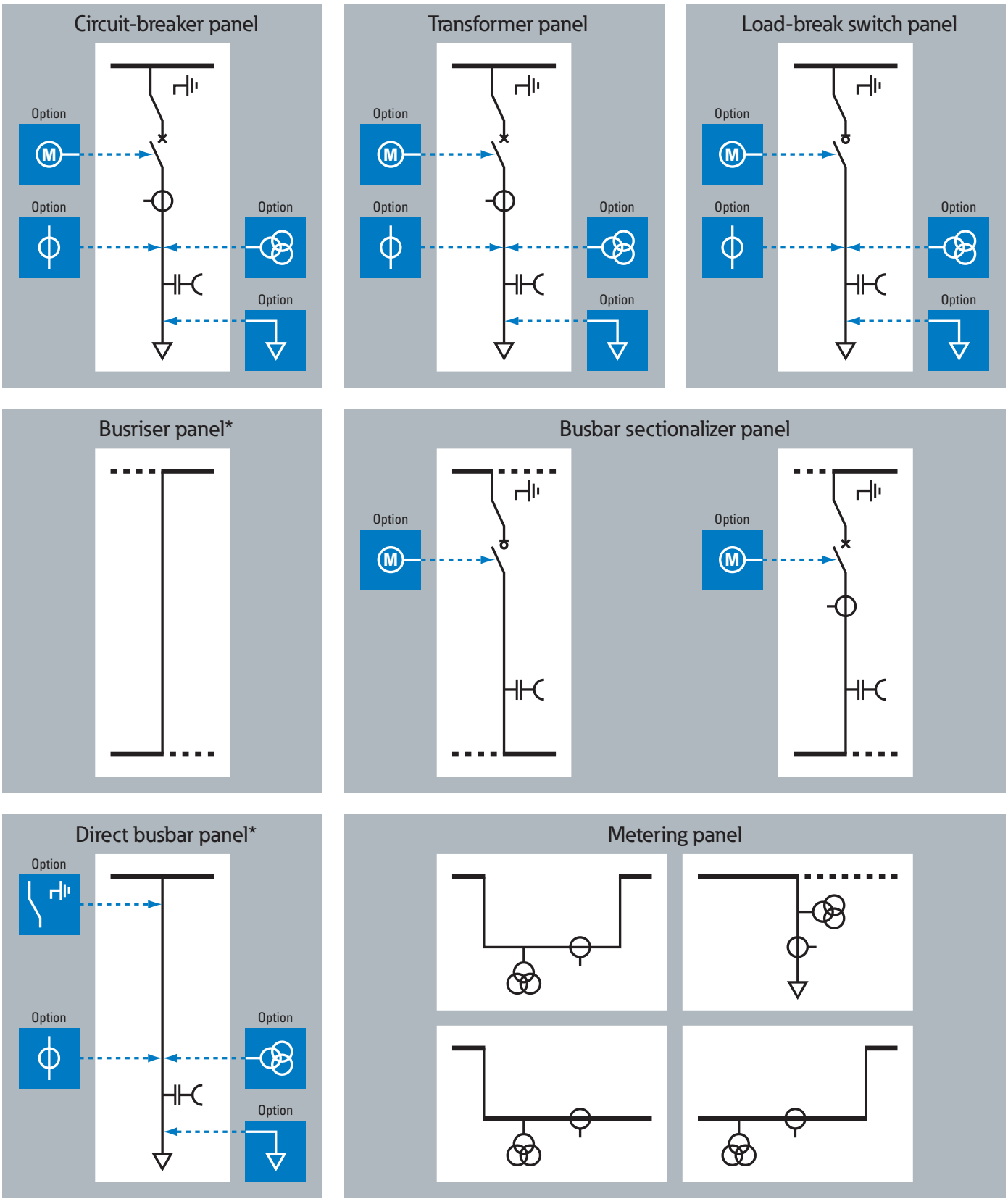
The Xiria E is standardised for the Woodward HighProtec line relays series. However the Xiria E is adaptable for the installation of other brands. In case more than one relay is required, the low voltage compartment can be extended.

Smart Grids

Equipment for (remote or local) communication between panels or automation systems can also be installed in the low voltage compartment. For instance an Eaton remote terminal unit (RTU) can be applied. Having this possibility makes the system the perfect solution for current and future Smart Grid applications.

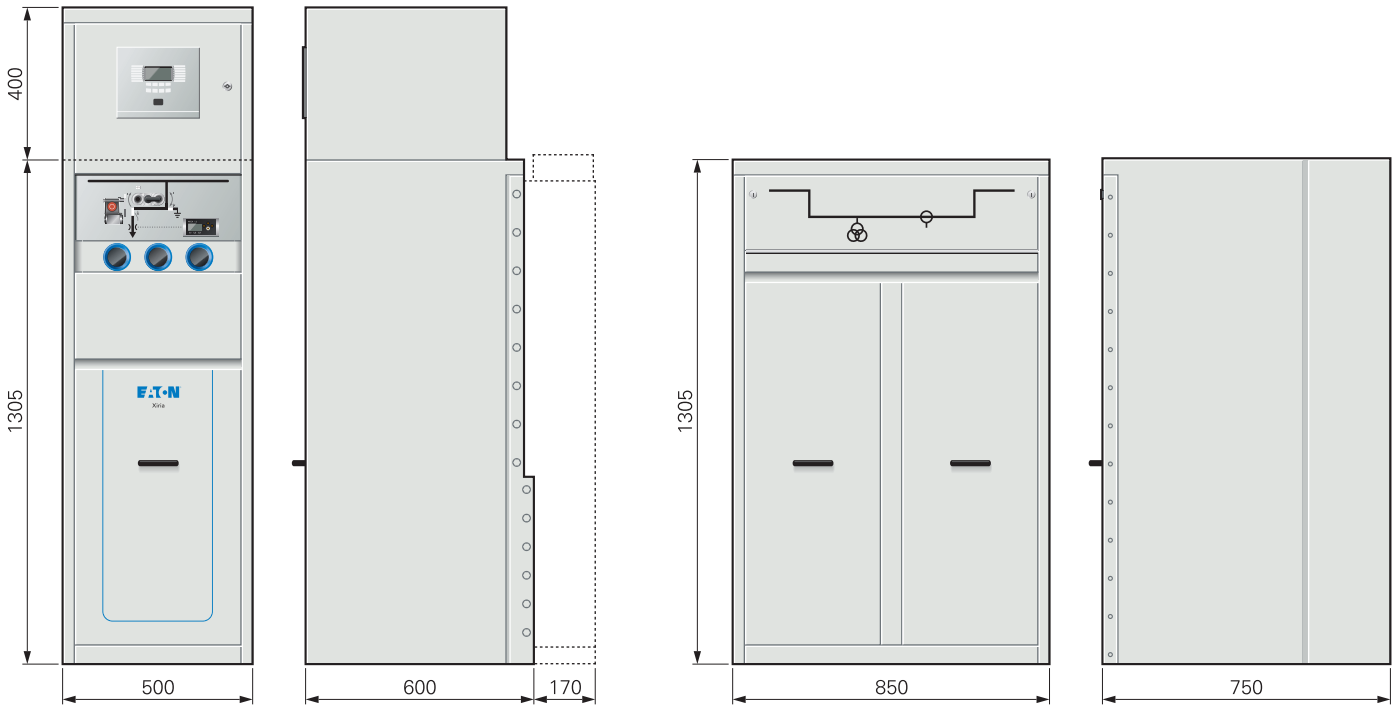
Eaton remote terminal unit (RTU).

Product Range



*) Direct busbar and busriser panel available at a later stage.

Dimensions (mm)



Circuit-breaker panel
Transformer panel
Load-break switch panel
Busriser panel
Busbar sectionaliser panel
Direct busbar panel

Metering panel

Standards

Xiria E complies with the following international standards

IEC 62271-1	Common specifications for high-voltage switchgear and control gear standards
IEC 62271-100	High-voltage alternating-current circuit-breakers
IEC 62271-102	Alternating current disconnectors and earthing switches
IEC 62271-103	High-voltage switches
IEC 62271-200	A.C. metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV
IEC 62271-304	Additional requirements for enclosed switchgear and control gear from 1 kV to 72.5 kV to be used in severe climatic conditions
IEC 60529	Degrees of protection provided by enclosures
IEC 60044-1	Instrument transformers - Part 1: Current transformers
IEC 60044-2	Instrument transformers - Part 2: Inductive voltage transformers
EN 50181	Plug-in type bushings above 1 kV up to 36 kV
ISO 9001-2000	Quality
ISO 14001	Environmental management

General		3.6 kV	7.2 kV	12 kV	17.5 kV	24 kV
Rated voltage	kV	3.6	7.2	12	17.5	24
Impulse withstand voltage	kV	40	60	75 / 95	95	125
Power frequency withstand voltage	kV-1m	10	20	28 / 38 / 42	38	50
Rated frequency	Hz	50/60	50/60	50/60	50/60	50/60
Loss of service continuity		LSC2	LSC2	LSC2	LSC2	LSC2
Partition class		PM	PM	PM	PM	PM
Internal Arc Classification (IAC)		AFLR	AFLR	AFLR	AFLR	AFLR
Internal arc resistance	kA - s	20 - 1	20 - 1	20 - 1	20 - 1	20 - 1
Internal arc resistance with absorber	kA - s	16 - 1	16 - 1	16 - 1	16 - 1	16 - 1
Internal arc resistance cable compartment	kA - s	16 - 1	16 - 1	16 - 1	16 - 1	16 - 1
Internal arc resistance cable comp. alternative	kA - s	20 - 1	20 - 1	20 - 1	20 - 1	20 - 1
Degree of protection in service		IP3X	IP3X	IP3X	IP3X	IP3X
Degree of protection with doors/covers open		IP2X	IP2X	IP2X	IP2X	IP2X
Ambient air temperature range	°C	-25 +40	-25 +40	-25 +40	-25 +40	-25 +40
Busbar system						
Rated normal current	A	630	630	630	630	630
Rated short-time withstand current	kA - s	20 - 1	20 - 1	20 - 1	20 - 1	20 - 1
Rated short time withstand current alternative	kA - s	20 - 3	20 - 3	20 - 3	20 - 3	20 - 3
Rated peak withstand current	kA	50	50	50	50	50
Load break switches						
Rated normal current	A	630	630	630	630	630
Rated active load break current	A	630	630	630	630	630
Rated short-circuit making current	kA	50	50	50	50	50
Rated short-time withstand current	kA - s	20 - 1	20 - 1	20 - 1	20 - 1	20 - 1
Rated short-time withstand current alternative	kA - s	20 - 3	20 - 3	20 - 3	20 - 3	20 - 3
Rated Cable Charging Breaking Current	A	31.5	31.5	31.5	31.5	31.5
Mechanical Endurance Class		M2 10,000x	M2 10,000x	M2 10,000x	M2 10,000x	M2 10,000x
Mechanical Endurance Class as Earth Switch		M0	M0	M0	M0	M0
Mechanical Endurance Class Disconnector		M0	M0	M0	M0	M0
Electrical Endurance Class		E3	E3	E3	E3	E3
Electrical Endurance Class as Earth Switch		E2	E2	E2	E2	E2
Circuit-breakers						
Rated normal current	A	630	630	630	630	630
Rated breaking current	kA	20	20	20	20	20
Rated short-circuit making current	kA	50	50	50	50	50
Rated Capacitive Switching Current Class		C2	C2	C2	C2	C2
Rated Cable Charging Breaking Current	A	31.5	31.5	31.5	31.5	31.5
DC Time Constant	msec	45	45	45	45	45
DC Component	%	<20	<20	<20	<20	<20
Mechanical Endurance Class		M2 10,000x	M2 10,000x	M2 10,000x	M2 10,000x	M2 10,000x
Mechanical Endurance Class as Earth Switch		M1	M1	M1	M1	M1
Mechanical Endurance Class Disconnector		M0	M0	M0	M0	M0
Electrical Endurance Class		E2	E2	E2	E2	E2
Rated short-time withstand current	kA - s	20 - 1	20 - 1	20 - 1	20 - 1	20 - 1
Rated short-time withstand current alternative	kA - s	20 - 3	20 - 3	20 - 3	20 - 3	20 - 3
Minimum tripping time	msec	80	80	80	80	80
Mechanism type		O - 3 min - CO - 3 min - CO				
Fused load-break switch						
Rated normal current	A	60	60	60	60	36
Fuses in accordance with IEC 60282-1	kV	10/12	10/12	12	20/24	24

Standards

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IEC 62271-304	Additional requirements for enclosed switchgear and control gear from 1 kV to 72.5 kV to be used in severe climatic conditions
IEC 61869-1	Instrument transformers - Part 1: General requirements
IEC 61869-2	Instrument transformers - Part 2: Additional requirements for current transformers
IEC 61869-3	Instrument transformers - Part 3: Additional requirements inductive voltage transformers
IEC 60529	Degrees of protection provided by enclosures
EN 50181	Plug-in type bushings above 1 kV up to 36 kV

ISO 9001	Quality
ISO 14001	Environmental management
ISO 50001	Energy management

Powering Business Worldwide

Eaton Industries (Netherlands) B.V.
P.O. Box 23
7550 AA Hengelo
The Netherlands
Tel.: +31 (0)74 - 246 40 10
Fax: +31 (0)74 - 246 40 25
info.electric@eaton.com
www.eaton.com

Product brochure
IEC medium-voltage switchgear up to 24 kV - 1250 A - 25 kA

Xiria NGX

Make the switch to natural air

Powering Business Worldwide

Powering business worldwide

Medium-voltage switchgear up to 24 kV - 1250 A - 25 kA

Modular, compact, single panel, Air-GIS based on proven technology for high-end secondary switchgear in distribution substations, commercial and industrial applications

Utility

Industry

Infrastructure

Data center

Commercial & Institutional

Power generation

Xiria NGX: Eaton's new modular switchgear for high-end secondary applications in distribution grids. A medium-voltage switchgear platform uniquely combines up to 24 kV - 1250 A - 25 kA ratings with safe, reliable, natural air technology without overpressure

Maximized uptime, optimized safety, and high energy capabilities are increasingly important for asset managers with power distribution responsibilities.

Eaton's IEC-certified, medium-voltage Xiria NGX switchgear of up to 1250 A busbar and 25 kA short circuit level meets these challenges by building on proven Xiria 630 A / 21 kA technology that served the market for more than 20 years. It uses clean and reliable natural air-GIS requiring no overpressure in a safe, sealed-for-life, IP65 stainless steel welded tank that fully retains its dielectric properties. Combining this with its uniquely high rating capabilities for natural air-only switchgear, Xiria NGX is the ideal 'fit and forget' choice. That's whether upgrading old infrastructure to strengthen or expand existing networks or ensuring safe, dependable power distribution in new ones.

Respected industry testing of Xiria applications in harsh conditions shows its high quality and low maintenance requirements mean asset owners can be assured of the minimized total cost of ownership (TCO) over a product lifetime of more than 40 years. A compact Xiria NGX footprint based on 500 mm panels makes the most of a valuable floor space. Critically, NGX also offers the flexibility valued by many network managers – for example, those starting with a 12 kV grid before making a later move to 24 kV.

Other key features of the simple-to-operate Xiria NGX, that's IEC-certified by KEMA laboratories, include the highest classifications for safety and uptime – IAC AFL(R) and LSC2, respectively. Its modular design enables easy upgrades with CTs, VTs, and motorized operation. Incorporating unique status visibility windows, NGX is one of few switchgear platforms currently offering motorized remote control for both the circuit breaker and disconnector. Smart switchgear solutions built around current and voltage sensors and a comprehensive set of additional options are also available.

A complete range featuring circuit breaker panels up to 1250 A, sectionalizer/riser, and metering panels, Eaton's next-level Xiria NGX changes the game for flexible, medium-voltage switchgear. It meets the high energy, minimized TCO and planet-friendly requirements now top of the power distribution agenda.

We know today's power grid needs

Since its launch in 2002, Eaton has successfully sold Xiria 630 systems for RMU and secondary applications. This product family has grown to a complete and diverse portfolio of extendable panels with a 630 A busbar at 21 kA-3 s short circuit rating.

Xiria NGX is Eaton's next-level product family for medium-voltage secondary applications with higher specifications (1250 A busbar at 25 kA-3 s short circuit rating). It is based on the same proven sustainable technology and extensive Xiria 630 experience.

Xiria 630 (block) | Xiria 630 (extendable) | Xiria NGX

The Xiria NGX range comprises single extendable compact circuit breaker panels, including metering and sectionalizer. Compact in design, available in any panel combination or sequence, enabling easy installation in small switch rooms or prefabricated substations. It is even possible to deliver sections of a maximum of five panels, pre-assembled and coupled in the factory to reduce the installation time at the site.

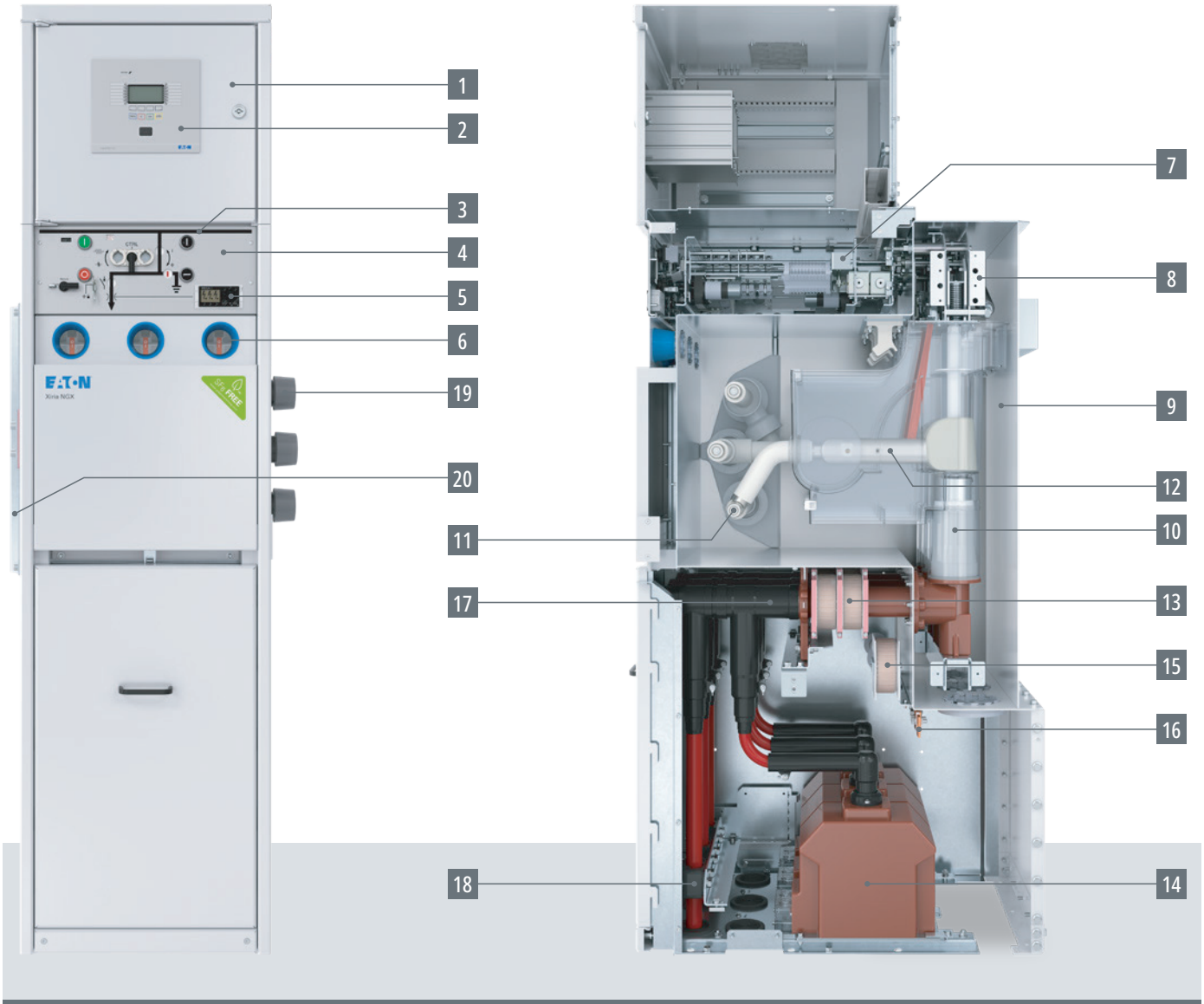
It offers features in line with market needs, like OCO (auto reclose), cable backside connection and motorized disconnector operation. Flexible solutions are available for internal arc exhaust: directly into the cable cellar, outside the switch room via arc channel/wall flange or inside the switch room via arc chimney with integrated arc absorbers.

By adding the Xiria NGX, Eaton can offer Xiria technology for multiple levels based on the same and proven key technologies. The table below is an overview of the ratings and features of both platforms.

Platform (*)	Xiria 630	Xiria NGX
Panels	Single extendable Block versions up to 5 panels, extendable	Single extendable, with option to deliver switchboard sections up to 5 panels from factory
Voltage rating	Up to 24 kV	Up to 24 kV
Short circuit rating	Up to 21 kA - 3 s	Up to 25 kA - 3 s
Main busbar rating	630 A	1250 A
Tank concept	Mild steel powder coating, filled with natural air	Stainless steel welded tank, filled with natural air
Cable connection	Front side	Front side and back side connection (top and bottom)
Circuit breaker panels	200 A / 630 A	630 A / 1250 A
Load break panels	630 A	Not available
Switching routine	O - 3 min - CO - 3 min - CO	O - 0,3 s - CO - 1 min - CO
Spring charging mechanism VCB	Manual charge (standard) / motorized (option)	Manual & motorized (standard)
Operation disconnector	Manual (standard) / motorized (option)	Manual (standard) / motorized (option)

(*) Note that both platforms are not extendable with each other.

Xiria NGX design



Circuit breaker panel (example)

1. Low-voltage compartment (400 / 600 mm high)
2. Protection relay
3. Mimic diagram
4. Control panel with operation of the circuit breaker and change-over switch
5. Voltage detection system
6. Inspection window
7. Exchangeable front operation module
8. Spring charging mechanism
9. Stainless steel tank
10. Vacuum interrupter
11. Busbar
12. Change-over switch
13. Current transformers
14. Voltage transformers
15. Coil and resistor for protection against ferroresonance
16. Earth bar
17. Cable cones
18. Cable clamps
19. Connection cones for simple coupling and extension
20. Standard end cover

Eaton's core technologies

Transitioning to more sustainable energy means additional power demand, pushing the grid to its limits and significantly challenging its stability, security, and reliability. Improvements have been made in secondary distribution switchgear to increase their functionality and features and make them more reliable, flexible, compact, and low maintenance.

Eaton's medium-voltage Xiria NGX switchgear of up to 1250 A busbar and 25 kA short circuit level now delivers against these challenges by building on Eaton's core technologies.

Proven industry-leading technology

Eaton has more than 80 years long expertise in switchgear design and innovation, using Eaton's core technologies: solid insulation, electrical field control, and vacuum technology.

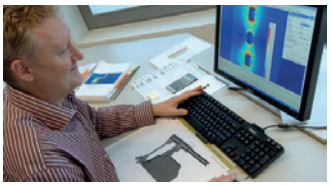
These technologies have been proven in the field time and again, as they are at the heart of the Xiria switchgear product family. Xiria 630 has an installed base of over 150,000 panels, catering to a wide range of applications for over 20 years.

Xiria NGX brings the proven Xiria technology to the next level with higher specifications (1250 A busbar application with 25 kA - 3 s short circuit ratings) and a sealed-for-life tank without overpressure.

Solid insulation

Years of experience designing and manufacturing insulation materials have taught us to construct smart single-phase insulated constructions. Using polycarbonate and thermoplastic elastomer (TPE) as high-quality primary insulation materials around live parts lets us shape the parts specifically for optimal insulation, robust construction, and cooling. Xiria NGX utilizes optimal field control through the special design of all primary components.

Electrical field control



With conventional shapes for primary busbars and conductors, the electrical field between the phases and between phase and earth is non-uniformly distributed. In areas with a high field, partial breakthrough can initiate avalanches resulting in flashovers.

In-depth knowledge about breakthrough phenomena and field steering techniques enables us to prevent flash over completely. The result is a particularly compact design.

Vacuum technology

Eaton vacuum interrupters consist of a ceramic cylinder housing a fixed and movable contact. The below facilitates contact movement under vacuum conditions. A shield surrounding the contacts prevents the insulators from becoming contaminated by metal vapor produced during the current interruption. This shield also ensures good potential distribution over the insulator.

A typical feature of Eaton vacuum interrupters is their low arc voltage and short arc times, resulting in an overall low arc energy. Contacts wear in a vacuum interrupter are, therefore, virtually negligible. Vacuum interrupters are maintenance-free and are certified for up to 30,000 operation cycles. They can withstand up to 100 short-circuit interruptions.

Air-GIS technology, natural air without overpressure as insulation medium

Xiria NGX is based on Air-GIS technology, using non-pressurized natural air as an insulation medium inside switchgear, reducing complexity and maintenance requirements and minimizing the risk of breakdowns and discharge. This means increased reliability, operational efficiency, and ensuring a safer environment by eliminating the potential hazards associated with high-pressure systems.

As a result, Eaton offers effective, streamlined and compact medium-voltage switchgear solutions prioritizing safety, performance, and longevity.

Features and benefits

Integrating Eaton's proven core technologies into the Xiria NGX ensures it is a compact, safe and reliable solution. Designed as a user and environment-friendly product throughout the whole chain from design to dismantling, Xiria NGX's features are constructed so that the costs for the owner are as low as possible, with no concessions to its quality during its lifetime of more than 40 years.

Environment and user-friendly design

- Air-GIS (switching in vacuum and natural air without overpressure in the tank for insulation)
- Environmental-friendly design for materials used (ROHS compliant)
- Only reusable and recyclable materials used
- Clear and straight-forward operation panels
- Easy and ergonomic cable connection and access
- Flexible solutions for bottom and top entry cable connections
- Ability to change cable cones while maintaining a sealed tank
- Coupling/extension of panels or switchboard sections via simple connection cones

Safe and reliable in use and operation

- Visible isolation using inspection windows in the front
- Logical mechanical and electrical interlocking prevents malfunctioning
- Fully IEC type-tested design by KEMA laboratories
- Internal arc type-tested solutions AFL(R) for exhaust in and outside the switch room
- Single pole insulated primary parts (applying phase houses for phase separation)
- Suitable for full remote operation and control
- Natural air in the tank without the need for overpressure guarantees dielectric properties
- Auto-reclosing function (OCO mechanism)

Low total cost of ownership (TCO)

Low initial costs

- Compact 500 mm wide panels up to 1250 A - 24 kV
- 12 kV and 24 kV panels in the same housing
- Cable connection from the front enabling wall standing arrangement
- Compact solution for cable back-side connection
- Reduced number of couplings at site due to option to deliver switchboard sections up to 5 panels, pre-assembled and coupled in the factory
- Compact solution to integrate busbar voltage measuring inside sectionalizer and riser panel

Minimized maintenance costs – fit and forget solution

- Primary parts and mechanism protected in welded sealed-for-life stainless steel tank (IP65)
- Maintenance-free vacuum circuit breaker
- Robust design with a minimum number of parts (routine tested in the factory)
- No pressure checks (GIS tank concept with natural air without overpressure)

Minimizing downtime

- Using proven technologies
- The highest degree of service continuity LSC2
- Preventing arc incidents with single-phase insulation
- Easy electrical upgrade of panel control via exchangeable front operation module

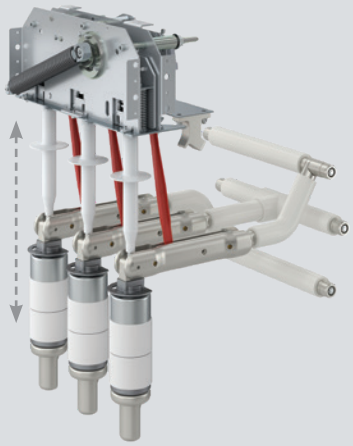
Low end-of-life disposal

- Materials are recyclable or can be re-used
- No special precautions, tools or decommissioning methods are needed

Main components

Vacuum circuit breaker

The vacuum circuit breaker uses a simple and reliable motor spring charging mechanism to operate the vacuum interrupters. The mechanism contains a low number of moving parts and makes no use of lubricants. It is completely housed in a sealed-for-life stainless steel welded tank and, therefore, needs no maintenance.

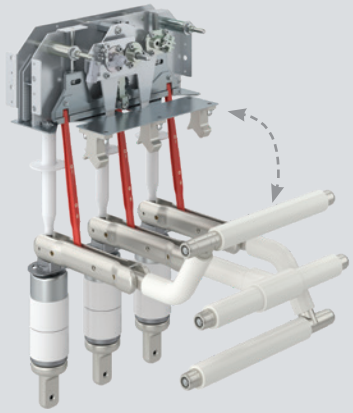


Features

- With environmentally friendly vacuum interrupters
- Simple spring charging mechanism
- Suitable for auto-reclosing (OCO mechanism)
- Housed in a sealed-for-life stainless steel tank
- Maintenance-free and no use of lubricants
- Manual and motor-operated
- Maintenance-free and tested up to 10,000 operations
- Free auxiliary contacts for open/closed positions (up to 5 NO + 5 NC)
- Inspection windows and mechanical indicators for position indication
- Integrated local/remote switch to allow the operator to take control of the switching

2-position change-over switch (disconnector)

All panels have a change-over switch in the same sealed-for-life tank as the circuit breaker. The change-over switch consists of three shafts connected to the tank's main busbars or earthing points. The operation of the change-over switch is mechanically interlocked with the circuit breaker. Only when the breaker is open it is possible to change the change-over position.

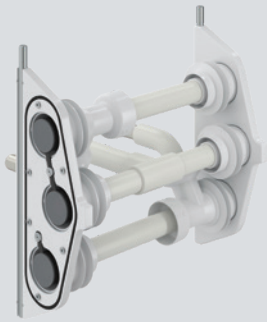


Features

- Manual-operated change-over switch with two positions (busbar / earth contact)
- Mechanically interlocked with the vacuum circuit breaker
- Option for the motorized operation of the change-over
- Maintenance-free and tested for 2,000 operations
- Housed in a stainless steel sealed-for-life tank
- Free auxiliary contacts for open/closed positions (up to 3 NO + 3 NC)
- Inspection windows and mechanical indicators for position indication

Main and vertical busbars

The main busbars are housed in the same sealed-for-life tank as the circuit breaker and change-over switch. Busbars are positioned outside the phase house. Via a vertical busbar, they connect to the disconnector mechanism inside the phase houses. All busbars are single-phase insulated with thermoplastic elastomers (TPE) to prevent a possible internal arc.

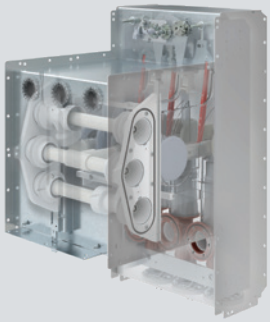


Features

- Copper main busbars, single phase insulated with thermoplastic elastomers (TPE)
- Natural air insulation between the busbars
- Simple and robust construction
- Housed in a stainless steel sealed-for-life tank
- Easy to couple via straightforward connection cones

Stainless steel tank

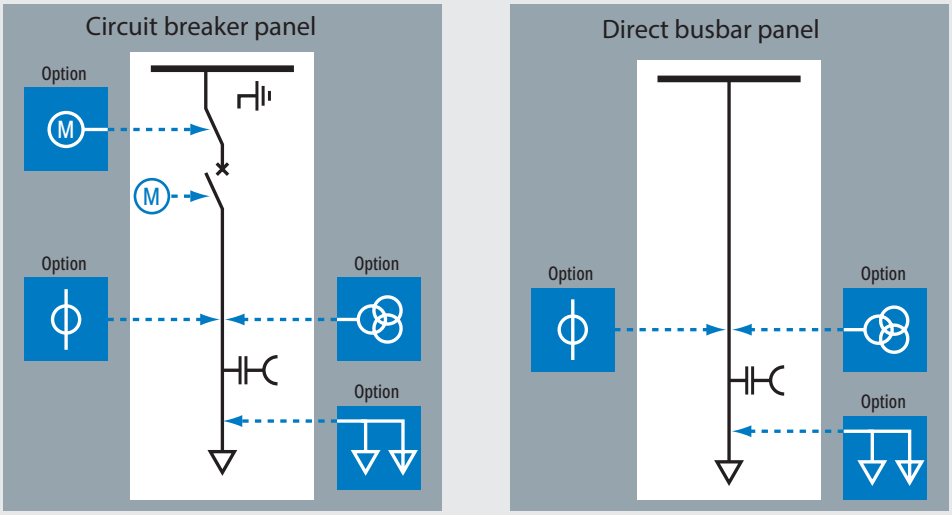
A sealed-for-life stainless steel welded tank with constant atmospheric conditions ensures high reliability and personnel safety. Primary parts and spring charging mechanism inside the tank are protected and maintenance-free.

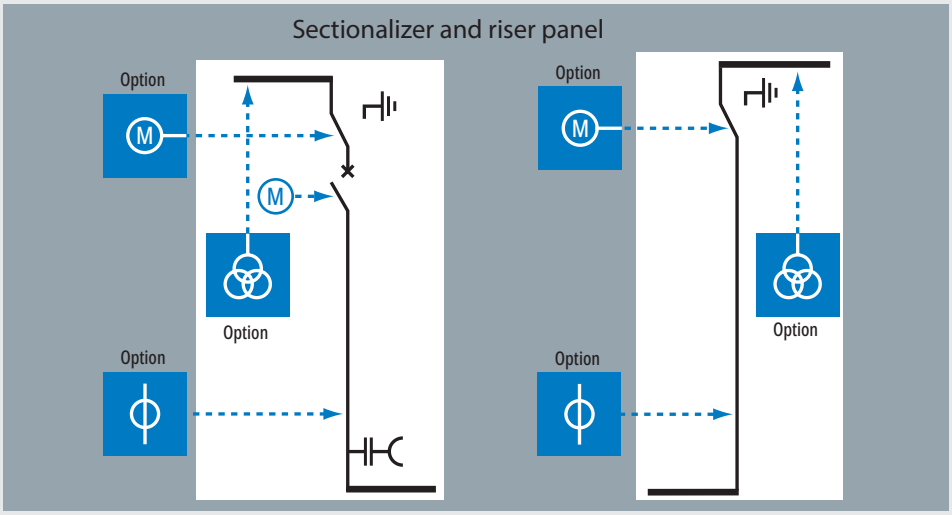


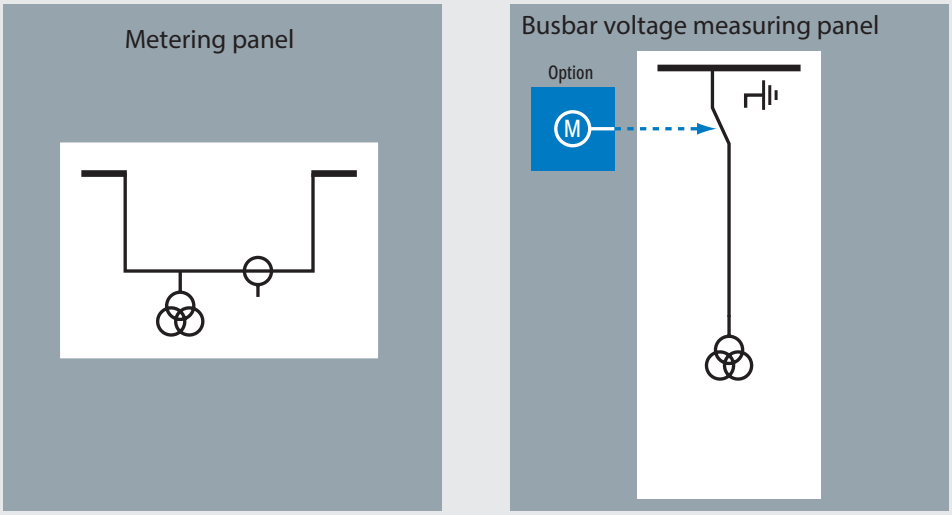
Features

- Welded stainless steel design
- Ingress protection of IP65
- Parts inside the tank are fully protected against environmental conditions
- Maintenance-free

Panel types and options



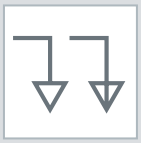





Circuit breaker


Change-over switch

Motor operation


Second or third cable


Capacitive voltage detection system


Voltage transformer


Current transformer

Technical data

General		3.6 kV	7.2 kV	12 kV	17.5 kV	24 kV
Rated voltage	kV	3.6	7.2	12	17.5	24
Impulse withstand voltage	kV	40	60	75 / 95	95	125
Power frequency withstand voltage	kV-1m	10	20	28 / 38 / 42	38	50
Rated frequency	Hz	50 / 60 (*)	50 / 60 (*)	50 / 60 (*)	50 / 60 (*)	50 / 60 (*)
Loss of service continuity		LSC2	LSC2	LSC2	LSC2	LSC2
Partition class		PM	PM	PM	PM	PM
Internal arc classification (IAC)		AFL(R)	AFL(R)	AFL(R)	AFL(R)	AFL(R)
Internal arc resistance (AFLR)	kA - s	25 - 1	25 - 1	25 - 1	25 - 1	25 - 1
Internal arc resistance with absorber (AFL)	kA - s	25 - 1	25 - 1	25 - 1	25 - 1	25 - 1
Degree of protection enclosure/control panel		IP3XD / IP2X (**)	IP3XD / IP2X (**)	IP3XD / IP2X (**)	IP3XD / IP2X (**)	IP3XD / IP2X (**)
Degree of protection with doors/covers open		IP2X	IP2X	IP2X	IP2X	IP2X
Ambient air temperature range	°C	-5...+40	-5...+40	-5...+40	-5...+40	-5...+40

Busbar system						
Rated normal current	A	1250	1250	1250	1250	1250
Rated short time withstand current	kA - s	25 - 3	25 - 3	25 - 3	25 - 3	25 - 3
Rated peak withstand current	kA	63	63	63	63	63

Circuit breakers						
Rated normal current	A	630 / 1250	630 / 1250	630 / 1250	630 / 1250	630 / 1250
Rated breaking current	kA	25	25	25	25	25
Rated short-circuit making current	kA	63	63	63	63	63
Rated capacitive switching current class		C2	C2	C2	C2	C2
Rated cable charging breaking current	A	31.5	31.5	31.5	31.5	31.5
DC Time Constant	msec	45	45	45	45	45
DC Component	%	<35	<35	<35	<35	<35
Mechanical endurance class circuit breaker		M1 / M2 (*)	M1 / M2 (*)	M1 / M2 (*)	M1 / M2 (*)	M1 / M2 (*)
Mechanical endurance class as earth switch		M1	M1	M1	M1	M1
Mechanical endurance class disconnector		M1	M1	M1	M1	M1
Electrical endurance class		E2	E2	E2	E2	E2
Rated short time withstand current	kA - s	25 - 3	25 - 3	25 - 3	25 - 3	25 - 3
Minimum tripping time	msec	38	38	38	38	38
Mechanism type				O - 0,3 s - CO - 1 min - CO		

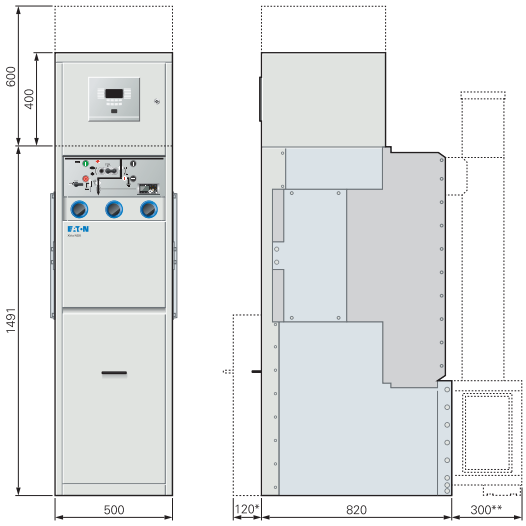
(*) Check availability
(**) Optional IP3XD

IEC standards / ISO norms

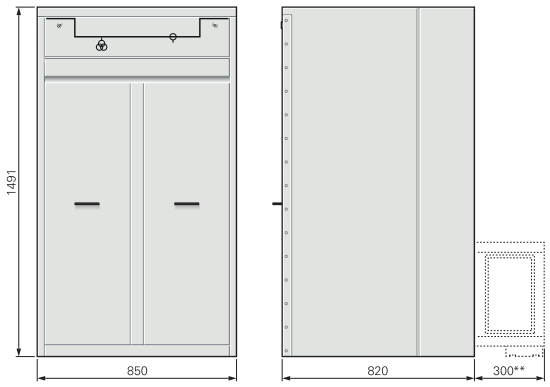
Xiria NGX complies with the following international standards.

Xiria NGX complies with the following international standards	
IEC 62271-1	Common specifications for high-voltage switchgear and control gear standards
IEC 62271-100	High-voltage alternating-current circuit breakers
IEC 62271-102	Alternating current disconnectors and earthing switches
IEC 62271-200	A.C. metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV
IEC 62271-213	Voltage detection and indication system
IEC 61869-1	Instrument transformers - Part 1: General requirements
IEC 61869-2	Instrument transformers - Part 2: Additional requirements for current transformers
IEC 61869-3	Instrument transformers - Part 3: Additional requirements inductive voltage transformers
IEC 60529	Degrees of protection provided by enclosures
EN 50181	Plug-in type bushings above 1 kV up to 36 kV
ISO 9001	Quality management system
ISO 14001	Environmental management

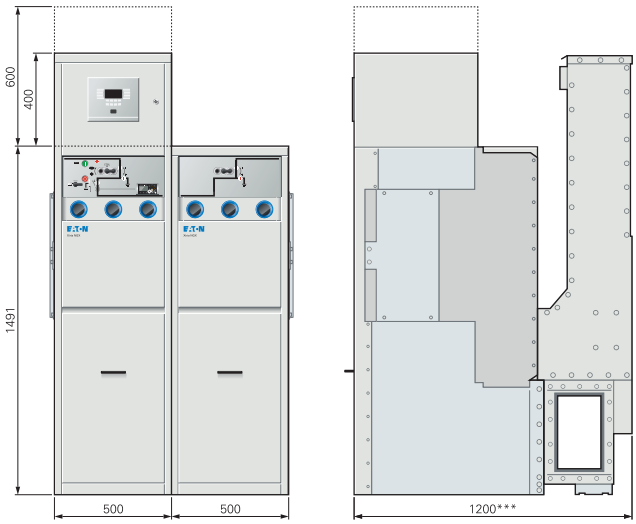
Dimensions (mm)



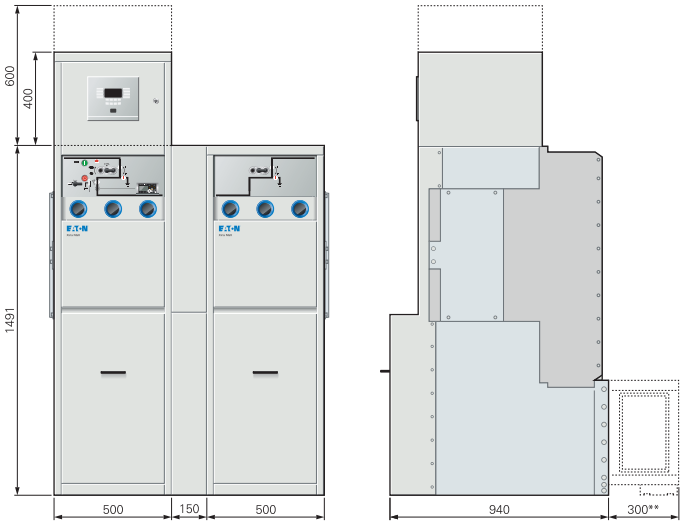
- Circuit breaker panel
- Direct busbar panel
- Busbar voltage measuring panel



- Metering panel



- Sectionalizer/riser with fixed rear connection (****)
  Option for integration voltage transformers



- Sectionalizer/riser with front side cable connection

(*) With extended base frame

(**) With optional arc channel or arc chimney with integrated arc absorbers (protection screen not shown)

(***) Including chimney for natural cooling

(****) Check availability

Power Xpert UX
High-voltage switchgear system

Maximizing performance and safety

Powering Business Worldwide

A high-performance solution for high-voltage power distribution

Eaton's Power Xpert UX™ IEC high-voltage switchgear system is designed for your most critical applications. At Eaton, our focus is to develop the latest in power distribution and protection technologies to optimize the performance of your installation, while keeping your personnel and equipment safe. With over 90 years of experience in high-voltage switching and vacuum technology, Eaton is best placed to provide the right equipment for the most demanding applications.

The Power Xpert UX high-voltage switchgear system showcases Eaton's heritage of expertise, industry-leading component technology and power distribution system design. This feature-rich platform ensures minimum process interruptions and delivers increased reliability and safety.

Power Xpert UX is a fully scalable system, enabling you to create an optimized high-voltage switchgear solution with fully IEC type tested ratings up to 50kA/4000A.

A truly global platform, the Power Xpert UX switchgear system is designed according to the latest IEC standards and fully supported from our manufacturing facilities around the world. Eaton's delivery model has the ability to meet your most challenging project requirements. The model allows you to standardize on a single global platform, increasing consistency and reliability of engineering and project delivery, while systematically reducing your initial installation and operating expenses.

Best-in-class testing

No matter where the system is produced around the world, the same rigorous testing is provided as standard. You can count on Eaton's commitment to quality, beginning in the design phase with full 3rd party type testing to all relevant IEC standards, right through to factory and on site acceptance testing. In addition to compliance to ISO 9001, all manufacturing locations must adhere to Eaton's quality system to ensure the highest quality standards are delivered.

Basic design

The construction of Power Xpert UX is modular by design. It is custom built to meet your project specific application parameters and has a broad set of features that can be tailored to meet your performance, reliability and safety requirements. The design draws on Eaton's extensive experience in insulation technologies, combining cast resin insulation and fully insulated busbar systems.

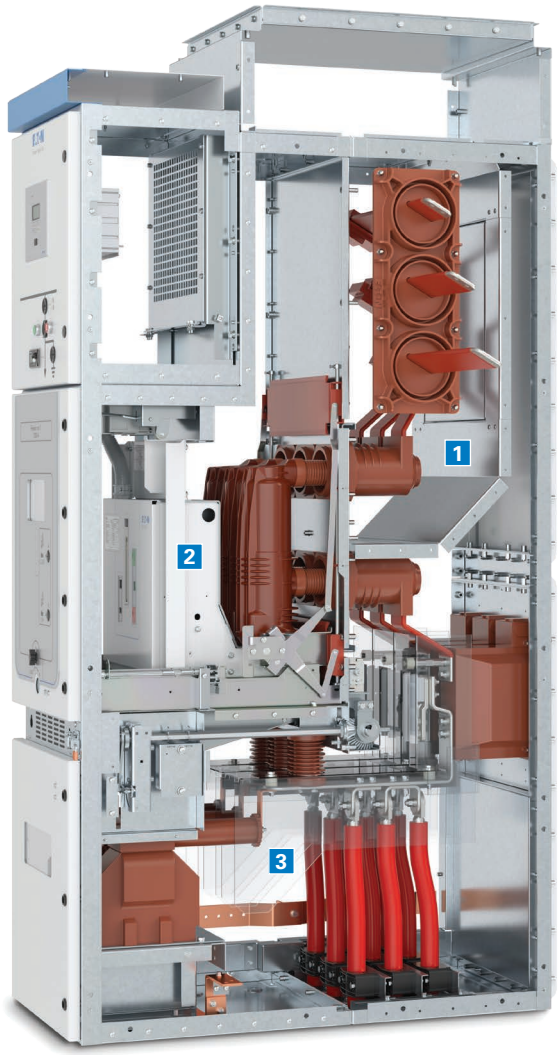
The Power Xpert UX platform has three high-voltage compartments separated by earthed metal barriers, providing the highest loss of service continuity classification LSC2B and partition class PM:

1. The busbar compartment

- Pressure relief for venting into the arc channel
- Busbars are fully insulated along their entire length
- Segregation of busbars per panel or number of panels

2. The switching device compartment

- Pressure relief for venting into the arc channel
- Test position included for full functional testing of the switching device without connection to primary power
- Includes all the safety interlocking mechanisms required for safe and reliable operation
- Houses SF_6 free switching devices using cast resin solid insulation technologies to ensure complete segregation and isolation between phases and between phases and earth
- Optional remote racking and operation of the withdrawable switching devices



3. The cable compartment

- Pressure relief for venting into the arc channel
- Connection for up to 9 cables per phase
- Provision for connection of primary cables from the front side
- Multiple sets of current transformers per phase
- Fixed/removable or fully withdrawable voltage transformers
- Houses the fixed integral fault making earthing switch, manually operated from the front side
- Optional remote operation of the earthing switch

Pressure relief solutions are available for venting gases either inside or outside of the electrical switch room and can be configured with full or low height arc channels to match your switch room parameters.

The Power Xpert UX is designed for maximum flexibility with switchboards capable of being positioned back to wall, front to front or back to back.

Whatever the **needs** of your application
Power Xpert UX can provide a **solution**

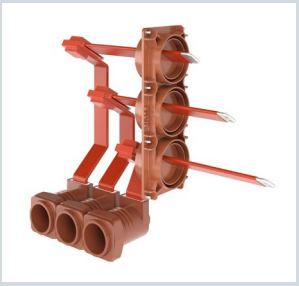
Leading with safety innovation

With proven technologies that offer best-in-class operation and maintenance, our Power Xpert UX system is designed with safety in mind.

Eaton's expertise in switchgear innovation, including cast-resin, vacuum circuit breaker and contactor technologies, arc interruption and electrical field control have been integrated into the design and development of Power Xpert UX. This ensures that the switchgear has the highest levels of safety and operational reliability at all times.

Arc free zones

Fully insulated and isolated current paths reduce the potential for internal faults through the creation of arc free zones.



Fully insulated busbar system.

Internal arc classification (IAC) AFLR up to 50kA for 1 second

In the unlikely event of an internal arc fault, the metal enclosed design and robust construction enables the Power Xpert UX system to successfully pass internal arcing tests in accordance with IEC 62271-200. This standard defines the required level of protection in the event of an internal arc fault, in all three primary compartments up to 50kA for 1 second.

The system has been proven by independent 3rd-party testing to provide an internal arc classification (IAC) of AFLR.

A = Protection for personnel

F = Protection at the front

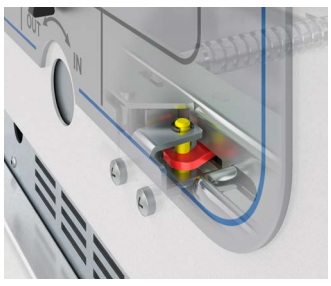
L = Protection at the sides

R = Protection at the rear

Safety and reliability through accessibility of compartments

Ensuring safety of personnel whether through operation or under maintenance is essential. Restricting access to high-voltage compartments is achieved through design. Power Xpert UX has the following accessibility definitions according to IEC62271-200:

- Busbar compartment: Tool-based / non-accessible
- Switching device compartment: Interlock controlled
- Cable compartment: Tool-based or option for interlock controlled



Interlock controlled access to the switching device compartment.

Interlock controlled access to the cable compartment.

Racking behind closed doors

To maximize operator safety Power Xpert UX enables operation of the withdrawable switching device from test to service and back to the test position, all behind closed doors. This ensures full internal arc containment at all times during operation.

Racking behind closed door.

Remote operation

For additional safety, full remote operation of the switchboard is possible without the need to enter the switch room. Operational safety and automation can be further enhanced by including the remote racking option for withdrawable switching devices and the option for remote operation of the integral earthing switches.

Full remote operation.

Continuous 24/7 temperature monitoring

Increased protection through permanently installed self-powered, non-contact infrared sensors that continuously monitor the thermal condition of joints and cable connections. The monitoring system enables detection of hotspots at an early stage of development and provides valuable maintenance data to prevent potential downtime.

Safety interlocks

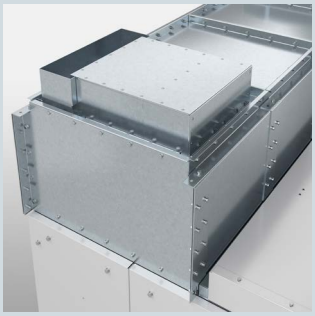
For personnel safety, the Power Xpert UX system is designed with a number of comprehensive mechanical interlocks according to IEC62271-200 for safe and reliable operation of the switchgear.

- It is not possible to rack-in or rack-out a switching device unless it is in the Off position
- It is not possible to rack-in a switching device to the Service position with the earthing switch in the Closed position
- It is not possible to close a switching device unless the device is in the Service or Test position
- The secondary socket can only be disconnected with the switching device in the Test position
- It is not possible to close the earthing switch when the switching device is in the Service position
- The door of the switching device compartment can only be opened with the switching device in the Test position
- It is only possible to rack-in or rack-out the switching device when the switching device compartment door is closed
- The cable compartment door can only be opened when the earthing switch is in the Closed position
- The earthing switch cannot be opened when the cable compartment door is open

Racking mechanism interlock.

Additional safety features

- Additional electrical or mechanical key interlocks are available to secure safe and reliable operation for busbar earthing and up or downstream interlocking
- Option for full remote control of the switchgear including racking and operation of withdrawable switching devices and remote operation of integral earthing switches
- Busbar earthing options including fixed integral solutions and withdrawable earthing devices
- Optional integrated arc absorber technology used for cooling gasses as a result of an internal fault to vent inside the switch room in a safe manner
- Design focused on single-pole insulation of phases to avoid or minimize the chances of an internal fault
- Rated partition class PM with earthed metal partitions or shutters between sections and compartments



Integrated arc absorber technology.

Partition class PM - opening of metal shutters.

Maximum uptime with minimal maintenance

To maximize uptime and minimize maintenance typical switchgear failure points were analyzed and addressed. Eaton designed the Power Xpert UX system to focus on enhanced reliability and reduced maintenance.

Features

Highest loss of service continuity classification (LSC2B)

Safety of personnel is critical, including during installation and maintenance. The ability to work on an installation without switching off the power to maximize uptime is defined as "Loss of Service Continuity" (LSC). It describes the extent to which the switchgear and control gear are allowed to remain operational in case access to a main circuit compartment is necessary. The Power Xpert UX has the highest classification, LSC2B, as standard. This rating indicates that it is safe to open the switching device compartment when the cables and busbars are energized.

Fully insulated and isolated design

Power Xpert UX utilizes insulating medium throughout the high-voltage current path to create and ensure arc free zones. This increases the lifetime reliability of the system as well as to ensure a safer environment under maintenance.

SF_6-free design

The combination of vacuum interrupters for switching, cast-resin technology and clean air as the isolation medium ensures that the Power Xpert UX is an environmental friendly system. Without SF_6 gas, plant maintenance and operation is simplified and costly administration, SF_6 gas management and end of life disposal costs are minimized.

Vacuum circuit breaker technology

By designing a simple and efficient low energy spring charged mechanism with the minimum possible number of parts, the maintenance requirements normally associated with this type of mechanism are minimized. The W-VACi breaker is virtually maintenance-free.

Vacuum contactor technology

Developed with cutting-edge technologies, Eaton's withdrawable type vacuum contactor switching devices are worldleading in terms of performance, safety and functionality. With a mechanical life up to 1,000,000 operations contactor switching devices are used in frequently operated loads and harsh environments.

Fully withdrawable voltage transformers

Fully withdrawable voltage transformers with shutters are available for safe operation under live conditions.

Busbar system

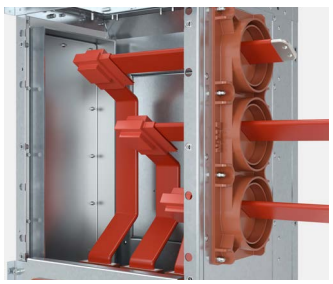
The Power Xpert UX busbar system is fully insulated along its entire length with molded supports providing segregation of the busbar chambers to adjacent panels. This ensures maximum integrity and provides a virtually maintenance-free busbar system.

Harsh environment protection

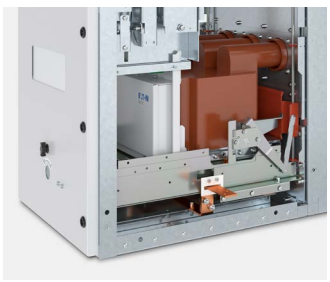
In areas where high-voltage switchgear can be exposed to harsh environments, solutions are available to avoid or minimize the impact to electrical current carrying components.

Eaton's newest range of IEC W-VACi vacuum circuit breakers are virtually maintenance-free.

Independently operated and lockable shutters allow for safe cable or busbar testing while adjacent compartments remain live.



A fully insulated busbar system provides a virtually maintenance-free system.



Fully withdrawable voltage transformers with shutters allow safe operation under live conditions with the cable compartment door closed.

Information is uptime

Switchgear failure has the potential to cause production downtime and can lead to costly repair bills and safety concerns. Effective control, protection and system diagnostics are essential to any reliable and safe network.

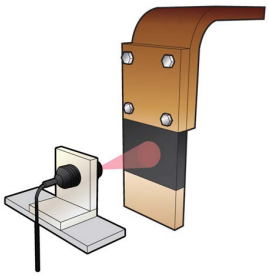
24/7 thermal monitoring system

By determining potential reliability issues before they occur, uptime can be increased through planned and preventative maintenance. Eaton has partnered with Exertherm, a world leader in continuous thermal monitoring, to provide the Power Xpert UX system with an optional continuous 24/7 temperature monitoring system. Hotspots in joints and cable connections are detected at an early stage of development via permanently installed infrared sensors.

The system provides valuable data for preventative maintenance. Based on real-time data, preventative maintenance can be scheduled to reduce unplanned downtime.

The thermal monitoring system is modular and can be scaled to any size of installation. Local or remote monitoring of the system is possible via local display or web connection.

Panel mounted alarm module connects via MODBUS to the system data cards mounted within the switchgear for local or remote alarm and data logging.

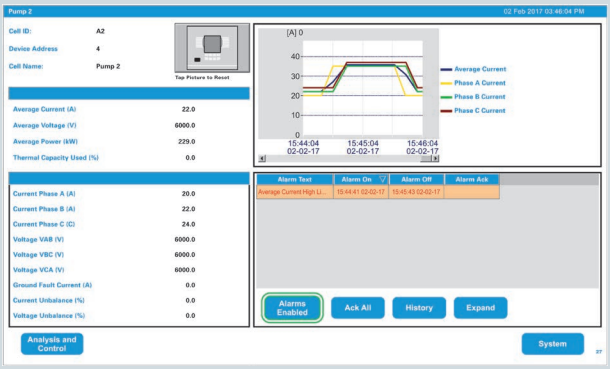


Self-powered, non-contact infrared sensor.

SmartPX downtime avoidance and maintenance system

Eaton's SmartPX™ is an advanced intelligent system for motor control and power distribution. The system provides an extensive range of protection, monitoring and control functions, either locally or via a network. It can be used in a stand-alone mode or integrated into other systems such as DCS and SCADA. The SmartPX system is capable of storing and analyzing data to streamline corrective and preventative maintenance of connected electrical equipment by learning load profiles over time and using that data to predict dangerous trends.

Modern operations require increasingly effective strategies to avoid process downtime. More and more real-time data is required to develop algorithms that monitor the system's health and predict problems. Rather than overloading the system's network with more data, the SmartPX system stores and analyzes local data and sends only relevant alarms and warnings to the upstream system, through push notifications and emails via LAN, WLAN or SMS.



SmartPX logs and trends the total power, current and voltage being used by the power distribution system and stores the data locally. SmartPX software monitors the electrical parameters of your system and detects patterns that may lead to future problems.

Flexibility in a compact footprint

Eaton understands that real estate is a valuable resource. The available space must be optimized to ensure building and land costs are minimized, without compromise to the solution design or functionality.

The footprint of Eaton's Power Xpert UX switchgear is one of the most compact of all systems available on the market. 12/17.5kV vacuum circuit breaker (VCB) panels with rated current of 630/1250A up to 31.5kA are only 600mm wide and 1320mm deep – up to 37% less floor area than similar switchgear solutions on the market.

Along with a compact footprint, the Power Xpert UX system offers flexible design options for the most demanding of applications.

Optional panel and switchgear solutions

- Fused load-break switch panels up to 24kV as an alternative for withdrawable switching devices
- 400mm wide Slimline vacuum contactor panels up to 7.2kV
- 600mm wide vacuum contactor panels up to 12kV
- Single width panel solutions with cables in/out (top/bottom, top/top)
- Back to wall installation
- Back to back, front to front and 'U' shaped configurations
- Top entry solutions for primary and secondary cables
- Bus-duct connections

Single width panel solution with cable in/out (top/bottom).

Flexibility in arc channel solutions

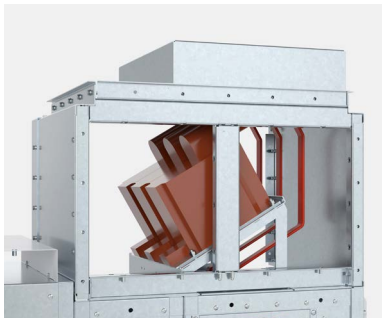
- Arc channels provided with integrated arc absorber technology for venting gases inside the switch room, without the need to exhaust to the outside
- Different heights of arc channels are available
- Flexible solutions to connect the arc channel to the wall flange (via sides, front or rear of the installation), in case of venting gases outside the switch room

Arc channel with integral arc absorber.

Low height arc channels.

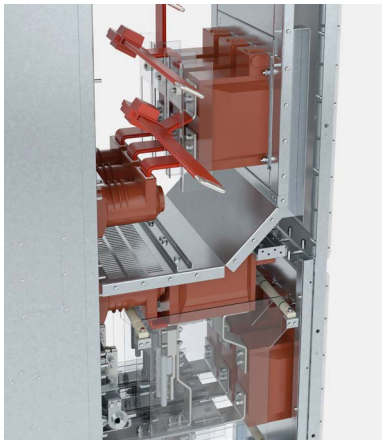
Space saving solutions

- Current and voltage transformers located in the bus riser
- Voltage transformer and integral fault-making busbar earthing combined in the bus coupler
- Top mounted voltage transformers
- Top mounted integral fault making busbar earthing
- Multiple sets of current transformers per phase
- Fixed/removable and withdrawable voltage transformers
- On board control power transformer (contactor)



Top mounted voltage transformers.

Top mounted integral fault-making busbar earthing.



Multiple sets of current transformers per phase.

Current and voltage transformers located in the bus riser.

Contact Eaton for other project specific solutions

Primary components

Eaton is one of the few global, fully integrated manufacturers of high-voltage switchgear. Utilizing core technologies of vacuum interruption and cast resin insulation, switching devices used within the Power Xpert UX switchgear have outstanding performance including:

- Optimal arc control
- Virtually maintenance-free
- High electrical endurance
- Insensitivity to environment
- SF_6 free
- Long service life

Eaton's industry leading medium voltage technology

Vacuum circuit breakers
Type W-VACi

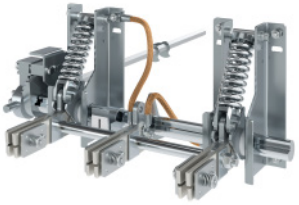
- Type tested in accordance with IEC62271-100
- 12/17.5kV up to 4000A 50kA/3sec.
- 24kV up to 2500A 31.5kA/3sec.
- Wide range of AC or DC auxiliary control voltages
- Full range of accessories
- Optional remote racking capability
- Electrical or mechanical key interlocking options

Vacuum contactors
Type W-SLC

- Tested in accordance with IEC 62271-106
- Mid-mount type
- 3.6/7.2/12kV ratings
- Contactor switching up to 400A
- Maximum fuse/contactor combination: 200A
- Breaking capacity with fuse up to 50kA
- Wide range of AC or DC auxiliary control voltages
- On-board contactor control power transformer option
- Optional remote racking capability
- Electrical or mechanical key interlocking options

Vacuum contactors
Type W-SLN

- Tested in accordance with IEC 62271-106
- Roll-on floor type
- 3.6/7.2kV ratings
- Contactor switching up to 400A
- Maximum fuse/contactor combination: 400A
- Breaking capacity with fuse up to 50kA
- Wide range of AC or DC auxiliary control voltages
- On-board contactor control power transformer option
- Suitable for integration in 400mm wide Slimline contactor panel
- Electrical or mechanical key interlocking options



Earthing switch

- Type tested in accordance with IEC62271-102
- 12/17.5kV up to 50kA/3sec. 130kA peak
- 24kV up to 31.5kA/3sec. 80kA peak
- Optional remote operating capability

Secondary equipment
for protection and control

Safe and reliable operation of any switchgear is built upon the foundation of a clear, uncomplicated control and protection system. Clarity of operation and ease of use are key fundamentals to world-class control and protection devices.

Safe, accurate protection and control

MRI4

Non-directional feeder protection

With a number of three phase protection elements, the MRI4 provides protection against overcurrent, short-circuit and earth fault. The relay is used for incoming and outgoing feeder protection or as back-up protection for differential protection systems.

MRA4

Directional feeder protection

The MRA4 is a directional protection and control relay with extensive protection functions to a variety of applications such as incoming or outgoing feeder protection, network protection and generator protection.

MCA4

Directional feeder protection

The MCA4 is a precise and reliable protection, control and monitoring relay for feeder, grid and generator applications. The hardware is designed for all nominal values in combination with protection and control functionality.

MRU4

Voltage and frequency protection

Designed to protect electrical equipment from dangerous voltage and frequency fluctuations. The MRU4 offers for example protection against under-voltages caused by mains short-circuits, or over-voltages due to load shedding or failure of a generator voltage controller.

MRM4

Motor protection

The MRM4 provides the necessary functions to protect motors. The protection functions are based on current measurement. The relay is also provided with monitoring functions such as motor start sequence, unbalance and thermal condition of the motor.

MRMV4

Motor protection with voltage measurement

Compared with the MRM4, the MRMV4 also features voltage measurement and is therefore able to monitor power, voltage and frequency.

MCDGV4

Generator differential protection

The generator differential protection relay MCDGV4 is a high precision protection for medium and high power generators. In addition to the phase and earth differential protection, the device provides a variety of generator specific protection functions.

MRDT4

Non-directional transformer differential protection

The various protective functions of the MRDT4 are specifically tailored to the protection of two winding transformers. The device offers in addition to the differential protection various communication and back-up protection functions.

Versatility for different applications

Power distribution and motor control application solutions differ substantially depending on the system, operating practices and site configuration. The Power Xpert UX system offers a versatile system for high-voltage applications to meet requirements for all applications within segments such as:

- Oil and gas
- Marine and offshore
- Data centers
- Power generation
- Metals and mining
- Infrastructure
- Utilities
- Automotive
- Healthcare
- Petrochemical industries

Marine version

The Power Xpert UX system is available in a marine version, designed to specifically meet the conditions on board ships and vessels related to vibration, inclination and environmental challenges.

Marine approvals available:

- Lloyds Register
- DNV
- Bureau Veritas
- American Bureau of Shipping (ABS)

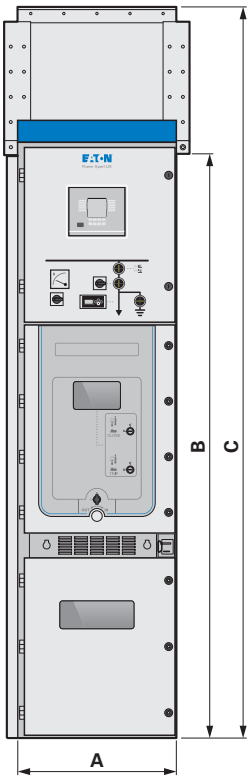
Seismic qualification

The Power Xpert UX system has been tested to withstand the effects of seismic events. The system exceeds the requirements of:

- International Building Code (IBC)
- California Building Code (CBC)
- Uniform Building Code (UBC), Zone 4 requirements
- IEEE Std 693
- ICC-ES AC156

Electrical data

System		3.6 kV	7.2 kV	12 kV	17.5 kV	24 kV
Rated voltage	kV	3.6	7.2	12	17.5	24
Impulse withstand voltage	kV	40	60	75	95	125
Power frequency withstand voltage	kV	10	20	28	38	50
Rated frequency	Hz	50/60	50/60	50/60	50/60	50/60
Busbar system						
Rated normal current	A	630 … 4000				630 … 2500
Rated short time withstand current	kA/s	25 … 50/3				20 … 31.5/3
Rated peak withstand current	kA	63 … 125				50 … 80
Circuit-breaker type W-VACi						
Rated nominal current	A	630 … 4000 (FC)				630 … 2500
Rated breaking current	kA	25 … 50/3				20 … 31.5/3
Rated short-circuit making current	kA	63 … 125				50 … 80
Rated short time withstand current	kA/s	25 … 50/3				20 … 31.5/3
Contactor type W-SLC						
Rated nominal current	A	400			-	
Rated current contactor / fuse combination	A	Max. 200			-	
Rated breaking current	kA	50 (limited by the fuse)			-	
Rated short time withstand current	kA/s	6/1			-	
Rated peak withstand current	kA	15.6			-	
Earthing switch						
Rated short-circuit making current	kA	63 … 130				50 … 80
Rated short time withstand current	kA/s	25 …50/3				20 … 31.5/3
Contactor type W-SLN (Slimline)						
Rated nominal current	A	400		-		
Rated current contactor / fuse combination	A	Max. 400 (double fuse)		-		
Rated breaking current	kA	50 (limited by the fuse)		-		
Rated short time withstand current	kA/s	6/1		-		
Rated peak withstand current	kA	15.6		-		
Earthing switch						
Rated short-circuit making current	kA	15.6		-		
Rated short time withstand current	kA/s	6/1		-		
Internal arc						
Internal arc classification AFLR	kA/s	Up to 50/1				Up to 31.5/1
Enclosure data						
Degree of protection		IP4X (IP41, IP42 or IP44 as an option)				
Loss of service continuity category		LSC2B				
Partition class		PM				
Standard color		RAL7035				



Main dimensions

System	Width A (mm)	Height B (mm)	Height C[1] (mm)	Depth D (mm)
3.6/7.2kV				
Slimline contactor	400	2200	2760	1770
3.6/7.2/12kV				
Mid-mount contactor panel	600	2200	2760	1320
3.6/7.2/12/17.5kV				
630A - 25kA	600	2200	2760	1320
1250A - 25/31.5kA	600	2200	2760	1320
2000A - 25/31.5kA	800	2200	2760	1320
2500A - 25/31.5kA	800	2200	2760	1320
1250A - 40/50kA	800	2200	2760	1500
2000A - 40/50kA	800	2200	2760	1500
3150A - 25/31.5/40/50kA	1000	2200	2760	1500
24kV				
1250A - 20/25/31.5kA	800	2320	2880	1570
2000A - 20/25/31.5kA	1000	2320	2880	1570
2500A - 20/25/31.5kA	1000	2320	2880	1570

[1] Total height with standard arc channel for venting gases outside the switch room.
For the availability of low height arc channels and integral arc absorber solutions, please contact Eaton.

Protection & control relays for your power systems

EATON
Powering Business Worldwide

Protection

for low- and medium voltage applications

Microprocessor-based devices that prevent unnecessary trips, isolate faults, protect motors, generators, cables, substations, and provides system information to help you better manage your system.

Features

- Extensive tests of KEMA, TÜV Nord and other certification agencies **proof hardware and software** protection
- **25 years Design-Life** Confirmation (at 40°C).
  This 4th generation of Eaton's performance protection relays technology are a significant contribution to a reliable energy supply.
- **Easy to use**
  - PLUG & PLAY via USB connection (device models on the devices)
  - Intuitive operation with guiding texts
  - Self-Check functions (Software plausibility checks)
  - Trouble shooting based on device data (fault analysis with event log, trend and disturbance recorder)
    - Trouble shooting guides are available
    - Export in ASCII and COMTRADE with recordings of 120 seconds with 32 samples per period
- **Fast commissioning** with integrated fault simulator
- **Free Software for parameter setting:** Smart View Download available:
- **Remote Service** with **IT-Security** Features available (or separate offline commissioning)
  - Menu for the activation of BDEW Whitepaper-compliant security settings (e. g. hardening of interfaces)
- **Customizable HMI** for your application (single line diagram and measuring values)
- **All-Inclusive offer** by standard are all functions included for the corresponding application. For example, the Feeder Protection Relay MRA 4 provides functions such as Auto Reclosing, Vector Surge, df/dt (ROCOF) and six Frequency, Q U<, LVRT, Protection Stages onboard, without extra charge.
- **Limited price** premium for protection relay brand
- **Multiple communications** protocols to your SCADA system – including Modbus, Profibus, DNP3.0, IEC 61850 and IEC 60870-5-103
- **International**
  - Languages: English, German, Portuguese, Spanish, French, Polish, Russian, Romanian
  - Approvals / certifications: CE, UL, CSA, EAC, KEMA, IEEE, Lloyd's Register*, FNN 2015 ("FNN-Hinweis: Anforderungen an digitale Schutzeinrichtungen", 2015)**

FNN 2015

* MCDGV4-2 and MRDT4-2

** "FNN-Hinweis: Anforderungen an digitale Schutzeinrichtungen", 2015. See Declaration of Conformity for details.

Types of protective relays

Type	MR[1)]	MC[2)]
Directional feeder protection	**MRA4-2**	**MCA4-2**
Overcurrent and earth fault protection OC&EF protection	**MRI4-2**	
Voltage and frequency protection	**MRU4-2**	
Motor protection	**MRM4-2**	
Motor protection with voltage measurement	**MRMV4-2**	
Generator differential protection		**MCDGV4-2**
Transformer differential protection	**MRDT4-2**	
Transformer differential protection with voltage measurement		**MCDTV4-2**
Line / cable differential protection with voltage measuring		**MCDLV4-2**

[1)] MR = Protection
[2)] MC = Control and protection

Eaton protection relays are ideally suited for application in Eaton medium voltage switchgear

Xiria family

Power Xpert® FMX

Power Xpert® UX

Complete range of protective relays

MCA4-2

Directional feeder protection

The MCA4-2 is designed for the protection and control of mid-range voltage feeders. In addition to numerous protection functions for feeder protection and the utility connection point, the switch control can be fully monitored and controlled by the MCA4-2 by remote control or on location.

MRA4-2

Directional feeder protection

The MRA4-2 is specifically tailored to the protection of incoming and outgoing feeders in MV systems and can be used for grid and generator protection.

MRI4-2

Non-directional feeder protection

The MRI4-2 is an overcurrent and earth fault relay. The relay is used for incoming and outgoing feeder applications and recloser can also be used as backup protection for differential protection systems.

MRU4-2

Voltage and frequency monitoring

The MRU4-2 is designed to protect electrical equipment against dangerous voltage and frequency fluctuations, and is used for busbar, generator and feeder protection.

MRM4-2

Motor protection

The MRM4-2 is designed for the protection of motors. All the protection functions based on current, as well as monitoring functions such as motor start-up and incomplete start-up sequence for motor protection are covered by the MRM4-2.

MCDTV4-2

Enhanced transformer differential protection

The MCDTV4-2 is a transformer protection device with phase and earth differential protection and with a large backup protection package. The device is specially designed to protect medium and large HV / MV / LV transformers in distribution and substation systems. The MCDTV4-2 is additional equipped with grid coupling functions for Distributed Energy Resources, especially for generator power plants.

MRDT4-2

Non-Directional transformer

The MRDT4-2 is a transformer differential relay designed to protect two winding transformers. The relay can also be used as a generator differential protection and incorporates backup protection functions.

MCDGV4-2

Generator differential protection

The high-precision generator differential protection relay MCDGV4-2 is designed for the protection of medium and large generators. The step-up transformer can be integrated into the protection zone (unit protection). In addition to the differential protection package the device offers pole slip protection, phase distance (backup) protection and a broad interconnection package (FRT, QV, Reconnection Release) as well as full packages for phase, earth, voltage, frequency and power protection, and many more.

MCDLV4-2

Line differential protection

The cable / line differential protection relay MCDLV4-2 is designed to protect cables and lines up to 24 km. There can even be an in-zone transformer within the line to be protected. In addition, it comes with a very comprehensive protection package like phase, restricted earth fault, inrush detection, and monitoring functions including grid interconnection and control functionality up to 6 switchgears.

MRMV4-2

Motor protection with voltage measurement

Compared with the MRM4-2, the MRMV4-2 also features voltage measurement and is therefore able to monitor power, voltage and frequency.

Electrical data

Protection functions	ANSI	MCA4-2	MRA4-2	MRI4-2	MRU4-2	MCDTV4-2	MRDT4-2	MCDGV4-2	MCDLV4-2	MRM4-2	MRMV4-2
Phase current prot. (non-directional)	50/51	-	-	6	-	-	4	-	-	6	6
Phase current prot. (non-directional and directional)	50/51/67	6	6	-	-	6	-	6	6	-	-
Generator or Transformer differential protection	87G/87T	-	-	-	-	●	●	●	-	-	-
Cable / line differential protection	87L	-	-	-	-	-	-	-	●	-	-
Restricted earth fault protection	87N (64REF)	-	-	-	-	2	2	2	2	-	-
Voltage controlled current protection	51C	●	●	-	-	●	-	●	●	-	-
Voltage restraint current protection	51V	●	●	-	-	●	-	●	●	-	-
Earth current elements (non-directional)	50N/51N	-	-	4	-	-	4	-	-	4	4
Earth current elements (non-directional and directional)	50N/51N/67N	4	4	-	-	4	-	4	4	-	-
Negative sequence current prot. (DEFT/INV)	46	2	2	2	-	2	2	2	2	2	2
Negative sequence current prot. (IEC/ANSI curves)	51Q	●	●	-	-	●	-	●	●	●	●
Overload protection with thermal replica	49	●	●	●	-	●	●	●	●	●	●
Voltage protection	27/59	6	6	-	6	6	-	6	6	-	6
Residual voltage protection	59N	2	2	-	2	2	-	2	2	-	2
Frequency protection	81 U/O	6	6	-	6	6	-	6	6	-	6
Inrush detection (2nd harmonic)		●	●	●	-	●	●	●	●	-	-
Voltage transformer supervision	60FL	●	●	-	●	●	-	●	●	-	●
Current transformer supervision	60L	●	●	●	-	●	●	●	●	●	●
Auto reclosing	79	●	●	●	-	-	-	-	-	-	-
Negative/positive sequence elements (voltage)	47	6	6	-	6	6	-	6	6	-	6
Phase distance protection	21P	-	-	-	-	-	-	2	-	-	-
Power swing blocking	68	-	-	-	-	-	-	●	-	-	-
Load blinder		-	-	-	-	-	-	●	-	-	-
Out of step tripping (Pole slip protection)	78 / 68	-	-	-	-	-	-	●	-	-	-
Circuit breaker failure protection	50 BF/62BF	●	●	●	●	●	●	●	●	●	●
Trip circuit supervision	74TC	●	●	●	●	●	●	●	●	●	●
Frequency gradient (ROCOF)	81R	●	●	-	●	●	-	●	●	-	●
Vector surge	78	●	●	-	●	●	-	●	●	-	●
Power protection: P, Q, Qr, S, Pr	32/37FQRS	6	6	-	-	6	-	6	6	-	6
Power factor cos (ϕ)	55	2	2	-	-	2	-	2	2	-	2
QV protection (reactive-power/undervoltage protection)		●	●	-	-	●	-	●	●	-	-
Synchro check	25	●	●	-	●	●	-	●	-	-	●
Motor start supervision		-	-	-	-	-	-	-	-	●	●
Locked rotor protection		-	-	-	-	-	-	-	-	●	●
JAM protection	51J	-	-	-	-	-	-	-	-	●	●
I< underload protection steps	37	-	-	-	-	-	-	-	-	●	●
Lockout function	86	●	●	●	●	●	●	●	●	●	●
Overexcitation V/Hz	24	-	-	-	-	●	-	●	●	-	●
Loss of excitation	40	-	-	-	-	-	-	●	-	-	●
100% stator earth fault protection	59TN/27TN	-	-	-	-	-	-	●	-	-	●
Protection parameter sets		4	4	4	4	4	4	4	4	4	4
Reverse interlocking		●	●	●	-	●	●	●	●	●	●
Event, failure and disturbance recorder		●	●	●	●	●	●	●	●	●	●
Control											
Control function for up to 6 switchgears		●	-	-	-	●	-	●	●	-	●
Control function for 1 switchgear		-	●	●	●	-	●	-	-	●	●
Measuring functions											
Currents		●	●	●	-	●	●	●	●	●	●
Thermal overload θ		●	●	●	-	●	●	●	●	●	●
Voltages		●	●	-	●	●	-	●	●	●	●
Frequency		●	●	-	●	●	-	●	●	●	●
Power: P, Q, S, Pr, PF (cos ϕ), Energy: Wp+, Wp-, Wq+, Wq- (4 quadrant energy counter)		●	●	-	-	●	-	●	●	●	●
Trend recording		●	●	●	●	●	●	●	●	●	●
Statistic measuring functions (min, max and avg values)											
Currents		●	●	●	-	●	●	●	●	●	●
Voltages		●	●	-	●	●	-	●	●	●	●
Frequency		●	●	-	●	●	-	●	●	●	●
Power: P, Q, S, PF (cos ϕ)		●	●	-	-	●	-	●	●	●	●
Thermal overload		●	●	●	-	●	●	●	●	●	●
Energy		●	●	-	-	●	-	●	●	●	●

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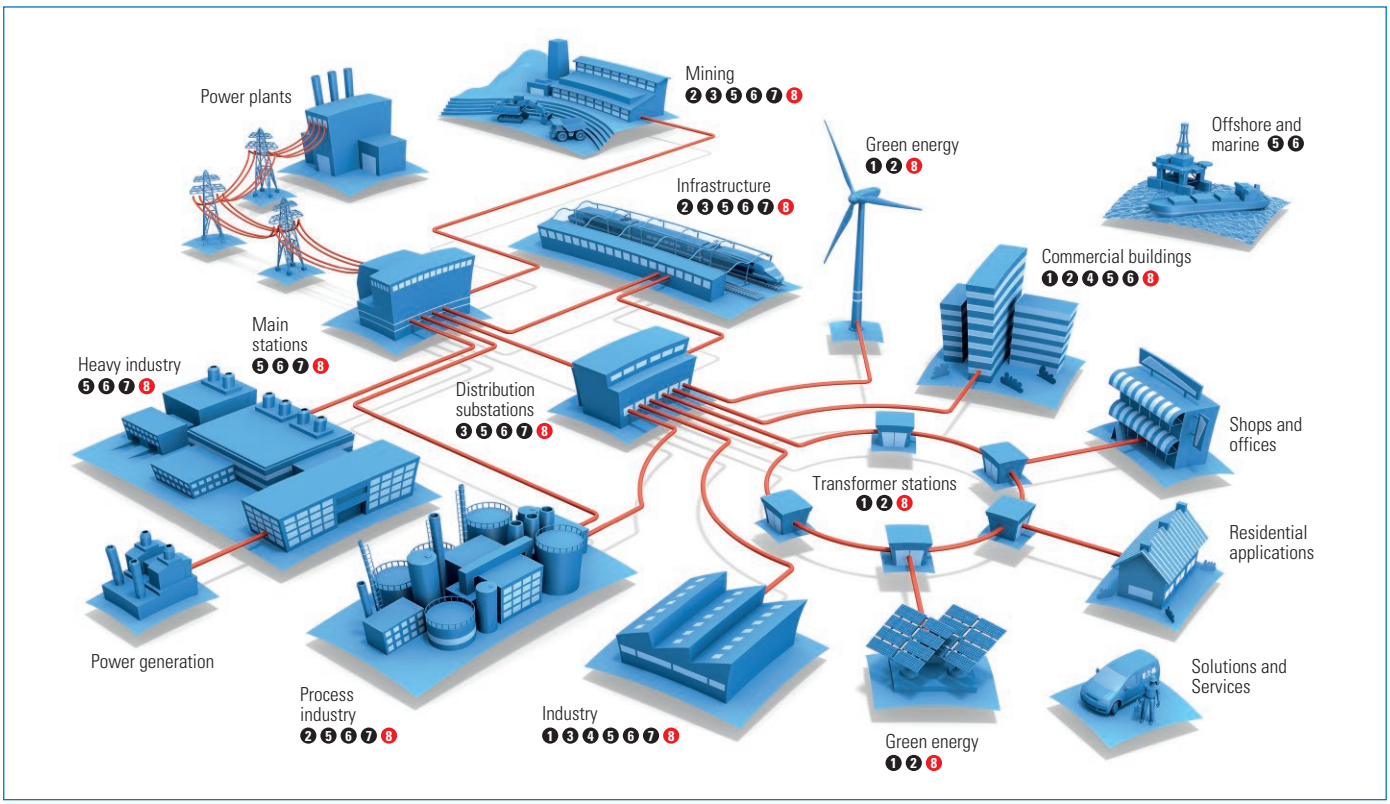

❶ Magnefix

❷ Xiria (blocktype)

❸ Xiria E (extendable)

❹ Xiria M (metering solutions)

❺ Power Xpert® FMX

❻ Power Xpert® UX

❼ MMS

❽ Protection and control relays

Eaton Industries (Netherlands) B.V.
P.O. Box 23
7550 AA Hengelo
The Netherlands

Tel.: +31 (0)74 - 246 40 10
Fax: +31 (0)74 - 246 40 25
info.electric@eaton.com
www.eaton.eu

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