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This Catalogue

We are proud to present to you Schneider Electric’s catalogue dedicated to its Medium Voltage offer. It represents the offering of the world’s largest supplier of medium voltage equipment and encompasses all aspects of switchgear, transformers, package substations, protection and control gear.

Schneider Electric’s origins date back to 1836 when the company was founded by brothers, Aldolphe and Eugene Schneider. Their company was based on mining, forges and foundries in Le Creusot, France, and rose to prominence during the Industrial Revolution. The company diversified quickly into armaments, power stations, electric locomotives, construction, iron and steel and took a leading position in the emerging electricity market.

The company survived the turbulent times of a new century and two world wars, and then expanded into electricity, steel works, and construction. Post-war diversification and a change of ownership in 1969 saw the company experience its most challenging period financially.

In 1981 new management overhauled the company’s assets, concentrating efforts on the electrical and controls industry. Key global acquisitions followed:

- **Merlin Gerin**, a leader in electrical switching technologies was formally brought into the group in 1986.
- **Telemecanique**, a leading specialist in industrial control and automation joined the business in 1988.
- **Square D**, a major North-American supplier of electrical distribution and industrial control equipment was acquired in 1991.

These three brands were strongly represented in Australia. Local acquisitions followed:

- **ASET Transformers**, a Victorian distribution transformer and kiosk manufacturer was acquired in 1994.
- **Nu-Lec Industries**, a Queensland manufacturer of pole-mounted reclosers and sectionalisers, was added in 2000.

Schneider Electric then focused its attention on the residential market. The company gained the household electrical accessory brand names of New Zealand based **PDL** in 2001 and Australian manufacturer, **Clipsal** in 2003.

Commercial sector growth continued to follow with more prestigious names joining Schneider Electric including:

- **TAC**, a global leader in building automation; **CiTect**, a global provider of software for industrial automation;
- **Pelco**, a hi-tech manufacturer of security cameras;
- **SCADAgROUP**, an Australian-based leading provider of telemetry products and solutions; and **APC**, a world leader in critical power and cooling services.

2010 saw the company embark on one its largest acquisitions, **Areva T&D**. The acquisition of Areva’s Distribution activity enables Schneider Electric to provide a comprehensive offer in medium voltage switchgear and network automation. It strengthens the company’s access to worldwide utilities and electro-intensive customers and enhances its position in the middle of the Smart Grid technological revolution.

To further strengthen its position in the Smart Grid market, **Telvent** is now part of Schneider Electric; offering electrical utility customers a complete solution for a more reliable, efficient and secure grid.

In January 2014, Invensys joins Schneider Electric. The Wonderware software and Foxboro RTU range now form part the Schneider Electric’s impressive Automation portfolio.

After more than 170 years of existence, sustainable development is now at the core of Schneider Electric’s strategy. Energy management is a key contributor to CO₂ emission reduction and the company sees itself as the only world leader in the automation and energy management fields. The company is committed to providing energy solutions that provide more while using less. To reinforce this commitment the company has formed many strategic alliances and proudly supports Australian initiatives such as ABGAR, NABERS and EEO. The company is also particularly proud of its achievement with BipBop, a programme geared at bringing electricity to the 1.6 billion of the planet’s population who are deprived of it.

Legacy Brands

In the medium voltage market, the history of the first 50 years of the 20th century was one of establishment of many suppliers, often local or national. The second 50 years has been one of consolidation of these companies. Due to the long life of electrical equipment (circa 30 years), many networks still have functioning equipment from companies which have been absorbed. Schneider Electric provides a range of services to support our legacy equipment throughout its lifecycle, with offers such as: specialist maintenance and diagnostics, retrofits, spare parts, and end of life disposal.

Such legacy brands include:

- **Merlin Gerin** (France)
- **Square D** (USA)
- **Yorkshire Switchgear** (UK)
- **Nuova Magrini Galileo** (Italy)
- **Federal Pioneer** (Canada)
- **Areva** (France)
- **GE** (UK)
- **GEC-ALSTHOM** (UK – France)
- **VEI** (Italy)
- **MESA** (Spain)
- **English Electric** (UK)
Switchgear designed for enhanced peace of mind

Because business relies on the availability of electricity, buildings need their medium voltage distribution systems not only to be reliable, but also to be energy efficient, durable, and able to adapt to changing business needs.

But the operators of these systems require more. Peace of mind is paramount, and can only be achieved with low-maintenance switchgear that helps ensure the safety of both people and assets. Switchgear that enables monitoring and lowers the total cost of ownership is critical.

Stress-free installation, upgrading and maintenance

By combining proven technologies with a modular architecture and the Shielded Solid Insulation System, Premset™ MV switchgear represents a breakthrough innovation in MV distribution. Additionally, its compact and easily upgradeable design optimises your costs through:

- Maintenance-free operation
- Extended life
- Easy installation and upgrades
- Compact size

The 3-in-1 architecture means its operation is not only intuitive — it's the safest switchgear in its class. And, due to an SF6-free design, end-of-life is made easier, with no need to worry about future legislation.

Because a reliable network depends on safe, flexible, and maintenance-free switchgear

Introducing Premset MV switchgear, flexible architecture designed to improve peace of mind.

High modularity with total insulation

Premset architecture is based on type-tested assemblies of functional blocks, which are designed to work together in every combination, to improve cost savings while facilitating modifications.
Transformer Solutions

The Transformer Solutions manufacturing plant in Benalla, Victoria is one of Australia’s market leaders in the manufacture of switchgear and transformers for electrical distribution networks. In particular, the Transformer Solutions factory designs and manufactures kiosks, comprising a medium-voltage ring main unit, transformer, and low-voltage feeder switchboard.

Transformers

Transformers are manufactured completely on-site complying with the Australian Minimum Efficiency Performance Standards (MEPS). Designed in accordance with AS 9001 Standards, they are oil filled and hermetically sealed.

Ring main units

The RM6 compact ring main, available in fixed or extensible ranges, is a market leader in 22KV (and 11KV) networks and after several generations starting in the early 80s the product range is the most comprehensive on the market. The range has been internal arc tested for operator safety and amongst the options available are automation (combined with the Easergy T200) Plug and Play for remote control and/or monitoring, metering, fault indicators, and a host of other accessories, all available from the standard range.

Over 50% of the RM6 ring mains are installed into kiosk substations under the same roof in Benalla.

LV switchboards

The Schneider Electric range of LV switchboards is assembled on-site to meet the needs of our customers. Assembled from a standard range of switchboards to AS3000 and/or customers specifications, they are customised to suit specific applications with a vast range of Schneider Electric air circuit breakers (ACB), moulded case circuit breakers (MCCB), loadbreak switches, fuseways, etc.

Kiosk substations

The kiosk substations are assembled from the transformer, and include HV (RM6) and LV switchgear manufactured on the same site, which feature the latest innovations of internal arc, oil containment, automation control and monitoring and cyclone rated. All kiosk substations are fully built and tested in the factory for delivery to site Australia wide.
Recloser Solutions, Queensland

Schneider Electric’s Recloser Solutions in Queensland (formerly Nu-Lec), designs and manufactures reclosers (ACR), sectionalisers (LBS) and advanced electronic controllers for power companies around the world. The stainless steel ADVC Advanced Controller Range provides a feature-rich, pole-mounted switchgear controller interface that is SCADA-enabled, supporting fully configurable DNP3, IEC and Modbus protocols over a broad range of communications media, including radio, modem and TCP/IP. The ADVC is designed specifically for the Schneider Electric recloser and sectionaliser range of products, which includes:

- The gas-insulated 3-phase N-Series ACR (up to 38kV)
- The solid dielectric 3-phase U-Series ACR (up to 27kV)
- The solid dielectric single-phase W-Series ACR (24kV)
- The gas-insulated 3-phase RL-Series LBS (up to 38kV)
  - also available as a manual unit without controller.

All switchgear is constructed from 316 stainless steel, sealed for life and sand-blasted during construction to give a permanent matte finish, ideal for extended outdoor use. The WSOS5 software supplied with each unit provides an intuitive interface designed to allow both local and remote communication with the controller module, facilitating data exchange and ease of configuration. The wide variety of available protection settings use information received from the integrated CTs and VTs in the switchgear, to ensure that consistent and user-configurable network protection is provided.

Exporting to over 60 countries, Recloser Solutions provides an overhead network automation system, which reduces outages, thereby reducing the cost of network operations and allowing consistency of supply, which satisfies the stringent SAIDI and SAIFI guidelines in place in many countries. The manufacturing facility and head office have more than 200 staff and are located at TradeCoast Central near Brisbane. With over 20 years of experience in the field, the Recloser Solutions factory is proud of its strong customer-service focus, including the flexibility to adapt products for operators’ needs and a commitment to fast delivery times. The ability to provide ‘factory dressed’ units to customer specifications allows units to be tested on arrival in the customer’s store before being transported to site in their original packaging – a cost-effective service that demonstrates Schneider Electric’s commitment to customer satisfaction.
E-House Solutions, Queensland

Manufacturing of electrical equipment began at the Rocklea site in 1948, when it was started by English Electric. English Electric manufactured distribution transformers, motors and oil circuit breakers at the site until 1968, when the company was acquired by GEC which added hydraulic valves, mine winders and electric locomotives to the product line. Becoming a very well-known site in the Pacific for the manufacture of switchgear and switchrooms, it continued to be owned by GEC Alsthom, then Areva until acquired by Schneider Electric in 2011.

Schneider Electric E-House Solutions Business is focused specifically on the supply of complete and integrated E-House Solutions, for markets segments such as oil & gas, mining & metals, power utilities, rail and industry. The E-House business has a strong capability in Medium Voltage Switchgear, complementing our strength in design, manufacture and testing of critical medium voltage and low voltage power distribution and substations. Our in-house capability spans structural, mechanical and electrical engineering, combining to provide a solution based offer to customers.

Schneider Electric’s E-House capability throughout our engineering disciplines ensures compliance with the Building Codes of Australia, as well as many other electrical design and safety standards such as AS3000 and AS62271-200.

Internal detailed electrical design skills can be applied to protection and control systems, and internal room cabling ensures our customers receive a complete and engineered solution when interfacing between medium voltage switchgear, low voltage switchgear, LV distribution boards, uninterruptable AC and DC power supplies, HVAC, room entry controls, telecoms, RTU, protection systems and more.

At completion, Schneider Electric are able to offer transport and lift plans to each customer and their location, limiting risks in handling until the E-House is secured at site.

Schneider Electric’s E-House Business is based at Eagle Farm in Brisbane. We have manufacturing facilities in Brisbane and around the country, adapting to clients needs where requested. Our Australian E-House business is a leader within Schneider Electrics group of global E-House businesses.
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Medium Voltage Panorama
Complete offer ranging from 3kV to 52kV

1. Prefabricated MV/LV substation (rectangular)
2. Pole-mounted transformers
3. Pole-mounted switchgear
4. Overhead network control and monitoring

KPX
Up to 36kV and 2.5MVA
Internal arc classification: IAC-AB according to AS62271.202

MINERA
Immersed transformer
Up to 36kV and 500kVA

N Series
Up to 38kV/800A
Recloser

RL Series
Up to 38kV/630A
Load break switch

U and W Series
Up to 27kV/630A
Recloser

AVDC
Monitoring, control and protection

Easergy Flite, G200
Communicating fault passage indicator for overhead MV lines
Air Insulated Switchgear (AIS)
- MCset up to 24kV/2500A
- PIX up to 24kV/2500A
- GenieEvo up to 13.8kV/2500A
- F400 up to 36kV/2500A
- DNF7-2 up to 36kV/3150A

MINERA
- Power transformer up to 170kV and 80MVA

Gas Insulated Switchgear (GIS)
- GMA up to 24kV/2500A
- GBGS up to 36kV/2000A
- GHA up to 36kV/2500A
- WI up to 52kV/2500A

MINERA
- Power transformer up to 170kV and 80MVA

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- GHA up to 36kV/2500A
- WI up to 52kV/2500A

Sepam Series 10, 20, 40, 60 and 80 protection, metering and control relays

CP range up to 36kV compact enclosure including switching and Earthing devices

MiCOM Series Px10, Px20, Px30 & Px40 protection and control relays

PowerLogic Digital Meters
Waveform capture and accurate metering

VAMP Series
Arc Flash Protection Relays
Medium Voltage Panorama
Complete offer ranging from 3kV to 52kV

**Switching substation**

11. Ring main unit

- RM6 up to 24kV/630A
- FBX up to 24kV/1250A
- CAS-36 up to 36kV/630A
- Flusarc up to 36kV/1250A
- Ringmaster C up to 13.8kV/630A

12. Remote control and fault tracking

- Easergy T200I, T200E, T200H, Flair
  Remote control and monitoring through DNP3, Modbus and IEC protocols

13. Prefabricated MV/LV substation (square)

- KPX²
  Up to 22kV and 2.5MVA

**Distribution substation**

- Internal arc classification:
  IAC-AB according to AS62271.202
Building a smarter grid with reliable, efficient energy

How Schneider Electric smart grid-ready products and solutions help balance your grid equation.

More and more people are learning to depend on energy as being integral to their daily lives.

Meanwhile, the electricity market is changing. Every day, end users’ expectations increase in terms of reliability and quality, and they gain greater awareness of energy’s environmental impact.

It’s an evolution. But as our reliance on electricity grows globally, the ways in which we produce, distribute, and use energy must also evolve. The solution will not only involve smarter demand, but also smarter supply - and as such, a smarter grid is at the heart of the issue.

As The Global Specialist in Energy Management™, Schneider Electric is smart grid-ready, enabling the products and solutions that support and connect the five key domains of a smarter grid:

- Flexible distribution
- Smart generation
- Demand-side management
- Efficient homes (including electric vehicles)
- Efficient enterprise (buildings, industrial facilities, and data centres).

Our vision isn’t just to connect our customers to the smart grid - but to also connect them with each other, facilitating smarter interactions and leading to increased energy management capabilities.

Our smart grid solutions include:

- Smart medium voltage (MV) / low voltage (LV) equipment
- Substation automation
- Feeder automation
- Enhanced distribution management solutions
- Microgrid control
- Volt/VAr management
- Real-time condition monitoring
- Electric vehicle load management.

GMX, TESA immersed transformers up to 33kV and 5MVA

Trihal Dry Type transformers up to 36kV and 15MVA

Tricast Dry Type transformers up to 52kV and 30MVA

Premset
Up to 17.5kV/1250A

SM6-24
Up to 24kV/1250A

SM6-36
Up to 36kV/630A

DVCAS
Up to 36kV/630A
# MV Metal-Enclosed Switchgear Selection Table

## Shielded Solid Insulation System

<table>
<thead>
<tr>
<th></th>
<th>Premset</th>
<th>Outdoor Premset</th>
<th>SM6-24</th>
<th>GenieEvo</th>
<th>Mcset 1-2-3</th>
<th>PIX</th>
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</thead>
<tbody>
<tr>
<td>1 Internal Arc Classification</td>
<td>IAC A-FLR 25kA/1s</td>
<td>IAC A-FLR (*) 21kA/1s</td>
<td>IAC A-FLR 20kA/1s</td>
<td>IAC A-FLR 25kA/1s</td>
<td>IAC A-FLR 50kA/1s</td>
<td>IAC A-FLR 40kA/1s</td>
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<tr>
<td>2 Loss of Service Continuity</td>
<td>LSC2A</td>
<td>LSC2A</td>
<td>LSC2A</td>
<td>LSC2A</td>
<td>LSC2B</td>
<td>LSC2B</td>
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<tr>
<td>3 Partitioning</td>
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<td>PM</td>
<td>PM</td>
<td>PM</td>
<td>PM</td>
<td>PM</td>
</tr>
<tr>
<td>4 Degree of Protection</td>
<td>IP 3X</td>
<td>IP54</td>
<td>IP 3X</td>
<td>IP 3X</td>
<td>IP 3X</td>
<td>IP 3X</td>
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<tr>
<td>5 Max. Electrical Performance</td>
<td>Un 17.5 kV In 1250 A Ith 25 kA</td>
<td>Un 13.8 kV In 630 A Ith 21 kA</td>
<td>Un ≤ 24 kV In ≤ 1250 A Ith ≤ 25 kA</td>
<td>Un ≤ 13.8 kV In ≤ 2500 A Ith ≤ 25 kA</td>
<td>Un ≤ 17.5 kV In ≤ 4000 A Ith ≤ 50 kA</td>
<td>Un ≤ 24 kV In ≤ 2500 A Ith ≤ 40 kA</td>
</tr>
<tr>
<td>6 Type of Protection</td>
<td>Circuit Breaker</td>
<td>Circuit Breaker</td>
<td>Circuit Breaker / Fuses</td>
<td>Circuit Breaker</td>
<td>Circuit Breaker</td>
<td>Circuit Breaker</td>
</tr>
<tr>
<td>7 Switching Medium</td>
<td>Vacuum</td>
<td>Vacuum</td>
<td>Vacuum / SF₆</td>
<td>Vacuum</td>
<td>Vacuum / SF₆</td>
<td>Vacuum / SF₆</td>
</tr>
<tr>
<td>8 Type of Circuit Breaker</td>
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<td>Fixed</td>
<td>Demountable</td>
<td>Fixed</td>
<td>Withdrawable</td>
<td>Withdrawable</td>
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</table>

(*) Consult Schneider Electric for availability.

## Air-Insulated Switchgear

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<thead>
<tr>
<th></th>
<th>CBGS-0</th>
<th>CBGS-2</th>
<th>GMA</th>
<th>GHA</th>
<th>WI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Internal Arc Classification</td>
<td>IAC A-FL 31.5kA/1s</td>
<td>IAC A-FL 25kA/0.5s</td>
<td>IAC A-FLR 31.5kA/1s</td>
<td>IAC A-FLR 40kA/1s</td>
<td>IAC A-FL 40kA/1s</td>
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<tr>
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<td>LSC2A</td>
<td>LSC2B</td>
<td>LSC2B</td>
<td>LSC2B</td>
</tr>
<tr>
<td>3 Partitioning</td>
<td>PM</td>
<td>PM</td>
<td>PM</td>
<td>PM</td>
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<tr>
<td>4 Degree of Protection</td>
<td>IP 3X</td>
<td>IP 3X</td>
<td>IP 3X</td>
<td>IP 3X</td>
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<tr>
<td>5 Max. Electrical Performance</td>
<td>Un ≤ 36 kV In ≤ 2000 A Ith ≤ 31.5 kA</td>
<td>Un ≤ 52 kV In ≤ 1600 A Ith ≤ 25 kA</td>
<td>Un ≤ 24 kV In ≤ 1600 A Ith ≤ 31.5 kA</td>
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<td>SF₆</td>
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<td>Vacuum</td>
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# Gas Insulated Switchgear

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<th>GMA</th>
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# Ring Main Unit

<table>
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<th>Model</th>
<th>Motorpact</th>
<th>MCset4</th>
<th>SM6-36</th>
<th>DNF7-2</th>
<th>F400</th>
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<tbody>
<tr>
<td>IAC A-FLR 50kA/0.25s</td>
<td>IAC A-FLR 31.5kA/0.15s</td>
<td>IAC A-FL 16kA/1s</td>
<td>IAC A-FLR 31.5kA/0.15s</td>
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<td>PI</td>
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<td>PM</td>
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<td>Up to IP 42</td>
<td>Up to IP 41</td>
<td>IP 3X</td>
<td>IP 4X</td>
<td>IP 3X</td>
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<tr>
<td>Un ≤ 7.2 kV</td>
<td>Un ≤ 24 kV</td>
<td>Un ≤ 36 kV</td>
<td>Un ≤ 36 kV</td>
<td>Un ≤ 40.5 kV</td>
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<tr>
<td>In ≤ 400 A</td>
<td>In ≤ 2500 A</td>
<td>In ≤ 1250 A</td>
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<tr>
<td>Ith ≤ 50 kA</td>
<td>Ith ≤ 31.5 kA</td>
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<td>Ith ≤ 40 kA</td>
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<td>SF₆</td>
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<tr>
<td>Page 38</td>
<td>Page 17</td>
<td>Page 10</td>
<td>Page 22</td>
<td>Page 21</td>
<td></td>
</tr>
</tbody>
</table>

**Ring Main Unit**

**Motorpact**

- IAC A-FLR 50kA/0.25s
- LSC2A
- PI
- Up to IP 42
- Un ≤ 7.2 kV
- In ≤ 400 A
- Ith ≤ 50 kA
- Fuses / Circuit Breaker
- Vacuum
- Withdrawable

**MCset4**

- IAC A-FLR 31.5kA/0.15s
- LSC2B
- PM
- Up to IP 41
- Un ≤ 24 kV
- In ≤ 2500 A
- Ith ≤ 31.5 kA
- Circuit Breaker
- SF₆
- Withdrawable

**SM6-36**

- IAC A-FL 16kA/1s
- LSC2A
- PI
- IP 3X
- Un ≤ 24 kV
- In ≤ 630 A
- Ith ≤ 25 kA
- Circuit Breaker / Fuses
- Vacuum
- Fixed
- Page 12

**DNF7-2**

- IAC A-FLR 31.5kA/0.15s
- LSC2B
- PM
- IP 4X
- Un ≤ 36 kV
- In ≤ 630 A
- Ith ≤ 21 kA
- Circuit Breaker
- SF₆
- Fixed
- Page 13

**F400**

- IAC A-FLR 40kA/0.15s
- LSC2B
- PM
- IP 3X
- Un ≤ 40.5 kV
- In ≤ 2500 A
- Ith ≤ 40 kA
- Circuit Breaker
- Vacuum
- Fixed
- Page 21

**Ringmaster CAS-36 DVCAS Flusarc 36**

- IAC A-F 21kA/1s
- LSC2A
- PI
- IP 54
- Un ≤ 13.8 kV
- In ≤ 1250 A
- Ith ≤ 21 kA
- Circuit Breaker / Fuses
- SF₆
- Fixed
- Page 15

- IAC A-FL 20kA/0.5s
- LSC2A
- PM
- IP3X
- Un ≤ 36 kV
- In ≤ 630 A
- Ith ≤ 20 kA
- Switch / Fuses
- Vacuum
- Fixed
- Page 11

- IAC A-FL 20kA/1s
- LSC2A
- PM
- IP 3X
- Un ≤ 36 kV
- In ≤ 1250 A
- Ith ≤ 20 kA
- Circuit Breaker / Fuses
- Vacuum
- Fixed
- Page 14

**Seamless Integration With Sepam or Micom Protection Relay**

For further information, contact your Schneider Electric Sales Representative.
Secondary Distribution Switchgear

Premset

Overview

Premset is a range of compact (375mm wide), SF6-free, shielded solid insulated fixed switchgear up to 17.5kV/1250A. It is the safest MV switchgear in its class, combining Shielded Solid Insulation System (2SIS) with extreme compactness, complete modularity and an easy to use 3-in-1 architecture. An outdoor version is also available.

Functional units:

- I06T - Disconnecting switch with integrated Earth switch (630A)
- I06H / I12H - Fast-closing disconnecting switch with integrated Earth switch (630A / 1250A)
- D01 / D02N - Disconnecting circuit breaker with integrated Earth switch (100A / 200A)
- D06N - Disconnecting circuit breaker with integrated Earth switch (630A)
- D06H / D12H - OCO heavy-duty disconnecting circuit breaker with integrated Earth switch (630A / 1250A)
- M06S / M12S - Solid-insulated Earth-screened metering unit (630A / 1250A)
- M06A / M12A - Air-insulated metering unit (630A / 1250A)
- G06 / G12 - Direct cable connection or busbar riser (630A / 1250A)
- VTM / VTP / VTF - Voltage transformer units

Electrical characteristics

<table>
<thead>
<tr>
<th>Insulation level</th>
<th>Ur kV</th>
<th>12</th>
<th>17.5</th>
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<tbody>
<tr>
<td>Power frequency withstand</td>
<td>Ud 50Hz, 1 min (kV rms)</td>
<td>42</td>
<td>38</td>
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<tr>
<td>Lighting impulse withstand</td>
<td>Up 1.2/50 μs (kV peak)</td>
<td>75</td>
<td>95</td>
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<table>
<thead>
<tr>
<th>Rated current</th>
<th>In A</th>
<th>630/1250A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated busbar current</td>
<td>IhkA</td>
<td>25kA x 1s</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ith kA</td>
<td>25kA x 3s 20kA x 4s</td>
</tr>
</tbody>
</table>

Main characteristics

Internal arc withstand

- 4 sided protection: 21kA/1s, A-FLR
- 4 sided protection: 25kA/1s, A-FLR (*)

*except M06A, M12A, VTF, VTM-F

Protection Index

- Shielded Solid Insulation System (2SIS)
- Class: PM (metallic partition)
- Loss of service continuity class: LSC2A
- Units in switchboard: IP3X
- Between compartments: IP2X

Applications

- Buildings, Data Centres, Infrastructure, Mining, Ports & Public Distribution
- Network protection - Sepam or MiCOM
- Intelligent networks - Remote management and monitoring

Shielded Solid Insulation System

The whole main circuit is solid insulated with epoxy or EPDM and the surface is covered by a screen connected to the Earth. This ensures the switchboard is insensitive to harsh environments (humidity, dust, pollution, etc.) and maintenance free.

Enhanced Safety

Premset switchgear is the safest and most intuitive switchgear in its class. Safety improvements include:

- A 3-in-1 design allowing breaking, disconnection, and Earthing functions to be all integrated into a single compact three-position device, making it simpler and easier to operate
- Positively driven built-in failsafe interlocks
- Live cable interlock preventing Earthing of live cables
- Integrated cable test device, interlocked with the Earth switch (no need to enter cable box or disconnect cable terminations)
- Direct Earthing of downstream cables
Overview

Outdoor Premset is a range of compact (375mm wide), SF6-free, shielded solid insulated fixed switchgear up to 13.8kV/630A. It is the safest MV switchgear in its class, combining Shielded Solid Insulation System (2SIS) with extreme compactness, complete modularity and an easy to use 3-in-1 architecture.

Functional units:
- SV6 - General purpose disconnecting switch (630A)
- SH6 - Heavy-duty disconnecting switch (630A)
- CV2 - MV/LV transformer protection disconnecting circuit breaker (200A)
- CV6 - General protection disconnecting circuit breaker (630A)
- CH6 - Heavy-duty line protection disconnecting circuit breaker (630A)
- MV6 - Solid-insulated Earth-screened metering unit
- VTM/VTP - Voltage transformer units

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur kV</th>
<th>7.2</th>
<th>12</th>
<th>13.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated busbar current</td>
<td>In A</td>
<td>630</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>ith kA/3s</td>
<td>21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Main characteristics

- Internal arc withstand
- Outdoor substation installation: 21kA/1s A-F
- Indoor substation installation: 21kA/1s A-F when installed against a wall. 21kA/1s A-FLR (*) when installed with top exhaust.

Protection Index
- Shielded Solid Insulation System (2SIS)
- Class: PM (metallic partition)
- Loss of service continuity class: LSC2A
- All external faces of the switchgear: IP54
- Between compartments: IP2X

(*) Consult Schneider Electric for availability.

Applications

- Utilities, buildings, mining and public distribution
- Network protection - Sepam or MiCOM
- Intelligent networks - remote management and monitoring

Cable testing device

Outdoor Premset switchboards are fitted with a dedicated cable testing device that greatly increases safety during cable testing. Cable testing can be carried out without accessing the cable box (cables remain connected) and without touching the cable terminations. Test device can be connected, prior to removing the Earth link, improving safety for the operator.

Enhanced Safety

Premset switchgear is the safest and most intuitive switchgear in its class. Safety improvements include:
- A 3-in-1 design allowing breaking, disconnection, and Earthing functions to be all integrated into a single compact three-position device, making it simpler and easier to operate
- Positively driven built-in failsafe interlocks
- Live cable interlock preventing Earthing of live cables
- Integrated cable test device, interlocked with the Earth switch (no need to enter cable box or disconnect cable terminations)
- Direct Earthing of downstream cables
- Direct access to cable conductor
- Double isolating gap during testing
Secondary Distribution Switchgear
SM6-24

Modular secondary distribution switchgear

Overview
The SM6-24 comprises modular units containing fixed or withdrawable metal-enclosed sulphur hexafluoride (SF₆) or vacuum switchgear, with a service voltage up to 24kV / 1250A.

SM6-24 includes a wide range of functional units to meet secondary distribution application needs.
- IM - 630A load break/fault make switch
- QM - 200A fuse-switch combination
- DM1 - SF₆ 630/1250A circuit breaker SF1
- DMV - vacuum 630/1250A circuit breaker Evolis
- CRM - Rollarc 400 or 400D contactor
- CVM - vacuum contactor
- GBC - medium voltage metering
- NSM - 630A auto-changeover

Electrical characteristics (SM6-24)

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur kV</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand</td>
<td>Ud 50Hz, 1 min (kV rms)</td>
<td>20</td>
<td>28</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up 1.2/50 μs (kV peak)</td>
<td>60</td>
<td>75</td>
<td>95</td>
<td>125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated current</th>
<th>In A</th>
<th>630 - 1250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated busbar current</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>400 - 630 - 1250</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

Main characteristics

Internal arc withstand
- Standard: 12.5kA/1s, A-FL
- Optional: 12.5kA/1s, A-FLR
  - 16kA/1s, A-FL and A-FLR
  - 20kA/1s, A-FL and A-FLR
- in accordance with AS 62271-200

Protection index
- Air insulated switchgear (AIS)
- Class: PI (insulating partition)
- Loss of service continuity class: LSC2A
- Units in switchboard: IP3X
- Between compartments: IP2X
- Cubicle: IK08

New internal arc classification
The enhanced SM-24 panels have an upwards exhaust tunnel up to 20kA/1s.

Applications
- Commercial, industrial, mining and public distribution
- Network protection – Sepam or MiCOM
- Intelligent networks - remote management and monitoring

Installation of an SM6 24kV switchboard installed in the middle of the room.
## Secondary Distribution Switchgear

**SM6-36**

Modular secondary distribution switchgear

### Overview

The SM6-36 comprises modular units containing fixed or withdrawable metal-enclosed sulphur hexafluoride (SF₆) or vacuum switchgear with a service voltage up to 36kV / 630A.

SM6-36 includes a wide range of functional units to meet secondary distribution application needs.

- **IM** - 630A load break/fault make switch
- **QM** - 630A fuse-switch combination
- **DM1** - SF1 630A circuit breaker
- **GBC** - medium voltage metering
- **NSM** - 630A auto-changeover

### Electrical characteristics

<table>
<thead>
<tr>
<th>Insulation level</th>
<th>Ur</th>
<th>kV</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand</td>
<td>Ud</td>
<td>50Hz, 1 min (kV rms)</td>
<td>70</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up</td>
<td>1.2/50 μs (kV peak)</td>
<td>170</td>
</tr>
<tr>
<td>Rated busbar current</td>
<td>ln</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>ith</td>
<td>kA/1s</td>
<td>25 1250</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 630 - 1250</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16 630 - 1250</td>
</tr>
</tbody>
</table>

### Main characteristics

**Internal arc withstand**
- 3 side protection: 16kA/1s, A-FL
- In accordance with AS 62271-200

**Protection index**
- Air insulated switchgear (AIS)
- Class: PI (insulating partition)
- Loss of service continuity class: LSC2A
- Units in switchboard: IP3X
- Between compartments: IP2X

### Applications

- Commercial, industrial, mining and public distribution
- Network protection – Sepam or MiCOM
- Intelligent networks - remote management and monitoring

### Visibility of main contact and analogue manometer

SM6-36 is now available with a viewing window for visibility of the main contact and an analogue manometer to monitor SF6 pressure.
Secondary Distribution Switchgear
DVCAS

Modular secondary distribution switchgear for wind farms

Overview
DVCAS is an indoor, modular gas insulated switchgear (GIS) intended for the MV section of compact MV/LV substations for wind application, with a service voltage up to 36kV / 630A. The busbar system is interconnected between functions by means of single-phase coupling bushings made of screened elastomeric insulation.

Extensibility
- RE – right side extensible
- LE – left side extensible
- DE – double extensible

Functional units
- I – switch disconnector
- D – circuit breaker protection for transformer
- O – direct bus connection
- T – Earthing disconnector
- DB – double cable connection

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage Ur kV</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand Ud 50Hz, 1 min (kV rms)</td>
<td>70</td>
</tr>
<tr>
<td>Lighting impulse withstand Up 1.2/50 μs (kV peak)</td>
<td>170</td>
</tr>
<tr>
<td>Rated current In A</td>
<td>630</td>
</tr>
<tr>
<td>Short-time withstand current Ith kA/3s</td>
<td>20</td>
</tr>
</tbody>
</table>

Main characteristics
Internal arc withstand
- 3 side protection: 20kA/1s, A-FL in accordance with AS 62271-200

Protection index
- Gas insulated switchgear (GIS)
- Class: PM (metallic partition)
- Tank: IP67
- Switchboard: IP3X
- Between compartments: IP2X

Applications
- Wind farms
- Prefabricated MV/LV substations - KPX
- Intelligent networks - remote management and monitoring
- Network protection – Sepam S10/VIP 4X

Sepam Series 10 Protection Relay
Protects against phase to phase faults and Earth faults, capable of detecting Earth faults from 0.2 A. Communication option available. Simple to install and setup without the need of a computer.
Overview

RM6 is an indoor, compact gas insulated switchgear (GIS) intended for the MV section of compact MV/LV substations and customer distribution substations, with a service voltage up to 24kV / 630A.

RM6 range includes a number of compact and modular functional units for secondary distribution needs. RM6 Free Combination is a new range extension and allows a higher configuration flexibility of switchboards to meet all needs:

- Free choice of functions and options
- Compatible with standard RM6 offer
- Tanks including 2 to 3 free choice functions
- More economical compared to several single extension function in line.

Functional units

- I – switch disconnector
- O – fuse-switch combination
- D – 200A circuit breaker
- B – 630A circuit breaker
- Mt – MV metering
- IC – network coupling with switch disconnector
- BC – network coupling with circuit breaker
- O – direct busbar connection

Extensibility

- NE – non-extensible
- RE – right side extensible
- LE – left side extensible
- DE – double extensible

Electrical characteristics (RM6)

<table>
<thead>
<tr>
<th>Rated voltage Ur kV</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand Ud 50Hz, 1 min (kV rms)</td>
<td>28</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Lighting impulse withstand Up 1.2/50 μs (kV peak)</td>
<td>75</td>
<td>95</td>
<td>125</td>
</tr>
</tbody>
</table>

Rated current

<table>
<thead>
<tr>
<th>Rated busbar current In A</th>
<th>630</th>
<th>630</th>
<th>400</th>
<th>630</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-time withstand current Ith KA/1s</td>
<td>25</td>
<td>21</td>
<td>12.5</td>
<td>16</td>
</tr>
<tr>
<td>KA/3s</td>
<td>21</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Rated current at elevated ambient temperature

<table>
<thead>
<tr>
<th>Deg C</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 630</td>
<td>575</td>
<td>515</td>
<td>460</td>
<td>425</td>
<td></td>
</tr>
<tr>
<td>A 400</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Functions I,O,B with C bushing A 630</td>
<td>575</td>
<td>515</td>
<td>460</td>
<td>425</td>
<td></td>
</tr>
<tr>
<td>Functions D with C or B bushing A 200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

Main characteristics

Internal arc withstand

- 3 side protection: 20kA/1s, A-FL in accordance with AS 62271-200

Protection index

- Gas insulated switchgear (GIS)
- Class: PM (metallic partition)
- Tank: IP67
- Switchboard: IP3X
- Between compartments: IP2X

Applications

- Commercial, industrial, mining and public distribution
- Prefabricated MV/LV substations - KPX
- Network automation – ATS 1/2
- Remote management and monitoring (Easergy T200)
- Network protection – Sepam S10/VIP 4X

700 possible combinations for RM6 Free Combination 2 or 3 functions

Possible combinations of RM6 2 functions

| 2nd function | 1st function | Type of tank:
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>T</td>
<td>NE: non-extensible</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>RE: extensible to the right</td>
</tr>
<tr>
<td>D</td>
<td>D</td>
<td>LE: extensible to the left</td>
</tr>
<tr>
<td>Q</td>
<td>Q</td>
<td>DE: extensible to the right and left.</td>
</tr>
<tr>
<td>O</td>
<td>O</td>
<td></td>
</tr>
</tbody>
</table>

Possible combinations of RM6 3 functions

<table>
<thead>
<tr>
<th>3rd function</th>
<th>2nd function</th>
<th>1st function</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Q</td>
<td>Q</td>
<td>Q</td>
</tr>
<tr>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>IC</td>
<td>IC</td>
<td>BC</td>
</tr>
</tbody>
</table>

(*) Possible only when RM6 is RE or DE. Consult Schneider Electric for availability.
Overview
FBX is an indoor, compact sulphur hexafluoride (SF6) insulated ring main unit for secondary distribution applications with a service voltage up to 24kV / 630A.

FBX range includes a number of compact and modular functional units for secondary distribution needs.

FBX-C Version (compact)
- 2, 3 or 4 functions

FBX-E Version (extensible)
- 1, 2, 3 or 4 functions

Functional units
- C – feeder with switch disconnector
- T1 – feeder with switch disconnector and fuses
- T2 – feeder with vacuum circuit breaker
- R – direct incoming
- Sb – busbar switch disconnector
- RE - busbar riser with Earthing switch
- CB- outgoing feeder with vacuum circuit breaker
- M – metering panel

Electrical characteristics

<table>
<thead>
<tr>
<th>Insulation level</th>
<th>Ur kV</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand</td>
<td>Ud</td>
<td>50Hz, 1 min (kV rms)</td>
<td>28</td>
<td>38 (42)</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up</td>
<td>1.2/50 μs (kV peak)</td>
<td>75</td>
<td>95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated busbar current</th>
<th>In A</th>
<th>630 / 1250*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-time withstand current</td>
<td>Ith</td>
<td>16 / 21 / 25*</td>
</tr>
<tr>
<td></td>
<td>kA/1s</td>
<td>16 / 21 / 16 / 21</td>
</tr>
</tbody>
</table>

*please consult Schneider Electric kA/3s 16 / 21 16 / 21 16 / 21

Main characteristics

Internal arc withstand
- 3 side protection: 20kA/1s, A-FL in accordance with AS 62271-200

Protection index
- Gas insulated switchgear (GIS)
- Class: PM (metallic partition)
- Tank: IP67
- Switchboard: IP2X (option: IP33)
- Between compartments: IP2X

Applications

- Commercial, industrial, mining and public distribution
- Prefabricated MV/LV substations
- Remote management and monitoring (Easergy T200)

Simple erection and assembly

The extension is a very simple process thanks to:
- The A-link device used to connect the busbars of two cubicles. Variations in positioning are compensated by fixed, spherical contacts and mobile couplings that can be adjusted axially and radially.
- Highly secure dielectric seals made with silicone insulating conical connectors adapted to the electrical voltage. The assembly of the insulating connectors is maintained by a mechanical force generated by:
- Integrated guiding pins for the correct alignment of the cubicles
- An assembly by bolts secured by mechanical stops.

During the assembly of an extension cubicle, an additional space of at least 450 mm is necessary to allow for handling.
Overview
Flusarc 36 is a sulphur hexafluoride (SF₆) insulated ring main unit for secondary distribution applications with a service voltage up to 36kV / 630A. It is available for both indoor and outdoor uses, in compact and modular versions.

Flusarc 36 range includes a number of compact and modular functional units for secondary distribution needs.

Functional units
- C – feeder with switch disconnector
- T1 – feeder with switch disconnector and fuses
- R – direct incoming
- CB – outgoing feeder with vacuum circuit breaker

Electrical characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>Ur</td>
<td>kV</td>
</tr>
<tr>
<td>Rated current</td>
<td>In</td>
<td>A</td>
</tr>
</tbody>
</table>

Main characteristics

Internal arc withstand
- 3 side protection: 20kA/1s, A-FL
  In accordance with AS 62271-200

Protection index
- Gas insulated switchgear (GIS)
- Class: PM (metallic partition)
- Tank: IP67
- Switchboard: IP3X
- Between compartments: IP3X

Applications
- Commercial, industrial, mining and public distribution.
- Intelligent networks - remote management and monitoring (PACiS)
- Protection unit - VIP400/VIP410

The disconnector’s three positions are:
- a. service position
- b. isolated position
- c. Earthing position
  (in this condition it is possible to access the cables compartment, in order to carry out maintenance or to install cables themselves)
Ring Main Unit (RMU)  
**Ringmaster C**

Ring main unit for secondary distribution application

### Overview

Ringmaster is an outdoor, compact gas insulated switchgear (GIS) intended for the MV section of compact MV/LV substations with a service voltage up to 13.8kV / 630A.

Ringmaster range includes a number of compact and modular functional units for secondary distribution needs:

- **RN2c** – 200A non-extensible ring main unit
- **RE2c** – 200A extensible ring main unit
- **RN6c** – 630A non-extensible ring main unit
- **MU2** – 200A feeder metering unit
- **CN2** – 200A non-extensible circuit breaker
- **SN6** – 630A non-extensible switch
- **CE2** – 200A extensible circuit breaker
- **CE6** – 630A extensible circuit breaker
- **SE6** – 630A extensible switch

### Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur kV</th>
<th>12</th>
<th>13.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand</td>
<td>Ud</td>
<td>50Hz, 1 min (kV rms)</td>
<td>20</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up</td>
<td>1.2/50 μs (kV peak)</td>
<td>75</td>
</tr>
<tr>
<td>Rated current</td>
<td>In A</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>Rated busbar current</td>
<td>Ih kA/3s</td>
<td>16</td>
<td>200 - 630</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td></td>
<td>21</td>
<td>-</td>
</tr>
</tbody>
</table>

### Main characteristics

- **Internal arc withstand**
  - 3 side protection: 21kA/1s, A-FLR (gas enclosure only)
- **Protection index**
  - Air insulated switchgear (AIS)
  - Class: PM (metallic partition)
  - Tank: IP67
  - Switchboard: IP54
  - Between compartments: IP2X

### Applications

- Outdoor harsh environments: mining, oil and gas, industry.
- Prefabricated MV/LV substations – KPX
- Network automation – ATS 1/2
- Remote management and monitoring (Easergy T200)
- Network protection – Sepam S10/VIP

### Sepam Series 10 Protection Relay

Protects against phase to phase faults and Earth faults; capable of detecting Earth faults from 0.2 A. Communication option available. Simple to install and set up without the need of a computer.
Primary Distribution Switchgear
MCset 1-2-3

Modular primary distribution switchgear

Overview
MCset 1-2-3 is an indoor, metal-enclosed withdrawable circuit breaker sulphur hexafluoride (SF₆) or vacuum switchgear intended for the MV section of HV/MV substations and high-power MV/MV substations with a service voltage up to 17.5kV / 4000A.

MCset 1-2-3 includes a wide range of functional units to answer primary distribution application needs.

- AD - incomer or feeder
- CL-GL - line up bus section
- TT - busbar metering and Earthing
- DI - switch-fuse feeder
- RD - direct incomer

Electrical characteristics

<table>
<thead>
<tr>
<th>Insulation level</th>
<th>Ur kV</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand</td>
<td>Ud 50Hz, 1 min (kV rms)</td>
<td>20 28 38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up 1.2/50 μs (kV peak)</td>
<td>60 75 95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Main characteristics

- Internal arc withstand
  - 3 side protection: 50kA/1s, A-FL
  - 4 side protection: 50kA/1s, A-FLR
    In accordance with AS 62271-200

- Protection index
  - Air insulated switchgear (AIS)
  - Class: PM (metallic partition)
  - Loss of service continuity classes: LSC2B
  - Units in switchboard: IP3X (Optional: Up to IP42)
  - Between compartments: IP2X

Applications

- Public distribution, heavy industry, oil and gas, infrastructure
- Marine
- Motor control - Motorpact
- Thermal monitoring
- Network protection – Sepam
- Intelligent networks - remote management and monitoring (Powerlogic SCADA)

Thermal Diagnosis System (MDT)

The Thermal Diagnosis System is used to monitor temperature rise using optical fibres and sensors installed at the heart of the sensitive areas. By using this system, the maintenance costs in MV substations are greatly reduced.
Primary Distribution Switchgear
MCset 4

Overview
MCset 4 is an indoor, metal-enclosed withdrawable circuit breaker sulphur hexafluoride (SF₆) switchgear intended for the MV section of HV/MV substations and high-power MV/MV substations, with a service voltage up to 24kV / 2500A. MCset 4 includes a wide range of functional units to accommodate primary distribution application needs.

- AD - incomer or feeder
- CL-GL - line up bus section
- TT - busbar metering and Earthing
- DI - switch-fuse feeder
- RD - direct incomer

Main characteristics
Internal arc withstand
- 3 side protection: 25kA/1s or 31.5kA/0.15s, A-FL
- 4 side protection: 25kA/1s or 31.5kA/0.15s, A-FLR

Protection index
- Air insulated switchgear (AIS)
- Class: PM (metallic partition)
- Loss of service continuity classes: LSC2B
- Units in switchboard: IP3X (Optional IP41)
- Between compartments: IP2X

Applications
- Public distribution, heavy industry, oil and gas, infrastructure.
- Marine
- Motor control - Motorpact
- Thermal monitoring
- Network protection - Sepam
- Intelligent networks - remote management and monitoring (Powerlogic SCADA)

Arc detection system VA1DA
The arc detection system is a state-of-the-art arc protection unit for electrical power distribution systems. The system consists of an arc protection unit and a light sensitive arc sensor that offers addition protection alongside traditional overcurrent measurements.
Primary Distribution Switchgear
PIX Compact with Roll On Floor Circuit Breaker

Compact modular primary distribution switchgear

Overview
PIX with roll on floor circuit breaker design provides an easy rack-in/rack-out option without the need for a separate breaker trolley, while offering all the features of the standard PIX family up to 17.5kV/2500A.

There are four different panel variants:
- CB - feeder panel with HVX circuit breaker and optional voltage transformer (≤1250A)
- BC CB - busbar section coupler panel with HVX circuit breaker and optional current transformer and Earth switch (2000/2500A)
- RMT - busbar riser panel with optional voltage transformer
- MT BBE - busbar metering panel with voltage transformer and busbar Earth switch

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur (kV)</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand</td>
<td>Ud (50Hz, 1 min (kV rms))</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up (1.2/50 μs (kV peak))</td>
<td>75</td>
<td>95</td>
</tr>
<tr>
<td>Rated busbar current</td>
<td>In (A)</td>
<td>2500</td>
<td>2500</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ith (kA/3s)</td>
<td>25/31.5/40</td>
<td>25/31.5/40</td>
</tr>
</tbody>
</table>

Main characteristics
- Internal arc withstand
  - 4 sided protection: 40kA/1s, A-FLR in accordance to AS62271-200
- Protection index
  - Air insulated switchgear (AIS)
  - Class: PM (metallic partition)
  - Loss of service continuity class: LSC2B
  - Units in switchboard: IP4X*

Applications
- Public distribution
- Network protection - Sepam, MiCOM or Gemstart
- Intelligent networks - remote management and monitoring

Compact design
Compact dimensions start with a 600mm wide cubicles for ratings up to 1250A and 800mm wide cubicles for ratings up to 2500A, up to 17.5kV.

For more info:
Catalogue: NRJED312395EN
Primary Distribution Switchgear

PIX

Overview
PIX is an indoor, metal-enclosed withdrawable circuit breaker sulphur hexafluoride (SF6) or vacuum switchgear intended for the MV section of HV/MV substations and high-power MV/MV substations with a service voltage up to 24kV / 2500A.

The innovative PIX family consists of:
- PIX Compact - 17.5kV, 31.5kA, 2500A single busbar
- PIX - up to 24kV, 31.5kA, 2500A single busbar
- PIX High - 17.5kV, 50kA, 5000A single busbar
- PIX MCC - 7.2kV, 50kA, 400A single busbar
- PIX 2B - 17.5kV, 25kA, 3150A double busbar.

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur (kV)</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand</td>
<td>Ud (50Hz, 1 min (kV rms))</td>
<td>28</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up (1.2/50 μs (kV peak))</td>
<td>75</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Rated current</td>
<td>In (A)</td>
<td>3150/4000*</td>
<td>2500</td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ih (kA/3s)</td>
<td>40</td>
<td>31.5</td>
<td></td>
</tr>
</tbody>
</table>

*with forced ventilation

Main characteristics

Internal arc withstand
- 3 side protection: 40kA/1s, A-FL
- 4 side protection: 40kA/1s, A-FLR
  in accordance with AS 62271-200

Protection index
- Air insulated switchgear (AIS)
- Class: PM (metallic partition)
- Loss of service continuity classes: LSC2B
- Units in switchboard: IP3X (Optional IP4X)
- Between compartments: IP2X

Applications

- Public distribution, heavy industry, oil and gas, infrastructure
- Marine
- Motor control – PIX MCC
- Network protection – Sepam, MiCOM or Gemstart
- Intelligent networks – remote management and monitoring (PACiS)

Remote racking and remote Earth switch operation

A fully-integrated remote racking solution can be provided by Schneider Electric to ensure operator safety and peace of mind. Electrical, mechanical and key interlocking options can be specified by the customer for their specific application along with wired and wireless options. The Earth switch of the PIX panel can also be motorised to provide another level of operator safety.
Primary Distribution Switchgear
GenieEvo

Overview
GenieEvo is an indoor, metal-enclosed fixed circuit breaker vacuum switchgear intended for the MV section of MV/LV substations and MV/MV substations, with a service voltage up to 17.5kV / 2500A.

GenieEvo includes a wide range of functional units to accommodate primary distribution application needs.

- VC - circuit breaker
- VB - bus section
- BBM - busbar metering
- P1 to P18 - type of protection

Electrical characteristics

<table>
<thead>
<tr>
<th>Insulation level</th>
<th>Ur kV</th>
<th>12</th>
<th>13.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand</td>
<td>Ud</td>
<td>50Hz, 1 min (kV rms)</td>
<td>28</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up</td>
<td>1.2/50 μs (kV peak)</td>
<td>75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated current</th>
<th>In A</th>
<th>630 - 1250 - 2000 - 2500</th>
<th>630 - 1250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated busbar current</td>
<td>Ih</td>
<td>25 - 200 - 630 - 1250 - 2000 - 2500</td>
<td>200 - 630 - 1250</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ith</td>
<td>25 - 200 - 630 - 1250 - 2000 - 2500</td>
<td>200 - 630 - 1250</td>
</tr>
</tbody>
</table>

Main characteristics
Internal arc withstand
- 3 side protection: 25kA/1s, A-FL
- 4 side protection: 25kA/1s, A-FLR
in accordance with AS 62271-200

Protection index
- Air insulated switchgear (AIS)
- Class: PM (metallic partition)
- Loss of service continuity classes: LSC2A
- Units in switchboard: IP3X
- Between compartments: IP2X

Applications
- Public distribution, heavy industry, oil and gas, infrastructure.
- Network protection – Sepam
- Intelligent networks - remote management and monitoring (Powerlogic SCADA)

Minimising maintenance operations
GenieEvo is a vacuum MV switchgear with virtually maintenance-free operation. Unlike conventional vacuum switchgear, the isolators in GenieEvo are sealed in an Earth-screened cast resin enclosure containing controlled air, which eliminates the need for regular cleaning of the copper contacts throughout the product’s entire life. Primary connections and busbar are also solid insulated.
Primary Distribution Switchgear
Fluair F400

Overview
Fluair F400 is an indoor, metal-enclosed withdrawable circuit breaker sulphur hexafluoride (SF₆) switchgear intended for the MV section of HV/MV substations and MV/MV substations, with a service voltage up to 40.5kV / 2500A.

Fluair F400 includes a wide range of functional units to accommodate primary distribution application needs.

- AD6-RD6: incomer or feeder
- CL6-GL6: line up bus section
- TT6: busbar metering and Earthing
- LB6: busbar metering

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>40.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulation level</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand</td>
<td>Ud 50Hz, 1 min (kV rms)</td>
<td>70</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up 1.2/50 μs (kV peak)</td>
<td>170</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated current</th>
<th>In A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated busbar current</td>
<td>1250 - 2500</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ith kA/3s</td>
</tr>
<tr>
<td>25</td>
<td>1250 - 2500</td>
</tr>
<tr>
<td>31.5</td>
<td>1250 - 2500</td>
</tr>
<tr>
<td>40</td>
<td>1250 - 2500</td>
</tr>
</tbody>
</table>

Main characteristics

Internal arc withstand

- 3 side protection: 25kA/1s or 31.5kA/0.5s or 40kA/0.15s, A-FL
- 4 side protection: 25kA/1s or 31.5kA/0.5s or 40kA/0.15s, A-FLR in accordance with AS 62271-200.

Applications

- Network protection – Sepam
- Intelligent networks - remote management and monitoring (PowerLogic SCADA)

Protection index

- Air insulated switchgear (AIS)
- Class: PM (metallic partition)
- Loss of service continuity classes: LSC2B
- Units in switchboard: IP3X (LV control cabinet: IP4X)
- Between compartments: IP2X

Composition of an F400 switchboard

F400 switchboards are made up of several interconnected functional units. A single busbar is used to connect the power between functional units within a switchboard. The permanent electrical continuity of all the metal frames is provided by connecting the Earthing busbar of each functional unit to the main Earthing circuit of the switchboard. Low voltage wiring trays run across the switchboard above the LV compartments. LV cables can enter the switchboard through the top or bottom of each functional unit.
Primary Distribution Switchgear
DNF7-2

Overview

DNF7-2 is an air insulated, metal-clad withdrawable switchgear for 36kV indoor applications. The withdrawn design gives easy access for installation and maintenance. The metal-clad construction, with automatic shutters and comprehensive interlocking, ensures operator safety at all times.

DNF7-2 meets the requirements of IEC Standards for 36kV. It has passed the internal arc and short circuit withstand current tests, complying to the recent IEC 62271-200. It is manufactured in our ISO 9001-2000 and ISO 14001 certified factories.

DNF7-2 includes a wide range of functional units to accommodate primary application needs.

- Ingress Protection IP4X as standard
- Fully interlocked and comprehensive operation from the front: all operation possible by closed door
- Ideal to convey high current load: up to 3150A with forced cooling
- Compact dimension – 1200mm for the complete range (up to 3150 A)
- Busbar segregation

Electrical characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>40 kV</td>
</tr>
<tr>
<td>Lightning impulse kVp</td>
<td>185 kVp</td>
</tr>
<tr>
<td>kV rms</td>
<td>95 kV</td>
</tr>
<tr>
<td>Rated current A</td>
<td>2500/3150*</td>
</tr>
<tr>
<td>Short time withstand 3 s. rms value kA</td>
<td>31.5</td>
</tr>
<tr>
<td>Break through capacity kA</td>
<td>31.5</td>
</tr>
<tr>
<td>Capacitive A</td>
<td>800 A</td>
</tr>
<tr>
<td>Degree of protection of the housing</td>
<td>IP3X</td>
</tr>
</tbody>
</table>

*With forced cooling (on request)
1200mm for the internal arc version

Main characteristics

- Enhanced Internal Arc Classification (IAC) AFLR 31.5 kA for 1 second (arc duct option available and tested)
- Air insulated switchgear (AIS)
- Class: PM (metallic partition)
- Loss of service continuity classes: LSC2B
- Units in switchboard: IP3X

Applications

DNF7-2 is a high-rated switchgear that can be used in a wide range of applications including:

- Heavy industries
- Utilities
- Infrastructure

DNF7-2 making capable Earthing switch

The DNF7 cubicle has been designed so that all parts are at Earth potential. A high-speed Earthing switch with short circuit capability is employed and interlocked with the circuit breaker. The rails for the withdrawable circuit breaker are fixed to the dual bend reinforced main structure with robust screws. This ensures the reliability of the movable current path connections are trustworthy.
Primary Distribution Switchgear
GI-E

SF₆ outdoor circuit breaker for outdoor switchyard

Overview
GI-E is a sulphur hexafluoride (SF₆) circuit breaker intended for use in medium voltage outdoor switching yards up to 40.5kV / 3150A.

GI-E circuit breakers are available in 2 different frame sizes.
- Type A up to 1600A
- Type B up to 3150A

Main characteristics

Classification
- Mechanical endurance: 10000 CO or 20 years
- Electrical endurance: 10000 CO at 1100A in accordance with IEC 62271-100

Applications
- Outdoor switching yards
- Protection of transformers
- Protection of capacitors

Breaking principle

GI-E circuit breakers use the puffer principle with SF₆ gas. This method cools and extinguishes the electric arc as it passes through zero current by puffing a gas compressed by a piston attached to the moving contact. The gas is channelled by an insulating nozzle towards the tubular arcing contacts that are used as an exhaust. In addition, the rated characteristics, breaking the rated current under the rated voltage, are generally maintained at zero relative bars of SF₆.

For more info: Catalogue: AMTED300042EN

For more info:
Catalogue: AMTED300042EN
Primary Distribution Switchgear
VOX

SF₆ outdoor circuit breaker for outdoor switchyard

Overview
VOX is a sulphur hexafluoride (SF₆) insulated vacuum circuit breaker intended for use in medium voltage outdoor switching yards up to 38kV / 2000A.

Main characteristics

Classification
- Mechanical endurance: 10000 CO or 20 years
- Electrical endurance: 10000 CO at rated nominal current
  In accordance with IEC 62271-100

Applications
- Outdoor switching yards
- Protection of transformers
- Protection of capacitors

EPDM polymer bushings
The bushings are designed with an electric conducting part made of copper, which is insulated with EPDM polymer. EPDM bushings allow a good resistance against mechanical or electrical shock. Their high mechanical strength reduces the risk of damage during handling and installation or maintenance. The EPDM polymer also offers the advantage over porcelain that small projectiles and other minor shocks do not cause any chipping. This flexibility also gives them a high resistance to vandalism or accidental damage, and their generally inert properties make them ideal for severe climatic and pollution conditions.

1 Busbar terminals
2 Vandal-proof EPDM bushings
3 Stainless steel tank - SF₆ filled
4 Vacuum interrupter
5 Bellows
6 Aluminium enclosure
7 Gland plate
8 Trip / close mechanical push-buttons
9 Circuit breaker with spring charging mechanism
10 CT cover (CT covers on all 6 bushings)
Primary Distribution Switchgear

CBR

Overview

CBR is an outdoor pole-mounted single-phase circuit breaker for railway applications, based on the combination of vacuum switching together with low-pressure gas insulation technology. All pole components are mounted inside a fully welded stainless steel tank providing a sealed-for-life gasket-free enclosure. CBR is available in one-pole or two-pole versions. The two-pole version is for the double supply system catenary + feeder. A load-switch (SDR) is also available.

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage Ur kV</th>
<th>27.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand Ud 50Hz, 1 min (kV rms)</td>
<td>95</td>
</tr>
<tr>
<td>Lighting impulse withstand Up 1.2/50 μs (kV peak)</td>
<td>250</td>
</tr>
<tr>
<td>Rated current</td>
<td></td>
</tr>
<tr>
<td>Rated current In A rms</td>
<td>1250/2000</td>
</tr>
<tr>
<td>Breaking capacity kA rms</td>
<td>25</td>
</tr>
<tr>
<td>Short circuit making current Ith kA/3s</td>
<td>63</td>
</tr>
</tbody>
</table>

Main characteristics

- Internal arc withstand
- Mechanical and electrical endurance at 2000A: 10000 operations
- IEC Standards: 62271-100, 60376, 60529, 60694, 60815
- CBR is manufactured in Schneider Electric’s ISO 9001, 14001 and OHSAS 18001 certified workshops

Located at the bottom of the pole, the control cabinet monitors the following functions:

- indication of circuit breaker position
- indication of capacitor charge (closing)
- operation counter
- control interface
- local or remote operation.

Applications

- Railways

Pole design

The poles of the CBR are based on gas insulated switchgear (GIS) technology, which ensures near maintenance-free switchgear and is suitable for harsh environmental conditions.
Outdoor Housing

Enclosures

Overview
As a market leader in outdoor enclosures, Schneider Electric can provide housing solutions for modular switchgear (SM6), ring main units (RM6) and power factor correction applications. Distributed from our Transformer Solutions factory, these enclosures protect and extend the life of the electrical equipment. Available in mild steel, stainless steel and marine grade aluminium, Schneider Electric is able to supply the right enclosure for your application.

Modular switchgear application
This photograph shows a typical HV intake substation, where SM6 is installed within an outdoor enclosure. The photograph also illustrates a meter box on the outside where the Supply Authority mount its kWh meters to monitor power consumption. This arrangement is sold in most Australian states and territories and is available in 4 to 13-way configurations.

Ring main unit application
This photograph shows a RM6 switching station in an outdoor enclosure and is available in 2 to 6-way configurations. The RM6 / outdoor enclosure combination is popular with all market sectors, as it provides a compact switching arrangement at a cost-effective price.

Power factor correction application
This photograph depicts a special stainless steel enclosure for mining applications. It contains capacitor banks for power factor correction and Rollarc contactors.
Electrical Houses
E-House Solutions

Transformer and prefabricated substations

Overview
E-house Solutions integrate major power and control equipment into prefabricated buildings.

Incorporated inside an E-House are switchgear, transformers, motor control, HVAC, lighting and security for all business operations. Schneider Electric can provide civil, mechanical and electrical expertise to custom fabricate E-Houses that are easy to install and maintain.

Main characteristics

Modular design
E-Houses are adapted to local and industrial conditions. E-Houses are flexible in design and can be upgraded with rear access doors, expandable walls, space saving design and are stackable, with a robust construction.

Safety & quality
Every E-House is pre-assembled in a controlled environment, ensuring personal safety. Easily integrated, they provide maximum protection for equipment and are environmentally friendly.

Reduced costs
Your E-House will reduce the costs of your on-site construction and electrical equipment installations. All equipment is pre-installed, tested and ready to use when it is delivered.

Design considerations
- Site area limitations
- MV / LV segregation
- HVAC heat loadings and locations
- Switchgear positioning – heat distribution
- Pad mount systems / ductings / return air flow
- Split system mountings
- Lighting and emergency lighting – internal and external
- 2 hr fire ratings – wall, floor, etc.
- Cabling considerations – e.g. transformer locations
- Ongoing maintenance – access to replace equipment
- Pressurisation – use of airlocks
- Allowances for future equipment
- Building Code of Australia – e.g. egress paths and exits
- Australian Standards – e.g. AS3000 = 600mm clearance
- All stakeholders – e.g. operators, local shire

Applications

- Heavy Industry
- MMM (mine mineral metal)
- Oil and gas
- Primary Substations
- Railway

Lifecycle

Remote equipment
View all equipment in real time
Receive instant problem notification
Analyse and improve energy efficiency

Extensive support services
One point of contact
Project management – from conception to completion
Consultation and maintenance services
Optimisation of costs
Reduced installation time
Complete safety of operation
Total service over the lifetime of the installation.
Electrical Houses
E-House Solutions

Transformer and prefabricated substations

Product information

Typical equipment that can be included in an E-House include:

**Electrical distribution products**
LV/MV switchgear, MCC, metering, protection and transformers (liquid immersed and dry-type).

**Automation and control products**
Motor control and protection, variable speed drives and soft starters, control and signalling components, pressure and vacuum switches, position sensors, components for machine safety, automation, software, HMI and SCADA.

**Installation and wiring products**
Switches and outlets, cable management systems, wiring accessories, industrial switchgear and lighting.

**Critical power products**
UPS, AC/DC batteries and chargers.

**IT infrastructure products**
Data racks, network switches.

**Building services**
HVAC systems and controls, security and surveillance, access control, supervisory software.

**Project engineering and management**
Project management, Australian Standards compliance, logistics.

**Services**
Installation, pre-commissioning, maintenance, spare parts, training.

Customer benefits

**Customised and scalable**
Your E-House will be customised to the specific power and environmental needs of your project. The panel design makes it easily adaptable for the equipment layout you require, and simplifies any future expansion.

**Reduce your costs**
Your E-House will reduce the costs of on-site construction and electrical equipment installations. All equipment is pre-installed, tested and ready to use when it is delivered.

**Save time**
As you no longer have to worry about the logistics of constructing an electrical building on site, considerable time savings will be made on your project. E-Houses are pre-assembled and tested in the factory before shipment, saving on-site commissioning costs and time.

**Better use of space**
Our E-House solutions save space compared to block buildings, giving you more options for efficient positioning. Have easier access to electrical equipment without the need for additional building space.
GIS-Type Metal-Enclosed Switchgear
CBGS-0

Overview
CBGS-0 is an indoor, metal-enclosed sulphur hexafluoride ($\text{SF}_6$) switchgear with insulated single busbar arrangement intended for MV the section of HV/MV substations and MV/MV substations, with a service voltage up to 36kV / 1600A.

CBGS-0 includes a wide range of functional units to accommodate primary distribution application needs.

- Line or transformer feeder
- Coupling
- Riser
- Disconnectors
- Switch disconnectors
- Auxiliary services

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage Ur kV</th>
<th>24</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand Ud 50Hz, 1 min (kV rms)</td>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>Lighting impulse withstand Up 1.2/50 μs (kV peak)</td>
<td>125</td>
<td>170</td>
</tr>
<tr>
<td>Rated current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated busbar current In A</td>
<td>1250 - 2000</td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current Ith kA/3s</td>
<td>25 630 - 1250 - 1600</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31.5 630 - 1250 - 1600 630 - 1250</td>
<td></td>
</tr>
</tbody>
</table>

Main characteristics

Internal arc withstand
- 3 side protection: 31.5kA/1s, A-FL
- 4 side protection: 31.5kA/1s, A-FLR

Protection index
- Gas insulated switchgear (GIS)
- Class: PM (metallic partition)
- Loss of service continuity classes: LSC2A
- MV compartment: IP65
- Units in switchboard: IP3X (IP4X)
- Between compartments: IP2X

Applications

- Public distribution, heavy industry, oil and gas, infrastructure
- Wind farms
- Network protection – Sepam or MiCOM
- Intelligent networks – remote management and monitoring (PowerLogic SCADA)

Breaking principle

CGBS-0 circuit breakers use the puffer principle with $\text{SF}_6$ gas. When the fixed and mobile contacts begin to open, the piston slightly compresses the gas inside the pressure chamber. The arc strikes between the arcing contacts while the piston continues its movement.

A small quantity of gas is injected onto the arc through the insulating nozzle. The distance between the two arcing contacts becomes sufficient for the current to be broken when it reaches the zero point, due to the dielectric properties of gas.
Overview
GMA is an indoor, metal-enclosed sulphur hexafluoride (SF₆) switchgear with insulated single busbar arrangement intended for MV the section of HV/MV substations and MV/MV substations, with a service voltage up to 24kV / 1250A.

GMA includes a wide range of functional units to accommodate primary distribution application needs.
- C - Switch-disconnector with Earthing switch
- T1 - Switch-disconnector with fuses and Earthing switch
- CB6 - Switch disconnector with circuit breaker (630A) and Earthing switch
- CB12 - Disconnector with circuit breaker (1250A) and Earthing switch
- BB-VT - Busbar module with plug-in and optional disconnectable VT

Electrical characteristics

<table>
<thead>
<tr>
<th>Insulation level</th>
<th>Ur kV</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand</td>
<td>Ud</td>
<td>50Hz</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up</td>
<td>1.2/50 μs</td>
<td>75</td>
<td>95</td>
</tr>
</tbody>
</table>

| Rated busbar current              | In A  | 2500 |
| Rated current                     | lth kA/3s | 31.5 |

Main characteristics

Internal arc withstand
- 3 side protection: 31.5kA/1s, A-FL
- 4 side protection: 31.5kA/1s, A-FLR
  In accordance with AS 62271-200

Protection index
- Gas insulated switchgear (GIS)
- Class: PM (metallic partition)
- MV compartment: IP65
- Units in switchboard: IP3X
- Between compartments: IP2X

Applications

- Public distribution, heavy industry, oil and gas, and mining
- Marine
- Network protection – Sepam, MiCOM or Gemstart
- Intelligent networks - remote management and monitoring (PACiS)

Efficient, compact and powerful

- GMA switchgear and control gear requires 25% less floor space and 30% less air space than existing gas insulated switchgear and control gear in the same performance class
- Outgoing switchgear cubicles with currents up to 800A can be designed with a module width of just 450mm
- Incoming switchgear cubicles with currents 1600A up to 2500A are only 800mm wide
- The bus sectionaliser with vacuum circuit breakers of 1600A to 2500A and integrated busbar have a module width of only 1000mm, and corresponding bus sectionaliser up to 1250A of only 800mm
- No gas work at site
- Feeder can be changed out of the switchgear row
- Screen of busbar system is Earthed (touch-proof)
- Simple and fast installation
- Busbar CTs can be installed without extra feeder width

GMA panel dimensions
GIS-Type Metal-Enclosed Switchgear

GHA

Overview

GHA is an indoor, metal-enclosed sulphur hexafluoride (SF₆) switchgear with insulated single or double busbar arrangement intended for MV the section of HV/MV substations, and MV/MV substations with a service voltage up to 40.5kV / 2500A.

GMA includes a wide range of functional units to accommodate primary distribution application needs.

- Circuit breaker panels for incoming and outgoing feeders
- Outgoing voltage transformer with isolating device on HV side and transformer Earthing feature
- Bus couplers
- Bus section couplers with circuit breaker including busbar risers
- Bus section couplers and bus couplers with integrated busbar Earthing
- Bus risers without switching devices
- Bus sectionaliser panels with twowhree-position disconnector
- Metering panels with current and/or voltage transformer

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur kV</th>
<th>12</th>
<th>17,5</th>
<th>24</th>
<th>36</th>
<th>40.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand</td>
<td>Ud 50Hz, 1 min (kV rms)</td>
<td>28</td>
<td>38</td>
<td>50</td>
<td>70</td>
<td>80</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up 1.2/50 μs (kV peak)</td>
<td>75</td>
<td>95</td>
<td>125</td>
<td>170</td>
<td>185</td>
</tr>
<tr>
<td>Rated current</td>
<td>In A 2500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ith kA/3s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal arc withstand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 side protection: 40kA/1s, A-FL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 side protection: 40kA/1s, A-FLR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in accordance with AS 62271-200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas insulated switchgear (GIS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class: PM (metallic partition)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MV compartment: IP65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units in switchboard: IP3X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between compartments: IP2X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Applications

- Public distribution, heavy industry, oil and gas, and mining
- Marine
- Network protection – Sepam, MiCOM or Gemstart
- Intelligent networks – remote management and monitoring (PACiS)
- Gas density monitoring - IDIS

B-link

The busbars of each GHA switchgear panel are installed in separated gas-filled compartments. They are independent of external environmental influences and integrated into the insulating gas monitoring system. The connection of the busbars from adjacent panels is established via our innovative busbar link system: B-link.

Benefits of the B-link system include:

- enabling assembly without gas work on site
- extensions or panel replacements within the panel assembly are possible without gas handling and without interference in the gas filled compartments
- after disassembly of a B-link system between adjacent panels; an isolating distance can be established to form separate busbar sections without gas handling
- if necessary, the resistance can be measured separately for each busbar section, for a complete busbar system or for a panel.
GIS-Type Metal-Enclosed Switchgear

WI

Overview

WI is an indoor, metal-enclosed sulphur hexafluoride (SF₆) switchgear with insulated single or double busbar arrangement intended for MV the section of HV/MV substations, and MV/MV substations with a service voltage up to 52kV / 2500A.

WI includes a wide range of functional units to accommodate primary distribution application needs.

WIA (single busbar)

- Circuit breaker panel
- Disconnector panel
- Bus section coupler

WIB (double busbar)

- Circuit breaker panel
- Bus section coupler
- Bus coupler (transverse)
- Metering panel

Electrical characteristics

| Rated voltage | Ur kV | 12 | 17.5 | 24 | 36 | 52 | ±27.5*
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand</td>
<td>Ud 50Hz, 1 min (kV rms)</td>
<td>28</td>
<td>38</td>
<td>50</td>
<td>70</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up 1.2/50 μs (kV peak)</td>
<td>75</td>
<td>95</td>
<td>125</td>
<td>170</td>
<td>200</td>
<td>250</td>
</tr>
<tr>
<td>Rated current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated busbar current</td>
<td>In A</td>
<td>2500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ith kA/3s</td>
<td>40</td>
<td>31.5</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Main characteristics

- 3 side protection: 40kA/1s, A-FL in accordance with IEC60298
- Protection index:
  - Gas insulated switchgear (GIS)
  - Class: PM (metallic partition)
  - MV compartment: IP65
  - Units in switchboard: IP3X
  - Between compartments: IP2X

Applications

- Public distribution, heavy industry, oil and gas, and mining
- Railway
- Network protection – Sepam, MICOM or Gemstart
- Intelligent networks – remote management and monitoring (PACIS)
- Gas density monitoring - IGIS

IGIS

IGIS is an intelligent electronic system for recording temperature-compensated insulating gas pressure in gas-insulated medium voltage switchgear. It is used for automatic, permanent monitoring of the insulating gas pressure during operation and, if necessary, for issuing quick signals to the switchgear and the control room.
Overhead Distribution Switchgear
N-Series

Recloser

Overview
The N-Series Three-Phase Automatic Circuit Recloser combines state-of-the-art vacuum arc interruption, with integrated voltage and current measurement. These features are encased in a fully welded and sealed 316 grade stainless steel tank filled with insulating SF6 gas.

Four models:
- N15 - 15.5kV, 12.5kA, 110kV BIL
- N27 - 27kV, 12.5kA, 150kV BIL
- N3812 - 38kV, 12.5kA, 170kV BIL
- N3816 - 38kV, 16kA, 170kV BIL.

- Up to 800A continuous current
- 10,000 operations
- Source-side voltage measurement as standard
- Load-side voltage measurement as standard
- ADVC COMPACT or ULTRA Controller

Main characteristics
- 15kV, 27kV and 38kV options
- 316 grade stainless steel tank
- Fully insulated bushing arrangement
- Latest technology vacuum arc interruption
- 800A continuous current
- 850A emergency current (8 hours)
- Exceptional reliability and service

Applications
- Feeder automatic circuit recloser
- Substation automatic circuit recloser
- Loop automation
- Automatic change-over
- Smart grid

For more info:
- Catalogue: Products L3-WS-70590-V2-EN
- Catalogue: ADVC2-1166
- Network Automation Page 96

N-Series circuit breaker
ADVC Ultra Flex Controller

N-Series pole mounted installation
N-Series substation installation
Overhead Distribution Switchgear
U-Series

Overview
U-Series Three-Phase pole-mounted Automatic Circuit Recloser uses the latest technology in solid dielectrics, vacuum interruption and insulants. A 316 grade stainless steel enclosure protects the mechanism against the environment. The U-Series is rated up to 27kV, rated load current 630A and rated interrupting current 12.5kA.

Two models:
- U15 - 15.5kV, 12.5kA, 110kV BIL
- U27 - 27kV, 12.5kA, 125kV BIL.

- Up to 630A continuous current
- 10,000 operations
- Source-side voltage measurement as standard
- Load-side voltage measurement optional
- ADVC COMPACT or ULTRA Controller

Main characteristics
- 15kV and 27kV options
- 316 grade stainless steel tank
- Latest technology in solid dielectric and vacuum arc interruption
- I-terminal current and voltage measurement
- Optional X-terminal voltage measurement
- 630A continuous rated current
- Mechanical lockout

Applications
- Feeder automatic circuit recloser
- Substation automatic circuit recloser
- Loop automation
- Automatic change-over
- Smart grid.

For more info:
Catalogue: ADVC2-1166

Customer Service Tel: 1300 369 233
Overhead Distribution Switchgear
W-Series

Recloser

Overview
W-Series Single-Phase SWER Recloser provides automation and remote control on one phase. The W-Series is rated up to 24kV, rated load current 400A and rated interrupting current 6kA.

- Up to 400A continuous current
- 10,000 operations
- Source-side voltage measurement as standard
- Load-side voltage measurement optional
- ADVC COMPACT or ULTRA controller

Main characteristics
- 24kV phase to ground
- 316 grade stainless steel tank
- Single Phase applications
- SWER (single wire Earth return) applications
- 400A continuous rated current

Applications
- SWER recloser
- Smart grid

For more info:
Catalogue: ADV21166

W-Series pole mounted installation
Overhead Distribution Switchgear
RL-Series

Overview

RL-Series Load Break Switches/Sectionalisers are contained in a hard wearing, SF6 gas-filled, 316 grade stainless steel tank and offers the latest in arc quenching technology.

Extremely short arcing times (within half a cycle) plus tulip-type contacts with arc-resistant material, ensure a long switching life and extended short-circuit making capability.

- MR model - manually operated load-break switch
- FA model - fully automated sectionaliser
- Source-side voltage measurement as standard
- Load-side voltage measurement as standard
- ADVC COMPACT or ULTRA controller
- Motor pack and controller be can be added later once the manual switch is in use.

Main characteristics

- 15kV, 27kV and 38kV models
- 630A continuous rated current
- 12.5 or 16kA short time withstand current
- 10,000 operations
- 316 grade stainless steel tank
- Bare terminal (15kV only) or fully insulated bushing arrangement
- Latest technology in SF6 arc interruption
- Choice of manual or automated operation

Applications

- Manual load-break switch
- Motorised load-break switch
- Fully automated sectionaliser
- Normally-open tie point

Mid-Pole Operator

Designed to make mechanical operation (via hook-stick) easier, the Mid-Pole Operator brings the mechanically operated point of the switch down the pole. The operation point is lower and mounts up to six metres underneath the switchgear.
Overhead Distribution Switchgear
ADVC Controller Range

Pole-mounted controller

Overview
The ADVC Controller Range offers advanced protection, measurement, diagnostic and communication features in a reliable package. Designed around the user, the new controller range offers flexibility and choice. Users have a choice of two cubic sizes (ULTRA and COMPACT) and two operator interfaces (flexVUE and setVUE).

All the protection, monitoring, communication, diagnostic and automation features are included as standard in all models.

- ULTRA - large 316SS controller cubicle with two accessory mounting areas
- COMPACT - smaller 304SS controller cubicle with one accessory mounting area
- flexVUE - interface with 20 configurable status lamps and 12 quick action keys
- setVUE - large 4 x 40 LCD with familiar menu-driven operation

Power supply options
- 110/240V a.c.
- Integrated VT
- DC

Accessories
- 8 x input, 8 x output interface
- Fast trip/close input interface

Main characteristics
- Choice of two operator interfaces, flexVUE or setVUE
- Choice of two cubicles, COMPACT or ULTRA
- IP65 rated protection for electronics
- RS232, RS485, V23 and 10Base-T Ethernet communication ports
- Temperature range down to -40°C
- DNP3, IEC 60870-5-101/104 and other protocols
- Stainless steel enclosure.

Applications
Automatic reclosing protection relay for Medium Voltage feeder applications. ADVC Controller Range interfaces to the following switchgear:
- N-Series
- U-Series
- W-Series
- RL-Series.

Custom Menu
With the Custom Menu features it is possible to nominate frequently used data field to appear in a dedicated scrolling menu. This new feature provides field operators with easy access to essential data, such as demand and system information when they open the controller door. It is also possible to access the entire engineering menu if required.

Custom Logic Tool (CLT)
Custom Logic Tool is used to customise system status indication via LEDs, enhance reporting via protocol and even allow the user to create their own control and automation functions in medium voltage overhead networks.

Distance to fault calculation
Based on line impedance, pre-fault and steady-state fault values the controller and calculates the distance from the recloser installation to the fault on the network. This information (in kilometres or miles) is used by the utility to despatch line crews more efficiently during network fault conditions.

Sync Check
Bringing co-generation online in medium voltage networks is now much easier with the Sync Check function available on the ADVC Controller. By utilising the integrated voltage sensors the Sync Check feature monitors the frequency, voltage phase, and amplitude on the source and load sides of the tie switchgear. Close operation is blocked when the generator is out of sync with the network and only allowed once the generator is in sync. The feature significantly improves network stability.
Motor Starters
Motorpact

Overview
Motorpact is an indoor, metal-enclosed switchgear intended for asynchronous MV motor applications with a service voltage up to 7.2kV / 3.8MW.

Motorpact includes a wide range of motor starters for different motor application needs.

- FVNR - full voltage non-reversing
- FVR - full voltage reversing
- 2S2W - 2-speed 2-winding full voltage non-reversing
- 2S1W - 2-speed 1-winding full voltage non-reversing
- RVSS - reduced voltage soft start
- S3 - sequential smart start reduced voltage non-reversing
- RVAT - reduced voltage auto-transformer

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur kV</th>
<th>3.3</th>
<th>5.5</th>
<th>6.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated busbar current</td>
<td>In A</td>
<td>2500 - 3150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>lth kA/3s</td>
<td>40</td>
<td>200 - 400</td>
<td></td>
</tr>
<tr>
<td>Transformer power with 315A single fuse</td>
<td>kVA</td>
<td>950</td>
<td>1500</td>
<td>1800</td>
</tr>
<tr>
<td>Transformer power with 315A double fuses</td>
<td>kVA</td>
<td>1800</td>
<td>3000</td>
<td>3500</td>
</tr>
</tbody>
</table>

Main characteristics

Internal arc withstand
- 3 side protection: 25kA/1s, A-FL
- 4 side protection: 25kA/1s, A-FLR
  in accordance with AS 62271-200

Protection index
- Air insulated switchgear (AIS)
- Class: PI (insulating partition)
- Loss of service continuity classes: LSC2A
- Units in switchboard: IP3X(Optional: Up to IP42)
- Between compartments: IP2X

RVSS application

Stand-alone soft starters are a good solution for installations where motors are far away from the main switchboard. Installing the soft starters close to the motors maintains maximum performance.

Applications where multiple motors are started or stopped one by one, can be controlled by one soft starter using the S3 option. This is a cost-effective solution for pumping stations or fans.
Motor Starters
PIX MCC

Overview
PIX MCC is a direct on-line (full voltage) motor starter that is part of the PIX family. It uses a ‘slimline’, single tier fused vacuum contactor for motor applications with a service voltage up to 7.2kV/2.7MW

Versions:
Version 1: electrically held with auxiliary power
Version 2: electrically held with internal VT
Version 3: with mechanical latch

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur kV</th>
<th>3.6</th>
<th>7.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td>Ud 50Hz, 1min (kV rms)</td>
<td>10</td>
<td>20(32)</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up 1.2/50 μs (kV peak)</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Rated current</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated busbar current (with cooling fan)</td>
<td>3150 (4000)</td>
<td>3150 (4000)</td>
<td></td>
</tr>
<tr>
<td>Rated short time withstand current 3s</td>
<td>kA rms</td>
<td>up to 40/50</td>
<td>up to 40/50</td>
</tr>
<tr>
<td>Rated peak withstand current</td>
<td>kAp</td>
<td>100/125</td>
<td>100/125</td>
</tr>
<tr>
<td>Fused contactor unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated thermal current</td>
<td>A</td>
<td>depending on fuse type</td>
<td></td>
</tr>
<tr>
<td>Nominal operating voltage</td>
<td>kV</td>
<td>3.3</td>
<td>6.6</td>
</tr>
<tr>
<td>Maximum motor rating</td>
<td>kW</td>
<td>1400</td>
<td>2700</td>
</tr>
<tr>
<td>Maximum transformer rating</td>
<td>kVA</td>
<td>1600</td>
<td>3100</td>
</tr>
<tr>
<td>Maximum capacitor bank rating</td>
<td>kVAR</td>
<td>1300</td>
<td>1700</td>
</tr>
<tr>
<td>Contactor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current (AC4 duty)</td>
<td>A</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Earth switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short time withstand current 1s/3s</td>
<td>kA rms</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Peak making current</td>
<td>kAp</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Main characteristics

Internal arc withstand
4 side protection: 40kA/1sec A-FLR

Protection index
- Air insulated switchgear (AIS)
- Class: PM (metallic partition)
- Loss of service continuity class: LSC2B
- Degree of protection, external: IP3X (IP4X optional)
- Degree of protection between compartments: IP3X
- Degree of protection with open door: IP2X

Applications
- Oil and gas, mining, power plants
- Motor starting
- Intelligent control and protection: GemStart 5

Compact design
The PIX Motor Control Center is a slimline design, which lines up directly with the PIX range, without interface cubicles. The design philosophy and operation are similar to the PIX switchgear range, helping reduce training time and minimise the risk of improper use.

MV devices
1. Busbars for cubicle interconnection
2. Withdrawable fused contactor
3. MV connections by cables accessible from the front face
4. Earthing switch
5. Current transformers

LV control cabinet
6. Low voltage auxiliaries and the protection, monitoring and control unit are in a control cabinet, which is separated from the medium voltage part.
Medium Voltage Drive Systems
Altivar 1200

MV variable speed drive

Overview
ATV1200 is an indoor variable speed drives (VSD) intended for asyncronous and syncronous MV motor applications, with service voltage up to 11kV. Significant energy saving on your application can be obtained, enabling a quick return on investment.

Electrical characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power rating</td>
<td>315-16200kVA</td>
</tr>
<tr>
<td>Input</td>
<td>24-54 pulse diode rectifier brige</td>
</tr>
<tr>
<td>Input voltage</td>
<td>3/6/11kV, as required</td>
</tr>
<tr>
<td>Input frequency</td>
<td>50/60Hz</td>
</tr>
<tr>
<td>Output voltage</td>
<td>3,6,11kV as required</td>
</tr>
</tbody>
</table>

Main characteristics
- Catch on fly (low and high inertia)
- Simulation mode for commissionig
- Master slave function up to 3 motors
- Speed synchronised control (load sharing)
- Motor auto-tuning
- Soft start function
- Multi-motor control (cascade mode)
- Auto-restart
- Communication: Modbus, Modbus TCP, Ethernet IP, Profinet or DeviceNet
- Protection class: standard IP31. Option: IP41, IP42

Applications
ATV1200 dedicated to industry and utilities applications such as fan, pump, compressor and conveyor.

Benefits
- Reduction of energy consumption
- Reliable, high performance motor control solution
- Easy integration into existing or new installation
- Reduced maintenance costs
- Comprehensive service and support available

Medium Voltage Drive
System ATV1200
Loose Components
Evolis 17.5 and 24

Vacuum circuit breaker

Overview
Evolis is a vacuum circuit breaker intended for use in medium voltage network applications, new installations or renovation, and provides protection for all types of applications up to 24kV and 2500A.

Evolis circuit breakers are available for different installations including:
- Evolis 17.5 fixed frontal version
- Evolis 24 fixed frontal or lateral versions
- Evolis 17.5 withdrawable frontal version
- Evolis 24 withdrawable frontal version
- Evolis 17.5 HP (high-power) withdrawable frontal version.

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage Ur kV</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand Ud 50Hz, 1 min (kV rms)</td>
<td>20</td>
<td>28</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Lighting impulse withstand Up 1.2/50 μs (kV peak)</td>
<td>60</td>
<td>75</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Rated current Ir A</td>
<td>630</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1250</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>2500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current Ith kA/3s</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Main characteristics
- Mechanical endurance: M2 (10000 operations)
- Electrical endurance: E2
- Capacitive current breaking: C1
- In accordance with IEC 62271-100

Applications
Protection of:
- Public distribution, mining, infrastructure, industry and commercial
- It provides protection for all types of applications such as cables, overhead lines, motors, capacitors, transformers and source busbar sections
- Auxiliaries, including shunt trip, undervoltage coil, motor mechanism, auxiliary switch, operations counter, etc.

Breaking principle
Evolis circuit breakers use the axial magnetic field (AMF) technique. It involves applying an axial magnetic field parallel to the axis of the two contacts, which allows a diffuse arc to be maintained even at high current values. The arc energy is spread over the whole contact surface area, therefore causing very low levels of erosion.
Loose Components
LF and LFP

Overview

LF and LFP are sulphur hexafluoride (SF6) circuit breakers and intended for use in medium voltage network applications, new installations or renovation and provides protection for all types of applications up to 17.5kV and 5000A.

LF and LFP circuit breakers are available for different installations including:
- LF fixed. Up to 3150A and 50kA breaking current
- LFP fixed. Up to 5000A and 50kA breaking current
- LF withdrawable. Up to 3150A and 50kA breaking current.

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage Ur kV</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Insulation level</th>
<th>Power frequency withstand Ud 50Hz, 1 min (kV rms)</th>
<th>20</th>
<th>28</th>
<th>38</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting impulse withstand Up 1.2/50 μs (kV peak)</td>
<td>60</td>
<td>75</td>
<td>95</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated current</th>
<th>Rated current In A 630</th>
<th>A 1250</th>
<th>A 2000</th>
<th>A 2500</th>
<th>A 3150</th>
<th>A 5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaker LF1/LF2/LF3/LFP</td>
<td>25</td>
<td>31.5</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current Ith kA/3s</td>
<td>25</td>
<td>31.5</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breaker LF1/LF2/LF3/LFP</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Main characteristics

- Mechanical endurance: M2 (10000 operations)
- Electrical endurance: E2
- Capacitive current breaking: C2
- In accordance with IEC 62271-100

Applications

- Public distribution, mining, infrastructures, industry and commercial.
- Through their anti-seismic qualification, they are particularly well suited to nuclear or thermal power production installations and applications in heavy industries, such as mining and petrochemical industry.
- Through their compact dimensions and harmonised range, LF circuit breakers are positioned very favourably on the retrofit market.
- With self expansion, the breaking technique used in these circuit breakers (all current types; capacitive and inductive) can be made or broken without generating overvoltage, which could damage your installation. The LF circuit breaker is ideally suited to operating capacitor banks.

Breaking principle

LF circuit breakers use the SF6 gas self expansion technique. It combines the effect of thermal expansion, with a rotating arc to create arc blowing and quenching conditions. The result is reduced control energy requirements and arcing contact erosion, which increases mechanical and electrical endurance.

Customer Service Tel: 1300 369 233
Loose Components SF

SF6 circuit breaker

Overview

SF is a sulphur hexafluoride (SF6) circuit breaker intended for use in medium voltage network applications, new installations or renovation and provides protection for all types of applications up to 40.5kV and 2500A.

SF circuit breakers are available for different installations including:
- SF1 fixed. Up to 36kV, 1250A and 25kA breaking current
- SFset fixed. Up to 24kV, 1250A and 25kA breaking current
- SF2 fixed. Up to 40.5kV, 3150A and 40kA breaking current
- SF F400 withdrawable. Up to 40.5kV, 3150A and 40kA breaking current.

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage Ur kV</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>36</th>
<th>40.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power frequency withstand Ud 50Hz, 1 min (kV rms)</td>
<td>28</td>
<td>38</td>
<td>50</td>
<td>70</td>
<td>95</td>
</tr>
<tr>
<td>Lighting impulse withstand Up 1.2/50 μs (kV peak)</td>
<td>75</td>
<td>95</td>
<td>125</td>
<td>170</td>
<td>185</td>
</tr>
<tr>
<td>Rated current In A</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>630</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1250</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3150</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breaker SF1/SFset/SF2</td>
<td>12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
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<td></td>
<td>25</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current Ith kA/3s</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Main characteristics

- Mechanical endurance: M2 (10000 operations)
- Electrical endurance: E2
- Capacitive current breaking: C2
- In accordance with IEC 62271-100

Applications

- Public distribution, mining, infrastructure, industry and commercial.
- With self expansion, the breaking technique used in these circuit breakers (all current types; capacitive and inductive) can be made or broken without generating overvoltage which could damage your installation.
- The LF circuit breaker is ideally suited to operating capacitor banks.

Breaking principle

SF circuit breakers use the puffer principle with SF6 gas. This method cools and extinguishes the electric arc as it passes through zero current by puffing a gas compressed by a piston attached to the moving contact. The gas is channeled by an insulating nozzle towards the tubular arcing contacts that are used as an exhaust.
Loose Components
Rollarc and CBX

SF₆ contactor and vacuum contactor

Overview
Rollarc is a sulphur hexafluoride (SF₆) contactor intended for use in frequently operated medium voltage network applications, new installations or renovation for all types of applications up to 12kV / 400A.

There are two types of Rollarc contactors:
- the R400, with magnetising holding
- the R400D, with mechanical latching.

The Rollarc R400 and R400D contactors are available in three versions:
- basic - contactor alone, without the cradle
- fixed - the contactor is mounted on a fixed cradle
- withdrawable - the contactor is mounted on a withdrawable cradle.

Electrical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur kV</th>
<th>7.2</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand</td>
<td>Ud 50Hz, 1 min (kV rms)</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up 1.2/50 μs (kV peak)</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated current</th>
<th>A</th>
<th>400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking capacity</td>
<td>kA</td>
<td>10</td>
</tr>
<tr>
<td>Breaking capacity with fuse</td>
<td>kA</td>
<td>50</td>
</tr>
<tr>
<td>Making capacity</td>
<td>kA</td>
<td>25</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ith kA/3s</td>
<td>10</td>
</tr>
</tbody>
</table>

Main characteristics
- Mechanical endurance (magnetic holding): 300,000 op
- Mechanical endurance (mechanical latching): 100,000 op
- Electrical endurance: 60 operating cycles at 10,000A
- In accordance with IEC 62271-105

Applications
- Rollarc is particularly suited to polluted environments such as mines, cement works, etc.
- Protection and control of MV motors, capacitor banks and power transformers.

Overview
The CBX is a vacuum contactor for 7.2kV and 12kV applications and is available as a single-phase (CBX3-C) or three-phase unit (CBXS3-C). A mechanical interlock between two contactors is available for motor reverse applications. A withdrawable type of CBX for motor starter cubicles equipped with fuse holders (DIN or BS type) is also available. The CBX contactor comes with an electronic auxiliary supply (EAS) as standard.

Electrical characteristics CBX3-C | CBXS3-C

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur kV</th>
<th>7.2/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency withstand</td>
<td>Ud 50Hz, 1min (kV rms)</td>
<td>20/28</td>
</tr>
<tr>
<td>Lighting impulse withstand</td>
<td>Up 1.2/50μs (kV peak)</td>
<td>60/75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated current</th>
<th>A</th>
<th>400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inductive Load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated thermal current</td>
<td>A</td>
<td>400</td>
</tr>
<tr>
<td>AC3 duty</td>
<td>A</td>
<td>400</td>
</tr>
<tr>
<td>AC4 duty</td>
<td>A</td>
<td>315</td>
</tr>
<tr>
<td>Maximum motor rating*</td>
<td>kW</td>
<td>5300</td>
</tr>
<tr>
<td>Inrush current</td>
<td>KAp</td>
<td>10</td>
</tr>
</tbody>
</table>

| Capacitive Load |     |     |
| Rated operational current | A | 400 |
| Maximum capacitor bank rating | kVAR | 3360/5600 |
| Rush current | KAp | 20 |

| Short time withstand current | kA | 4 | 4 |
|------------------------------|----|----|
| 1s                            |    |    |
| 30s                           |    |    |
| Peak on 1/2 cycle | kA | 19 | 19 |
| Average chopping current | 2.3 | 2.3 |

* DIN fuses for motor application type FD3M available on request

Main characteristics
- Mechanical endurance: 3 000 000
- Electrical endurance at rated current: 500 000

Applications
- Process industries
- Mining
- Oil & Gas
- Power Generation
Loose Components
Indoor Instrument Transformers

Overview
The Schneider Electric range of instrument transformers is designed for voltages from 0.72kV to 36kV and rated currents from 5A to 4000A to meet all medium and low voltage electrical distribution requirements.

Schneider Electric instrument transformers include a wide range of indoor equipment for voltage or current measurement.

- CT - current transformer
- VT - voltage transformer
- LPCT - low power current transformer

Main characteristics

<table>
<thead>
<tr>
<th>Accuracy class</th>
<th>Metering</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 - laboratory metering and rare billing applications</td>
<td>0.5 - statistical metering and typical billing applications</td>
<td>5P - differential or zero sequence protection (most common)</td>
</tr>
<tr>
<td>0.5P - impedance relay or amperometric protection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Applications

- Network protection – Sepam
- Metering - ION

LPCT
LPCT is a low power current transformer using an MV signal in the secondary circuit. It increases safety of the installation, as an open circuit secondary does not damage the unit and simplifies installation with prewired cable and connection to the protection relay. Thanks to a linear characteristic, one device can provide protection functions from a few amps up to the short circuit level

Protection or metering devices have to receive data on electrical values (current or voltage) from the equipment to be protected. For technical, economical and safety reasons, this data cannot be obtained directly on the equipment’s MV power supply; we have to use intermediary sensors - current and voltage transformers. These devices reduce the size of value to be measured, providing galvanic separation and supplying the power needed to process the data. CTs and VTs are an integral part of the protection circuit.

Example: 400/5 A, 15 VA, cl 0.5, FS 10

<table>
<thead>
<tr>
<th>Primary current</th>
<th>Secondary current</th>
<th>Safety factor</th>
<th>Accuracy class</th>
</tr>
</thead>
<tbody>
<tr>
<td>(see explanation in the example)</td>
<td>(see explanation in the example)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: 400/5 A, 15 VA, 5P10

<table>
<thead>
<tr>
<th>Primary current</th>
<th>Secondary current</th>
<th>Safety factor</th>
<th>Accuracy class</th>
</tr>
</thead>
<tbody>
<tr>
<td>(see explanation in the example)</td>
<td>(see explanation in the example)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For more info:
Catalogue: AMTED300031EN
Loose Components

Fuses

Overview

Schneider Electric fuses provide protection to medium voltage distribution devices from 3 to 36kV from both the dynamic and thermal effects of short-circuit currents greater than the fuse's minimum breaking current.

The Schneider Electric range includes fuses for different medium voltage applications.

- Fusarc CF - DIN type up to 250A at 3 to 36kV
- Solefuse - UTE type up to 125A at 7.2 to 36kV
- MGK - motor applications up to 250A and 7.2kV
- Tepefuse - instrument transformer protection

Main characteristics

- Un - rated voltage
- In - rated current
- I₃ - minimum rated breaking current
- I₁ - critical currents
- Iᵢ - maximum rated breaking current

Applications

- Considering their low cost and lack of required maintenance, medium voltage fuses are an excellent solution to protect various types of distribution devices.
- Medium voltage current consumers (transformers, motors, capacitors, etc).
- Public and industrial electrical distribution networks.

Fuse characteristics

In accordance with IEC 60282-1, it is recommended to replace all three fuses in a three-phase circuit when one of them has already blown, unless it is certain that there has been no overcurrent in the fuses that have not blown. It is important to take into account the fact that the striker only acts when the fuse element has blown. However, if the striker has not been activated, this does not mean that the fuse has not been subject to an overcurrent.

Time/current characteristics curves

3.6 - 7.2 - 12 - 17.5 - 24 - 36 kV

Time (s)

Current (A)
Loose Components
Propivar

Capacitors and medium voltage banks

Overview
A Propivar medium voltage capacitor has a maximum premissable rated voltage of 2250V. When connected in series-parallel groups, they provide high-power banks for elevated system voltages up to 36kV.

Propivar capacitors
- With or without internal fuses
- Single-phase or three-phase
- Max. network voltages up to 36 kV
  - Up to 450 kvar (three-phase capacitors)
  - Up to 600 kvar (single-phase capacitors)

Main characteristics
Devices using power electronics (variable speed drives, rectifiers, UPS, arc furnaces, fluorescent lamps, etc.) circulate harmonic currents in electrical networks. Such harmonics can interfere with the operation of many devices. Capacitors are highly sensitive to harmonics. A high level of harmonic pollution causes capacitors to overheat and age prematurely (breakdown). Different types of compensation must be chosen according to the power of the harmonic generators.

Standard type - for slightly polluted network
SAH type - for highly polluted network

Applications
Compensation of reactive power on a network or in an electrical installation has various economic and technical advantages:
- Economic advantages in that it cuts down on electricity bills through elimination of excessive consumption of reactive power
- Technical advantages in that it:
  - Increases power available at the secondary of the transformers
  - Reduces voltage drop in MV distribution networks
  - Reduces temperature rise in cables for constant active power.

Construction
Propivar capacitors are composed of elements, which include:
- Aluminium foil electrodes.
- A non-chlorinated biodegradable dielectric liquid and a polypropylene film.
A dielectric solely made up of plastic films helps to greatly reduce dielectric losses. The Propivar capacitor complies with standard IEC 871, 1 and 2.
Loose Components
Easergy PS100

Backup power supply

Overview
Easergy PS100 is a high-availability power supply, including a battery to ensure uninterrupted operation of the whole
substation in the event of loss of the main supply.

Traditional backup power supplies require a set of 2 or 4 batteries to produce 24V or 48V, with complicated replacement
and adjustment of the battery pack. The PS100 needs only one battery, simplifying replacement. The battery is a
standard sealed lead-acid 12V battery with a 10-year service.

Main characteristics
- Includes a regulated and temperature-compensated charger
- Stops the battery before deep discharge
- Carries out a battery check every 12 hours
- Measures battery ageing
- Forwards monitoring information via a Modbus communication port and output relays

The PS100 consists of two parts:
- power supply
- one battery.

<table>
<thead>
<tr>
<th>Power supply (PS100)</th>
<th>Battery</th>
</tr>
</thead>
<tbody>
<tr>
<td>24V or 48V output</td>
<td>12V, 24Ah or 38Ah sealed lead acid battery available</td>
</tr>
<tr>
<td>DIN rail mounting</td>
<td></td>
</tr>
<tr>
<td>RJ45 Modbus communication port</td>
<td></td>
</tr>
<tr>
<td>Diagnostics with LEDs</td>
<td></td>
</tr>
</tbody>
</table>

Applications
The PS100 unit supplies backup operating power for:
- MV switchgear electrical mechanism (motor and coils)
- transmission equipment (e.g. radio)
- protection relays, fault passage indicators or other IEDs
- all other devices in ML/LV substations (LV breakers, PLC concentrator).

Improved availability of MV/LV substations
The PS100 is designed to ride through power network interruptions of up to 48 hours. It is associated with a battery
selected to meet the required backup time. For example, a 38Ah battery provides 12 hours of backup power supply to a
SM6 switchboard including 4 Sepam units.
Loose Components
Trio Radio

Digital data radio modems

Overview
Trio radios provide secure and reliable wireless communication for municipal water suppliers, oil and gas producers, electrical utilities and other industries. A powerful Network Management System is available for remote configuration and monitoring of the entire radio system from any network node and is an essential tool in troubleshooting and preventative maintenance tasks. Monitoring and control infrastructure can be situated in geographically-dispersed locations, comprised of a diverse mix of equipment and system architectures, and subject to stringent environmental and safety regulations.

Main characteristics
- Licensed band – 380 to 520 MHz (UHF) - standard and redundant base/repeater stations (E-Series, M-Series)
- Unlicensed band - 915 MHz/2.4GHz Frequency Hopping Spread Spectrum (FHSS) (J-Series, K-Series)
- Ethernet and serial connectivity
- Point-to-point (PTP) and point-to-multipoint networks (PTMP)
- Network wide diagnostic interrogation which can be performed from anywhere in the system including any remote radio
- Remote over-the-air configuration of any radio from any location
- Over the air firmware upgrades
- FCC, ETSI, ACMA and CSA/ATEX approved

Applications
- Oil and Gas - pipeline monitoring, wellhead production, Emergency shut-down (ESD)
- Power Distribution - Integration with RTUs (T200) and Controllers (ADVC) for substation switching and fault indication, protection and isolation, transformer monitoring
- WWW - PLC monitoring (water quality, flow, pressure, temperature etc..) for sewage treatment, flood management

Remote diagnostics and network management
Trio radios remote diagnostics and network management features can improve infrastructure costs by combining multiple vendor applications onto a single radio network in kiosk, substation and pole transformer monitoring applications.
## Protection, Control and Monitoring

### Easergy T200

**Overview**

Easergy T200 has been specially designed to meet the needs of customers in managing MV substations, offering compact and open-ended solutions.

- Management of 1 to 16 switches or circuit breakers
- Backup power supply for motorisation, transmission equipment and control unit
- High-performance fault current detection
- Measurements for better control of the network load
- Network reconfiguration automation systems
- Communication with the control centre
- Monitoring, for local or remote operation
- Compatible with any type of SCADA system

### Main characteristics

**Switch/circuit breaker monitoring and control**

- Fault current detection
- Automation functions
- Voltage or current measurements
- Concentration of Modbus communication devices
- Data and measurements archives
- Backup power supply
- 1 to 2 Serial ports
- 1 Ethernet and USB port

### Applications

**Network automation**

- **Changeover switch (ACO)** - The changeover switch automation system allows for the automatic control and management of power supply sources in the MV secondary distribution network.
- **Bus tie coupling (BTA)** - Bus tie automation is an automation system for switching sources between two incoming lines and a busbar coupling switch.
- **Sectionaliser (SEC)** - The sectionaliser automation system opens the switch after a predefined number of faults during the voltage dip in the reclosing cycle of the upstream circuit breaker.
- **Self-Healing Grid (SHG)** - Pre-engineered solution to detect and isolate faults in underground open rings. Restoration of power to healthy sections of the ring is done in less than 20 seconds.

### Features:

- New automation function (genset automation)
- A continuously updated range of protocols includes the main standards IEC 870-5-101, IEC 870-5-104, DNP3, Modbus and other proprietary protocols, which allows T200 integration into a wide range of existing monitoring and control platforms
- Optimum transmission network management via two serial communication ports and an Ethernet port
- Wide range of integrated modems, including radio, PSTN, GPRS, GSM and DL
- Web interface for monitoring and control.

---

**Diagram:**

[Diagram of Easergy T200 configuration and connectivity.]
Protection, Control and Monitoring
Easergy Flite/Flair

Overview
Easergy Flite and Easergy Flair are the ranges of phase and Earth fault passage indicators for use in MV overhead and underground networks.

Easergy Flite and Flair ranges provide products for all the different MV distribution applications.

**Easergy Flite** - range for overhead
- Flite 110-SA - line-mounted single-phase ammetric fault detection
- Flite 116-SA/G200 - communicating line/pole-mounted ammetric fault detection

**Easergy Flair** - range for underground
- Flair 21D, 22D, 23D, 23DM - Ammetric fault detection incorporated in the switchgear. Flair 23DM with Modbus serial communication port
- Flair 219, 279 - wall-mounted ammetric fault detection
- Flair 200C - communicating wall-mounted ammetric

Main characteristics
- Ammetric fault detection
- Electrical measurements
- Concentration of Modbus communication devices
- Data and measurements archives
- Backup power supply
- 1 serial port
- 1 Ethernet and USB port

Applications
**Fault detection**
- Ammetric fault detection - The changeover switch automation system allows for the automatic control and management of power supply sources in the MV secondary distribution network.
- Network monitoring - The sectionaliser automation system opens the switch after a predefined number of faults during the voltage dip in the reclosing cycle of the upstream circuit breaker.

A continuously updated range of protocols, including the main standards IEC 870-5-101, IEC 870-5-104, DNP3, Modbus and other proprietary protocols, allows integration into wide range of existing monitoring and control platforms.

- Reliable MV network fault detection and indication, for complete peace of mind.
- Optimised actions through detailed local or remote information.
- Remote network reconfiguration through control units (GSM, Internet, standard protocols, etc.).
Protection, Control and Monitoring
MiCOM C264

Substation control unit

Overview
The MiCOM C264 is the latest generation of modular substation computers. It can act as an IEC61850 client and server, a powerful Ethernet gateway, a measurement unit and can host fast automation (FBD) and slow automation (PLC). With its ability to function as a remote terminal unit (RTU), a bay controller, a data concentrator, a gateway or a voltage regulator, the MiCOM C264 is a compact solution to countless applications installed in demanding electromagnetic conditions.

Main characteristics
- 40TE/80TE/19" Racks
- Flexible I/Os (Digital and analogue)
- Direct CT/VT Connection: Measurements/Protection module
- IEC 61850 Station Bus communication
- IEDs Concentrator with up to 4 serial sub-networks
- Upstream SCADA Communication
- Built-in Automation
- User programmable logic FBD
- User programmable PLC Automation with IEC1131-3 Tools
- Local LCD display
- Energy and Power Quality
- Cyber security

Applications
- Remote Terminal Unit
- Bay Controller Unit
- Substation Controller Unit
- Sequence of Events Recorder (SOE- SER)
- Data Concentrator
- Power Quality monitoring
- Automatic Voltage Regulator - AVR

Built-in Automation
- Automatic Voltage Regulation
- Autoreclose
- Synchro check
- Load Shedding

MiCOM C264 - Data Concentrator
Shown below is a typical architecture diagram of the C264 acting as a data concentrator with IEC61850 servers.
Protection, Control and Monitoring
Sepam Series Overview

Overview
With multi-functional Sepam protection relays, you can measure, manage, analyse and produce diagnostics for all applications in an installation. Range modularity makes it easy to select the relay corresponding exactly to your needs. The range is structured for typical applications (substations, transformers, generators, capacitors, busbars and motors) and provides the necessary functions for each application (protection, metering, control and monitoring, etc.). Starting with a Sepam base unit, complete solutions can be built up by adding input/output modules, sensors and communication modules.

Main characteristics
- Cost-effective solution for essential protection functions
- Phase and/or Earth-fault currents
- Logic discrimination
- Up to 7 outputs and 4 inputs
- Communication port available on Sepam 10A

Sepam Series 10 - For simple applications
- Backlit LCD graphic bitmap display
- 16 inverse time over-current characteristic curves
- Easy software setup
- Two 86-cycle fault records, last trip fault values and last 64 time-tagged alarms
- Self-test diagnostics
- Wide range of control power inputs (AC/DC)
- Breaker Failure and Cold Load Pick Up functions for S24 and T24

Applications
- Protection of:
  - substations incomers and feeders
  - transformers
  - motors
  - busbars
  - loss of mains
  - generators
  - capacitors

Sepam Series 20 - For usual applications
- Compact case provides standardised dimensions (< 100 mm deep)
- Directional over-current protection for dual incomers, couplings and closed-loop feeders
- Current and voltage inputs
- Setting software with Boolean logic equation assistance
- CT/VT and trip circuit supervision
- Twenty seconds of fault recording configurable for multiple captures, detailed history of last 5 trip reports and retention of last 200 time-tagged alarms
- 16 RTD inputs

Sepam Series 40 - For demanding applications
- Directional over-current protection for dual incomers, couplings and closed-loop feeders
- Current and voltage inputs
- Setting software with Boolean logic equation assistance
- CT/VT and trip circuit supervision
- Sixteen seconds of fault recording configurable for multiple captures, detailed history of last 5 trip reports and retention of last 200 time-tagged alarms
- 16 RTD inputs

Sepam Series 60 - For demanding applications
- Standardised dimensions for enhanced protection of incomers/feeders, transformer, motor, generator, bus, capacitor-bank applications
- Differential protection of transformers
- Differential protection of motors and generators
- Protection for incomers, couplings and important feeders
- Expanded logic-equation capabilities
- Graphical assistance for setting software
- Battery backup for historical and fault waveform data retention
- Synchro-checks module available
- 16 RTD inputs
- 28 binary inputs and 16 outputs

Sepam Series 80 - For custom applications
- Standardised dimensions for enhanced protection of incomers/feeders, transformer, motor, generator, bus, capacitor-bank applications
- Differential protection of transformers
- Differential protection of motors and generators
- Protection for incomers, couplings and important feeders
- Expanded logic-equation capabilities
- Graphical assistance for setting software
- Battery backup for historical and fault waveform data retention
- Optional mimic-based display units are available to view a portion of single-line and phasor diagrams
- 42 binary inputs and 23 outputs

For more info:
- Catalogue:
  - SEPED307026EN
  - SEPED303005EN

Applications
- Protection of:
  - substations incomers and feeders
  - transformers
  - motors
  - busbars
  - loss of mains
  - generators
  - capacitors

10
Protection, Control and Monitoring
Sepam Series 10 Selection Guide

Protection for simple applications

A Sepam Series 10 catalogue number comprises different elements:

- **Range** Sepam Series 10
- **Model**
  - Earth-fault protection: N
  - Phase-overcurrent and Earth-fault protection: B
  - Phase-overcurrent and Earth-fault protection, logic inputs and communication port: A
- **Number of current inputs**
  - 1 Earth-fault input: 1
  - 2 phase-current inputs + 1 earth-fault input: 3
  - 3 phase-current inputs + 1 earth-fault input: 4
- **Sensitivity of earth-fault protection**
  - Standard (0.1…24 Ino): 1
  - Sensitive (0.01…2,4 Ino): 2
  - High sensitivity (0.2…24 A and 2…240 A): 3
- **Supply voltage**
  - 24…125 V d.c. and 100…120 V a.c.: A
  - 110…250 V d.c. and 100…240 V a.c.: E
  - 220…250 V d.c. and high-threshold logic inputs: F

### Catalogue numbers

<table>
<thead>
<tr>
<th>Sepam Series 10</th>
<th>Cat. no</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
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<td>Sepam Series 10 B 31 E</td>
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### Replacement parts

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### Core balance CTs

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<td>G0110</td>
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<td>Core balance CTs, dia. 120 mm</td>
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<td>59635</td>
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<td>Core balance CTs, dia. 200 mm</td>
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<td>59638</td>
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### Protection, Control and Monitoring

**Sepam Series 20 Selection Guide**

**Protection for basic applications**

<table>
<thead>
<tr>
<th>Protection</th>
<th>ANSI code</th>
<th>Substation</th>
<th>Transformer</th>
<th>Motor</th>
<th>Busbar</th>
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<tbody>
<tr>
<td>Phase overcurrent</td>
<td>S20</td>
<td>S24</td>
<td>T20</td>
<td>T24</td>
<td>M20</td>
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<tr>
<td>Earth fault / Sensitive Earth fault</td>
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<td>50G/51G</td>
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<td>Earth fault cold load pick-up/blocking</td>
<td>CLPU 50/51N</td>
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<td>Breaker failure</td>
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<td>Excessive starting time, locked rotor</td>
<td>48/51LR/14</td>
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<td>1</td>
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<td>Starts per hour</td>
<td>66</td>
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<td>Positive sequence undervoltage</td>
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<td>Remanent undervoltage</td>
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<td>Phase-to-phase undervoltage</td>
<td>27S</td>
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</tr>
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<td>Phase-to-neutral undervoltage</td>
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<td>1</td>
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<td>Neutral voltage displacement</td>
<td>27N</td>
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<td>2</td>
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<tr>
<td>Overfrequency</td>
<td>81H</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Underfrequency</td>
<td>81L</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Rate of change of frequency</td>
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<tr>
<td>Recloser (4 cycles)</td>
<td>79</td>
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<td>Time relay</td>
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<td>Temperature monitoring (8 RTDs)</td>
<td>3B/49T</td>
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</table>

**Metering**

- Phase current I1, I2, I3 RMS, residual current I0
- Demand current I1, I2, I3, peak demand current IM1, IM2, IM3
- Voltage U21, U32, U13, V1, V2, V3, residual voltage V0
- Positive sequence voltage Vd / rotation direction
- Frequency
- Temperature

**Network and machine diagnosis**

- Tripping current Trip1, Trip2, Trip3, Trip4
- Unbalance ratio / negative sequence current Ii
- Disturbance recording
- Thermal capacity used
- Remaining operating time before overload tripping
- Waiting time after overload tripping
- Running hours counter / operating time
- Starting current and time
- Start inhibit time
- Number of starts before inhibition
- Cable arcing fault detection

**Switchgear diagnosis**

- Cumulative breaking current
- Trip circuit supervision
- Number of operations, operating time, charging time

**Control and monitoring**

- ANSI code
- Circuit breaker / contactor control
- Latching / acknowledgement
- Logic discrimination
- Switching of groups of settings
- Annunciation

**Additional modules**

- 8 temperature sensor inputs - MET148-2 module
- 1 low level analog output - MSA141 module
- Logic inputs/outputs - MES114/MES114/MES114F (10I/4O) module
- Communication interface - ACE949-2, ACE959, ACE937, ACE969TP-2, ACE969FO-2, ECI850


(1) For shunt trip unit or undervoltage trip unit.
(2) Exclusive choice between logic discrimination and switching from one 2-relay group of settings to another 2-relay group.
(3) Performs Sepam B20 functions.
(4) Applications S24 and T24 perform the functions of applications S23 and T23 respectively.
Protection, Control and Monitoring
Sepam Series 40 Selection Guide

Protection for demanding applications

<table>
<thead>
<tr>
<th>Protection</th>
<th>ANSI code</th>
<th>Substation</th>
<th>Transformer</th>
<th>Motor</th>
<th>Generator</th>
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<tr>
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<td>50/51</td>
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<td>Earth fault cold load pick-up</td>
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<tr>
<td>Excessive starting time, locked rotor</td>
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<td>Starts per hour</td>
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<td>Thermostat / Buchholz</td>
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</table>

**Metering**

- Phase current I1, I2, I3, RMS, residual current IR
- Demand current I1, I2, I3, peak demand current IM1, IM2, IM3
- Voltage U1, U2, U3, V1, V2, V3, residual voltage VR
- Positive sequence voltage V1, rotation direction
- Negative sequence voltage V1
- Frequency
- Active, reactive and apparent power P, Q, S
- Peak demand power PML, QML, power factor
- Calculating active and reactive energy (W.h, var.h)
- Active and reactive energy by pulse counting (W.h, var.h)
- Temperature

**Network and machine diagnosis**

- Tripping context
- Tripping current I1, I2, I3, trip2, trip3, trip4
- Unbalance ratio / negative sequence current I1
- Phase displacement V0, V1, V2, V3
- Unbalance recording
- Thermal capacity used
- Remaining operating time before overload tripping
- Waiting time after overload tripping
- Running hours counter / operating time
- Starting current and time
- Cable arcing fault detection
- Fault location
- Start inhibit time, number of starts before inhibition

**Switchgear diagnosis**

- Cumulative breaking current
- Trip circuit supervision
- Number of operations, operating time, charging time
- CT / VT supervision
- 60FL

**Control and monitoring**

- ANSI code
- Circuit breaker / contactor control
- Display and acknowledgment
- Logic discrimination
- Switching of groups of settings
- Annunciator
- Logic equation editor

**Additional modules**

- 8 temperature sensor inputs - MET148-2 module
- 2 low level analog output - MSB414 module
- Digital input/output module options.
- Customer Service Tel: 1300 369 233
- For more info: SEPED303005EN
- Catalogue: SEPED303005EN
- Standard, 3 according to parameter setting and MES114/MES114E/MES114F or MET148-2 (2 modules possible).
- For shunt trip unit or undervoltage trip unit.
## Protection, Control and Monitoring
### Sepam Series 60 Selection Guide

**Protection for demanding applications**

<table>
<thead>
<tr>
<th>Protection</th>
<th>ANSI code</th>
<th>Substation</th>
<th>Transformer</th>
<th>Motor</th>
<th>Generator</th>
<th>Cap.</th>
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</thead>
<tbody>
<tr>
<td>Phase overcurrent(1)</td>
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<td>49RMS</td>
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<td>Thermostat / Buchholz(2)</td>
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<tr>
<td>Temperature monitoring (16 RTDs)(4)</td>
<td>38/49T</td>
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<td>Synchro-check(4)</td>
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### Control and monitoring

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<tr>
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<td>Logic discrimination(2)</td>
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<td>Latching / acknowledgement</td>
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<td>Adaptation using logic equations</td>
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</table>

The figures indicate the number of relays available for each protection function.

Standard, O options.

(1) Protection functions with 2 groups of settings.

(2) According to parameter setting and optional MES120 input/output modules.

(3) With optional MET148-2 temperature input modules.

(4) With optional MCS025 synchro-check module.
# Protection, Control and Monitoring

## Sepam Series 60 Selection Guide

### Protection for demanding applications

<table>
<thead>
<tr>
<th>Metering</th>
<th>Substation</th>
<th>Transformer</th>
<th>Motor</th>
<th>Generator</th>
<th>Cap.</th>
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<tr>
<td></td>
<td>S60</td>
<td>S62</td>
<td>T60</td>
<td>T62</td>
<td>M61</td>
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<td>G60</td>
<td>G62</td>
<td>C60</td>
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<td>Positive sequence voltage Vd / rotation direction</td>
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### Network and machine diagnosis

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<th>Substation</th>
<th>Transformer</th>
<th>Motor</th>
<th>Generator</th>
<th>Cap.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>S60</td>
<td>S62</td>
<td>T60</td>
<td>T62</td>
<td>M61</td>
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<td>G60</td>
<td>G62</td>
<td>C60</td>
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### Additional modules

- 8 temperature sensor inputs - MET148-2 module
- 1 low level analog output - MSA141 module
- Logic inputs/outputs - MES120/MES120G/MES120H (14I/6O) module
- Communication interface - ACE949-2, ACE959, ACE937, ACE969TP-2, ACE969FO-2, ECI850, ACE850TP or ACE850FO

### Switchgear diagnosis

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<td>60/60FL</td>
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<td>Trip circuit supervision</td>
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<tr>
<td>Cumulative breaking current</td>
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<tr>
<td>Number of operations, operating time, charging time, number of racking out operations</td>
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</table>

### Additional notes:

- (1) Standard, [ ] options.
- (2) According to parameter setting and optional MES120 input/output modules.
- (3) With optional MET148-2 temperature input modules.
- (4) With optional MCS025 synchro-check module.
### Protection for demanding applications

#### Protection

###### ANSI code

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<th>Protection Function</th>
<th>ANSI Code</th>
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<tr>
<td>Earth fault</td>
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<td>Breaker failure</td>
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<td>Negative sequence</td>
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<td>Thermal overload for cables</td>
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<td>Thermal overload for capacitors</td>
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<td>Capacitor bank unbalance</td>
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<td>Restricted Earth fault</td>
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<tr>
<td>Two-winding transformer differential</td>
<td>87T</td>
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<tr>
<td>Machine differential</td>
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<td>Directional phase overcurrent</td>
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### Control and monitoring

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</table>

The figures indicate the number of relays available for each protection function.

- Standard, I2 options
- (1) Protection functions with 2 groups of settings.
- (2) According to parameter setting and optional MES120 input/output modules.
- (3) With optional MET148-2 temperature input modules.
- (4) With optional MCS025 synchro-check module.

---

For more info: [Catologue SEPED303005EN](#)
Protection, Control and Monitoring
Sepam Series 80 Selection Guide

Protection for demanding applications

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<th>Motor</th>
<th>Generator</th>
<th>Busbar</th>
<th>Cap.</th>
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<tbody>
<tr>
<td>Phase current I1, I2, I3 RMS</td>
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<td>Measured residual current I0, calculated I0E</td>
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<td>Demand current I1, I2, I3</td>
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<td>Peak demand current IM1, IM2, IM3</td>
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<td>Measured residual current I0</td>
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<tr>
<td>Voltage U21, U22, U13, V1, V2, V3</td>
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<td>Residual voltage V0</td>
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<td>Positive sequence voltage Vd</td>
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<td>Negative sequence voltage Vd</td>
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<td>Residual voltage V0</td>
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<td>Frequency</td>
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<td>Active power P, P1, P2, P3</td>
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<td>Calculated active and reactive energy (kWh, a VARh)</td>
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<tr>
<td>Calculated residual current I0E</td>
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<td>Voltage U21, V1 and frequency</td>
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<tr>
<td>Voltage U21, U32, U13, V1, V2, V3, Vd, V1 and frequency</td>
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<td>Neutral point voltage V0t</td>
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</tbody>
</table>

**Network and machine diagnosis**

**Tripping context**

**Tripping current Trip1, Trip2, Trip3**

**Phase fault and earth fault trip counters**

**Unbalance ratio / negative sequence current li**

**Harmonic distortion (THD), current and voltage (Hd, Lkd)**

**Phase displacement dq1, dq2, dq3**

**Phase displacement q1, q2, q3**

**Disturbance recording**

**Motor start report (MSR)**

**Motor start trend (MST)**

**Datalog (DLG)**

**Thermal capacity used**

**Remaining operating time before overload tripping**

**Waiting time after overload tripping**

**Running hours counter / operating time**

**Starting current and time**

**Start inhibit time**

**Number of starts before inhibition**

**Unbalance ratio / negative sequence current I11**

**Through current I1, I2, I3**

**Current phase displacement B**

**Apparent sequence impedance Zd**

**Apparent phase-to-phase impedances Z21, Z32, Z13**

**Third harmonic voltage, neutral point or residual**

**Difference in amplitude, frequency and phase of voltages compared to nominal values**

**Capacitor unbalance current and capacitance**

**Switchgear diagnosis**

**ANSI code**

**CT / VT supervision**

**Trip circuit supervision**

**Auxiliary power supply monitoring**

**Cumulative breaking current**

**Number of operations, operating time, charging time, number of rack out operations**

**Additional modules**

**8 temperature sensor inputs - MET148-2 module**

**1 low level analog output - MSA141 module**

**Logic inputs/outputs - MES120/MES120G/MES120H (14I/16O) module**

**Communication interface - ACE949-2, ACE959, ACE937, ACE969-2 TP, FO, ACE850 TP, FO or EC850**

**Modbus communication, IEC 60 870-5-103, DN3 or IEC 61850**

**Measurement readouts**

**Remote indication of events**

**Remote control orders**

**Remote protection setting**

**Transfer of disturbance recording data**

**GOOSE message IEC 61850**

---

For more info:
- Catalogue: SEPED03300GEN
- Customer Service Tel: 1300 369 233

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Protection, Control and Monitoring
MiCOM Series Overview

Digital protection relays

Overview

The MiCOM range of protection relays offers varying levels of functionality and hardware options to best suit the protection requirements and allows the customer to choose the most cost effective solution for their application. The 10, 20, 30 and 40 series hardware platforms are the building blocks of the MiCOM protection relay range providing a wide variety of protection, control, measurement, monitoring and communication functions.

The MiCOM S1 Studio makes for easy setting and configuration of relays and management of relay setting files for all Micot relays.

Micot Relay Platforms and Applications

MiCOM Px10
- P111Enh - Auxiliary powered overcurrent and Earth fault
- P114D - Dual powered overcurrent and Earth fault, with settings via DIP switches
- P115 - CT or dual powered overcurrent and Earth fault, with settings via HMI menu
- P116 - Dual-powered overcurrent and Earth fault
- P211 - Motor protection

MiCOM Px20
- P12x/y - Directional and non-directional overcurrent and Earth fault
- P22x - Motor protection
- P62x - Feeder differential protection
- P72x - High impedance differential protection
- P82x - CB fail
- P92x - Voltage/frequency (e.g. load shedding)

MiCOM Px30
- P13x - Feeder & Motor Protection
- P43x - Distance protection
- P53x - Line differential protection
- P63x - Transformer protection
- Px30C - Compact protection (cutdown versions, limited functionality, 2 inputs, 8 outputs)
- Px38 - AC Railway protection

MiCOM Px40
- P14x - Feeder protection
- P24x - Motor protection
- P34x - Generator protection
- P44x - Distance protection
- P54x - Current differential protection
- P64x - Transformer relay with sigma delta input modules
- P74x - Busbar protection
- P84x - CB fail, auto-reclosure function relay.

Applications

The MiCOM range offers comprehensive protection solutions at all power system levels such as Generation, Transmission and Distribution covering the following applications:

- Generator protection
- Transformer protection
- Feeder / Line protection
- Busbar protection
- Motor protection
- Interconnector / Grid Connection protection
- Voltage and Frequency protection
- Directional / Non-directional overcurrent & Earth fault protection
- AC Railway protection
- Distance Protection
- Restricted Earth Fault Protection
For more info: 
Catalogue: NRJED111010NEN

Protection, Control and Monitoring
MiCOM Px20, Px30, Px40

Feeder management relays

| Protection, Control and Monitoring MiCOM Px20, Px30, Px40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Protection | 1 Phase or Earth overcurrent | 50/5/P/N | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3 Phase overcurrent | 50/5/IP | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ground fault | 50/5/N | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Phase directional | 67P | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ground Fault directional | 67N | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Sensitive directional earthing | 67N | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Transient Ground Fault directional | 67N | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Watertight earthing | 67W | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Neutral admittance | 1N | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Restricted earthing | 64 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Voltage controlled overcurrent | 51V | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Negative sequence overcurrent | 46 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Thermal overload | 49 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Undercurrent | 37 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Over/Undervoltage | 27/53 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Residual over voltage | 59N | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Negative sequence overvoltage | 47 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Over/Undervoltage frequency | 810/1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Rate of change of frequency | 87N | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Incomplete sequence relays | 48 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Master sequence devices | 34 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Lock-out | 86 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Directional power | 32 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Circuit breaker failure | 50BF | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Motor | 49LF | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Startup Monitoring | 66 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Autoreclose | 79 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Check synchronising | 25 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Broken conductor | 46/68C | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Voltage transformer supervision | VTS | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Current transformer supervision | CTS | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Cold load pick-up | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Inrush blocking | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Switch on to fault | 50TF | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Circuit breaker monitoring | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Trip Circuit Supervision | TCS | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Limit value monitoring | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Protective Signalling | 85 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Interlock | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

1 - Please note that some relays may have a limit on max. I/O when used as a combination.
3V0 measured input and allows vee connected VTs.
### Motor and generator management relays

#### Protection

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<td>7</td>
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<tr>
<td>VT inputs</td>
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<td>4/5</td>
<td>4/5</td>
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<td>1 or 3</td>
<td>3</td>
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<td>Opto Inputs (max)</td>
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<td>6/0 or 4/2</td>
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#### Motor Protection

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<tbody>
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<td>Motor Differential</td>
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1 - Please note that some relays may have a limit on max. I/O when used as a combination.
Protection, Control and Monitoring
MiCOM Px20, Px30, Px40

Distance relays

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Protection

Distance Protection
Distance
21/21N

Autoreclose
79
3 pole
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1/3 pole
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-■■■■
-■■■■

Power Swing Blocking
78
-■■■■
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-■■■■
Out of step tripping
68
-■■■■
-■■■■
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Check synchronising
25
-■■■■
-■■■■
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Directional Power
32
-■■■■
-■■■■
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Switch on to fault
50/27
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-■■■■
-■■■■

Mutual Compensation
-■■■■
-■■■■
-■■■■
Rail Catenary Protection
HZ
-■■■■
-■■■■
16 2/3
25/50/60
-■■■■
-■■■■

Defrost Protection
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-■■■■
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Train startups
3di destroyer
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Phase overcurrent
50/51P
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Phase directional
67P
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Delta directional comparison
61/42V
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Ground fault
50/51N
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Ground Fault directional
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Transient Ground Fault directional
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Neutral admittance
5Y
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Wattmeter earthfault
67W
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Negative sequence overcurrent
46
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Directional negative sequence
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Thermal overload
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Under/Over voltage
27/59
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Residual over voltage
59N
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Over/Under frequency
81U
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Rate of change of frequency
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Circuit breaker failure
50BF
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Broken Conductor
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Stub Bus Protection
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Voltage/Current transformer supervision
VTS/CTS
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Capactive voltage transformer supervision
CVTS
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Channel Aided Scheme Logic
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Trip Circuit Supervision
TCS
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InterMicom
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1 - Please note that some relays may have a limit on max. I/O when used as a combination.
Protection, Control and Monitoring
MiCOM Px20, Px30, Px40

Line differential, transformer and busbar protection relays

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Protection

Line Differential | 87P |
2 terminal | - |
2/3 terminal | - |
FO signalling | - |
Metallic signalling | - |
SDN/Satnet network | - |
In-J Zone transformer | - |
2nd harmonic restraint | - |
Vector Compensation | - |
Transformer Bus (CT saturation) | - |
2 breaker configuration | - |
Direct/Permissive Intertripping | - |
Phase Companion | 87PC |
PLC signalling | - |
Transformer Differential | 87P |
Windings | - |
Restricted earth fault | 87G/64 |
Overfluxing 5th harmonic | - |
Overexcitation | 24 |
2nd harmonic restraint | - |
Busbar Protection | 87BB |
Central unit (Nbr of Feeders) | - |
Peripheral units - 8 zones | - |
Phase segregated differential | 87P |
Sensitive earth fault differential | 87N |
Check Zone | 87C2 |
CT Saturation Detection | - |
Fibre optic signalling | - |

Ancillary Functions

Phase overcurrent | 50/5/3P |
Phase directional | 67P |
Ground fault | 50/5/N |
Ground Fault directional | 67N |
CT supervision | CTS |
Sensitive directional earthfault | 67N |
Wattmetric earth fault | 64W |
Distance Protection | 21 |
Power Swing Blocking | 78 |
Check Synchronism | 25 |
Negative sequence overcurrent | 46 |
Thermal overload | 49 |
Loss of load/Undercurrent | 37 |
Under/Over frequency | 87U/O |
Circuit breaker failure | 50BF |
Autoreclose | 79 |
Over/Under voltage | 27/59 |
Trip Circuit Supervisor | TCS |

1 - Please note that some relays may have a limit on max. I/O when used as a combination.
## Protection, Control and Monitoring

**MiCOM Px20, Px30, Px40**

### Voltage, frequency and ancillary protection relays

<table>
<thead>
<tr>
<th>Device</th>
<th>P821</th>
<th>P841A</th>
<th>P841B</th>
<th>P921</th>
<th>P922</th>
<th>P923</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT inputs</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>VT inputs</td>
<td>-</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Opto Inputs(max)</td>
<td>5</td>
<td>16</td>
<td>24</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Output Contacts(max)</td>
<td>9</td>
<td>14</td>
<td>32</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

### Protection

- **Breaker Failure Protection**
  - 50BF: 1, 1/2, - , - , -

- **2 Stage**
  - - , - , - , - , -

- **Pole Discrepancy**
  - - , - , - , - , -

- **Dead Zone Function**
  - - , - , - , - , -

- **Autoreclose**
  - 79 , 1 , 1/2 , - , -

- **Mesh Corner/Single Switch**
  - - , - , - , - , -

- **Check Sync**
  - 25 , 1 , 2 , - , -

- **Ferroresonance Suppression**
  - - , - , - , - , -

- **Open Line Detector**
  - DLO , - , - , - , -

- **High Speed Breaker Fail**
  - 50BF , - , - , - , -

- **Fast Hybrid Output contacts**
  - - , - , - , - , -

- **3 pole tripping**
  - - , - , - , - , -

### Voltage and Frequency Protection

- **Undervoltage**
  - 27 , - , - , - , -

- **Overvoltage**
  - 59 , - , - , - , -

- **Residual Overvoltage**
  - 59N , - , - , - , -

- **Phase Sequence Voltage**
  - 47/27D , - , - , - , -

- **Under/Over frequency**
  - 81U/O , - , - , - , -

- **Rate of change of Frequency (df/dt+1)**
  - 81R , - , - , - , -

- **Frequency supervised Rate of change of Frequency (f+df/dt)**
  - 81RF , - , - , - , yes by logic

- **Frequency supervised average Rate of change of Frequency (f+df/dt)**
  - 81RAV , - , - , - , -

- **Generator Abnormal Frequency**
  - 81AB , - , - , - , -

- **Load Restoration logic**
  - - , - , - , - , -

- **Trip Circuit Supervision**
  - TCS , - , - , - , -

---

For more info:

- Catalogue: NRJED111010EN
- For more info: 2 Catalogue: NRJED111010EN
Protection, Control and Monitoring

VAMP

Arc flash protection units

Overview

VAMP arc flash protection is an extremely fast protection system for LV and MV switchgear and controlgear. It has been specially designed to maximise safety to personnel and to minimise material damage in the event of an arc fault. A VAMP arc protection system can principally be implemented in three different ways, as an autonomous master unit system, as part of the VAMP protection relay system or as an integration between a master unit system and the VAMP protection relay system.

VAMP 120
- Integrated 19-256 V a.c./d.c. aux. supply
- Up to 4 sensors
- Selective trip for 2 zones
- Operation time 7ms
- NO and NC trip outputs (Zone 1)

VAMP 121
- Up to 10 sensors
- Single trip contact
- Operation time 9ms
- Binary input for blocking or resetting (programmable) the unit
- Possibility for double arc channel activation trip criteria
- BIO light transfer to other VAMP device

VAMP 221
- Modular system consisting of a central unit, I/O units and arc sensors.
- Current and light tripping (can be configured for light only trip)
- Continuous system self-supervision
- Point arc sensor or fibre loop sensor connections
- Circuit breaker failure protection (CBFP)
- Programmable operation zones

VAMP 321
- Modular system consisting of a central unit, I/O units and arc sensors
- Operation on simultaneous current and light or on light only
- Event logs, disturbance recording and real-time clock
- High speed output, HSO: 1 ms
- Point arc sensor or fibre loop sensor connections
- Circuit breaker failure protection (CBFP)
- Programmable operation zones

Main characteristics
- Operation on light only
- Support point or smoke sensors
- Simple installation
- Self-supervision

Applications
- Wind Power
- Motor Control Centres (MCC)
- Utilities
- Marine

Why ARC Flash Protection

When the traditional time-grading or blocking based protection coordination principle is used, the traditional protection systems may not provide fast enough protection of substation faults. Further, high-impedance type of Earth-faults may cause prolonged operation times of Earth-fault relays leading to the significant release of the arcing energy. These facts pose a considerable risk to human beings and economical assets.
Customer Service Tel: 1300 369 233

Metering Solutions
ION7550/ION7650

Advanced energy and power quality meter

Overview

Used at key distribution points and sensitive loads, ION7550 and ION7650 meters offer advanced power quality analysis coupled with revenue accuracy, multiple communications options, web compatibility and control capabilities.

- Monitor compliance with International Quality-of-Supply Standards (IEC 61000-4-30 class A, EN50160, IEEE 519, IEEE 1159, and CBEMA/ITIC)
- Evaluate flicker based on IEC 61000-4-15 and IEEE 145

Electrical characteristics

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (L-L, L-N): per phase, min./max., unbalance</td>
<td>0.1% reading</td>
</tr>
<tr>
<td>Frequency: present, min./max.</td>
<td>± 0.005 Hz</td>
</tr>
<tr>
<td>Current (I1, I2, I3)</td>
<td>0.1% reading</td>
</tr>
<tr>
<td>Current (I4, I5)</td>
<td>0.4% reading</td>
</tr>
<tr>
<td>Power: real (kW), reactive (kVAR), apparent (kVA), per phase, total</td>
<td>IEC 62053-22 class 0.2S</td>
</tr>
<tr>
<td>Energy: real (kWh), reactive (kVARh), apparent (kVAh), rec/del</td>
<td>IEC 62053-22 class 0.2S</td>
</tr>
<tr>
<td>Power Factor (at unity PF)</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

Main characteristics

Power quality analysis:
- ultra-fast detection and capture of transients
- detection and capture of voltage sags and swells
- waveform recording up to 1024 samples per cycle
- advanced alarms with set point learning capability.

Complete communications:
- multiple communication ports (RS232/485, RJ45, fibre, optical port, internal modem)
- gateway functionality (Ethernet, modem)
- web server, FTP server, SMTP (email) data push
- various supported protocols (Modbus RTU and TCP master/slave, IEC61850, DNP3.0, SNMP, ION, MV90)
- numerous I/O options.

Internal memory for data and event logging:
- min/max, trend, forecast, events/alarms, 1 ms timestamp, GPS.

Security:
- multi-user access with multi-level security, anti-tamper seal protection.

Modular, extensive programmability
ION7550 and ION7650 meters now support IEC61850 for better interoperability between systems, and reduced deployment time and cost.
Metering Solutions
ION8800

Energy revenue and power quality meter

Overview
Used at interconnection points on medium and high voltage networks, ION8800 is designed for tariff metering and power quality monitoring. It includes revenue accuracy, multiple communications options, web compatibility and control capabilities.

3 base-model feature sets:
- ION8800C – basic tariff / energy revenue meter with sag / swell monitoring
- ION8800B – ION8800C + EN50160 compliance monitoring
- ION8800A – ION8800B + waveform capture and transient detection.

Electrical characteristics

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (L-L, L-N): per phase, min./max., unbalance</td>
<td>0.1% reading</td>
</tr>
<tr>
<td>Frequency (42-69 Hz): per phase, total</td>
<td>± 0.005 Hz</td>
</tr>
<tr>
<td>Current (I1, I2, I3, I4): per phase, total, min./max., unbalance</td>
<td>0.1% reading</td>
</tr>
<tr>
<td>Current demand: present, min/max., predicted</td>
<td>0.2% reading</td>
</tr>
<tr>
<td>Power: real (kW), reactive (kVAR), apparent (kVA)</td>
<td></td>
</tr>
<tr>
<td>Power demand: present, min/max., predicted</td>
<td></td>
</tr>
<tr>
<td>Energy: real (kWh), reactive (kVARh), apparent (kVAh), bidirectional, net, total</td>
<td>IEC 62053-22/23 class 0.2S</td>
</tr>
<tr>
<td>Power Factor: per phase, total</td>
<td>0.5%</td>
</tr>
<tr>
<td>Crest factor current channels</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Main characteristics

Revenue metering:
- meets IEC62053-22 Class 0.2S
- multiple tariffs and time-of-use (TOU) calculations
- password protection and anti-tamper seal protection.

Power quality analysis:
- monitor compliance with international Quality-of-Supply Standards (IEC 61000-4-30 class A, EN50160, IEEE 519, IEEE 1159, SARFI)
- ultra-fast detection and capture of transients (20μs at 50Hz)
- detection and capture of voltage sags and swells
- waveform recording up to 1024 samples per cycle
- advanced alarms with set point learning capability.

Complete communications:
- multiple communication ports (RS232/485, RJ45, fibre, optical port, internal modem)
- gateway functionality (Ethernet, modem)
- web server, FTP server, SMTP (email) data push
- various supported protocols (Modbus RTU and TCP, DNP3.0, SNMP, ION).

Tailor the meter to the application, with numerous I/O options:
- solid-state Form A and Form C digital outputs
- mechanical alarm relay
- high and low voltage digital inputs
- retrofit compatible with IEC/DIN 43862 19" rack mount series
- essailec connector with common measurement and energy pulsing pin-out greatly reduces installation costs
- the ION8800 passed the NMI M6 Pattern Approval for revenue metering.

Applications
- Revenue metering at generation, transmission, or distribution locations
- Energy availability and reliability
- Power quality analysis
- Disturbance detection
# PowerLogic Metering Range

## Product selection

### Basic multi-function metering

<table>
<thead>
<tr>
<th>Name</th>
<th>PM3000 Series</th>
<th>PM5350 / PM5350IB</th>
<th>PM5100 / PM5300 / PM5500</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>metering &amp; sub-metering</td>
<td>Class 0.5S IEC 62053-22</td>
<td>metering &amp; sub-metering</td>
</tr>
<tr>
<td></td>
<td>Class 0.5 IEC 62053-21</td>
<td>Class 1 IEC 62053-23</td>
<td>Class 0.5S IEC 62053-22</td>
</tr>
<tr>
<td></td>
<td>Class 2I EC 62053-23</td>
<td></td>
<td>Class 0.2S (PM55xx)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IEC 62053-22</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Class 1/2 IEC 62053-24</td>
</tr>
</tbody>
</table>

### Applications

<table>
<thead>
<tr>
<th>Panel instrumentation</th>
<th>PM3000 Series</th>
<th>PM5350 / PM5350IB</th>
<th>PM5100 / PM5300 / PM5500</th>
</tr>
</thead>
</table>

### Energy efficiency and cost

<table>
<thead>
<tr>
<th>Energy efficiency and cost</th>
<th>PM3000 Series</th>
<th>PM5350 / PM5350IB</th>
<th>PM5100 / PM5300 / PM5500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub billing and cost allocation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demand and load management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Billing analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Power availability & reliability

<table>
<thead>
<tr>
<th>Power availability &amp; reliability</th>
<th>PM3000 Series</th>
<th>PM5350 / PM5350IB</th>
<th>PM5100 / PM5300 / PM5500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmonics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dip/swell, transient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compliance monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Revenue metering

<table>
<thead>
<tr>
<th>Revenue metering</th>
<th>PM3000 Series</th>
<th>PM5350 / PM5350IB</th>
<th>PM5100 / PM5300 / PM5500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue metering</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>PM3000 Series</th>
<th>PM5350 / PM5350IB</th>
<th>PM5100 / PM5300 / PM5500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement accuracy (active energy)</td>
<td>Class 0.5</td>
<td>Class 0.5</td>
<td>Class 0.2S (PM55xx)</td>
</tr>
<tr>
<td>Installation</td>
<td>DIN rail</td>
<td>Flush mount 96 mm x 96 mm</td>
<td>Flush mount 96 mm x 96 mm</td>
</tr>
<tr>
<td>Voltage measurement</td>
<td>50V to 330V AC (Ph-N)</td>
<td>20-480 V AC (L-L)</td>
<td>20 V L-N / 35 V L-L to 277 V L-N</td>
</tr>
<tr>
<td></td>
<td>80V to 570V AC (Ph-Ph)</td>
<td>20-277 V AC (L-N)</td>
<td>/480 V L-L</td>
</tr>
<tr>
<td></td>
<td>up to 1MV AC (ext VT)</td>
<td></td>
<td>/600 V L-L (PM55xx)</td>
</tr>
<tr>
<td>Current measurement</td>
<td>external CT</td>
<td>external CT</td>
<td>external CT</td>
</tr>
<tr>
<td>Communication ports</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Inputs / Outputs</td>
<td>2 I/O</td>
<td>4 I/O (PM55xx)</td>
<td>6 I/O (PM55xx)</td>
</tr>
<tr>
<td>Memory capacity</td>
<td>256 kb</td>
<td></td>
<td>1.1 MB (PM55xx)</td>
</tr>
</tbody>
</table>
# PowerLogic Metering Range

## Product selection

### Intermediate metering

<table>
<thead>
<tr>
<th>Name</th>
<th>PM810</th>
<th>PM820 / PM850</th>
<th>PM870</th>
<th>PM8000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
<td>energy and basic PQ power meter</td>
<td>energy and basic PQ power meter</td>
<td>energy and basic PQ power meter</td>
<td>energy and basic PQ power meter</td>
</tr>
<tr>
<td></td>
<td>IEC 61557-12 PM/DSS/K70/0.5</td>
<td>IEC 61557-12 PM/DSS/K70/0.5</td>
<td>IEC 61557-12 PM/DSS/K70/0.5</td>
<td>IEC 61557-12 PM/DSS/K70/0.5</td>
</tr>
<tr>
<td></td>
<td>ANSI 12.20 Class 0.2S real energy</td>
<td>ANSI 12.20 Class 0.2S real energy</td>
<td>ANSI 12.20 Class 0.2S real energy</td>
<td>ANSI 12.20 Class 0.2S real energy</td>
</tr>
</tbody>
</table>

### Applications

#### Panel instrumentation

| Panel instrumentation | I, U, F, P, Q, S, PF, E, THD, Min/Max, harm, alarm, I/O (I, U unbalance, demand, clock/cal) (PM810 w/PM810LOG) | I, U, F, P, Q, S, PF, E, THD, Min/Max, harm, alarm, I/O (I, U unbalance, demand, clock/cal) |

#### Energy efficiency and cost

| Sub billing and cost allocation | | |
| Demand and load management | | |
| Billing analysis | | |

#### Power availability & reliability

| Harmonics | w/PM810LOG | dip/swell |
| Dip/swell, transient | | dip/swell |
| Compliance monitoring | PM850 only | |

#### Revenue metering

| Revenue metering | |

### Characteristics

| Measurement accuracy (active energy) | ANSI 62053-22 Class 0.5S | ANSI 12.20 Class 0.2S | IEC 61053-22 Class 0.2S | ANSI 12.20 Class 0.2S |
| Installation | Flush & DIN rail mount 96 mm x 96 mm | Flush & DIN rail mount 96 mm x 96 mm | Flush & DIN rail mount 96 mm x 96 mm | Flush & DIN rail mount 96 mm x 96 mm |
| Voltage measurement | 0-347 VAC L-N 3P (0-600 VAC L-L) | 57-400 VAC L-N 3P | 100-690 VAC L-L | |
| Current measurement | external CT | external CT | external CT | external CT |
| Communication ports | 1 - 4 (option) | 1 - 4 (option) | 1 - 4 (option) | 2 |
| Inputs / Outputs | 18 I/O | 18 I/O | 18 I/O | up to 27 DI, 9 DO up to 16 AI, 8 AO |
| Memory capacity | 80 kb with PM810 LOG | 80 / 800 kb | 800 kb | 512 MB |
# PowerLogic Metering Range

## Product selection

### Advanced metering

<table>
<thead>
<tr>
<th>Name</th>
<th>ION7550</th>
<th>ION7650</th>
<th>CM4000T</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
<td>energy &amp; power quality meter</td>
<td>energy &amp; power quality meter</td>
<td>energy &amp; power quality meter</td>
</tr>
<tr>
<td>IEC 62052-11</td>
<td>IEC 62053-22</td>
<td>IEC 62052-11</td>
<td></td>
</tr>
<tr>
<td>IEC 62053-22/23</td>
<td>Class 0.2S</td>
<td>ANSI 12.20 Class 0.25</td>
<td></td>
</tr>
<tr>
<td>IEC 61000-4-30 Class A</td>
<td>IEC 62053-22/23</td>
<td>IEC 61000-4-30</td>
<td></td>
</tr>
</tbody>
</table>

### Applications

- **Panel instrumentation**
  - I, U, F, P, Q, S, PF, E (demand, minimum and maximum values)

### Energy efficiency & cost

- **Sub billing and cost allocation**
- **Demand and load management**
- **Billing analysis**

### Power availability & reliability

- **Harmonics**
- **Dip/swell, transient**
- **Compliance monitoring**

### Revenue metering

- **Revenue metering**

### Characteristics

<table>
<thead>
<tr>
<th>Measurement accuracy (active energy)</th>
<th>Class 0.2S</th>
<th>Class 0.2S</th>
<th>Class 0.2S</th>
<th>Class 0.2S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>DIN 192</td>
<td></td>
<td>ANSI socket mount 9S, 35S, 36S, 39S and 76S; FT21 switchboard case</td>
<td></td>
</tr>
<tr>
<td>Voltage measurement</td>
<td>57-347V L-N AC or 100-600V L-L AC</td>
<td>0 to 600 V AC (ext. VT)</td>
<td>57-277V L-N AC (9S, 36S); 120-480 V-L-LAC (35S)</td>
<td></td>
</tr>
<tr>
<td>Current measurement</td>
<td>external CT</td>
<td>external CT</td>
<td>external CT</td>
<td>external CT</td>
</tr>
<tr>
<td>Communication ports</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Inputs / Outputs</td>
<td>up to 32 I/O</td>
<td>up to 25 I/O</td>
<td>up to 22 I/O</td>
<td>up to 16 I/O</td>
</tr>
<tr>
<td>Memory capacity</td>
<td>up to 10 MB</td>
<td>up to 32 MB</td>
<td>10 MB</td>
<td>4 MB</td>
</tr>
</tbody>
</table>

---

Customer Service Tel: 1300 369 233

Schneider Electric

---

![Image](image.png)
## PowerLogic Metering Range

### Product selection

<table>
<thead>
<tr>
<th>Name</th>
<th>Com’X 200 / 210 / 510</th>
<th>EGX100 / 300</th>
<th>ION7550 RTU</th>
<th>StruxureWare™ Power management software</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
<td>Ethernet GPRS data logger</td>
<td>Ethernet Integrate gateway server</td>
<td>Ethernet gateway-server + onboard I/O</td>
<td>Power management</td>
</tr>
</tbody>
</table>

### Communications

- **Name**: Com’X 200 / 210 / 510, EGX100 / 300, ION7550 RTU
- **Function**: Ethernet GPRS data logger, Ethernet Integrate gateway server, Ethernet gateway-server + onboard I/O
- **Features**:
  - **Devices supported**: EM3000 Series, IEM3000 Series, PM800 Series, ION7300, Acti 9 Smartlink, Masterpact, PM5000 Series, Compact NSX, IEM1, IEM2000, IEM3000, PM3000 Series
  - **Web server with standard HTML pages**: (Configuration only)
  - **Web server with custom HTML pages**: EGX300 only
  - **Real time data**: EGX300 only
  - **Historical data**: Export to Internet database server, EGX300 only
  - **Automatic notification**:  
  - **Alarm and event logs**:  
  - **Waveform display**:  
  - **Custom animated graphics**:  
  - **Manual/automatic reports**:  

### Power management software

- **Name**: StruxureWare™ Power management software
- **Function**: Power management

### Characteristics

- **Ethernet ports Modbus TCP/IP protocol**: 2, 10/100 Base TX port, 10/100 Base TX port
- **RS485 (2-wire / 4-wire) Modbus protocol ports**: 1, 1, 1
- **Number of devices connected directly**: 32 modbus devices, 6 pulse meters (or dry contacts), 2 analogue sensors, 32
- **RS232 configuration ports**: 1, 1
- **Miscellaneous**:
  - Connectivity: WiFi, GPRS, or Ethernet
  - Serial line to Ethernet connectivity
  - Modern port I/O (24/1/30 O max)
- **Installation**: DIN rail, DIN rail, DIN 192 cutout (180 x 180 mm)

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**StruxureWare™** is a suite of interoperable, and scalable supervisory software dedicated to power monitoring that enables you to maximise operational efficiency, optimise power distribution systems, and improve bottom-line performance.
Software

PACiS Substation Control

Electrical substation protection, control and monitoring solution

Overview

Substation protection, automation and control solution.

Scalable IEC61850 designed substation automation system from a single controller to a complete multi-ring architecture.

PACiS core components are:

- C264 - Substation control unit
- A300 - Solid state protocol gateway (IEC 61850, DNP3, etc.)
- Hxxx - IEC61850 Ethernet switches and modules
- EcoSUI - Substation monitoring and control software (HMI)
- SCE - System configuration editor
- SMT - System maintenance tool
- iFLS - Fast load shedding software

The PACiS components are deployed along side with IEDs to provide a complete integrated automation solution:

- MiCOM protection relays
- Sepam protection relays
- ION power meters
- Third party IEDs

Main characteristics

- Native IEC61850 applications
- IEC61131-3 automation compliant
- Fast self-healing redundant network (<1ms)
- Disturbance record and waveform oscillography management
- Cyber security

Applications

- Commercial building, Healthcare center, Mining, Oil and Gas, Utility
- Electrical Control & Monitoring System (ECMS)
- Substation Automation (AVR, ATS, etc)
- Self Healing Loop Automation
- Load shedding and load management
- Emergency generator and energy storage management
- Advanced PMS Applications

Supported protocols

- IEC61850
- DNP3/DNP3 over IP
- IEC608705-5-101, IEC608705-5-103, IEC608705-5-104
- Modbus
- HNZ

For more info:

Brochure:
- NRJED111002EN
- NRJED123596EN - SUI
- NRJED124035EN - PACiS Utility
- NRJED100038EN
- NRJED10004EN
Software
ADMS

Advanced distribution management system

Overview
The Schneider Electric ADMS provides a real-time network control system. The system has been independently recognised by the Gartner Technology research firm as the most advanced DMS on the global market and rated it with the highest possible rating of “strong positive”. The software incorporates real-time SCADA, OMS and DMS including advanced features, such as embedded volt/VAR Optimisation, fault management in the form of automatic fault detection isolation and supply restoration, near-term load forecasting, and distributed energy resources support, network planning tools etc. on a single platform using a single user interface.

The ADMS is a tool that enables users to efficiently plan, operate, and work on a distribution network. It facilitates the analysis and monitoring of distribution networks in real time, and also provides a study or planning mode capability for both backward and forward review to analyse different running arrangements identify potential hotspots and facilitate options to improve network reliability and lower costs.

The ADMS is managed with standard interfaces such as CIM, IEC, DNP, ICCP and is a key offering for the smart grid solution.

Main characteristics
- Real time network monitor and control (SCADA)
- Mathematical network model and power applications (DMS)
- Efficient fault management and voltage improvement
- Network analysis (short-circuits, relay protection, losses, reliability, performance)
- Optimisation and reduction of investments in building power facilities and network automation
- Reduction of network peak load and power losses
- Improvement of power quality and customer services
- Local supervision system based on Schneider Electric's OASyS SCADA

Real-time network control system with integrated SCADA/DMS/OMS/DSM in a single product:
- SCADA control and data acquisition
- Network model with state estimation
- DMS - with a wide array of network management applications
- OMS - outage management system to manage trouble calls and a mobile workforce and to provide fault prediction and outage statistics
- DSM - demand side load management
- GUI - schematic and geographical displays of HV/MV/LV networks, including all remote and manually operated devices
- VSSM - validated switching sequence management, improves safety/reliability of network operation
- IVVO - integrated voltage/var control (optimisation), to reduce peak demand and load flow losses
- FLISR - fault location, isolation and supply restoration, to reduce outage time and improve regulatory performances

Simulation environment
- Training environment
- Historical services
- Mobile workforce services
- Standard Interfaces

ADMS benefits
- Improved safety and reliability of the network operation
- Reduced peak demand and load flow losses
- Reduced customer outage time
- Improved (regulatory) performance indices
- Improved utilisation of network facilities:
  - reduced investment
  - Improved power quality
  - Improved customer services
  - Increased utility profit

Applications
- Smart grid

Supporting protocols
- DNP v3.0
- Modbus
- IEC-101, IEC-104, IEC-103
- ICCP
- OPC
- Many other protocols supported

Dynamic mimic diagram GUI
Network builder GUI
Transformers and Prefabricated Substations
GMX, MINERA and TESA

Overview
Hermetically-sealed oil-immersed transformers up to 36kV and 5MVA. Custom-designed (GMX and MINERA) or pre-designed (TESA) to suit most distribution transformer applications.

Schneider Electric has a long history of transformer manufacturing in Australia. Our transformer factory is located in Benalla, Victoria. A wide range of oil-immersed transformers and transformer solutions are designed to meet different specifications and applications.

- GMX - ground mounted transformer up to 36kV and 5MVA
- TESA - ground mounted transformer up to 22kV and 2.5MVA
- MINERA - pole mounted transformer
- KPX - prefabricated (kiosk) substation

Main characteristics
In accordance with the requirements of AS 2374.1.2 all Schneider Electric distribution transformers are fully compliant with (MEPS). Minimum Energy Performance Requirement). The scope of AS 2374.1.2 covers oil-immersed and dry-type distribution transformers with power ratings from 10 kVA to 2500 kVA intended to be used on 11 kV and 22 kV networks. Compliance to MEPS is a legally enforceable requirement on all manufacturers since the 1st October, 2004.

Applications
Indoor and outdoor transformers suitable for industrial, commercial, mining or infrastructure applications. They are suited to applications where low voltage switchgear is to be installed within the operating plant remote from the transformer.

Transformer optional features
MV switch fuse or circuit breaker transformer protection.

Oil temperature indicator, integrated safety detector, pressure relief device, winding temperature indicator, marshalling box, wheels.

Integrated safety detector
The integrated safety detector combines the functions performed by a number of transformer accessories in a single, compact and reliable instrument. It is composed of a robust plastic body, watertight and resistant to extreme climates.

This device detects 4 functions:
- pressure
- temperature
- oil Level
- gassing.

General features
- Degree of protection (EN60529): IP66
- Degree of shock tightness (EN50102): IK07
- Temperature resistance: -40°C to 120°C
- Max. rated pressure: 500 mbar
Transformers and Prefabricated Substations
MINERA

Overview
The MINERA oil-immersed medium voltage power transformer is dedicated to all applications up to 170kV and 80 MVA. Schneider Electric’s R&D team has created a variety of MINERA transformers to meet both utility and industrial requirements. The superior reliability of the transformer means that it is highly suitable for the oil and gas market.

Main characteristics
Rated power from 2.5 up to 80 MVA; rated insulation level up to 170 kV; rated frequency 50 or 60 Hz; mineral, synthetic or natural ester oil insulating liquid; conventional or reduced losses; wide range of accessories; high capacity of cooling options such as ONAN, ONAF, OFAF or ODWF; off-circuit tap changer (OCTC) or on-load tap changer (OLTC); hermetically sealed or breathing type with conservator.

Applications
- Utilities: transmission and distribution network, automatic voltage regulator
- Power generation: hydro, nuclear, thermal, photovoltaic
- Small industries: textile, automotive, pharmaceuticals, food
- Renewable energies: solar, wind onshore and offshore, biomass
- Mining: ground-mounted, under ground mounted, heavy polluted area
- Metal: furnace, cycloconverter load, rectifier load
- Oil and gas: onshore, offshore, FPSO, hazardous area

Magnetic core
The transformer’s magnetic core is manufactured from a high grade, cold-rolled, grain-oriented silicon steel. The lamination stacking is either butt-lap or step-lap-type. The magnetic core is generally a multi-layer circular cross section and the slitting and cutting of the magnetic core is made by automated machines. In order to reduce transformer sound level to a minimum, the magnetic core and its framework are carefully sized to minimise the vibrations and, in particular, magnetostriction effects, which constitute the main sources of sound in medium power transformers.
Transformers and Prefabricated Substations
Trihal/Tricast - Cast Resin Transformers

Dry-type transformers up to 52kV/30MVA

Overview

Schneider Electric has two types of cast resin transformers: Trihal and Tricast. Although the methods of construction and E, C and F ratings differ, the basic technology is similar. However, the Tricast is also available with an on-load tap changer if requested. Both Tricast and Trihal are both self-extinguishing, providing an effective solution for use in industrial installations susceptible to fire hazards. In addition, they meet the needs of special applications, such as wind farms and are the perfect replacement for PCB transformers.

Trihal is available in two levels. The standard level C2 E2 F1 10pC suits the majority of situations. It is ideal in clean, dry rooms such as in hospitals, airports, high-rise buildings and the like. Trihal also has a range C3 E3 F1 5pC for extreme environments where high humidity over 95% and/or heavy pollution are encountered. This range is also specially tested to prove partial discharge ≤ 5pC. Trihal and Tricast are fully compliant with the Minimum Energy Performance Standards (MEPS) AS 2374.1.2.

Technical Characteristics

Rated power: Trihal (15MVA), Tricast (25-30)MVA.
Rated voltage: Trihal (40kV), Tricast (36-52)kV.
Phases: one or three-phase unit.
Rated frequency: 50Hz or 60Hz.
Type of cooling: AN
(AF, ANAF available on request).
Manufacturing standards: AS 60076, EN 60726, NF EN 60076-11 and NF C 52-115, VDE 0532 part 6, DIN 42523, ANSI C57.12.01
Other: thermal protection system.

On request: enclosure, fans, anti-vibration pads, plug-in bushing, monobloc bushing, automatic voltage regulator panel, surge arrestors, etc.

Safety and Reliability

To ensure total compliance with relevant national and international standards, Trihal transformers have been put through the most stringent series of tests. Trihal is one of few transformers having successfully passed these tests and is characterised by the following features:

Standard offer
- C2 – Climate Test – Operation and Storage to -25°C.
- E2 – Environment Test – Frequent condensation or heavy pollution or both - Relative humidity up to 93%.
- ≤ 10pC – Routine Test for Partial Discharge.

Premium offer
- C3 – Climate Test – Operation and Storage to -50°C.
- E3 – Environment Test – Nearly total condensation or heavy pollution or both. - Abnormal level of humidity up to 95% to IEC 60076-16.
- ≤ 5pC – Special test for Partial Discharge.

Trihal/Tricast is your best solution for public safety. Whether for industrial plants susceptible to fire hazards or use in public buildings and high rise developments that are occupied or visited by thousands of people every day.

Applications

- Rail
- Water
- MMM
- Wind farms
- Buildings
- Oil and gas
Transformers and Prefabricated Substations

KPX

Medium voltage kiosk substation

Overview

Prefabricated (kiosk) substations are defined as an enclosure containing transformers, low voltage and high voltage switchgear, connections and auxiliary equipment to supply low voltage energy from a high voltage system or vice versa.

Kiosk designs may have different configurations depending on the requirements of the site “footprint” and access.

- KPX - elongated design with access from both ends
- KPX² - square design with access from one side

Main characteristics

Safety

Kiosk substations contain electrical equipment, often located in a public environment, requiring them to meet the highest safety standards.

The risk of equipment failure in a kiosk substation is minimised through the design. In the rare occasion of medium voltage equipment failure, an internal arc rated kiosk design minimises the risk of injury to near public or an operator working with the kiosk door open.

Applications

Wind farm solutions - The initial design of a wind farm can have profound implications for its future profitability. Once a site has been identified and a decision taken to invest in its development, the wind farm design process begins. The fundamental aim is to maximise energy production, minimise capital and operational costs and stay within the constraints imposed by the site. The kiosk substation for wind farms have to take into account many variables like the environment (oil containment), exposure to windy weather and connection to the grid.

Electrical utility solutions - For electrical utilities, long blackout periods and voltage fluctuations are unacceptable. Their primary needs include safety of supply and continuity of service, due to increasing pressures from the mandatory measurement of customer service and customer expectations.

Defence solutions - Defence substations differ from those provided by electrical utilities, as typically they also form part of the emergency power distribution system and contain control and communications equipment needed to effectively distribute and control emergency power.

Industrial solutions - Reliability of supply for industrial customers is critical. A power outage can cost millions of dollars depending on the type of industry. Their primary needs include quality of supply, energy efficiency and continuity of service.

Defence-style cyclone-rated kiosk

Schneider Electric has recently designed a defence style kiosk for use in cyclone regions that has been independently tested and verified to meet cyclone criteria AS/NZ 1170.2.2011. The kiosk is suitable for cyclonic region D and terrain category 2 and has been tested for an ultimate wind design speed of 88m/s. The construction of the upper and base frames consists of cross members made from hot dipped galvanised carbon steel and the enclosure panels are made using stainless steel.
Overview
High voltage/low voltage (HV/LV) factory tested outdoor prefabricated (kiosk) substations have been largely used for more than 30 years. Prefabricated substations are defined as an enclosure containing transformers, low voltage and high voltage switchgear, connections and auxiliary equipment to supply low voltage energy from a high voltage system or vice versa.

The first prefabricated substation in Australia to successfully pass a type test for personnel protection from internal arc faults to AS 62271.202, was manufactured in Schneider Electric's Benalla factory in 2007. This was followed by successful testing of a ring main unit (RMU) outdoor enclosure in 2008.

Schneider Electric continues to design prefabricated substations at the highest level of safety for the operator and the public.

Safety
The risk of equipment failure in a kiosk substation is minimised through the design. In rare occasions of medium voltage equipment failure, an internal arc rated kiosk design minimises the risk of injury to nearby public or an operator working with the kiosk doors open.

The design ensures that extremely hot gases generated during a fault are cooled via a patented filter, reducing the effects of overpressure and flame within the enclosure. The design limits the release of projectiles and flaming particles, which could potentially injure the public, operators or start bushfires.

Schneider Electric has invested in safety studies over the years to provide the safest possible solutions for our customers and general public.

Versions of our new KPX, KPX² and RMU kiosk designs have been type tested to ensure personnel and operator protection against internal arc faults, as per Annex A of Australian Standard AS 62271.202. They have an internal arc classification of IAC-AB and are rated to withstand an internal arc fault of 20kA for 1s. If internal arc classified kiosks are required, this option must be requested at quotation.

Environment
A kiosk substation should be designed to ensure internal connections are protected from extreme environmental conditions, such as high temperatures, rainfall, dust and wind. Schneider Electric’s rigorous testing and graphic modelling ensures proper ventilation, protection against incoming water, sealed connections and secure locked doors.

The KPX kiosk design is not only protected against the environment, they also help to protect the environment. All our kiosk substations incorporate the option for full transformer oil containment. If the transformer leaks oil, there is no risk to environment, as the oil is contained inside the kiosk. This feature is extremely important for applications close to water catchment areas to avoid possible pollution.

At the end of the kiosk life cycle our service offer makes sure that all materials are handled with respect to the environment.

Smart kiosk
Combining our kiosks with remote monitoring and control from the Easergy range, will help to reduce outage times and significantly improve service quality and continuity of energy supply. Modern communication infrastructure ensures that a network management system can be set up step-by-step according to your investment plan, gaining benefits from the start. Well planned and designed loop automation systems ensure that the majority of your customers can be reconnected to the network during the first minute after an outage occurs.
Value throughout your system lifecycle

Schneider Electric Services offer the benefits of true lifecycle support for your electrical distribution systems. Our capabilities enable us to provide a wide range of services and solutions for your installations, from initial concept design through to end-of-life management and renewal programs.

Our highly trained services team work with you to understand your needs and offer individually tailored solutions, allowing you to focus on your core business. Schneider Electric has global and local project teams to manage your automation, electrical distribution and energy management projects.

With a full range of services encompassing strategic consulting, design and engineering, maintenance contracts, support and education, Schneider Electric is the right partner for your projects and engineering challenges.

Schneider Electric Services provide specialist manufacturer's support for medium voltage equipment – delivering value throughout your system life cycle.
Projects and solutions

Our aim is to work with you to understand your needs and offer individually tailored solutions, allowing you to focus on your core business. As one of the world’s largest and most successful electrical technology groups, we are able to provide a complete electrical turnkey package, encompassing the design and supply of equipment, through installation and commissioning, to operation and training.

We bring together products and services from Schneider Electric and third party strategic partners to provide the best possible solution, while minimising your risks.

Our Australian based teams bring you the benefits of:

- one experienced project team, with a single point of contact
- project management excellence to deliver your solution
- solutions technical expertise, supported by our global activities to provide the latest innovations for your application
- experienced engineers providing design services and comprehensive power system analysis. The Schneider Electric team also provides protection relay grading and fault studies.
- optimum procurement model, coordinating the local and global activities of Schneider Electric, including selected partners (where appropriate) and the necessary logistics
- Australian Standards compliance. Our ISO9001 compliant operations and local expertise ensures your project meets all relevant standards.

Installation and pre-commissioning

The correct installation and commissioning of electrical distribution and automation equipment on an electrical system ensures that the apparatus performs and conforms to the customer’s, regulator’s and manufacturer’s requirements.

Benefits

- Equipment is installed and commissioned by Schneider Electric trained technicians.
- Peace of mind knowing that equipment is correctly installed.
- Reduced risk of problems with protection and control systems.
- Product warranty is preserved.

Application support

Schneider Electric's Automation Solutions team provides comprehensive product application, configuration support and offer practical implementation advice based on the IEC61850 Standard suited to the Australian and New Zealand power industry. Our team is well versed with implementation strategies, Ethernet basics, substation configuration language, device configuration, system analysis, sampled values, GOOSE and network topology.

Further, Schneider Electric has developed short seminars to provide practical implementation advice and examples of the IEC61850 Standard suited to the Australian and New Zealand power industry. Protection engineers and senior technical staff can also take part in the annual Analysis and Protection of Power Systems Course (APPS Course) to increase their skills in the fundamentals of protection system design.
Spare parts
Maximise the uptime your operations by ensuring you have the appropriate spare parts for your MV distribution equipment. By having access to the right spare parts at the right time you can ensure that your equipment is returned to service in the shortest possible time, avoiding lost revenue and safeguarding your assets and business.

Schneider Electric supplies original spare parts for both current and superseded Schneider Electric product ranges (including Merlin Gerin, Yorkshire Switchgear and Magrini Galileo). We can provide assistance in identifying the required parts for your equipment from our extensive product libraries.

The use of OEM parts ensures that your MV equipment performs to in accordance with the original specifications. This can be further assured by having your spare parts fitted and tested by Schneider Electric service technicians.

There are four major phases in the product life cycle:

**Commercialisation period**

The period is launched on the market and is included in the Schneider Electric catalogue. The supply of spare parts is guaranteed.

**Guaranteed spare parts supply period**

If the product is withdrawn from the market, Schneider Electric will continue to supply spare parts for a limited period of time. Generally speaking, the average guaranteed spare part supply period after the end of commercialisation is:

- **Medium voltage:** 12 years
- **Low voltage:** 10 years
- **Compact (accessories - devices):** 3 years
- **Electronic equipment:** According to the range

When the end of the guarantee period is reached, the product is considered to be expired.

**Non-guaranteed spare parts supply period**

As of the expiry date, the product is considered to be expired. Spare part stock and supply are no longer guaranteed after the expiry date. This period ends on the date on which the spare part offer is ended. On that date, the stocks are entirely destroyed as well as the manufacturing tools.

**Device retrofit period**

Commercialisation of a retrofit offer for the replacement of old switchgear and protection devices. The supply of retrofits will stop at the end of the commercialisation of the new devices used. The spare parts for these retrofits will therefore be managed as described above.
Services

Transformer refurbishment

Schneider Electric offers a range of refurbishment and repair services to extend the life of transformers and kiosks. By partnering with Schneider Electric you can gain full lifecycle support for your electrical distribution equipment and maximise the return on your investment. Benefit from our expertise gained through 40 years of transformer manufacturing in Australia.

Transformer repair and refurbishment services

Level 1: On-site inspection and condition assessment
Inspection of the transformer at your premises followed by a written report of our findings and recommendations.

Level 2: On-site repair
Minor repairs to tank, radiator and gaskets (where practicable).

Level 3: Intermediate repair
Repair and refurbishment at our transformer manufacturing facility.

Level 4: Major repair
Removal of transformer core and coils for repairs and moisture removal.

Level 5: End-of-life disposal
The offer ensures safe, environmentally friendly disposal of the equipment. Hazardous materials are extracted and disposed of by specialist partners approved by Schneider Electric. Maximum recycling of materials is achieved.

Oil testing services

Test A: PCBs
Test for polychlorinated biphenyls (PCBs) before disposal.

Test B: Dissolved Gas Analysis (DGA)
Evaluates transformer condition by the presence of dissolved gasses.

Test C: Basic Condition Assessment
Comprises Test B, plus a suite of oil tests to evaluate the condition of the transformer.

Test D: Full Condition Assessment
An exhaustive suite of oil tests to provide information on the overall condition of the transformer.

Kiosk refurbishment

We also specialise the total repair and refurbishment of MV/LV kiosks. This extends the life of your assets and helps you make the most of your capital investment.

This offer typically comprises:
- door-to-door kiosk refurbishment service contracts
- condition assessment of the kiosk and equipment with detailed report
- kiosk enclosure repairs and re-paint
- MV and LV switchgear inspection and repairs or replacement
- upgrade transformer power capacity
- upgrades to the MV or LV equipment
- full re-testing of complete kiosk
- end-of-life disposal.
Services

Protection relay retrofit

Improve the performance of your switchgear protection and control systems with Sepam and MiCom.

The period is launched on the market and is included in the Schneider Electric catalogue. The supply of spare parts is guaranteed.

- Replace old style single function protection units with a single multifunction protection relay
- Improved safety and reliability due to digital technology
- Benefit from enhanced functionality such as diagnostic functions and communications
- Pre-engineered solutions for legacy Schneider Electric relays (e.g. Sepam 2000)
- Custom engineered protection retrofit solutions

ECOFIT™

Renew your operations and extend the life of your medium voltage installation with our circuit breaker retrofit solutions.

- Pre-engineered, type tested solutions
- Superior performance
- Choice of SF₆ gas or vacuum technologies
- Increased safety and reliability
- Minimal downtime due to roll-out, roll-in solution
- Reduced maintenance and spare parts costs
- Phased implementation for budget control

Our retrofit solutions cover the full range of legacy Schneider Electric brands, including:

- Merlin Gerin: Belledonne
- Merlin Gerin: Fluair
- Merlin Gerin: Vercors
- Magrini Gallileo: Epoclad range
- Yorkshire: YSF6 range
- English Electric: OLX range
- Avera: HMC
- Avera: FP

1. Erection & commissioning  
2. Installation  
3. Assessment  
4. Asset Management Programme  
5. On Demand Maintenance  
6. Modernisation  
7. End of Life
Services

Environmental disposal
Schneider Electric has developed a total solution for managing the disposal of your used switchgear, from collection through to the completion of recycling and destruction processes. Our environmental disposal offer tracks your equipment through all phases of the process and provides documentation to confirm the destruction of the equipment and the quantity of SF₆ gas that has been reclaimed.

Giving SF₆ a second life
Sulphur Hexafluoride (SF₆) is a gas that is unparalleled in Medium Voltage (MV) switchgear applications. The technical and economic performance of MV Switchgear using SF₆ is unrivalled to this day. Due to its great stability and its capacity for immediate recomposition after electrical arcing, it contributes directly to the very long life of such equipment. Furthermore, the characteristics of SF₆ allow it to be recycled and ultimately reused. In the electrical industry and especially the medium voltage industry, SF₆ is used in a sealed-for-life enclosure within the equipment. SF₆ can only have an environmental impact if it is released to the atmosphere, for example, through improper disposal of switchgear at the end of its life.

SF₆ gas recovery system

Example recyclables in RM6 equipment

<table>
<thead>
<tr>
<th>IDI</th>
<th>IQI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous metal</td>
<td>78.5%</td>
</tr>
<tr>
<td>Non-ferrous metal</td>
<td>13.3%</td>
</tr>
<tr>
<td>Thermohardening</td>
<td>4.7%</td>
</tr>
<tr>
<td>Thermoplastics</td>
<td>2%</td>
</tr>
<tr>
<td>Fluids</td>
<td>0.5%</td>
</tr>
<tr>
<td>Electronic</td>
<td>0.7%</td>
</tr>
<tr>
<td>Other</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

1kg of SF₆ gas = 23.9 tonnes CO₂ in terms of global warming potential*

In Australia
3,000 SF₆ circuit breakers potentially reach the end of their expected life each year.

>80% of distribution switchgear can be recycled.

Collection
MV switchgear is collected from the customer’s site and transported to our facility. Our procedures follow EPA guidelines, including the tracking system used to record each item of equipment throughout the disposal process.

SF₆ gas recycling
SF₆ gas is recovered using our specialised evacuation process, which accurately records the quantity of gas recovered. The SF₆ gas is cleaned and tested to ensure maximum recycling.

Equipment recycling
The remainder of the equipment is destroyed using a specialised process, which separates the ferrous, non-ferrous metals and non-metallic (plastics) materials. This enables us to achieve maximum recycling of your used MV switchgear.

Certificate of destruction
A certificate of destruction is issued at the conclusion of our recycling process. The certificate includes the quantity of recovered SF₆ gas and equivalent CO₂, which supports your reporting obligations.
## MV Metal-Enclosed Switchgear

### Technical information

<table>
<thead>
<tr>
<th>Common International Standards</th>
<th>Type tests according to IEC62271-200 / AS62271.200</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 60694: common clauses to high voltage switchgear</td>
<td>n°1 - Dielectric tests</td>
</tr>
<tr>
<td>IEC 62271-200: AC metal-enclosed switchgear and controlgear for rated voltage above 1kV and upto and including 52 kV</td>
<td>n°2 - Measurement of the resistance of circuits</td>
</tr>
<tr>
<td>IEC 62271-100: high voltage alternating current circuit breakers</td>
<td>n°3 - Temperature-rise tests</td>
</tr>
<tr>
<td>IEC 62271-102: alternating current disconnectors and Earthing switches</td>
<td>n°4 - Short-time withstand current tests</td>
</tr>
<tr>
<td>IEC 60470: high voltage alternating current contactors</td>
<td>n°5 - Verification of the protection</td>
</tr>
<tr>
<td>IEC 60265-1: high voltage switches</td>
<td>n°6 - Verification of making and breaking capacities</td>
</tr>
<tr>
<td>IEC 60282-2: high voltage fuses</td>
<td>n°7 - Mechanical operation tests</td>
</tr>
<tr>
<td>IEC 60255: measurement relay and protection unit</td>
<td>n°8 - Pressure withstand tests</td>
</tr>
<tr>
<td>IEC 60044-1: current transformers</td>
<td>n°9 - Tests on non-metallic partitions and shutters</td>
</tr>
<tr>
<td>IEC 60044-2: voltage transformers</td>
<td>n°10 - Tightness tests</td>
</tr>
<tr>
<td>IEC 60529: degrees of protection provided by enclosures</td>
<td>n°11 - Internal arcing test</td>
</tr>
<tr>
<td>IEC 60529: degrees of protection provided by enclosures</td>
<td>n°12 - EMC tests</td>
</tr>
</tbody>
</table>

### 1. Internal arc classification

#### IAC switchgear:
Metal-enclosed switchgear, which meets prescribed criteria for protection of persons in the event of internal arc as demonstrated by the appropriate type tests.

#### Accessibility type:
- Type A - restricted to authorised personnel only.
- Type B - unrestricted accessibility, including that of the general public.
- Type C - accessibility restricted by out of reach installation.

#### Identification of protection:
- F - front side
- L - lateral side
- R - rear side

#### Power and duration of fault:
- Current/time (example 25kA/1s)

#### Internal arc classification has to be proven with the relevant type test certificate

<table>
<thead>
<tr>
<th>Each compartment with live MV equipment has to be tested</th>
<th>Installation conditions which have to be met</th>
<th>All 5 criteria must pass tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable/connection compartment</td>
<td>Minimum ceiling height</td>
<td>Correctly secured doors and covers that do not open</td>
</tr>
<tr>
<td>CB compartment</td>
<td>Minimum installation distance from wall</td>
<td>No fragmentation of the enclosure occurs</td>
</tr>
<tr>
<td>Busbar compartment</td>
<td></td>
<td>Arcing does not cause holes in the accessible sides</td>
</tr>
</tbody>
</table>

#### LSC-1:
Type of switchgear is not intended to provide service continuity during maintenance and may require complete disconnection of the switchgear from the system before accessing the interior of the enclosure.

#### LSC-2A:
When accessing components of one functional unit, the other functional units of the switchgear may be kept in service.

#### LSC-2B:
In addition to LSC-2A, the incoming high voltage cables to the functional unit being accessed may be kept energised.

### 2. Loss of service continuity

#### LSC-2:
Type of switchgear is intended to allow maximum continuity of service of the network during access to the compartments inside the switchgear.

#### LSC-2A:
When accessing components of one functional unit, the other functional units of the switchgear may be kept in service.
3. Partitioning classifications

**PM**
Metallic shutters and partitions between live parts and the open compartment.

**PI**
Insulation-covered discontinuity in the metallic partitions/shutters between live parts and the open compartment.

4. Degree of protection (IP ratings)

<table>
<thead>
<tr>
<th>IP</th>
<th>1st numeral</th>
<th>2nd numeral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st numeral: conforming to AS60529 protection against ingress of solid matter</td>
<td>2nd numeral: conforming to AS60529 protection against ingress of water</td>
</tr>
<tr>
<td>0</td>
<td>No protection.</td>
<td>No protection.</td>
</tr>
<tr>
<td>1</td>
<td>Full penetration of 50mm diameter sphere not allowed. Contact with hazardous parts not permitted.</td>
<td>Protected against vertically falling drops of water. Limited ingress permitted.</td>
</tr>
<tr>
<td>2</td>
<td>Full penetration of 12.5mm diameter sphere not allowed. The jointed test finger shall have adequate clearance from hazardous parts.</td>
<td>Protected against vertically falling drops of water with enclosure tilted 15° from the vertical. Limited ingress permitted.</td>
</tr>
<tr>
<td>3</td>
<td>The access probe of 2.5mm diameter shall not penetrate.</td>
<td>Protected against sprays to 60° from the vertical. Limited ingress permitted.</td>
</tr>
<tr>
<td>4</td>
<td>The access probe of 1.0mm diameter shall not penetrate.</td>
<td>Protected against water splashed from all directions. Limited ingress permitted.</td>
</tr>
<tr>
<td>5</td>
<td>Limited ingress of dust permitted (no harmful deposit).</td>
<td>Protected against jets of water. Limited ingress permitted.</td>
</tr>
<tr>
<td>6</td>
<td>Totally protected against ingress of dust.</td>
<td>Protected against strong jets of water. Limited ingress permitted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Protected against the effects of immersion between 15cm and 1m.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Protected against strong jets of water. Limited ingress permitted.</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Protected against the effects of immersion between 15cm and 1m.</td>
</tr>
</tbody>
</table>

Additional letter (optional): protection of persons against contact with hazardous parts

A: Protection against access with the back of the hand
B: Protected against access with a finger (Ø 12mm)
C: Protected against access with a tool (Ø 2.5mm)
D: Protected against access with a wire (Ø 1.0mm)

Example:

**IP41**
Protection against vertically falling water drops and solid objects ≥ 1.0mm Ø

**IP2XC**
Protection against solid objects ≥ 12.5mm Ø and live parts are not accessible by tools ≥ 2.5mm Ø

X
Where protection level is not specified, it shall be replaced by the letter “X”.

Customer Service Tel: 1300 369 233
Line Currents and Short Circuit Currents for Three-Phase Transformers

Minimum Energy Performance Standards (MEPS)

### MEPS Table

<table>
<thead>
<tr>
<th>kVA</th>
<th>Voltage kV</th>
<th>Required Power (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0.380</td>
<td>98.85%</td>
</tr>
<tr>
<td>150</td>
<td>0.400</td>
<td>98.94%</td>
</tr>
<tr>
<td>160</td>
<td>0.415</td>
<td>98.94%</td>
</tr>
<tr>
<td>200</td>
<td>0.440</td>
<td>99.03%</td>
</tr>
<tr>
<td>250</td>
<td>0.690</td>
<td>99.13%</td>
</tr>
<tr>
<td>300</td>
<td>1.000</td>
<td>99.17%</td>
</tr>
<tr>
<td>315</td>
<td>1.050</td>
<td>99.22%</td>
</tr>
<tr>
<td>400</td>
<td>1.1</td>
<td>99.27%</td>
</tr>
<tr>
<td>500</td>
<td>1.1</td>
<td>99.31%</td>
</tr>
<tr>
<td>600</td>
<td>1.1</td>
<td>99.36%</td>
</tr>
<tr>
<td>750</td>
<td>1.1</td>
<td>99.37%</td>
</tr>
<tr>
<td>800</td>
<td>1.1</td>
<td>99.37%</td>
</tr>
<tr>
<td>1000</td>
<td>1.5</td>
<td>99.40%</td>
</tr>
</tbody>
</table>

**Line Current = kVA / (1.732 x kV)**

### Minimum Energy Performance Standards

**Standard:**

**Scope:**
- Distribution transformers between 10kVA and 2500kVA connected to 11kV or 22kV networks (50Hz only)
- Single-phase, three-phase systems
- Transformer impedance between 3% and 8%
- Two winding transformers only

**Government regulations:**
- All distribution transformers sold in Australia must comply with the standard.
- State government regulators are responsible for enforcing the regulations.
- Website: www.energyrating.gov.au

**Definition:**
The transformer power efficiency at 50% load and unity power factor in percent is calculated in accordance with AS2374.1.2 - 2003 S 1.5.1 (c).

\[
\eta_{50\%} = \frac{0.5 \times S_r + 0.25 \times P_l + P_o}{0.5 \times S_r} \times 100\%
\]

Where:
- \( S_r \) = Rated power in kVA
- \( P_l \) = No Load Loss in kW
- \( P_o \) = Load Loss in kW
- \( i \) = Load relative to transformer rating

**Formulae:**
- \( S_r \)
- \( \eta_{50\%} \)
- \( \eta_{90\%} \)
- \( KVA \)
- \( \% \)
- \( S_r \)
- \( P_l \)
- \( P_o \)
- \( i \)

---

Customer Service Tel: 1300 369 233
### Three-Phase Common Transformer Vector Groups

<table>
<thead>
<tr>
<th>Phasor symbols</th>
<th>Terminal markings and phase displacement diagram of induced voltages</th>
<th>Winding connections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HV winding</td>
<td>LV winding</td>
</tr>
<tr>
<td>Dy1</td>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Yd1</td>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Phase displacement = Minus 30°**  
Clock-hour figure = 1

| Dy11           | ![Diagram](image5.png)                        | ![Diagram](image6.png)              |
| Yd11           | ![Diagram](image7.png)                        | ![Diagram](image8.png)              |

**Phase displacement = Plus 30°**  
Clock-hour figure = 11
Pressure conversion information

<table>
<thead>
<tr>
<th>Bar</th>
<th>PSI</th>
<th>kPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 bar = 14.5 psi</td>
<td>1 psi = 6.895 kPA</td>
<td>1 kPA = 7.5188 mm Hg</td>
</tr>
<tr>
<td>1 bar = 100 kPa</td>
<td>1 psi = 51.71 mm Hg</td>
<td>1 kPA = 0.2853 in. of mercury</td>
</tr>
<tr>
<td>1 bar = 750 mm Hg</td>
<td>1 psi = 2.036 in. of mercury</td>
<td>1 kPA = 0.01 bar</td>
</tr>
<tr>
<td>1 bar = 29.53 in. of mercury</td>
<td>1 psi = 0.069 bar</td>
<td>1 kPA = 0.145 psi</td>
</tr>
</tbody>
</table>
Energy quality with power factor correction and harmonic filtering

Most utilities have specific policies for billing reactive energy. Price penalties are applied if the active power/apparent power ratio is not within the guidelines.

Solutions

Power factor correction

Every electric machine needs active and reactive power to operate. Power factor is used to identify the level of reactive energy. If the power factor drops below the limit set by the utility, then power factor correction equipment can be installed in order to avoid penalties. By correcting a poor power factor, these solutions also reduce kVA demand. The results are a 5 to 10% lower electricity bill, cooler equipment operation and longer equipment life. In addition, proper power factor correction helps optimise electrical network loading and improves reliability.

Harmonic filtering

Equipment such as drives, inverters, UPS, arc furnaces, transformers during energisation and discharge lamps generate harmonic currents and voltage distortion. These harmonics stress the network, overload cables and transformers, cause outages and disturb many types of equipment such as computers, telephones and rotating machines. The life of equipment can be greatly reduced.

MV capacitor bank selection guide

Step 1: basic data collection

Network characteristics:
- voltage U (V)
- network frequency (Hz).
- Operating conditions:
  - energy bills
  - measurements of power: P(kW) cos phi.

Step 2: calculation of the reactive power Qc (kvar)
The reactive power is determined either:
- from the electricity bills, depending on the method of recording the consumption of kvar applied by the energy supplier
- from the electrical data of the installation.
- The aim is:
  - not to pay for the consumption of reactive energy and to ensure optimum use of the transformers, cables and control and protection switchgear
  - to satisfy the standards currently in force: compliance with a minimum cos phi, energy quality standards.

Step 3: choice of type of capacitor bank according to the harmonics

The presence of non-linear loads creates harmonic currents and voltages. The compensation equipment is chosen according to the value of these harmonics.

Step 4: choice of type of compensation

Global compensation
The type of compensation should be chosen by taking into account the calculated reactive power Qc (kvar) and the apparent power Sn (MVA) of the upstream transformer.

Qc/Sn < 15% the reactive power of the capacitor banks is constant and they are started up or shut down when a predetermined kvar value is reached. It is an "on/off" type of operation.

Qc/Sn > 15% if automatic startup or shutdown for the capacitor bank (controlled by Varlogic varmetric relay) is specified, the reactive power of the capacitor banks is split into "steps" with the possibility of starting or stopping more or fewer steps. The reactive power corresponds to the change in load requirements.

Motor compensation

- If there is no risk of self-excitation the capacitor bank will be connected in parallel with the motor.
- If there is a risk of self excitation it is only possible to connect to the motor terminals; the capacitor bank will be connected to the busbar independently of the motor.

Step 5: selection table

The recommended choice is based on the network insulation voltage, network harmonic pollution level and on the type of compensation.
Based on the installation power (in kW) and power factor.
Given the installation power factor (cos ϕ) before compensation and the desired power factor after compensation, the table below can be used to obtain the coefficient, which must be applied to the active power to determine the required capacitor bank output.

### Useful Formulas:

1. **ϕ compensation**
   - \[ \phi = 0.93 (\tan \phi) \]
2. **Applications and Solutions**
   - \[ P_{f.} = \cos \phi = \frac{kW}{\sqrt{3} VA \sin \phi} \]
   - \[ kW = \frac{\sqrt{3} VA \cos \phi}{1000} \times 1000 \]
   - \[ kVAR = \frac{\sqrt{3} VA \sin \phi}{1000} \times 1000 \]
   - \[ KVA = \frac{\sqrt{3} VA}{1000} \]
   - \[ I = \frac{kVA \times 1000}{\sqrt{3} V} \]
   - \[ I_c = \frac{kVAR \times 1000}{\sqrt{3} V} \]

### Capacitor bank sizing table

<table>
<thead>
<tr>
<th>tan cos</th>
<th>tg cos</th>
<th>cos (or tan )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75</td>
<td>0.59</td>
<td>0.48</td>
</tr>
<tr>
<td>0.46</td>
<td>0.43</td>
<td>0.40</td>
</tr>
<tr>
<td>0.36</td>
<td>0.33</td>
<td>0.29</td>
</tr>
<tr>
<td>0.25</td>
<td>0.20</td>
<td>0.14</td>
</tr>
<tr>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Example Calculation:**

Calculate the required kvar output for a 500kW installation to raise the power factor from cos ϕ = 0.75 (tan ϕ = 0.88) to cos ϕ = 0.93 (tan ϕ = 0.4).

Qc = 500 x 0.487 = 244 kvar, whatever the system rated voltage.

### Useful Formulas:

1. **Power Factor Calculation:**
   - \[ P_{f.} = \cos \phi = \frac{kW}{\sqrt{3} VA \sin \phi} \]
2. **Current**
   - \[ I = \frac{kVA \times 1000}{\sqrt{3} V} \]
3. **Capacitor Bank Size**
   - \[ I_c = \frac{kVAR \times 1000}{\sqrt{3} V} \]

Where:

- **Pf:** power factor; kW = active power; kVAR = reactive power; kW = apparent power; V = volts; A = amps; I = line current; Ic = rated capacitor current.

---

AS/NZS3000:2007 Clause 4.15.2.3 'Current carrying capacity of supply conductors' require circuit breakers to be rated at 1.35 times the rated capacitor current to allow for capacitor and voltage tolerances and harmonic currents.'
FVNR full voltage (direct on line) motor starter
Applies the system line voltage to motor terminals to start a motor. The resulting inrush current can be high, ranging from 400% to 1000% of full load current. Fig. 1 shows the typical inrush current of 600%. Full voltage starting also provides high starting torque (about 150% of full load torque).
Full voltage motor starters are the most widely used and meet most of applications. Motorpact FVNR motor starter is particularly suitable, due to its simple and cost-effective design, compact footprint, easy operation and low maintenance.

Reduced voltage motor starters
Starting with reduced voltage decreases the full load current (FLC) at the motor terminals in proportion to the voltage reduction while the full load torque (FLT) is reduced by the square of the voltage reduction.
Reductions are done with either an autotransformer, a primary reactor or a SoftStart electronic device.

RAVT auto-transformer motor starter
It provides maximum starting torque with minimal line current. Due to transformer action, the line current will be 25%, 42% or 64% of full voltage values for the 50%, 65% or 80% taps respectively.
The two methods of transitioning from full voltage to reduced voltage are open and closed transitions:
- open transition disconnects the motor from the power source for a brief time, allowing the motor to act as a generator. However, when reconnected, transients are produced that can damage the motor
- closed transition never disconnects the motor from the power source.

Motorpact RVAT auto-transformer motor starter uses the closed transition, or Konndorfer method.
The transition from reduced voltage to full voltage on Motorpact motor starters can be based on current or time. The overcurrent relay of the Sepam 41 monitors the motor current. When the motor current drops below the preset value, the relay signals the motor starter to full voltage.
If the controller does not transition to full voltage in a preset time (acceleration time plus two seconds), an incomplete sequence relay signals the controller to stop. Fig. 1 and Fig. 2 show motor starting with auto-transformer, showing that the starting torque is slower than for full voltage.

RVSS soft start motor starter
A central processing unit (CPU) controls the reduced voltage applied to the motor, by phasing angle firing the SCR power module, and then slowly and gently increases torque through control of the voltage and current until the motor accelerates to full speed.
Motorpact RVSS SoftStart motor starter can have different starting settings:
- Voltage ramp with current limit: the initial torque setting applies just enough voltage to the motor to cause the motor shaft to begin to turn. This voltage is gradually increased
- Constant current: the current is immediately increased to the current limit point and held here until the motor reaches the full speed. The voltage is function of the necessary torque.
- Torque regulation: control of the acceleration, current and voltage are function of the torque; see Fig. 4 and Fig. 5
Because a MV power supply interruption is unacceptable, especially in critical applications, an automatic system is required for MV source transfer.

For your peace of mind, RM6 enables automatic control and management of power sources in your medium voltage secondary distribution network with a short time (less than 10 seconds), guaranteeing the high reliability of your installation.

ATS 1/2
On loss of voltage on L1, the automatic transfer system automatically switches to L2. Consider a network with two medium voltage network sources supplying a transformer. With the automatic control feature provided by the T200, on loss of voltage on the main line L1, the automatic transfer system automatically switches to the backup line L2. The flexibility of the T200 allows for 3 different operating modes to dictate what will happen after switching to the backup line.

Case 1: as soon as voltage returns to L1, the ATS changes back to the main line.
Case 2: the ATS does not change back to the main line. Flow of power continues on L2 except in the event of a voltage loss on L2.
Case 3: ATS does not change back to the main line. Flow of power continues on L2 regardless of the voltage on the two lines.

For a network with a changeover between a distribution system line and a generator, the option for 3 different operating modes is also available; similar to the example above. The ATS also provides the option for sending out a generator start up signal for this configuration.

ATS 2/3
On loss of voltage on one line, the ATS opens this line and closes the bus coupler. The combination of the RM6 switchboard and Easergy T200 provides a high-reliable and pre-tested solution that ensures the availability of your energy.

Consider a source changeover between 2 incoming lines L1 and L2 and a busbar coupling switch. On loss of voltage on the main line L1, the ATS opens this line and closes the busbar coupler. This allows that load to be power from the backup line L2. The flexibility of the T200 allows for 2 different operating modes to dictate what will happen next in this configuration.

Case 1: as soon as voltage returns to L1, the ATS changes back to the main line. (the switch for L1 closes and the busbar coupler is opened)
Case 2: voltage presence is monitored during a configurable period. If the voltage disappears during this period, the coupling switch is opened and the ATS is locked.

Consider a source changeover between 2 incoming lines L1 and L2 and a busbar coupling switch. On loss of voltage on the main line L1, the ATS opens this line and closes the busbar coupler. This allows that load to be power from the backup line L2. The flexibility of the T200 allows for 2 different operating modes to dictate what will happen next in this configuration.

Case 1: as soon as voltage returns to L1, the ATS changes back to the main line. (the switch for L1 closes and the busbar coupler is opened)
Case 2: voltage presence is monitored during a configurable period. If the voltage disappears during this period, the coupling switch is opened and the ATS is locked.

| 2 VPIS-VO | Voltage sensor: dedicated version of VPIS with voltage output signal. |
| 2 VD23   | Voltage detector: a relay is activated when a loss of voltage is detected from the VPIS voltage output signal. |
| 2 FPI    | Fault passage indicator: if a fault current is detected, the automatic transfer system is locked in order to avoid closing the healthy line onto the fault. |
| 1 T200 I + switch function motorised | From the digital input coming from the VD23 and the FPI information, T200 I takes the decision to switch from one line to another. |

Communication to SCADA: optionally, communication facilities may be added. 

Modems: PSTN, Radio, GSM/GPRS, Ethernet,...
Protocols: Modbus, IEC 870-5-101, DNP3,...
Functions: dual port, remote configuration,...
Schneider Electric’s range of switchgear can be remotely controlled or provide fully automatic supply restoration. The switchgear can be readily embedded in a centralised scheme or can have automation restoration logic embedded in the firmware of the associated controllers such that the switchgear can, intelligently and independent of other SCADA systems, restore supplies to all healthy sections of a circuit following a fault. This restoration can be achieved with or without the need for communications depending on the network and customer preferences. In either case, the switchgear is usually remotely controlled and the switchgear will automatically report the revised circuit and switchgear status to the central master station.

Schneider Electric also offers a highly sophisticated Advanced Distribution Management System, which has an embedded FDIR, Fault Detection Isolation and Restoration Algorithm. The centralised ADMS system has embedded state estimation to precisely define the network model, and process an unbalanced load flow algorithm based on that model together with telemetered real-time data recovered from the network. FDIR can operate in manual or automatic mode. In manual mode, post fault, the system will recommend the switching steps required to isolate the minimum faulted section of line and restore supplies to the healthy parts of the circuit. The system continually calculates the available capacity on each circuit and in the event that there is insufficient capacity to pick up the load lost, the scheme will transfer some load from the proposed back feed circuit to adjacent circuits. The scheme is fully dynamic and works regardless of the network running arrangement. In automatic mode the scheme utilises remotely controlled switchgear and automatically undertakes all of these isolation and supply restoration steps completely independent from the operator. This scheme is optimised to work with Schneider Electric switchgear, but works with any switchgear that uses standard telemetry protocols.
Schneider Electric’s industry experience and focus on innovation can help you to achieve your performance potential. Offering custom engineered solutions with proven technology, Schneider Electric can ensure optimised levels of availability while protecting your processes and operations at every stage.

1. **Resource Extraction**
   Manage oil and gas production from the well to the field with four integrated offers that increase efficiency and reduce mechanical failures and downtime.

2. **E-Houses for offshore and onshore, Floating Production Storage and Offloading Units (FPSO)**
   Complete and modular E-House design delivering compact, efficient, and cost-effective power substations.

3. **Seabed Electrical Distribution**
   A cost-effective, modular solution with high liability for onshore to 60 MV subsea processing located at up to 3000m deep.

4. **Pipeline Management**
   Complete pipeline distribution solutions that help increase safety, enhance reliability and improve operational performance and profitability.

   Complete power distribution solutions for large oil & gas sites (refineries, petrochemical and LNG plants) based on IEC 61850 Standards.

6. **Integrated Security Solutions**
   Supported by an open but secure telecom backbone, with high-performance CCTV and efficient access control.
Applications and Solutions

Solutions for the mining industry

Schneider Electric's global mining experience has led to the refinement of tools and systems that are adaptable to each individual mining application. Intelligent systems make it possible to maximise revenue generation by gathering and processing the information needed to optimise production performances and costs.

In addition to pre-developed architectures greatly reducing system design costs, substantial operating savings can also be made through maintenance management services and energy efficient practices.

Architecture scalability permits installations to be expanded as and when demand trends shift. This flexibility, combined with process oriented design tools, allows for tightly knit solutions, precisely integrating all mining processes, which simultaneously reduce resource wastage.

Through integrating technologies across multiple domains of expertise, Schneider Electric is capable of delivering end-to-end solutions for the mining sector.

Increase revenue
Increase revenue and production capacity through information management, demand chain visualisation and remote operations.

Reduce costs
Reduce design, implementation and operating costs by using proven and standard architectures and deploying them in a rapid and controlled manner.

Total integration
Integrated technology from the boardroom to the device means a standards approach can be taken to expansion projects, essentially 'cookie cutting' the way to increased capacity.

Turnkey project management
Utilise Schneider Electric capability to turnkey your project and manage your procurement, design and installation risk through a single contract.

Efficient deployment
Delivering packaged electrical and automation solutions. Containerised data centres, control rooms and packaged substations means your entire electrical and automation infrastructure can be delivered and installed at site pre-tested and ready to commission.

Contribute to sustainable development
Improve health, safety and people development and reduce environmental impact.
Applications and Solutions

One stop shop partner

Complete offer for:
- Electrical Supply for traction power, signalling, stations
- Substation Automation
- Network Management Systems / SCADA / Distribution Automation

Delivered as:
- Renewable energy connectivity
- Energy Management services
- Ticketing Systems
- Communication Systems
- Secure Power Solutions

Railways electrical systems
- Trackside power supply
- Energy Management
- Smart Business Management

Green Stations

On-board automation
- Signalling automation

Secured Signalling
- Secured IT centres
- Secured passenger stations

Passenger stations security
- Infrastructure surveillance
- Stations Energy Efficiency
- Smart Stations
Schneider Electric addresses water management challenges with flexible, efficient solutions ranging from simple pump control through to integrated process plant architectures - ensuring optimal reliability, availability and safety.

**Reducing design and construction cost and time**
Optimising time and cost requires structured design tools. These range from pre-developed automation architectures and object libraries to electrical network calculations for each type of pumping station and treatment plant.

**Reducing plant operating costs**
The application of innovative, energy-efficient hardware and software produces substantial energy bill and maintenance savings. These include motor control systems and power optimisation solutions such as harmonic filtering and power factor correction.

**Remote station management**
Telemetry solutions ensure precise coordination of multiple sites allowing for continuous measurement, data recording, remote configuration, adjustment, signalling and maintenance.

**Process life cycle support and services**
Support is available throughout water plant life cycles ensuring maximised process uptime and equipment lifespan. Services include spares and repairs, maintenance contracts, productivity/upgrade consulting and training.
Because without reliable power, a building is out of business

Introducing Premset MV switchgear, flexible architecture that improves peace of mind and reduces total cost of ownership

Switchgear designed for enhanced peace of mind
Because business relies on the availability of electricity, buildings need their medium voltage distribution systems not only to be reliable, but also to be energy efficient, durable, and able to adapt to changing business needs.

But the operators of these systems require more. Peace of mind is paramount, and can only be achieved with low-maintenance switchgear that helps ensure the safety of both people and assets. Switchgear that provides monitoring and lowers the total cost of ownership is critical.

Stress-free installation, upgrading, and maintenance
By combining proven technologies with a modular architecture and the Shielded Solid Insulation System, Premset™ MV switchgear represents a breakthrough innovation in MV distribution. Additionally, its compact and easily upgradeable design optimizes your costs through:

- Maintenance-free operation
- Compact size
- Extended life
- Easy installation and upgrades

The 3-in-1 architecture means its operation is not only intuitive — it’s the safest switchgear in its class. And, due to an SF6-free design, end-of-life is made easier, with no need to worry about future legislation.

Architecture with distributed intelligence
The Intelligent Electronic Devices (IEDs) used in Premset solutions allow for easy integration, with a plug-and-play scanning system for easy configuration.
All Enquiries (Australia wide)
Email: customercare.au@schneider-electric.com
www.schneider-electric.com.au
Tel: 1300 369 233
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Regional representatives located in: Launceston

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■ Unit 3, 26 Gibberad Road, Balcatta, WA 6021 (Electrical Distribution)

Northern Territory
Darwin ■ 16 Albatross Street, Winnellie, NT 0820

Manufacturing sites
Benalla ■ Medium voltage switchgear and transformer manufacturing and development
■ Sydney Road, Benalla, VIC 3672

Brisbane ■ Medium voltage overhead distribution switchgear manufacturing and development
■ 80 Schneider Road, Eagle Farm, QLD 4009

Adelaide ■ Wiring accessories and low voltage switchgear manufacturing
■ 33-37 Port Wakefield Road, Gepps Cross, SA 5094

Rocklea ■ Medium voltage switchgear and transportable substations
■ 35 Evans Road, Rocklea, QLD 4106
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