<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traction power solution</td>
<td>7</td>
</tr>
<tr>
<td>Distribution power</td>
<td>31</td>
</tr>
<tr>
<td>Signalling power</td>
<td>53</td>
</tr>
<tr>
<td>Tunnels &amp; stations</td>
<td>65</td>
</tr>
<tr>
<td>Energy &amp; infrastructure management</td>
<td>83</td>
</tr>
<tr>
<td>Services</td>
<td>89</td>
</tr>
<tr>
<td>Operations &amp; asset management</td>
<td>99</td>
</tr>
</tbody>
</table>
Answer the challenges of today. And tomorrow.

The increasing demand for sustainable mobility represents a challenge today. There is an emergent need of modernization of existing networks and investment in new infrastructures to comply with the developing need of energy efficiency and smarter infrastructures.

Ensure
Safety, Security and Reliability

Monitor, Control & Optimize
The electrical assets on the rail network
With Schneider Electric intelligent solutions.

We understand the requirements that are essential to modern railway networks. With a long history of working in the rail industry, we provide reliable solutions for your installation. Our range of high-quality, innovative and cost-effective electrical solutions ensures that your rail project is completed successfully, and with energy optimization.

Our equipment and solutions have been selected by the most demanding rail and metro operators, and enable millions of passengers to safely reach their destinations every day.
# Traction power solution

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformers</td>
<td>8</td>
</tr>
<tr>
<td>AC traction transformers</td>
<td>8</td>
</tr>
<tr>
<td>Rectifier oil transformers</td>
<td>9</td>
</tr>
<tr>
<td>Rectifier cast resin transformers</td>
<td>10</td>
</tr>
<tr>
<td><strong>AC MV traction switchgear</strong></td>
<td>11</td>
</tr>
<tr>
<td>27.5kV-200 kV BIL indoor traction switchgear</td>
<td>11</td>
</tr>
<tr>
<td>27.5kV-250 kV BIL indoor traction switchgear</td>
<td>12</td>
</tr>
<tr>
<td>27.5kV-250 kV BIL outdoor traction switchgear</td>
<td>14</td>
</tr>
<tr>
<td><strong>Disconnectors</strong></td>
<td>15</td>
</tr>
<tr>
<td>AC traction disconnectors</td>
<td>15</td>
</tr>
<tr>
<td>DC traction disconnectors</td>
<td>16</td>
</tr>
<tr>
<td>Control system for catenary disconnectors</td>
<td>16</td>
</tr>
<tr>
<td><strong>Protection for AC traction</strong></td>
<td>17</td>
</tr>
<tr>
<td><strong>RTU</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>Substation automation</strong></td>
<td>19</td>
</tr>
<tr>
<td><strong>MV power quality</strong></td>
<td>20</td>
</tr>
<tr>
<td>AC and DC traction systems</td>
<td>20</td>
</tr>
<tr>
<td><strong>E-House</strong></td>
<td>22</td>
</tr>
<tr>
<td><strong>UPS - AC and DC traction systems</strong></td>
<td>23</td>
</tr>
<tr>
<td>Single-phase UPS</td>
<td>24</td>
</tr>
<tr>
<td>Three-phase UPS</td>
<td>25</td>
</tr>
<tr>
<td><strong>Cooling</strong></td>
<td>27</td>
</tr>
</tbody>
</table>
Minera MP – Power traction transformer
Medium power transformers up to 100 MVA and 170 kV

The Minera oil-immersed medium voltage power transformer is dedicated to all applications up to 170 kV and 100 MVA. Schneider Electric’s technical expertise and know-how have been employed to create a wide variety of reliable transformers that satisfy customer requirements for both utility and industrial applications, even the most demanding such as Oil and Gas.

Technical characteristics
- Rated power: from 3.15 up to 100 MVA
- Rated voltage: up to 170 kV
- Phases: one or three-phase unit
- Rated frequency: 50 Hz or 60 Hz
- Type of cooling: ONAN (ONAF, OFAF, ODAF, OFWF or ODWF on request)
- Voltage regulation: off-circuit tap changer (OCTC) or on load tap changer (OLTC)
- Optional: breathing or sealed type, standard or low noise levels, a wide variety of accessories

Minera
Distribution transformers up to 3.15 MVA and 36 kV

The Minera oil-insulated voltage medium power transformer from Schneider Electric has been developed with proven, permanently optimized technology. The entire range is highly versatile and offers high quality, reliability and a long service life with minimum maintenance and easy recycling.

Technical characteristics
- Rated power: from 50 kVA up to 2.5 MVA
- Rated voltage: up to 36 kV
- Phases: Three-phase unit
- Rated frequency: 50 Hz or 60 Hz
- Type of cooling: ONAN (ONAF, OFAF, ODAF, OFWF or ODWF on request)
- Voltage regulation: off-circuit tap changer (OCTC) or on load tap changer (OLTC)
- Optional: breathing or sealed type, standard or low noise levels, a wide variety of accessories
Transformers
Rectifier oil transformers

Minera R – Rectifier transformer
Medium power transformers up to 80 MVA and 170 kV

The electrical and mechanical design of the Schneider Electric rectifier transformer is based on decades of experience in transformer design for both medium and high voltage ranges, expert calculation and CAD programming. They are oil-type transformers filled with mineral, silicone or vegetable oil. They operate at the fundamental frequency of an alternating current system and are designed to have one or more output windings connected to the rectifier. It is possible to make major changes in the output current and voltage by using the transformer with a different rectifier configuration.

Technical characteristics
- Rated power: up to 80 MVA
- Rated voltage: various - please consult us
- Phases: three-phase unit
- Rated frequency: 50 Hz or 60 Hz
- Type of cooling: ONAN, ONAF (other on request)
- Optional: provided with protection levels up to IP55

Vegeta – Biodegradable vegetable oil transformer
Special transformer up to 25 MVA and 72.5 kV

Vegeta transformers are equipped with MV coils reeled using “wet” technology; the product itself is made of non-flammable and fire-retardant materials. It is therefore perfect for applications where the use of other types of transformers is impossible because of safety and difficult working conditions, e.g. in industrial installations susceptible to fire hazards. Additionally, it is suitable for internal use as a substitute for oil transformers.

Technical characteristics
- Rated power: up to 25 MVA
- Rated voltage: up to 36 kV
- Phases: one or three-phase unit
- Rated frequency: 50 Hz or 60 Hz
- Type of cooling: AN (other on request)
- Optional: provided with protection levels up to IP55
Transformers

Rectifier cast resin transformers

Trihal
Dry-type transformers up to 15 MVA and 36 kV

Trihal is a best-in-class high-quality transformer that performs reliably in a wide range of environments. It is perfectly suited to a wide variety of industries, from densely populated buildings and critical infrastructure to heavy industry and renewable energy production, and is an excellent replacement for PCB transformers.

Technical characteristics
- Rated power: up to 15 MVA
- Rated voltage: up to 36 kV
- Rated frequency: 50 Hz or 60 Hz
- Type of cooling: AN, AF (other on request)
- Optional: thermal protection system
- Enclosure, fans, anti-vibration pads, plug-in bushing, monobloc bushing, automatic voltage regulator panel, surge arrestors, etc.

Tricast
Dry-type transformers up to 25 MVA and 52 kV

High quality and reliability make Tricast cast resin dry type transformers the perfect solution for infrastructure projects such as transmission and distribution substations, public buildings and high-rise developments. As Tricast is self-extinguishing, it is an effective solution for use in industrial installations susceptible to fire hazards. In addition, it meets the needs of special applications such as wind farms.

Technical characteristics
- Rated power: 25 MVA
- Rated voltage: 52 kV
- Rated frequency: 50 Hz or 60 Hz
- Type of cooling: AN, AF (other on request)
- Optional: thermal protection system
  - On-load tap changer, enclosure, fans, antivibration pads, plug-in bushing, monobloc bushing, automatic voltage regulator panel, surge arrestors, etc.

Resiglas
Dry-type transformers up to 25 MVA and 36 kV

Resiglas transformers are equipped with MV coils reeled using “wet” technology; the product itself is made of non-flammable and fire-retardant materials. It is therefore perfect for applications where the use of other types of transformers is impossible because of safety and difficult working conditions, e.g. in industrial installations susceptible to fire hazards. Additionally, it is suitable for internal use as a substitute for oil transformers.

Technical characteristics
- Rated power: up to 25 MVA
- Rated voltage: up to 36 kV
- Phases: one or three-phase unit
- Rated frequency: 50 Hz or 60 Hz
- Type of cooling: AN (other on request)
- Optional: provided with protection levels up to IP55
AC MV Traction Switchgear
27.5 kV-200 kV BIL indoor traction switchgear

GHA-Rail
Gas insulated switchgear up to 27.5 kV, 2000 A, 25k A

Technical characteristics
- Up to 200kV BIL
- 1 or 2 pole versions
- Compact and modular design
- Vacuum circuit breaker

Features
- B-Link
- Cable connection variety
- Gas Monitoring System (IDIS)

Advantages
- Extensions or panel replacements within the panel assembly are possible without gas handling and without interference in the gas filled compartments
- Choice of inner and outer cone connections according to IEC 50181
- Visual indication of each gas-filled compartment

Benefits
- Faster installation of switchboard
- Safer operating environment for operators
- Easy cable termination (test leads are directly attached to the cable plugs therefore test sockets or space connections are not required)
- Reduced onsite maintenance and peace of mind
Traction power solution

AC MV Traction Switchgear

WI-Rail
Gas insulated switchgear up to 27.5 kV, 2500 A, 31.5 kA

Technical characteristics
- Up to 250 kV BIL
- 1 or 2 pole versions
- Compact and modular design
- Vacuum circuit breaker

Features
- Compact switchgear
- Modular design
- Separate single-phase metal-enclosed module
- Vacuum switching

Advantages
- Cubicles are only 600 mm in width
- Extension of an existing switchboard possible on both sides. Extension is also possible from single to double busbar models
- The voltage transformer can be on the busbar or in the outgoing feeder area
- High performance and reliability

Benefits
- Able to fit more cubicles in limited space
- Easy and quick switchboard upgrade and replacement
- Flexible voltage transformer arrangement
- Environmentally friendly
AC MV Traction Switchgear
27.5 kV-250 kV BIL indoor traction switchgear

CBGS-2
Gas insulated switchgear up to 250 kV BIL

Technical characteristics
• Rated voltage: 52 kV (three-phase) / 2x27.5 kV (two-phase) / 1x27.5 kV (single-phase)
• Busbar system: Single / Double
• Rated current busbar & feeders: up to 2000 A
• Rated short time withstand current: 25 kA / 1 s
• Internal Arc Classification: AFL / AFLR 25 kA / 1 s
• Class: LSC2 PM
• Protection and control devices: Sepam, MiCOM, VAMP or Thermal diagnosis

VXA-VXB
Vacuum circuit breaker

VXA - VXB outdoor vacuum circuit breakers have been specially designed to meet the specific requirements of AC traction power supply systems. They comply with main IEC and EN standards.

Technical characteristics
• Ratings: 17 kV 16.7 Hz or 27.5 kV 50/60 Hz
• VXA: single pole configuration
• VXB: two pole configuration
• Can be fixed pole-mounted type or mounted on withdrawable trucks
• Can be configured with a rated lightning impulse withstand voltage (BIL) up to 250 kV
Traction power solution

AC MV Traction Switchgear
27.5 kV - 250 kV BIL outdoor traction switchgear

CBR / SDR outdoor
Circuit breaker and load break switch

Technical characteristics
• Outdoor pole mounted AC switchgear for railway catenaries
• Two types of units available:
  – SDR load break switch - 27.5 kV, 2000 A, 25 kA
  – CBR circuit breaker - 27.5 kV, 1600 A, 12.5 kA
• Both can be supplied in single and two pole configurations

Features
• Dead Tank Technology
• No civil work
• Vacuum switching

Advantages
• The active circuit is placed in an inert insulated gas, confined in a sealed and earthed stainless steel tank
• Only assembly and commissioning required

Benefits
• Almost maintenance-free switchgear
• Fast and easy installation
• Environmentally friendly
Traction power solution

Disconnectors

AC traction disconnectors

Catenary disconnectors

1 x 27.5 kV - 2 x 27.5 kV, BIL 200 kV

Equipment for catenary - RB +AE-35

Technical characteristics

• Vertical opening disconnectors
• Specially designed for high speed catenaries
• Self-cleaning high-pressure contacts.
• Live parts in nickel-plated electrolytic copper
• Polymeric insulator up to 1500 mm creepage distance
• Operation via electrical or manual control
• Available with isolated power system

Equipment for catenary - SE +AE-35

Technical characteristics

• Vertical opening disconnectors
• Designed for high speed catenary and traction substations
• Current carrying parts made of nickel-plated electrolytic copper
• Insulator manufactured in brown porcelain
• Electrical or manual operation available

Feeder gantry and catenary disconnectors up to 55 kV

Equipment for catenary – S G-SGP+AE-85

Main characteristics

• HS railways two phases dedicated design
• Fast opening operation
• High endurance, reliability and availability

Technical characteristics

• Single or double phase
• 55 kV, 250 kV BIL, and up to 2750 A
• Several arrangements available
• Up to 10,000 operation mechanical endurance
• Silver plated, self cleaning contacts
• Operation under severe conditions (10 mm ice, 0.5 g seismic, limit temperatures)
• Porcelain and polymeric insulators available

Safe
Reliable
Compact
Easy installation and operation
**Traction power solution**

**Disconnectors**
**DC traction disconnectors**

**Equipment for catenary - RB +AE-35**
Direct current catenary disconnectors up to 7 kV

**Technical characteristics**
- Vertical opening disconnectors
- Specially designed for railways, metros and tram catenaries
- Self-cleaning high-pressure contacts
- Live parts in nickel-plated electrolytic copper
- Insulators manufactured in brown porcelain
- Electrical or manual operation
- Available with isolated power system

**Catenary disconnectors**
1 x 27.5 kV - 2 x 27.5 kV BIL 200 kV

**Technical characteristics**
- Vertical opening disconnectors
- Designed for high speed catenary and traction substations
- Current carrying parts made of nickel-plated electrolytic copper
- Insulator manufactured in brown porcelain
- Electrical or manual operation available

**Control system for catenary disconnectors**
**Distributed solution based on RTU’s**

The typical architecture is comprised of one RTU to collect the information from field and to send the data to the HMI, and another RTU in each motor disconnector. The RTU installed in field has a specific design which comprises:
- DIN rail mounting
- 2 digital inputs
- 2 digital output
- 2 analog inputs
- RS485 communication port

**Technical characteristics**
- Cooper or FO Local network
- HMI with access control
- Interlock device management
- Substation control & protection interface
- Voltage detector for overhead equipment
Traction power solution

Protection for AC traction

MiCOM P138 / 139
The MiCOM P138/139 is a directional overcurrent protection device for rail applications. It features flexible hardware options for simple adaptation to specific application requirements.

Technical characteristics
- High current tripping with separate CT, tank protection
- Directional overcurrent time protection with dependent and independent characteristics
- Thermal overload protection with coolant temperature measuring
- Overvoltage / undervoltage time protection
- Overfrequency / underfrequency protection
- CB supervision function (CBF, CBM)
- Auto reclose

MiCOM P436 / 438
The MiCOM P436/P438 is a rail catenary protection device for classic and two-phase auto transformer feeders. It features a comprehensive and advanced range of main and backup protection functions suitable to meet many system requirements.

Technical characteristics
- Distance protection with polygonal or circular characteristics, train start-up detection, dynamic
- High current tripping
- High impedance fault detection
- O/C with IDMT- and DTOC-characteristics
- Thermal overload protection with coolant temperature
- Auto reclose control
- CB supervision function (CBF, CBM)

MiCOM P638
The MiCOM P638 is a transformer differential protection device for railway applications. The device can also perform directional overcurrent protection and ensures effective protection of transformers in railway systems.

Technical characteristics
- Differential protection for single-phase railway transformers
- Inrush stabilization, CT saturation supervision
- Zero sequence filtering for both transformer ends (configurable)
- Transverse differential protection for high- and low-voltage side
- Tank protection (high current stage)
- Directional overcurrent time protection, DTOC and IDMT characteristics
- Thermal overload protection with coolant temperature measuring
- Overvoltage / undervoltage time protection, frequency protection
- CB supervision function (CBF, CBM)

The rail protection devices of the MiCOM Px30 Series are designed for selective protection of AC catenary systems and their supplies.

Proven protective functions allow a wide range of applications to protect supplies and catenaries in classic and autotransformer-fed (AT) systems. Additionally, a suite of backup protection and automation functions are available. A user-friendly control interface and several communication ports allow simple configuration and extensive polling of information.

PM100528
The rail protection devices of the MiCOM Px30 Series are designed for selective protection of AC catenary systems and their supplies. Proven protective functions allow a wide range of applications to protect supplies and catenaries in classic and autotransformer-fed (AT) systems. Additionally, a suite of backup protection and automation functions are available. A user-friendly control interface and several communication ports allow simple configuration and extensive polling of information.

- A complete homogeneous family
- Largest experienced and installed base
- Widest global presence
- Unique high impedance distance fault detection
- Embedded logic enables network automation
Traction power solution

RTU
Substation control RTU

SAITEL 2000DP
Powerful backplane modules

RTU with operational redundancy for power supply, CPU, communications channels, or for the entire system (supporting automatic failover with hot-swap).

Input / Output acquisition modules with signal conditioning and integrated time synchronization (1 ms) and independent time stamping.

A data acquisition subsystem based on the standard Profibus-DP serial field bus to support flexible configurations.

Technical characteristics

• Modularity
• Reduced maintenance costs
• High processing capability
• SAITEL 2000DP software integrated baseline
• Application versatility
• Diagnostic tool

SAITEL DR
Versatile DIN-rail modules

It is a RTU with versatile, scalable and compact platform for secure field acquisition, automation and communication.

Intelligent Terminal Block consists of a Head Unit with zero, one or several acquisition blocks. Head units are CPU units (based on microcontrollers) with integrated communications ports (Ethernet, serial ports) and digital inputs.

Technical characteristics

• Scalable
• Secure
• Large storage capabilities
• Powerful yet cost effective
• Distributed
• Compact
Substation automation
Automation control system

PACiS substation automation solution
The strength of experience

PACiS solutions contribute to energy efficiency, protection of assets and improving grid availability with the inclusion of cyber security. They offer powerful and fast automation to reduce outages, management of electrical network balance, and optimization of energy availability in electrical distribution systems worldwide. Local services and support by Automation Experts help you to get the full benefit of your investment.

Scalable IEC61850 designed substation automation system from a single controller to a complete multi-ring architecture. The solution consists of the PACiS core components (hardware and software) and IEDs. PACiS has been used in the railway market as a Energy Traction and Supervision System.

Main characteristics
- Open, flexible and based on standards
- IEC 61850 substation modeling
- Dedicated automation for energy application
- Innovative cyber security approach
- IEC 61-131-3 automation compliant
- Disturbance record and waveform oscillography management
- Fast load-shedding

PACiS Solutions offer versatile architectures, energy dedicated automation and IEDs with cyber security.
Together with a full range of services to optimize project realization and provide long-term customer support.

PACiS solutions

Key components leveraging IEC 61850
- Engineering and administration tool suites including cyber security administration
- SCADA / HMIs: EcoSUI, PSE
- Bay Controller and automation (BCU): MiCOM C264
- Gateway with multiple protocols (IEC61850, DNP3, T104 / T101, Modbus, IEC 608705-5-10X, etc.)
- Remote Terminal Units (RTU): Saitel, MiCOM C264
- Ethernet switches with redundancy (SHP, RSTP, PRP, HSR): MiCOM Hxxx

Unrivalled IED devices
- Protection relays: MiCOM, Sepam and Vamp
- Power and Measurement units: Powerlogic ION, PMxxx
- Motor controllers: Tesys Tand multiple third party IEDs
- Services
- System specifications, project realization, installation retrofit, patch management, training, maintenance, after sales services, etc.
CP 230
Voltage drop compensation along catenary

The CP230 MV capacitor bank is custom designed, in accordance with customer’s specification. It is used to reduce voltage drops along a catenary line. It complies with IEC standards.

Technical characteristics

- Voltage level: up to 245 kV
- Frequency: 50 / 60 Hz
- Aluminum or galvanized steel frames
- Inrush current limiting reactor
- Single phase reactors
- Dry type air core

Passive harmonic filter

Traction (DC) power electronics generate harmonics that pollute the energy supplier’s network.

The filters absorb the harmonic currents generated by these non linear loads; they are based on an inductance connected in series with a capacitor and on a resistance in parallel with the inductance.

Passive harmonic filters are custom designed on a case-by-case basis. A preliminary site audit and precise definition of needs are essential to guarantee the performance of this type of solution. It complies with IEC standards.

Technical characteristics

- Voltage level: up to 75 kV
- Frequency: 50 / 60 Hz
- Aluminum or galvanized steel frames
- Maximum reactive power: 35 Mvar (other values available on demand)
- Reactors: single–phase, dry, air-core
- Tuning frequencies: chosen according to the harmonics to be filtered and the performances to be achieved
Traction power solution

**MV power quality**

AC & DC traction systems

---

**Active harmonic filtering**

Active harmonic filters are custom designed on a case-by-case basis. A preliminary site audit and precise definition of needs are essential to guarantee the performance of this type of solution. The equipment comprises a fixed MV bank of shunt capacitors with detuned reactor and an electronic power quality device "Accusine" combined with a step-up transformer. This equipment can be installed indoors. Complies with IEC standards.

**Technical characteristics**

- Voltage level: up to 75 kV
- Frequency: 50/60 Hz
- Injection of reactive energy in leading or lagging mode
- Response time less than 20 ms
- Reactive energy compensation without transient
- Continuous compensation
- Separate monitoring of each phase for unbalanced loads

- **Efficiency**
  - Response time less than one cycle
- **Reliability**
  - Accusine PCS
  - Propivar NG
- **Safety**
  - Inrush current limiting reactor
  - Human Machine Interface easy reading
- **Flexibility**
  - A compact and modular design adaptable to site conditions

---

Hybrid Var Compensation equipment is designed to perform reactive compensation in real time.
Traction power solution

E-House
Trackside substations

Schneider Electric offers fully integrated and tested pre-fabricated GIS E-House traction substation solutions for the rail segment.

Utilizing many years of experience in providing engineered E-House traction substations, Schneider Electric has the ability to provide standard or highly customized solutions to suit various rail applications and requirements.

The Electrical House (E-House) is a factory integrated, tested, validated, compact power distribution solution. The E-House contains traction switchgear, HVAC, UPS, and building management and control systems. It helps you optimize the cost of transportation, installation and commissioning, and enhance uptime thanks to qualified and reliable design.

- **Reduced site costs**
  Significantly reduced site costs and reduced traffic interruption costs utilizing fully factory integrated and tested prefabricated substations, including MV switchgear, protection systems, UPSs and SCADA systems, providing a Plug and Play approach for rail applications. CAPEX reduction thanks to reduced engineering, installation, and commissioning costs. OPEX reduction via a highly serviceable design and local technical experts.

- **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.

- **High availability with GIS**
  As all busbars and live parts are fully enclosed and not subjected to external influences, gas insulated switchgear (GIS) offers the highest level of system availability and reliability.

- **Type tested to highest standards**
  Fully type tested to IEC 62271-200 and all relevant rail application standards.

- **Lower whole-of-life costs**
  Significantly lower maintenance costs as all live parts are enclosed in a hermetically sealed metal enclosure, preventing exposure to humidity, dust, insects or corrosive atmospheres. The GIS uses a simple robust vacuum switching mechanism, which requires little maintenance.

- **Easy and intuitive operation**
  Intuitive operation panel fitted with highly visible graphical indication for operation and status indication for Disconnector, Vacuum Circuit Breaker and Earth Switch. All functions are inherently interlocked for safe operation.

- **High personnel safety**
  Increased safety with integrated voltage, gas and internal arc detection systems that provide excellent operator protection.
UPS - AC and DC traction systems

A single-phase uninterruptible power supply (UPS) is typically installed close to critical equipment, improving the power quality of the rail network.

Schneider Electric can provide communicating UPS systems, high-efficiency modular UPS systems and customized, engineered-to-order solutions.

Key benefits

Reduced total cost of ownership
- Whatever your constraints and objectives
- Wherever your site is located

Rugged industrial environments
- Our systems are planned and built to meet your requirements
- With highly adaptable and customizable solutions to the standards required by your industry sector or environment

Design flexibility
- Offering the best combination of efficiency, reliability, energy savings and reduced operating costs
Traction power solution

UPS - AC and DC traction systems
Single-Phase UPS

Smart-UPS On-line 1-20 kVA

Smart-UPS™ On-line provides high-density, true double-conversion online power protection.

Capable of supporting loads from 1 to 20 kVA in a rack / tower convertible form, the Smart-UPS On-line is available from 2 U to 12 U. The 15 kVA and 20 kVA models enable support of power hungry blade servers or heavily loaded equipment racks.

Features and benefits

- **Double-conversion On-line**
  Provides tight voltage and frequency regulation and zero transfer time for reactive loads (machinery, lab equipment, etc.)

- **Frequency and voltage regulation**
  Gives higher application availability by correcting poor frequency and voltage conditions without using the battery

- **Rack / tower convertible**
  Ensures integration in various environments

- **Hot-swappable / User-replaceable batteries**
  Ensures continuous operation of the load even when the batteries are being replaced

- **Advanced 16-segment LED display**
  Clear presentation of unit and power status with visual indicators (LCD on 15 – 20 kVA models)
Traction power solution

UPS - AC and DC traction systems
Three-Phase UPS

MGE Galaxy 3500
10 / 15 / 20 / 30 / 40 kVA

Features and benefits

Reduced total cost of ownership

- Up to 96 percent efficiency:
  Minimizes energy loss and operating costs over time

- Optimized footprint:
  Allows for a wide range of uses in electrical rooms and up to 60 percent space saving

- Reduced electrical infrastructure rating:
  Reduces cost for wiring, transformers, and generators

- Input power factor correction:
  Reduces installation costs

Rugged industrial environments

- Sturdy enclosure:
  2 mm heavy-gate-steel front cover and frame design

- Easily replaceable air filters:
  Prevent dust and debris from affecting UPS performance (arrestance value of 80 percent as per ASHRAE™ 52.1)

- IP51:
  Ruggedized enclosure with drip shield and dust protection that prevents liquids and dirt particles from entering the UPS

- Floor anchoring:
  Prevents the UPS from tilting

- Wheels:
  Allows the UPS to be easily rolled into place
Traction power solution

UPS - AC and DC traction systems
Three-Phase UPS

Gutor PXP AC UPS 1000

Features and benefits

Reliability
- Platform with large installed base and many years of proven field reliability
- Decentralized control architecture for increased reliability
- Redundant and individually monitored fans

Footprint
- Smallest footprint on the market among industrial UPS systems
- For applications with limited available space

Low THDi
- PFC rectifier dramatically reduces input harmonics (< 5 % THDi), minimizing distortion to upstream equipment

Industrial design
- Robust mechanical design (vertical and horizontal acceleration stress up to 0.5 g)
- Electrically and physically integrated galvanic isolation (input and output) as standard
- Designed to withstand harsh environmental conditions (temperature, altitude, humidity, EMC)

- Low input harmonics
- Increased efficiency
- Reduced footprint
- Flexible design
- World-class reliability
Thanks to the wide range of operation features, Schneider Electric cooling units are able to adapt to multiple processes, at any external conditions. An engineering-to-order design approach allows solutions to be customized to fit a specific application.

As a global specialist in energy management, Schneider Electric’s commitment is to provide integrated solutions to make energy safe, reliable, efficient, productive and green.

Main benefits

- **Microprocessor controller**
  Allows unit to restart without intervention after a power failure. Allows for room-level redundancy with up to 10 units operating in a group. Indicates operation mode and room conditions through user-friendly navigation with icon displays. Allows for communication with multiple Building Management System (BMS) protocols.

- **Electronically commutated fans**
  Provide highest efficiency and reduce total power consumption by matching room heat load.

- **High sensible-to-total cooling ratio**
  Through careful sizing of heat exchanger coils.

- **Electronic expansion valve**
  Increases coefficient of performance (COP) and energy savings with accurate refrigerant control.

- **Tandem scroll compressors**
  Increase efficiency by utilizing an oversized coil for one compressor during part load operation.

- **Indirect free-cooling**
  Utilizes cool ambient air during winter, and automatically changes outdoor heat exchanger set points to eliminate compressor operation during economiser hours (energy saving units).

- **Humidity control**
  Available on all units.

- **Dehumidification**
  Operates only when required, ensuring continuous, uniform air distribution without airflow reduction.

- **Multiple heat rejection configurations**
  Available in air-cooled, water-cooled, glycol-cooled, twin cooled, and economizer systems.

- **Building management systems**
  Designed to work with the most common BMS systems including BACnet and Modbus.

- **Complete front serviceability**
  Enables all maintenance through front access.

- **Automatic floor pressurization system**
  Ensures stable airflow pressurization under floor regardless of above-floor changes.
Key benefits

- **Safe and reliable design**
  Guarantees operation in the most varied working conditions thanks to the use of cutting-edge solutions and to the availability of a wide range of accessories and options.

- **Pretested and validated solution**
  All units are tested at the end of the manufacturing process.

- **Redundant components**
  Redundancy is applied on the critical sections of the units to maintain availability on 24/7 operating processes.

- **Integrated dual and double power supply**
  Automatic Transfer Switch options are available on cooling units. Automatic commutation guarantees high reliability levels in the event of failures.

- **Quick restart**
  Full-load operation in less than three minutes with specific arrangements guarantees continuous chilled water availability to the data center.

- **Complete unit monitoring**
  All main components are constantly monitored and adjusted in order to operate within their correct limits and to increase the unit reliability.

---

**Uniflair AM (5kW-20kW)**
- Direct expansion
- Chilled water

**Uniflair LE (20kW-200kW)**
- Direct Expansion (air-cooled or water-cooled) (20 kW – 100 kW)
- Chilled water

**Uniflair WM (4kW-17kW)**
- Monoblock unit for external installation
- Air-cooled direct expansion
- Direct free-cooling Energy Saving Indirect Free-cooling
- Twin cool (chilled water + direct expansion)

**Uniflair MB (6kW-12kW)**
- Monoblock unit for external installation
- Air-cooled direct expansion
- Direct free-cooling

**Uniflair SP (6kW-15kW)**
- Ceiling and Wall-mounted split system
- Air-cooled direct-expansion
- Direct free-cooling
Distribution power

<table>
<thead>
<tr>
<th>MV switchgear</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary distribution</td>
<td>32</td>
</tr>
<tr>
<td>Primary and secondary distribution</td>
<td>40</td>
</tr>
<tr>
<td>Secondary distribution</td>
<td>42</td>
</tr>
<tr>
<td>Protect &amp; control monitoring</td>
<td>46</td>
</tr>
<tr>
<td>MV / LV prefabricated substation</td>
<td>50</td>
</tr>
</tbody>
</table>
MCset – Air insulated switchgear

The strength of experience

MCset complies with the main IEC standards. MCset is an indoor switchgear assembly that provides maximum user safety. It is designed to meet all electrical distribution needs up to 24 kV and incorporates a set of innovative solutions.

Technical characteristics

- High safety class thanks to 3 metallic compartments
- LSC2B-PM
- Wide range of rated voltage: 7.2, 12, 17.5, 24 kV
- Internal arc classification: AFL (R) up to 50 kA 1 s
- Single busbar (SBB)
- Withdrawable circuit breaker: LF or SF (24 kV)
- Withdrawable Contactor: Rollarc
- Can be combined with Motorpact for contactor applications
- Protection and control devices: Sepam, MiCOM, GemControl, VAMP or thermal diagnosis

PIX Standard & PIX High – Air insulated switchgear

Optimizing reliability with air insulated switchgear

The PIX range of indoor switchgear assemblies provides maximum user safety. It is designed to meet all electrical distribution needs up to 24 kV and incorporates a set of innovative solutions. It complies with main IEC standards.

Technical characteristics

- High safety class thanks to 3 metallic compartments
- LSC2B-PM
- Wide range of rated voltage: 7.2, 12, 17.5, 24 kV
- Internal arc classification: AFL(R) up to 50 kA 1 s
- Single busbar (SBB)
- Withdrawable circuit breaker: HVX
- Withdrawable contactor: CVX
- Protection and control devices: Sepam, MiCOM, GemControl

- Reliability
- Safety
- Simplicity
MV switchgear
Primary distribution

NEX - Air insulated

An optimized metal-enclosed cubicle concept
NEX complies with IEC standards. NEX is a modular type-tested cubicle, designed to meet local requirements and local standards, equipped with a vacuum circuit breaker.

Technical characteristics
• Rated voltage: 17 / 24 kV
• Single Busbar
• Rated operational current vacuum technology: 3150 A / 2500 A
• Rated peak withstand current vacuum technology: 31.5 kA / 25 kA
• Internal Arc Classification: AFLR 25 kA 0.5 s/1 s
• Loss of Service Continuity: LSC 2B
• Partition class: PM
• Protection and control devices: Sepam, MiCOM

GenieEvo – Air insulated switchgear

Bringing simplicity and high reliability to your applications
GenieEvo complies with IEC and BS standards. GenieEvo is a compact indoor medium voltage switchgear assembly. A fixed circuit breaker and 3-position disconnector, combined with solid insulation technology, makes it a simple and highly reliable solution.

Technical characteristics
• Compartmented design
• LSC2A-PM
• Rated voltage: 13.8 kV
• Solid insulated single busbar
• Fixed (demountable) circuit breaker: Evolis
• Resin encapsulated busbars and disconnector are virtually insensitive to ambient conditions
• Internal arc classification: AF (LR) up to 25 kA 1 s
• Protection and control devices: Sepam, MiCOM, VAMP arc flash or GemControl
MV switchgear
Primary distribution

Distribution power

F400 – Air insulated switchgear

From experience to innovation
F400 complies with IEC standards. F400 is an indoor medium voltage switchgear assembly, specifically designed on the basis of extensive experience.

Technical characteristics
- 3 compartment design
- LSC2B-PM
- Rated voltage up to 36 kV (Vacuum) / 40.5 kV (SF6)
- Single busbar (SBB)
- Withdrawable circuit breaker Roll on Floor: SF + Vacuum
- IP4X
- Internal arc classification up to AFLR:
  - Vacuum (25 kA / 1 s 31.5 kA / 0.5 s)
  - SF6 (25 kA / 1s 31.5 kA / 0.5 s and 40 kA / 0.15 s)
- Protection and control devices: Sepam, GemControl

Masterclad – Air insulated switchgear

The reliability of a quality design
Masterclad complies with ANSI standards. Masterclad is an ANSI-rated medium voltage switchgear assembly. It offers, as standard, a two-high drawout breaker arrangement that can be combined with a series of basic modular units, control packages and instrumentation to satisfy many user application requirements.

Technical characteristics
- Tested to ANSI / IEEE C37.20.2
- Compartmented design
- Rated voltage up to 27 kV
- Busbar and circuit breaker ratings from 1200-4000 A
- Withdrawable circuit breaker Roll on Floor: VR
- Enclosure options:
  - Indoor
  - Outdoor walk-in and non-walk-in
- Arc Resistant Type 2B (ANSI / IEEE C37.20.7)
- Optional arc terminator
- Protection and control devices: Powerlogic, ION

• Field proven: 50,000 units already installed
• Safety
• Simplicity

• Rugged & durable
• Long life
• Flexible arrangements
**CBGS-0 – Gas insulated switchgear**

**Maximum safety in a reduced space**

CBGS-0 complies with the following standards and certifications: IEC, ANSI / IEEE, ENA, UL Listed. CBGS-0 is a gas insulated switchgear assembly for indoor substations (HV / MV-MV / MV) that provides power in utilities, wind farms, railways, data centers, oil & gas, mining, mineral and metals, airports, etc.

**Technical characteristics**

- Rated voltage: up to 36 / 38 kV
- Busbar system: single
- Rated current busbar & feeders: up to 2000 A
- Rated short-time withstand current: up to 31.5 kA / 3 s
- Internal Arc Classification: AFL / AFLR: 31.5 kA / 1 s
- Class: LSC2 PM
- No SF6 handling on site
- Protection and control devices: Sepam, MiCOM, VAMP or Thermal diagnosis
- SF6 (25 kA / 1 s 31.5 kA / 0.5 s and 40 kA / 0.15 s)
- Protection and control devices: Sepam, GemControl

**Continuity of service**

- Unaffected by the environment
- Optimized maintenance on medium voltage version

**Maximum safety**

- Operating safety (interlocks)
- IAC tested
- No access to medium voltage parts

**Investment optimization**

- Optimized cost
- Lifecycle + 30 years
- Space and maintenance savings
- Fully factory-tested
### MV switchgear

**Primary distribution**

---

**GMA – Gas insulated switchgear**

**Takes up less space, supplies more power**

GMA is an indoor, metal-enclosed, SF6-insulated switchgear assembly for primary distribution up to 24 kV. Its compact size allows switchboards to be installed in very small rooms with a ceiling height of less than 2.4 meters. Its clear, ergonomic design ensures extremely straightforward handling during installation and operation. Preferred solution for E-houses, due to its small dimensions and lighter weight. It complies with IEC, GOST and other national standards.

**Technical characteristics**

- Range optimized for rated voltage: 7.2, 12, 15 / 17.5, 24 kV
- Rated current up to 2500 A
- Thermal short-time withstand current: up to 31.5 kA - 3 s
- Vacuum circuit-breaker
- Single busbar (SBB) arrangement
- Outer cone cable connection
- No gas-handling at site
- Loss of Service Continuity LSC2
- Internal Arc Classification (IAC) in accordance with IEC 62271-200 AFL or AFLR up to 31.5 kA - 1 s
- Double busbar back to back with one circuit breaker
- Special option: rear top or bottom cable entry
- High recycling rate (≥ 90 %) by design (see Product Environmental Product)

---

- **Less space required**
  - Small
  - Very economical outgoing feeder
  - 450 mm wide version up to 800 A and 31.5 kA

- **More power**
  - Small incomer
  - 800 mm wide version for 2500 A with natural cooling
  - No access to medium voltage parts

- **More compact and safer**
  Internal arc type-tested for 2.4 meters ceiling height up to 31.5 kA - 1 s

- **Minimized shutdown time**
  Outgoing PT and busbar PT with disconnecting switch
GHA – Gas insulated switchgear

Safe, simple and smart design

GHA is an indoor, metal enclosed SF6-insulated switchgear assembly with vacuum circuit breaker for primary distribution up to 40.5 kV with a clear, ergonomic design that ensures extremely straightforward handling during operation and installation. Delivered ready to connect from the “crane hook”.

It complies with IEC, GOST, CSA, ENA, CNS, Railway and other national standards and is preferred solution for E-Houses due to its small dimensions and lighter weight.

Technical characteristics

- Rated up to 40.5 kV, 2500 A, 40 kA - 3 s: Solution with busbar up to 4000 A
- Compact dimensions for SBB and DBB
- No gas handling at site, due to innovative GHA busbar link (B-Link)
- Delivered ready to connect from the “crane hook”
- 1- and 2-pole version for Railway application up to 200 kV BIL
- Cable outer-cone connection or optional inner-cone
- Front cable access
- Intuitive user guidance with mechanical interlocks and all operations from front
- Rear top cable entry up to 2500 A
- Internal Arc Classification (IAC) in accordance with IEC 62271 - 200 AFL or AFLR up to 40 kA - 1 s

- Eco-friendly design
  - No gas works on site during installation, replacement and end-of-life disposal
  - Leakage test done in the factory
  - High recycling rate (≥ 90%)

- High factory-assembled quality
  Feeders are delivered to sites fully assembled and routine-tested - simply connect!

- Easy, safe installation
  Safe outer-cone cable solution: up to 40.5 kV and 2500 A and height ≥ 600 mm from the front
WS – Gas insulated switchgear

Compact - Modular – Robust

WS is an indoor MV switchgear with vacuum circuit breaker, suitable for configuring single or double busbar switchgear with the same footprint. Robust design throughout. Mechanical indication and reliable mechanical interrogation interlocks. Preferred solution for E-Houses, due to small dimensions and less weight. Shell DEP approved for Oil & Gas. It complies with IEC, ENA and other national standards.

Technical characteristics

- Rated up to 36 kV, 2500 A, 31.5 kA-3 s
- Vacuum circuit-breaker
- Type WSA Single BusBar (SBB) or type WSB Double BusBar (DBB)
- Compact design: feeder width 600 mm throughout
- Disconnectable circuit breaker
- Equal footprint requirement for single and double busbars
- Cable inner-cone connection
- Intuitive user guidance with mechanical interlocks and all operations from front
- M-encapsulation and enclosure
- Rear cable connection
- Internal arc classification (IAC) in accordance with IEC 62271-200, IAC AFL up to 31.5 kA-1 s

- Long service life and optimized maintenance
- Modular and robust design
- Small footprint for Single BusBar and Double BusBar
- Operating safety
- IAC tested
MV switchgear
Primary distribution

VOX – Vacuum circuit breaker

Outdoor dead tank circuit breaker
Switching in vacuum, insulation in a SF6-gas tank to provide gas-insulated environment totally immune from external ambient conditions.
Mounted in a stainless steel tank, sealed for life-time, optimized for reduced maintenance and life-cycle costs.

Technical characteristics
- Designed and tested to meet the standards of IEC, IEEE, BS, AS, GOST and GB
- The range is designed for voltages up to 40.5 kV, up to 40 kA and up to 2000 A
- Ambient temperature -40 °C / +40 °C
- High mechanical and dielectric performances
- Reduced life-time costs
- Optimized maintenance
- Out-of-phase switching for decentralized generation (wind farms)
- Suitable for high speed auto-recloser switching
- Suitable for capacitor bank switching
Discover the new generation of medium voltage switchgear

The specificities of the railways environments require adapted solutions, demanding high reliability in terms of security and safety. Schneider Electric now introduces Premset, its very latest switchgear innovation and the first global product using a Shielded Solid Insulation System (2SIS), a technological breakthrough for medium voltage distribution.

While environmentally friendly, no parts of the main circuit are exposed to free air. Therefore, in addition to its impressive ability to maintain optimal performance in any environment (insensitivity to dust, water, etc.), 2SIS improves the safety of people and assets, with much reduced risk of internal arcing and reduced maintenance.

Reliable, compact, smart grid-ready and end-user friendly to operate, Premset is a 3-in-1 system: it implements the breaking-disconnecting-earthing functions in a single device with fully interlocked, intuitive operation.

Technical characteristics

- Integrated Intelligence
- Up to 17.5 kV, 630-1250 A
- Isc: 25 kA 3 s, internal arc withstand: A-FLR 25 kA 1 s
- Operation from: -25 °C ~ +40 °C
- Altitude: no derating up to 3000 m
- Loss of service continuity: LSC2A
- Partition class of compartment accessible for maintenance: PM
- All external faces of the switchgear: IP3X (indoor version), IP 54 (outdoor version)
- Main circuit and all HV parts: IP67
- Flooding service continuity ensured for 96 h
- Complies with: IEC, GOST and GB standards
MV switchgear
Primary and secondary distribution

Premset: Born to be digital

Integrated Intelligence
- Smart and advanced management solutions across the network for Control & Monitoring
- Feeder automation
- Load management
- Asset management
- Automatic Transfer System
- Architecture with distributed intelligence and embedded protection chain

All-in-one application
Premset invites itself into your devices

- **Safety**: a wealth of innovations dedicated to customer safety
- **Efficiency**: a smart solution entirely designed to optimize customer assets
- **Reliability**: long-lasting performance ensuring continuity of service for the customer
- **Flexibility**: a compact, modular design for all customer applications

Premset live! app:
a concentrate of Schneider Electric innovations

3D modeling, augmented reality and virtual reality: find out all about it from your Schneider Electric contact!
FBX – Gas insulated switchgear

FBX is a gas insulated switchgear assembly for secondary distribution networks up to 24 kV. It benefits from the best-in-class footprint in the market. Innovative, its wide range of functions ensures the protection of people and equipment whilst maximizing power availability.

FBX comes equipped with all the necessary smart sensors to enable network and demand management.

Technical characteristics

- Up to 24 kV / 630 A / 25 kA 1 s
- IAC up to 25 kA 1 s
- Vacuum circuit breaker
- Up to 5 functions in one SF6 tank
- Either compact or extensible
- Auto-reclosing M2 vacuum circuit breaker
- Compliant with IEC62271-200 standard

RM6 – Gas insulated switchgear

RM6 is a gas insulated switchgear assembly for secondary distribution networks up to 24 kV. It benefits from proven technology and is the number 1 world reference with over 1.5 million functions installed worldwide. Built with safety in mind, its wide range of functions ensures the protection of people and equipment whilst maximizing power availability.

RM6 comes equipped with all the necessary smart sensors to enable network and demand management.

Technical characteristics

- Up to 24 kV / 630 A / 20 kA 1 s
- IAC up to 20 kA 1 s
- SF6 circuit breaker
- Up to 5 functions in one SF6 tank
- Either compact or extensible
- Compliant with IEC62271-200 standard
SM6 – Air insulated switchgear
Modular units up to 36 kV

A modular switchgear assembly that guarantees high reliability for your underground secondary distribution applications. SM6-24 & 36 kV units are used for the medium voltage section in transformer substations in public distribution and commercial buildings.

Technical characteristics

- Air insulated switchgear
- Modular and extensible
- 24 kV, 630 A / 1250 A, 25 kA 1s
- 36 kV, 630 A 20 kA 1 s, 1250 A 25 kA 1 s
- IAC up to 20 kA 1 s, A-FL or A-FLR for 24 kV
- IAC 16 kA 1s AFL 36 kV
- Protection with fuse or SF6 & vacuum circuit breaker (vacuum up to 24 kV)
- Disconnectable & withdrawable (up to 24 kV) circuit breaker
- Compliant with IEC 62271-200

- Upgradability
- Compact size
- Reduced maintenance
- Ease of installation
- Easy and safe to operate
- Designed with control and monitoring in mind
**MV switchgear**

Secondary distribution

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**DVCAS – Gas insulated switchgear**

The DVCAS cubicle is a compact piece of equipment resulting from combining various modules for renewable segments.

**Technical characteristics**

- Gas Insulated Switchgear
- 36 / 38 kV, 630 A, 20 kA 3 s
- IAC: AFL-AFLR 20 kA 1 s
- Protection with vacuum circuit breaker
- Modular design in a compact architecture: simple and efficient
- Compliant with IEC, UL, ENA

- Maximum safety for people and the installation
- Maximum continuity of service with minimum maintenance
- Smart Grid ready solution for greater efficiency
- Customizable, cost-efficient equipment, with short lead times

---

**Flusarc 36 – Gas insulated switchgear**

The design of Flusarc 36 is particularly well adapted for severe environments. Its compact size allows quick, easy installation, and fits easily in prefabricated substations, kiosk substations or wind towers.

**Technical characteristics**

- Gas insulated switchgear
- Block type or modular, extensible or not
- 36 kV, 630 A, 25 kA 1 s
- Fully IAC tested AFL 16 / 20 kA 1 s
- Protection with fuses or circuit breaker (vacuum interruption technology)
- Compliant with IEC 62271-200

- Safety
- Flexibility
- Low cost of ownership
- Easy installation and operation
Distribution power

MV switchgear
Secondary distribution

Ringmaster – Gas insulated switchgear

Configured for indoor or outdoor medium voltage applications, the Ring Main Unit provides simple transformer protection and isolation with remote control of a multi-panel metered consumer switchboard. Engineered for extreme climates, fully-certified internal arc design, providing flexibility for any location, up to 13.8 kV.

Technical characteristics

- Gas pressure indicator as standard
- Anti-reflex operating handle with facilities for electrical operation
- Interlocked medium voltage cable test access (no need to remove cable terminations or use loose earthing devices)
- Integral self-powered protection with TFL, adjustable curve & relay options using VIP or Sepam
- IP54 enclosure
- Available as extensible and non extensible functions
- Simple to follow mimic providing user-friendly operation
- Earth screened cast-resin gas module
- Range of dry type metering units
- Mechanical tripped on-fault indication
- Resin encapsulated busbars in air bus chamber for extensible version
- Direct coupling to transformers or cable connection
- Compliant with IEC 62271-100, IEC 60265, IEC 2271-200, BS EN 60265 and ENA TS 41-36

- Reliable
- Efficient
- Safe
- Self powered protection
Increase your capabilities

From cost-effective to high-end protection and control, the comprehensive MiCOM range allows complete optimization of your solution. MiCOM protection relays were launched in 1999 using best-in-class protection techniques and are now combined with the latest technology to position MiCOM as a highly dependable range of devices. Their protection techniques are fine-tuned to give you the best possible protection for your assets. We also engineer quality into every device with best-in-class standards to match our protection performance.

<table>
<thead>
<tr>
<th>Series P10</th>
<th>Series P20</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Product Image" /></td>
<td><img src="image2.png" alt="Product Image" /></td>
</tr>
</tbody>
</table>

### Applications

- **Series P10**: Fulfils the basic requirements of buildings and small industry applications with a particular focus on overcurrent and motor protection.
  - Two families are available:
    - Auxiliary powered
    - Self powered/dual powered

- **Series P20**: Fulfils the basic/medium requirements of industrial, utility and building applications, providing simplicity and ease-of-use in a wide range of installations.
  - Scalable solutions where type and quantity of protection features are model dependent
  - Flexible logic equations available on most models
  - Compact hardware options for easy installation
  - Multi-language HMI
  - Advanced protection functions

### Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Series P10</th>
<th>Series P20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic inputs</td>
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<td>Max. 12</td>
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<tr>
<td>Logic outputs</td>
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<td>Boolean logic equation</td>
<td>NO</td>
<td>Flexible logic (model dependent)</td>
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<td>Communication ports</td>
<td>USB front port, 1 rear port</td>
<td>RS232 front port, 1 rear port, 1 optional 2nd rear port</td>
</tr>
<tr>
<td>IEC 61850 protocol</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>
### Distribution power

**MV switchgear**

**Protect & control monitoring**

**MiCOM series**

---

#### Series P30

- **Applications**
  - Fulfills the protection requirements of utility and industrial applications with a particular focus on integrated feeder control and provides dedicated railway protection devices.
  - Protection with bay level control options to facilitate feeder management
  - Input / output quantity selectable based on requirements
  - Protection functions available for isolated / Petersen coil earthed systems
  - Surface and flush mounted (including detachable HMI option) as well as compact case models are available
  - Full Programmable Scheme Logic (PSL) and function keys

#### Series P40

- **Applications**
  - Fulfills the protection requirements for a wide market of utility and industrial applications and offers a wide range of protection functions.
  - IEC 62439 redundancy protocols PRP (Parallel Redundancy Protocol) and HSR (High availability Seamless Redundancy) with dual IP addresses
  - Configurable communication protocol IEC 61850 Editions 1 or 2
  - Full Programmable Scheme Logic available with graphic configuration tool for easy setting
  - Scalable input / output hardware depending on requirements
  - Operating voltage selectable via software for opto inputs

#### Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Series P30</th>
<th>Series P40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic inputs</td>
<td>Max. 82</td>
<td>Max. 64</td>
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<tr>
<td>Logic outputs</td>
<td>Max. 48</td>
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<tr>
<td>Boolean logic equation</td>
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<td>Fully programmable</td>
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</tbody>
</table>
| Communication ports | - RS232 front port  
|                   | - 1 rear port  
|                   | - 1 optional 2nd rear port | - RS232 front port  
|                   | - 1 rear port  
|                   | - 1 optional 2nd rear port |
| IEC 61850 protocol | YES - Edition 1 | YES - Edition 1 & 2 |
Go for simplicity

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 that exactly corresponds to your needs.

The range is structured for typical applications (substations, transformers, generators, capacitors, busbars, and motors) and provides the necessary functions (protection, metering, control and monitoring, etc.). Starting with a Sepam base unit, complete solutions can be built by adding input / output modules, sensors and communication modules.

<table>
<thead>
<tr>
<th>Series P20</th>
<th>Series P40</th>
</tr>
</thead>
</table>

### Applications

**For usual 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 function for S24 and T24

**For demanding applications:**
- Compact case provides standardized 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
- 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

### Characteristics

<table>
<thead>
<tr>
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<tbody>
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<td>Redundancy</td>
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<td>GOOSE message</td>
<td>NO</td>
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</tbody>
</table>
Distribution power

MV switchgear
Protect & control monitoring

Series P60

Series P80

Applications

For demanding applications:
- Directional over-current protection for dual incomers, couplings and closed-loop feeders
- 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
- Optional mimic-based display units are available to view a portion of single-line and phasor diagrams
- Battery backup for historical and fault waveform data retention
- Synchro-checks module available
- 16 RTD inputs

For custom applications:
- Standardized dimensions for enhanced protection of incomers / feeders, transformer, motor, generator, busbar and capacitor-bank applications
- Differential protection of transformer or machine transformer units
- 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

Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Series P60</th>
<th>Series P80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic inputs</td>
<td>0 to 28</td>
<td>0 to 42</td>
</tr>
<tr>
<td>Logic outputs</td>
<td>4 to 16</td>
<td>5 to 23</td>
</tr>
<tr>
<td>Communication ports</td>
<td>1 to 2</td>
<td>2 to 4</td>
</tr>
<tr>
<td>IEC 61850 protocol</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Redundancy</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>GOOSE message</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>
A substation should be designed to ensure the internal connections. The visible part of MV / LV underground networks, prefabricated substations are defined as a packaged solution with an enclosure that integrates all the MV / LV equipment (such as MV / LV transformers), low voltage and medium voltage switchgear, connections and auxiliary equipment required by the end user.

Main characteristics – Safety

- Prefabricated substations contain electrical equipment, often located in a public environment, and must therefore meet the highest safety standards
- The risk of equipment failure in a prefabricated substation is minimized through the design
- 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 or operators, or start bushfires. In the rare event of medium voltage equipment failure, an internal arc-rated kiosk design minimizes the risk of injury to the nearby public or an operator working with the kiosk door open
- Our substations are fully connected, tested in factory before delivery
- Schneider Electric has invested in safety studies over the years to provide the safest possible solutions for our customers and the general public
- Prefabricated substations are defined as an enclosure containing transformers, low voltage and high voltage switchgear, connections and the auxiliary equipment for supplying low voltage power from a high voltage system or vice versa
Prefabricated substations are defined as an enclosure containing transformers, low voltage and high voltage switchgear, connections and the auxiliary equipment for supplying low voltage power from a high voltage system or vice versa.

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

Environment

A substation should be designed to ensure the internal connections are protected from extreme environmental conditions, such as high temperatures, rainfall, dust and wind. Schneider Electric’s rigorous testing and graphic modeling ensures proper ventilation, protection against incoming water, sealed connections and secure locked doors. At the end of the substation life cycle, our service offer ensures that all materials are handled with respect for the environment.

Smart substation

Combining our substations with remote monitoring and control from the Easergy range will help to reduce outage times and significantly improve service quality and continuity of the energy supply. A modern communication infrastructure ensures that a network management system can be implemented step-by-step according to your investment plan, reaping benefits from the start. Well-planned, well designed loop automation systems ensure that the majority of your customers can be reconnected to the grid in the first minute after an outage occurs.

Customization

Although manufactured in an industrial process, as they are installed in public areas, our substations can be customized on demand. The substation color can be adapted to suit the final site environment or the walls or roof decorated so as to blend in with its environment.

Transport - Ease of installation

The industrialized manufacturing process for our prefabricated substations allows fast, safe delivery of a complete product ready to be connected to the grid. Transport is possible on a standard truck.

Site preparation

The installer must provide a suitable base surface which can support the configuration and weight of the substation to be installed.
### Signalling

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformers</td>
<td>54</td>
</tr>
<tr>
<td>LV / LV transformers</td>
<td>54</td>
</tr>
<tr>
<td>MV / LV transformer</td>
<td>55</td>
</tr>
<tr>
<td><strong>UPS</strong></td>
<td>56</td>
</tr>
<tr>
<td>Secured signalling power</td>
<td>60</td>
</tr>
<tr>
<td>Fault protection</td>
<td>60</td>
</tr>
<tr>
<td>Automatic supply restoration</td>
<td>61</td>
</tr>
</tbody>
</table>
Imprego
Special transformer up to 400 kVA and 1.1 kV

The LV / LV transformer range is available in ratings up to 400 kVA. Imprego transformers are used to change the earthing system, isolate network disturbances, change the voltage and to supply power and ensure personal safety and equipment longevity.

Technical characteristics

• Rated power: up to 400 kVA (for higher ratings, please consult us)
• Rated voltage: 400 / 400 V or 400 / 231 V and up to 1.1k V
• Phases: single phase, three-phase
• Rated frequency: 50 Hz or 60 Hz
• Optional: electrostatic shield between the primary and the secondary connected to the earth, completely separate windings; covers may be purchased later as accessories

Imprego AT
Dry-type autotransformer up to 400 kVA and 1.1 kV

The autotransformers range is available in ratings up to 400 kVA.
They are used to adapt the network voltage without isolating the installation from electrical disturbances and they help increase its size compared to a transformer with the same power.

Technical characteristics

• Rated power: up to 400 kVA (for higher ratings, please consult us)
• Rated voltage: 231 / 400 V or 400 / 231 V and up to 1.1 kV
• Phases: three-phase
• Rated frequency: 50 Hz or 60 Hz
• Optional: star / star coupling with neutral
Minera pole-mounted
Distribution transformers up to 500 kVA and 36 kV

The Minera pole-mounted range is an outdoor range of pole-top oil-filled transformers. Rated from 10 kVA to 500 kVA, single or three-phase at 12 kV, 24 kV and 36 kV. A wide range of oil-immersed transformers and transformer solutions designed to meet different specifications and applications.

Technical characteristics

- Rated power: up to 500 kVA
- Primary voltage: 27.5 kV / Secondary Voltage: 220 V
- Phases: three-phase and single-phase
- Rated frequency: 50 Hz
- Type of cooling: ONAN
- Optional: oil temperature indicator
Installation and service ability

- **Easy to install**
  All connections are made through the front, eliminating the need for rear or side access

- **Front access servicing**
  Simplifies installation and maintenance while minimizing space requirements

- **Multiple levels of service**
  With package or individual service component options, our services are structured for you to choose what APC by Schneider Electric can do for you

### MGE Galaxy 5500 3:3

20 / 30 / 40 / 60 / 80 / 100 / 120 kVA

Special transformer up to 400 kVA and 1.1 kV

### Power Availability

- **Fault tolerance**
  Built-in 100 percent rated static bypass switch prevents interruption by allowing load transfer to utility power during heavy overloads

- **Redundant components**
  Provides increased backup for greater reliability and ensures continuous operation

- **High overload capacity**
  Improves downstream circuit discrimination

### Features and Benefits

- **Footprint optimization:** "all in one box" configuration

- **Pre-installed network management card**
  Allows for easy network integration, compliant with IP v6, SNMP v3, and PowerChute™ suite

- **Parallel operation**
  Connect as many as six units in parallel for capacity and redundancy to grow with your power requirements

- **IGBT-based technology for power quality**
  Supplies clean, stable power to sensitive loads, ensuring critical power protection, optimum performance, and extended life

- **Redundant components**
  Provides increased backup for greater reliability and ensures continuous operation

- **Dual input**
  Allows for connection to two separate input sources for increased availability

- **Built-in static and maintenance bypass**
  Enables the UPS unit to transfer the load to utility power, without interruption, in the event of heavy overload or fault
Galaxy VM 3:3 - 160 / 200 kVA

Integration into your facility infrastructure

• Compact footprint
• Back-to-the-wall installation
• Operates at 40 °C continuously without de-rating
• Embedded seismic rating, approval for IBC® level 2
• Low audible noise levels
• Replaceable dust filter for harsh environments
• Configurable input / output relays
• Top and bottom cable entry
• Parallel capability to increase multiple UPS systems for capacity or redundancy
• Cold Start: capability to start the UPS on battery without mains power present
• External synchronization capability

Ease of installation

• System designed for ease of cabling in confined installation spaces
• Single cabinet top and bottom cable entry
• Integrated casters for ease of mobility
• UPS and modular battery cabinets

Integration

• Schneider Electric StruxureWare™ software applications and suites
• Electrical network earthing systems
• Facilities infrastructure
• Seismic certified
• Monitoring systems — BMS, Modbus, etc.

High-efficiency operating modes

• Double conversion mode
  - Up to 96.5% efficiency in double conversion online mode even at low load levels
  - Less energy losses = cost savings
  - Less heat dissipation = lower cooling needed and hence cost savings

• ECO mode
  - Up to 99.5% efficiency
  - Compliant with IEC® 62040-3 class 3 output definition of UPS standard

• ECOnversion mode
  - Ultra high efficiency up to 99%
  - Keeps excellent load protection
  - Continuously charged batteries
  - Compliant with IEC 62040-3 class 1 output definition of UPS standard
  - Input power factor correction and no harmonics
Sized for harsh environments

- Robust electrical performance
- Unsurpassed output performance, thanks to the sizing and quality of the power components:
  - High fault-clearing capabilities
  - High load crest factor > 3:1
  - Excellent voltage stability, even for stepped load switching or unbalanced loads
  - Designed for any type of load (from industrial to IT)
  - No derating, even for loads with a leading power factor

Benefits

- High fault-clearing capacity for better discrimination in the electrical network
- Compatibility with all types of loads, including computer loads and loads with high crest factors

MGE Galaxy 7000 3:3 - 160 / 200 / 250 / 300 / 400 / 500 / 1000 kVA

Environment adaptation

- Ambient temperature adaptability
- Digital electronics offer additional features:
  The available output power is automatically adapted to the temperature e.g. a 500 kVA UPS delivers 538 kVA at 20 °C ambient temperature

Easy to upgrade

- Power and redundancy upgrades
- Power requirements can change over time
- MGE Galaxy 7000 output can be multiplied by a factor of eight. Redundancy can also be added or upgraded as needed e.g. 2N, N+1 or N+2

Up to 94.5% efficiency (means significant savings)

The innovative technology built into the MGE Galaxy 7000, including digital electronics for better and faster regulation, an IGBT rectifier, and transformer-less design, results in high efficiency.

Benefits

- Energy savings to cut costs
- Reduced air conditioning and ventilation in the UPS room

Efficiency Booster Mode (EBM) (available on parallel installation)

The innovative and highly anticipated Efficiency Booster Mode function helps to maintain highest global efficiency in a parallel system, without any compromise in the global availability of the system.

Benefits

- Improve system efficiency by an average of 2%
- Reduce electricity consumption and cooling of the UPS room
- Manage your energy

Smart Power Test (SPoT) feature

This advanced feature creates significant savings during overall system installation. By removing the need for a load bank, additional breakers and switchgears are not necessary.

Benefits

- Installation can be tested at any load level and at any power factor
- SPoT can be used on both single and parallel systems
Gutor PXP AC UPS 3000 Three-phase output - 5 / 10 / 15 / 20 / 30 / 40 / 50 / 60 / 80 / 100 / 120 / 140 / 160 kVA

Features and benefits

- **Reliability**
  - Platform with large installed base and many years of proven field reliability
  - Decentralized control architecture for increased reliability
  - Redundant and individually monitored fans

- **Footprint**
  - Smallest footprint on the market among industrial UPS systems
  - For applications with limited available space

- **Low THDi**
  - PFC rectifier dramatically reduces input harmonics (< 5 % THDi), minimizing distortion to upstream equipment

- **Industrial design**
  - Robust mechanical design (vertical and horizontal acceleration stress up to 0.5 g)
  - Electrically and physically integrated galvanic isolation (input and output) as standard
  - Designed to withstand harsh environmental conditions (temperature, altitude, humidity, EMC)

- **Transformerless option**
  - Optional transformerless configuration available
  - Reduction in footprint, weight and cost
  - Increased efficiency with equivalent performance

- **Interface and communication**
  - Freely programmable alarms and meters
  - Communication via Modbus, TCP / IP, IEC 61850, RS485
  - Web interface for remote monitoring

- **Energy efficiency**
  - Up to 94% efficiency using state of the art semiconductor technology (IGBT)
  - PFC rectifier means no oversizing of diesel generator is required

Overview

- Low input harmonics
- Increased efficiency
- Reduced footprint
- Flexible design
- World-class reliability
Why an IT network?
- **Safety**: no dangerous potential even in case of insulation fault
- **Continuity of service**: the process does not stop at the 1st fault
- **Fire prevention / explosion**: no spark nor overheating due to insulation fault
- **Savings on OPEX**: allow preventive maintenance and planned servicing

Why Vigilohm?
Vigilohm warns at 1st fault, at insulation monitor and locator levels, while the process is not interrupted

---

**Vigilohm**

**Insulation monitoring devices for IT (ungrounded) electrical networks**

**Overview**

Vigilohm is a range of devices designed to monitor an IT (ungrounded) electrical distribution network.

- **Insulation Monitors** measure the insulation resistance of the network and trigger an alarm if it drops below a pre-set threshold.
- **Locators** measure the insulation resistance of each individual feeder, and trigger an alarm if it drops below the threshold. There are automatic & manual locators.
- **Auxiliaries** are toroids, dedicated to Vigilohm locators, voltage adaptors to reach > 1700 V, impedances, etc.

**Technical characteristics**

Products are compliant with:

- Small to very large network up to > 500 Km
- Low to very disturbed network, including UPS, speed drives, motor starters
- Low to very capacitive networks, up to 2000 µF
- Single to multi generator architectures
- Simple to large installations where detailed electrical values (R&C) per feeder are necessary

- Insulation monitoring up to 2000 µF network capacitance with IM400
- R&C measurement per feeder
- Settable insulation alarm threshold per feeder
- Modbus communication IMD and Locators with XML3xx and XL3xx
Secured signalling power
Automatic supply restoration

The full system automatically restores power to signalling equipment following FSP or cable faults. The full system will isolate the circuit fault and then restore power automatically, reducing a power interruption to less than thirty seconds.

- Complete detection
  Our fault detection solutions ensure peace of mind locally or remotely
- Continuous monitoring of the status of the signalling power network

When a fault occurs on the Network, the ASR will retrieve the recorded fault current values from each functional supply point and, with this information, identify the fault location.

The ASR will isolate the fault and restore power to the Network in under thirty seconds.
Signalling

Secured signalling power
Automatic supply restoration

Simple diagrams provide an overview of how the system reacts to a cable fault

Features and benefits

• **Local and remote fault detection**
  - Reduces the time to locate and isolate a cable fault – thus reducing delays and down time
  - Easy to install and retrofit by non-specialist personnel
  - Factory configured and tested
  - Remote only - supports DNP3 and Modbus for diagnostics at the network management system
  - Class 2 compliant

• **Automatic supply restoration**
  - Automatically locates and isolates a cable fault – minimizing delays and down time
  - Automatically locates and isolates FSP faults - minimizing delays and down time
  - Provides real time and historical reporting
  - Easy to use touch screen interface with graphical network representation with alarm and event handling
  - View and remotely control the system through Internet Explorer
  - No modifications required to the FSP cable size or circuit protection
  - Easy to install and retrofit by non-specialist personnel
  - Supports DNP3 and Modbus
  - Class 2 compliant

Non auto-reconfiguring fault detection

Local fault detection
The local fault detection solution identifies the location and type of fault following loss of power on the signalling network, reducing engineering time and resources to locate and isolate signalling power faults for each conductor.

Remote fault detection
The remote fault detection solution provides remote identification of the location and type of fault following loss of power on the signalling network, further reducing engineering time and resources to locate and isolate signalling powers faults.
# Tunnels & stations

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video</td>
<td>66</td>
</tr>
<tr>
<td>Lighting</td>
<td>70</td>
</tr>
<tr>
<td>Low-voltage final distribution</td>
<td>72</td>
</tr>
<tr>
<td>Power quality management</td>
<td>74</td>
</tr>
<tr>
<td>Struxuware power management software</td>
<td>76</td>
</tr>
<tr>
<td>Power &amp; energy meters</td>
<td>77</td>
</tr>
<tr>
<td>Insulation fault monitoring</td>
<td>79</td>
</tr>
<tr>
<td>Power factor correction and harmonic filters</td>
<td>80</td>
</tr>
<tr>
<td>Automation</td>
<td>81</td>
</tr>
</tbody>
</table>
Video

Video expert VMS
Gateway to performance

Technical characteristics

- Designed for reliability though fault-tolerant software, distributed architecture, and multiple levels of redundancy
- Provides migration paths for Endura® and Digital Sentry® systems
- Browser-based administration interface provides management capabilities without a hard client
- Supports up to 6 monitors per workstation, each driven by independent CPUs, displaying up to 16 HD streams per monitor
- Create and assign tags, organizing network resources as you see fit

Performance through integration

VideoXpert is all about providing security professionals with the information they need, when they need it. Since information is more than video security, VideoXpert has been fundamentally designed to seamlessly integrate with third-party systems to deliver a unified video-based operations control center for your entire business.

Optera TM - IMM Series
12 MP mini domes with SureVision 2.0

180° Panoramic, Seamless Stitching, Immersive Views, WDR and Low-Light Performance

Technical characteristics

- Constant, seamless situational awareness
- Multiple immersive PTZ views at VMS
- Zoom in for detail live or retrospectively with client-side de-warping
- Up to 12 MPx resolution for better detail at distance
- Up to 12.5 IPS at full resolution
- 8 Pelco video analytic behaviors
- 3-year warranty
Video

Sarix IME Series
Environmental domes with SureVision 2.0
IP66-rated IP mini domes

Technical characteristics
• Up to 3 MPx resolution
• Up to 30 Images per Second (IPS) at 3 MPx
• IP66-rated
• Built-in Pelco analytics suite
• Local storage (micro SD)
• ONVIF® Profile-S and Profile-G conformant
• 3-year warranty and support

Evolution 360° - 5MP 360°

Technical characteristics
• 5MPx 1 / 2.5 CMOS sensor
• H.264 / MJPEG multistream
• Ceiling / wall / table mount
• Compatible with Oncam Grandeye 3D de-warping software
• Client-side de-warping on Pelco Digital Sentry and other compatible VMS platforms
• ONVIF Profile-S compliant
ESPRIT HD
Fully integrated HD PTZ and pressurized camera systems

Technical characteristics
- Full suite of built-in analytics including autotracker, adaptive motion detection, and more
- Electronic Image Stabilization (EIS)
- 360° continuous pan rotation at 100° per second
- Tilt range of +36° to –85° from horizontal
- Pan / tilt and enclosure with Integrated Optics Package (IOP) or pressurized Integrated Optics Cartridge (IOC)
- 16 preset tours, 256 presets, 32 window blanks platforms

Spectra Enhanced
High definition IP dome positioning system

Technical characteristics
- Full HD 1080p 60 fps with 130 dB WDR
- Easy to drive, low latency PTZ
- Single cable installation (HPOE, PoE+)
- Electronic image stabilization
- Full suite of video analytics behaviors
- 32 Gb local recording via SD card
- Vivid imaging mode
- Visibility enhancement mode
- 5 white balance modes

• ONVIF Profile-S and Profile-G conformant
• Sure Vision 2.0 technology
• Wide Dynamic Range
• Low light
• Anti blooming
• Five form factors including rugged stainless steel
Sarix TI Thermal
Thermal imaging IP camera with Sarix technology

Technical characteristics
- Designed for maximum environmental protection
- Long Wave Infrared (LWIR), un-cooled, “Sun-Safe” amorphous silicon microbolometer
- User-definable / programmable camera settings
- Up to 2 simultaneous video streams
- Built-in analytics

IP & analog video accessories
Enhance your video system scope, capabilities and performance

Technical characteristics
- Fiber connectivity for long distance applications
- Encoders and decoders to support analogue legacy systems
- Infrared and white lighting for difficult scenes
- Environmental housings for extreme temperatures: -60˚ to +70˚C
- Industrial HD monitors for 24 / 7 operation

Special modification requests - Customized solutions for any application

Interactive SMR catalogue: http://specialmodifications.pelco.com/

Technical characteristics
- Blend cameras and enclosures with colors, patterns, and architectural features through custom fabrication and finishing
- View over and around obstructions by modifying mounts
- Stainless steel enclosures and mounts for marine and other corrosive environments
- Specialized enclosures for rail and traffic monitoring
Safety
Ensuring the safety of staff and patrons is key. Our solutions can ensure appropriate light level and provision is available for 24/7 operations. Control and monitoring of exit, emergency and evacuation lighting in tunnels and on platforms ensures a clear and illuminated passage out in the event of an emergency.

Maximize uptime
Intelligent lighting and control systems can provide advanced measuring and monitoring of lighting systems for maintenance and status reporting. Integration with 3rd party systems (like CCTV and SCADA) ensures a holistic view of the total operations.

High quality products
High quality and durable light fittings are important. Clipsal’s lighting solutions are suited to harsh environments, and also deliver the benefit of connected and integrated control.

Energy efficiency
Energy savings can be achieved through lighting control systems. Lighting can respond to changing natural light levels, presence or occupancy detection, and dim or set to fall back levels at certain times of day.
Features and benefits

C-Bus

In today’s commercial spaces, control and management systems are an integral aspect of every well designed building and public space. Modern commercial facilities require more light, more comfort, more intelligence and improved power efficiency whilst maintaining a safe and secure environment. With an increasing focus towards getting more from less, energy efficiency is a paramount, while enhancing the functionality and ambiance of a space.

C-Bus achieves these objectives, and provides complete control of lighting and other electrical devices. The comprehensive C-Bus product range provides specifiers, lighting designers and integrators with the essential requirements to meet any control and management system specifications.

C-Bus provides exceptional flexibility, scalability and robust system architecture, which comes together to create the most innovative and cost effective control solution for any commercial application.

DALIcontrol

DALIcontrol is a complete building-wide digital lighting control system built on the DALI (Digital Addressable Lighting Interface) international standards.

DALI standardizes the control of electronic ballasts, transformers, LEDs, emergency lights and exit signs in an easy to manage digital lighting control system. DALIcontrol utilizes an Ethernet backbone to extend the system footprint, and offers individual control of every single light, while also monitoring its status.

DALIcontrol lighting systems are scalable from single room control to complete buildings (commercial buildings, architectural lighting, tunnels, restaurants and retail applications).
Low voltage final distribution

Acti9 iC60H circuit breakers

iC60H circuit breakers are multi-standard circuit breakers which combine the following functions:

- Circuit protection against short circuit currents
- Circuit protection against overload currents
- Suitable for industrial isolation according to IEC / EN 60947-2 standard
- Fault tripping indication by a red mechanical indicator in circuit breaker front face

Technical characteristics

- ICU at 400V - AS / NZS 60898-1: 6000, 10,000 A
- ICU at 415V - AS / NZS 60947-2: 10, 15 kA
- Type: 1P, 1P+N, 2P, 3P, 4P
- Rating: 0.5 to 63 A
- Curves: B, C, D
- Standards: AS / NZS 60947-2, 60898-1

Features and benefits

VisiSafe

- Suitable for industrial isolation according to IEC / EN 60947-2 standard
- The green strip is independent from the toggle and provides clear indication of the state of the contacts
- Benefit from better operational safety

VisiTrip

- Fault tripping is indicated by a red mechanical indicator on the front face
- Benefit from quick and easy operator indication

Comms ready

- Centralize control and monitoring of data with just a simple, ready-to-connect Acti 9 Smartlink communication module
- Large diversity of data available to universal Modbus TCP / IP and serial
- One-click, prefabricated wiring for comprehensive communication between your distribution panel and any facility management system
- Reliable, error-proof manufacturer guaranteed connections
- EMC tested for immunity, radiated and conducted safety
- Benefit from quick and easy monitoring and control wiring

Tailored accessories

- Monitoring and control auxiliaries
- Padlock system
- Rotary handle
- Screw shields
- Sealable terminal shields
- Interpole barrier
Low voltage final distribution

Acti9 iID residual current circuit breakers

iC60H circuit breakers are multi-standard circuit breakers which combine the following functions:

• Circuit protection against short circuit currents
• Circuit protection against overload currents
• Suitable for industrial isolation according to IEC / EN 60947-2 standard
• Fault tripping indication by a red mechanical indicator in circuit breaker front face

Technical characteristics

• RCD Type: A, B, C
• Type: 2P, 4P
• Rating: 40 to 100 A
• Standards: AS / NZS 61008-1
• Sensitivity: 30, 300, 300 mA

Features and benefits

VisiSafe

• The green strip is independent from the toggle and provides clear indication of the state of the contacts
• Benefit from better operational safety

VisiTrip

• Fault tripping is indicated by a red mechanical indicator on the front face
• Benefit from quick and easy operator indication

Comms ready

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Tailored accessories

• Monitoring and control auxiliaries
• Padlock system
• Screw shields
• Sealable terminal shields
• Interpole barrier
Power quality management

Power management system

The rail market is faced with increasing demand from both passenger travel and the rail freight industry.

To ensure safety, security and reliability, rail operators need intelligent solutions to monitor, control and optimize the electrical assets on the rail network.

Power management enables you to better monitor, measure, and optimize the infrastructure performance throughout its lifecycle.

It offers a fully integrated power management solution leveraging our expertise in power management combined with our new, state-of-the-art building management system, SmartStruxure solution.

And it provides actionable information to:

• **Ensure electrical network health**
  – Monitor electrical equipment and key assets
  – Improve response to power related issues

• **Increase power quality awareness**
  – Power factor, harmonics and voltage disturbances
  – Detect faults and diagnose key electrical problems

• **Improve energy usage accountability**
  – Track energy consumption and allocate costs
  – Achieve energy conservation objectives

The main goals and benefits of this solution are:

• Reduce operating expenses by reducing energy consumption
• Improve availability and equipment life
  – Visibility to electrical lines, power factor, harmonics, voltage disturbances, identify faults and quickly diagnose problems
• Achieving sustainability goals

PowerLogic™ systems from Schneider Electric provide a full range of metering and monitoring products and solutions, scalable from simple metering and analysis to remote online power management solutions.

Ranges include energy management PowerLogic software and metering, Vigilohm insulation fault detection, current transformers, as well as harmonic filtering and Power Factor correction solutions.
Power quality management

Power management system

Our systems help you:

• Meet power quality compliance standards
• Monitor power availability and reliability
• Reduce downtime
• Verify contractual performance commitments
• Increase profitability
• Optimize maintenance
• Analyze power quality data to:
  – Troubleshoot
  – Identify root cause
  – Anticipate faults
  – Detect disturbance direction
• Track and verify:
  – Frequency stability
  – Voltage variations
  – Unbalances
  – Harmonics and other unfavourable conditions
• Avoid the costly affects of power quality problems
  – Reduction of transformer life through heating
  – Reduced fundamental frequency system capacity
  – Degraded motor performance
  – Tripped sensitive loads
  – Blown fuses, cycling UPS
  – Telecommunications interference

Communications include:

• Local mastering
  – Data concentration of serial/Ethernet metering devices
• Gateway functionality
• Web-based presentation
• Email data transfers
  – Ethernet support of metering, SCADA, and PQ protocols
Power quality management
StruxureWare™ power management software

StruxureWare™ power management software provides a complete power management supervisory interface that gives you access to your entire electrical network, integrating seamlessly with WonderWare enterprise software. The software converts power-related data into timely, accurate information for you to act on.

- Track real-time power conditions
- Analyze power quality and reliability
- Respond quickly to alarms to avoid critical situations
- Our power management software provides:
  - Extensive analysis and reporting tools
  - Intuitive visualization and control interfaces
  - Flexible, scalable architectures that can meet your unique needs today, and continue to do so well into the future

The depth of different offerings makes it easy to match a product to your goals, your business, and your budget.
Power quality management

Power & energy meters

PowerLogic ION7650 series

Loaded with advanced functionality for monitoring key distribution points and sensitive loads, the PowerLogic ION7650 power and energy meter offers an unmatched feature set including advanced power quality analysis coupled with revenue accuracy, multiple communications options, web compatibility, and control capabilities.

- Analysis of efficiency, losses and capacity
- Bill verification, cost allocation and sub-metering
- Power quality compliance monitoring
- Problem notification and diagnosis
- Demand and power factor management
- Control of loads, generators and other equipment
- Fully supported by StruxureWare Power Management software

PowerLogic PM8000 series

Designed for key metering points throughout your energy infrastructure, the PowerLogic PM8000 series meter combines accurate 3-phase energy and power measurements with data logging, power quality analysis, alarming and I/O capabilities not typically available in such a compact meter.

- Maximize profits by providing the highest output possible with the least amount of risk to availability
- Optimize availability and reliability of electrical systems and equipment
- Monitor power quality for compliance and to prevent problems
- Fully supported by StruxureWare Power Management software

PowerLogic PM5000 series

The ideal fit for cost management applications, the PowerLogic™ PM5000 power meter provides the measurement capabilities needed to allocate energy usage, perform tenant metering and sub-billing, pin-point energy savings, optimize equipment efficiency and utilization, and perform a high level assessment of the power quality in an electrical network.

- Sub-billing/tenant metering
- Equipment sub-billing
- Energy cost allocation
- Track real-time power conditions
- Monitor control functions
- Provide basic power quality values
- Monitor equipment and network status
Power quality management

Power & energy meters

PowerLogic PM3000 series

The PowerLogic PM3000 series power meter is a cost-effective, feature-rich range of DIN rail mounted power meters that offers all the measurement capabilities required to monitor an electrical installation. Ideal for power metering and network monitoring applications that seek to improve the availability and reliability of your electrical distribution system, the meters are also fully capable of supporting sub-metering and cost allocation applications.

- Bill checking to verify that you are only charged for the energy you use
- Aggregation of energy consumption, including WAGES, and cost allocation per area, per usage, per shift or per time within the same facility
- Energy cost and usage analysis per zone, per usage or per time period to optimize energy usage
- Metering of electrical parameters to better understand the behavior of your electrical distribution system

Acti 9 iEM3000 series

The Acti 9 iEM3000 energy meter series offers a cost-attractive, competitive range of DIN rail-mounted energy meters ideal for sub-billing and cost allocation applications. Combined with communication systems, like Smartlink, the Acti 9 iEM3000 series makes it easy to integrate electrical distribution measurements into facility management systems. It’s the right energy meter at the right price for the right job.

- Bill checking to verify that you are only charged for the energy you use
- Sub billing individual tenants for their energy consumption, including WAGES
- Aggregation of energy consumption, including WAGES, and allocating costs per area, per usage, per shift, or per time within the same facility
- Basic metering of electrical parameters to better understand the behavior of your electrical distribution system
Power quality management
Insulation fault monitoring

Vigilohm

An IT earthing system allows your electrical distribution system to continually operate, even in the presence of an insulation fault, without endangering people or property. Required as part of an IT earthing system, an insulation monitoring device (IMD) detects the initial fault so you can make repairs before a second fault triggers protective devices that halt operations. Even though IMDs are mandatory in IT earthing systems, not all IMDs are equivalent. IT earthing systems are often considered complex and difficult to install. Vigilohm has changed that by combining the increased energy availability, improved safety, and reduced risk of fire and explosion you expect, with the simplicity you need.

- Simple ordering, operation and installation
- Synchronicity with modern, communicating ungrounded electrical distribution networks
- Compliance with international standards
- Seamless integration into complete solutions
- Exclusive measurement of leakage capacitance
- Increased property life by enabling preventive and corrective maintenance operations
Tunnels & stations

Power quality management
Power factor correction and harmonic filters

VarSet
The entire VarSet range offers a unique combination of abilities to give you more convenience, reliability, and cost-effectiveness across a broad range of applications. Forward-thinking design and meticulous manufacturing quality means you can count on VarSet capacitor banks to deliver dependable, long-term service.

- Easy installation
- Ease-of-use and maintenance
- Straightforward EMS integration
- Long life performance
- Safety protection
- Robust enclosure for various environments
- Tested and certified according to IEC 61439-1 & 2, IEC 61921

Accusine+
AccuSine+ Products solve a wide range of power quality problems.

AccuSine PFV+ is a very simple and effective means to eliminate leading or lagging power factor, reduce voltage fluctuations, enhance equipment operating life, and improve system power capacity. AccuSine PFV+ offers many features in one package that others require multiple models to accomplish. Power Factor correction with Accusine PFV+ is worry-free and without the risk of resonance.

AccuSine PCS+ is a flexible, high performance, cost-effective solution to stabilize electrical networks by providing harmonic mitigation, power factor correction and load balancing.

Both AccuSine PCS+ and Accusine PFV+ can help you reduce CAPEX expenditures and OPEX expenses, helping you improve:

- Harmonics
- Power factor
- Imbalance (specifically important for motor applications)
- Voltage stability (such as localized photovoltaic networks)
- Flicker
As the original manufacturer of PLCs, we have in-depth knowledge to develop software tools and quick wiring adapters that reduce the risk, time and cost of upgrading your controllers to our state-of-the-art Modicon PLCs.

Any interruption of production is an interruption in profit. Schneider Electric’s automation experts understand this and have the proven experience necessary to develop a plan that fits your specific needs, to minimize risk, downtime and costs, while improving productivity.

Unity Pro

Unity Pro is the common programming, debugging and runtime software for the Modicon M340, Atrium, Premium, M580 and Quantum PLC ranges.

Unity Pro is multitasking software offering the following features:

- All in one software
- Five IEC 61131-3 programming languages
- Integrated, customizable DFB library
- PLC simulator on PC for program validation prior to installation
- Built-in tests and diagnostics
- Wide range of online service

Modicon M340

Modicon M340 is a mid-ranged PLC ideal for the railway industry due to its compact size and high performance. It is also a user-friendly Plug and Play platform featuring a SD memory card.

All-in-one CPU:

- 7 Kinst/ms
- Multitasking system for guaranteed reflex time
- USB port for programming and HMI
- Two additional ports as required: Ethernet, CANopen, Modbus.
- Compatible memory
- Programming code: up to 70 Kinst
- Application back-up in supplied memory card additional file storage up to 128 MB with FTP access

Modicon Quantum

Modicon Quantum is a large PLC for high-level multitasking systems such as railway networks. Featuring a hot-standby processor, it is ready to take over with total transparency.

Features:

- Five IEC languages as standard
- Memory capacity up to 11 Mb
- Safety processors and I/O modules to manage safety integrated systems
- Hot-standby solutions with LCD keypad for local monitoring
- Numerous built-in ports (USB port, Ethernet TCP/IP port with Web server, Modbus Plus and at least one Modbus serial port on the front panel)
- A host of connectivity options: Profibus DP, Ethernet router module, Router modules, etc.
Energy & infrastructure management

Answering today’s energy challenge, Schneider Electric offers a powerful, open and scalable software solution to manage energy systems with associated facilities as well as energy sustainability services to enable rail operators to reduce operating costs.

Our SCADA systems manage energy systems and associated infrastructures of metros and high-speed lines around the world.
The transportation industry is made up of complex networks that must operate efficiently and safely.

Today, security is more and more dependent on the invisible aspects of the technological systems that monitor transport.

Integrated infrastructure management system

Integrated control center

Governments promote laws to make travelling more secure. Schneider Electric develops innovative technologies to help you to provide a safe and enjoyable journey to your passengers. Based on highly scalable software architectures, Schneider Electric solutions provide for integrated infrastructure management systems that support easy integration and standardization.

By using technically advanced, open and flexible architecture, Schneider Electric applications are expandable and able to support future growth, unique needs of energy supply, passenger stations and railway tunnels management and their changing requirements.

Schneider Electric rail solutions

- **Include:**
  Integrated, customized and centralized applications that are scalable, sustainable and cost-effective to manage your infrastructures such as energy systems, railway tunnels and passenger stations

- **Provide:**
  - Applications for tracking critical real-time, near real-time and historic data for all these facilities along with the telecommunication infrastructure required for this complex task
  - High safety of the controls and information flow with an appropriate flexible communication architecture between and inside electrical substations and passenger stations, using various wireless or cable solutions, engineered by Schneider Electric
The integrated control system can be designed to meet the local management functions, but also to integrate the local control with other traction substations, overhead equipment, railway tunnels and passenger stations, incorporating a complete central control center, from where all the facilities can be monitored and controlled.

The system may also be configured as a distributed system, allowing remote control or operation of these entire premises from any of the railway network’s locations according to operational procedures.

This results in seamless integration and operational efficiencies across different kinds of facilities.

Accurate weather forecast layer, superposed to the topologic geographic layer, can be added to support management decisions to ensure passenger satisfaction and asset preservation.
Energy & infrastructure management

Integrated infrastructure management system

Key capabilities

- Real-time associated databases
- Reusable component object-based technology
- Centralized management through reputed SCADA architectures such as OASyS and Wonderware
- Cyber security functionalities
- Distributed configuration on IP network
- Trending, analysis, operations reports, data and webpage reports
- Asset management and maintenance tool
- Based on PLCs or Market’s main manufacturers remotes

Main subsystems controlled

- Electrical traction substations: high, medium and low voltage equipment
- Overhead catenary equipment
- Railway tunnels: ventilation, fire detection & extinguishing, emergency exits, normal and emergency lighting, etc.
- Detectors: fallen objects, side wind, etc.
- Railway stations electro-mechanical elements (escalators, lighting, ventilation, environmental sensors, AFC, security gates, etc.)
- Passenger information, intercom and chronometry system
- Digital video-monitoring (CCTV) system
- Telecom system

Key benefits

- Open, scalable and easily integrated
- User-friendly interface, diagnostics, monitoring, administration and maintenance systems
- Supports major standard industry and changing requirements
- Sustainable architecture supports cost-effective asset, conditions and operations management
- Near-real time training, monitor and simulation
Services

Schneider Electric’s installed base services, solutions, and professional services help you increase performance throughout the life cycle of your installation.

Our asset management services provide optimization of maintenance and asset availability, reducing overall maintenance cost and unexpected downtime.

Energy sustainability services provide added value that directly improves your bottom line, through optimizing your energy costs on one hand, and your energy usage on the other.

<table>
<thead>
<tr>
<th>Schneider Electric Services</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP4 audits</td>
<td>92</td>
</tr>
<tr>
<td>Service plans</td>
<td>94</td>
</tr>
</tbody>
</table>

Schneider Electric Services

Peace of mind throughout your installation life cycle

**Plan**
Schneider Electric helps you to plan the full design and execution of your solution, looking at securing your process and optimizing your time:

- **Technical feasibility studies:** Accompany customer to design solution in his given environment
- **Preliminary design:** Accelerate turnaround time to come to a final solution design

**Install**
Schneider Electric will help you to install efficient, reliable and safe solutions based on your plans.

- **Project management:** Designed to help you complete your projects on time and within budget
- **Commissioning:** Ensures your actual performance versus design, through on site testing & commissioning, tools & procedures

**Operate**
Schneider Electric helps you maximize your installation uptime and control your capital expenditures through its service offering.

- **Asset operation solutions:** The information you need to increase safety, enhance installation performance, and optimize asset maintenance and investment
- **Advantage service plans:** Customized service plans which cover preventive, predictive and corrective maintenance
- **On site maintenance services:** Extensive knowledge and experience in electrical distribution maintenance
- **Spare parts management:** Ensure spare parts availability and optimized maintenance budget of your spare parts
- **Technical training:** To build up necessary skills and competencies in order to properly operate your installations in safety

**Optimize**
Schneider Electric provides recommendations for improved safety, availability, reliability & quality.

- **MP4 electrical assessment:** Define improvement & risk management program
When it comes to your electrical distribution installation, we can help you:

- Increase productivity, reliability, and safety
- Mitigate risk and limit downtime
- Keep equipment up to date and extend lifespan
- Cut cost and increase savings
- Improve your return on investment

CONTACT US!
www.schneider-electric.com/electricaldistributionservices

Renew

Schneider Electric extends the life of your system while providing upgrades.

Schneider Electric offers to take full responsibility for the end-of-life processing of old electrical equipments.

- **ECOFIT™**: Keep up to date & improve performance of your electrical installations (LV, MV, Protection Relays, etc.)
- **MV product end of life**: Recycle & recover outdated equipment with end of life services

Frequency of maintenance intervention

Schneider Electric recommends a schedule for maintenance activities to extend Electrical Distribution equipment performance over time. Frequencies under normal/healthy operation (minor equipment criticality and optimal environmental conditions) can be generally defined as follows:

<table>
<thead>
<tr>
<th>Maintenance</th>
<th>Min. freq.</th>
<th>Who</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive</td>
<td>every 4 years</td>
<td>Manufacturer</td>
<td>Certified Partner</td>
</tr>
<tr>
<td>Advanced</td>
<td>every 2 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>every 1 year</td>
<td></td>
<td></td>
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</tbody>
</table>

(1) Recommended under normal operating conditions (minor equipment criticality and optimal environmental conditions).
However, this recommended frequency should be increased according to:

a) the level of criticality (low, major, critical)

b) the severity of environment conditions (i.e. corrosive, naval, offshore) following recommendations of Manufacturer’s services.
Critical safety issues
An MP4 assessment helps you to identify critical safety issues, such as:
• Incorrect breaking capacity
• Absence of interlocking devices
• Insufficient personnel protection
• Unprotected access to live parts

Enhance installation safety and reliability with MP4 services
Our electrical consultants partner with your teams during an MP4 installation assessment. In every step they are supported by professional software integrating Schneider Electric know-how.

MP4 services give you a clear vision of your installation, so you can:
• Maximize production levels by increasing installation availability and quality
• Improve your OPEX by providing a roadmap to optimize your operations and maintenance
• Prioritize investments and optimize your CAPEX
• Increase safety and reduce electrical risk levels
• Predict failures and act before they happen
• Replicate some or all recommendations at other sites

Each MP4 assessment delivers 4 detailed improvement plans, as well as a summary of critical safety issues. You get:

**Maintenance Plan**
- A description of the level of maintenance to be performed
- The stress and reliability levels of critical devices
- A strategy for the maintenance plan schedule

**Modernization Plan**
- A list of the equipment at the end of its service life and proposals for available retrofit solutions
- Advice on improving installation performance
- Suggestions on how to adapt your installation to meet new business requirements

**Monitoring Plan**
- A predictive approach to anticipate potential device failure
- Energy quality and availability indicators
- Opportunities for energy savings related to the solutions deployed

**Management Plan**
- Safety recommendations for technical staff
- Service contracts respecting your subcontracting policy
- Management of square parts
- Competency management including expertise and training
- Data management via the Schneider Electric™ expert system
### Step 1
**Specify your electrical energy needs and assess your current capabilities**

The first step of an MP4 service consultation involves:
- Understanding your process and quantifying your financial risks
- Identifying the critical points in your process
- Making a link with the electrical network and highlighting devices or busbars that could trigger these high risk events
- Locating the main energy consumption points
- Gaining an understanding of your current and future operations & maintenance organization and capabilities

### Step 2
**Assess equipment and evaluate network robustness**

- **During Step 2 we:**
  - Build a stress indicator for each set of equipment, based on:
    - environmental conditions (e.g. humidity, temperature, salinity)
    - operating conditions (e.g. load rate, number of operations)
    - equipment ageing
  - Carry out a reliability study to evaluate the robusteness of the network design related to the critical points identified on Step 1
  - Classify each set of equipment according to the probability of its contribution to undesired events

### Step 3
**Rate critical levels**

In Step 3 we combine stress and reliability levels to rate the criticality of each set of equipment and define the appropriate service policy:
- Critical equipment (e.g. predictive maintenance emergency recovery plan, upgrading action)
- Major equipment (e.g. preventive maintenance)
- Minor equipment (e.g. periodic inspection)

### Step 4
**Draw up plans and share conclusions**

Based on the output of Step 3, the following deliverables are consolidated:
- List of critical safety issues
- List of upgrade actions necessary to restore nominal installation performance
- 4 plans to:
  - Optimize your operating expenditure (Maintenance Plan)
  - Improve your performance (Modernisation and Monitoring Plans)
  - Track the implementation of actions including training, spare parts management, recovery plan, etc. (Management Plan)
- An assessment of the priority of each recommendation and its economic balance sheet
- Formal presentation of conclusions and recommendations to ensure strong understanding by all parties involved
Service plans

Service plans benefits

Total cost of ownership reduction and budget control
• Lower operating expenses compared with other maintenance options
• Control over annual maintenance budget

Greater safety, availability and lifetime
• Maintenance by the manufacturer
• Improved safety and security
• Enhanced uptime and equipment life span
• Anticipation of costly technical issues
• Reduction of downtime and critical losses

Reactivity commitment
Servicing time and spare parts availability commitment

Preventive maintenance

The equipments needs regular check-ups in order to maintain its original level of operation. Moreover, to ensure the maintenance is conducted in the optimal way, it needs to be performed by skilled professionals.

Schneider Electric service plans include regular preventive maintenance that fits the needs of your equipment and your business.

Our experienced field service representatives conduct the maintenance, using special tools and dedicated consumables. They are supported by powerful data management tools, making the work more efficient and precise.

Benefits
• Flexible scheduling and maximum continuity of service
• Compliance with service regulations and international standards
• Extension of equipment lifetime
• Expert recommendations
• Improvement of installation safety and availability
• Diagnosis can be performed during equipment operation
Predictive maintenance

Predictive maintenance gives insight into the state of the equipment and expert advice on how to optimize it, enabling you to manage proactively.

Available with or without shutdown, predictive maintenance significantly reduces the possibility of unexpected downtime and helps anticipate equipment failure and associated costs. It also keeps you compliant with service regulations and international standards.

In addition, predictive maintenance helps identify technical issues caused by critical phenomena - such as electrical and environmental issues or mechanical wear - before they cause serious damage.

Benefits

• Access to manufacturer’s data for efficient diagnosis
• Greater ability to manage maintenance time and costs
• Improvement of installation safety and availability by anticipating future failures
• Clear analysis of diagnostic results in formal report and expert recommendations

Corrective maintenance

When unexpected downtime occurs, every second counts. In order to safeguard your business and speed up restart time you need the assurance of timely reactivity by an experienced, well-trained field service team as well as the guarantee of spare part availability.

Corrective maintenance from Schneider Electric gives you the reactivity you need in the event of a technical issue.

Benefits

• Access to highly qualified personnel 24/7
• Reactivity commitment in case of a failure
• An appropriate response customized to your environment
• Decreased indirect costs of downtime
• Special spare-parts and labour rate (with Advantage Plus plan)
• Annual forecasted maintenance budget (with Advantage Prime plan)
Service plans

Asset On-line,
a direct link to an installed base

With Asset On-line, get 24/7 access to the consolidated maintenance history and information about the installed base.

To keep track of one installation or many, all your data is conveniently organized online for ease of access.

Benefits

- A global overview of your electrical distribution status
- Schneider Electric expert analysis & recommendations for the installation
- Simplified communication between your maintenance teams and ours
- Maintenance indicators: equipment quality level and obsolescence, scheduled visits and site security level

Training solutions

Optimize your team’s competencies with help from our team of international experts. Get a full solution for training deployment, including hosting.

- Team competence management
- Hands-on training on full-size equipment in our worldwide training centers or at your site
- Classroom training
- e-learning sessions (available in multiple languages)
- D training experience

Electrical risk prevention

Test your employees’ knowledge and ensure they have the right safety know-how. Module includes videos, quizzes and a final test in order to deliver a certificate.

Electrical distribution fundamentals

Discover and explore electrical networks from power generation to consumers, and better understand what happens during a voltage drop or black out. This module refreshes the employees’ knowledge with high-quality interactive content.
Operations & asset management

Schneider Electric integrated asset management solutions span enterprise asset management, from smart, connected equipment, mobile workforce, reporting and analysis, predictive maintenance, workflow and condition management.

Offering a real-time answer for reducing costs while maximizing asset reliability and performance, our solutions help organizations realize outstanding returns from all their assets, including people, processes and equipment.

<table>
<thead>
<tr>
<th>Business process integration</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset management and condition monitoring</td>
<td>102</td>
</tr>
<tr>
<td>Software platforms</td>
<td>103</td>
</tr>
<tr>
<td>Wonderware</td>
<td>104</td>
</tr>
<tr>
<td>Avantis</td>
<td>105</td>
</tr>
</tbody>
</table>
Business process integration

The platform for process integration at business level

Open data can be taken from anywhere to anywhere on the global network. In this way we are connecting all of the maintenance and repair staff, the logistics, the infrastructure, tracks the equipment, rolling stock and so on with the rest of the business and doing it in real time.

The whole operations side can be made visible with modern data systems, supporting not only asset management but the sharing of information between all of the assets, people and processes in the railway, through the network and into the business environment. Whether it is an asset failing that requires that customers (freight or passengers) be informed of a delay or change in times, or an asset that needs to be repaired more often than is expected, bringing the data together in one overall system saves time, effort and money.

Doing this with Avantis enables the railway to keep on saving money while you manage your systems and processes.
Business process integration

When asset management becomes necessary

- Continuous Improvement Initiatives are necessary (Six Sigma, etc.)
- Increasing maintenance cost, out of control
- Lack of key decision support information
- Not meeting daily schedule
- Unplanned downtime due to equipment failure
- High cost of expedited equipment ordering and delivery
- Loss of production time to unplanned downtime
- Trouble meeting production commitments
- Too much paperwork
- Work Orders Requests and Execution process are paper-based
- Premature failure of equipment

Entreprise integration

System platform

Standalone solutions
Asset management and condition monitoring

Asset management for rail Infrastructure

Today’s highly competitive landscape requires rail industry players to strike a balance between reducing maintenance and operational costs, and not compromising safety and regulatory standards, while simultaneously meeting commercial objectives such as punctuality and network velocity.

Railway operations are highly dependent on the health of assets as well as real-time information on events occurring during operations.

Remote Condition Monitoring on a continuous basis enables prediction of asset failures, timely intervention and informed decisions on intervention strategies.

Beyond infrastructure management and maintenance, RCM data provides useful inputs for numerous business applications in the rail industry, such as:

- Smart rail operations to improve operational performance (on parameters such as throughput, velocity, reliability, safety, and security)
- RCM data integrated with mobility applications to positively impact the way the railways are working
- Predictive and preventive maintenance resulting in operational expenditure (OPEX) and capital expenditure (CAPEX) planning and optimization
- Warranty management of assets and life cycle cost minimization
- Condition-based speed advisory systems to promote safe operations and improve fuel management (not applicable for Metro system)
- Insights into the performance of products under various field conditions — leading to better product planning and development by the original equipment manufacturers (OEMs) and other manufacturers. For instance, sensors on the locomotives’ relay performance data so that manufacturers assess maintenance requirements and try to prevent breakdowns
- Historical data analysis of asset performance and risk assessment carried out by railroaders can drive better supplier selection and informed negotiation
- Development of asset deterioration models and depreciation calculations that are more accurate.

Schneider Electric Infrastructure Asset Management Platform is specifically suited for the unique needs of rail maintenance.

The work process for maintaining rail infrastructure including linear assets such as track, electrification and wayside equipment, differs from the process for maintaining stationary plants and facilities or moving assets.

The software supports the work flow for rail maintenance of way and features applications that support linear assets, as well as fixed assets, including inspections, linear reference definition, mobile crews, track possession and work order management.
On-line asset health and performance monitoring solution

Wonderware eDNA and Avantis PRiSM can be deployed together for centralized online asset health and performance monitoring.

eDNA provides a proven, reliable and scalable data management infrastructure for managing all of the telemetry and sensor related asset information. An enterprise historian is traditionally used as the foundation for this type of application.

The historian component of the solution provides:

- Collection and archiving of high fidelity asset sensor and smart device related data
- Visualization applications for graphical display and trending of data
- Object data model for organization of data using an asset based organizational approach
- Web based reporting
- High availability platform with integrated security

The predictive analytics component of the solution provides:

- Early warning identification of equipment health and performance problems
- Advanced optics pattern recognition technology (multivariate analysis)
- Asset specific algorithms and fixed rules that can be customized by the end user of the software
- Diagnostic tools for analysis of the PRiSM model results
- Fault diagnostics
- Asset health ranking
- Web based reporting
Wonderware
An open platform for real-time business processes integration

- A real-time open platform to monitor, control, integrate and manage tunnels, trackside, power, etc
- Real-time communication with devices and systems
- Big Data Analysis & management
- Data consolidation and alarming
- Visualization
- Integration of external applications

Wonderware software is based on a distinctly unique, powerful and elegant approach to delivering what customers most need in their real-time industrial software systems. Wonderware System Platform surpasses all other platforms in engineering simplicity, operational agility and information empowerment.

It helps customers secure their future, protect the operational integrity of their plants, enhance the operational insight of their people and enables them to adapt easily and affordably to change. These are a few of the are many reasons Wonderware software is the world’s favourite and brings value to thousands of organizations.

Wonderware InTouch has been the world’s number one Human Machine Interface (HMI) for over 25 years and offers legendary ease of use, market leading innovation, unequalled investment protection, brilliant graphics, unsurpassed connectivity, the industry’s best support and the broadest partner ecosystem.

The award-winning HMI software is an open and extensible Supervisory HMI and SCADA solution that enables the rapid creation of standardized, reusable visualization applications and deployment across an entire enterprise without having to leave the office. Used in over one-third of the world’s industrial facilities, InTouch software continues to deliver business value in engineering simplicity, operational agility and real-time performance mastery. This helps drive maximum performance, increased agility, lowered costs, additional security and reduced risk.

Wonderware eDNA (enterprise Distributed Network Architecture) is an advanced data management platform for collecting, archiving, displaying, organizing, analyzing and reporting upon a company’s real-time operational and asset health related information. The software platform includes a highly scalable enterprise data historian for efficiently archiving and providing rapid retrieval of high-fidelity time series data.

An advanced lossless compression method is used to minimize the required storage capacity while maintaining the original resolution of the data. eDNA supports the ability to easily integrate with hundreds of control, monitoring, smart device and other enterprise business systems that companies rely on for day-to-day operations.

An RDBMS database is incorporated into the software suite and integrated with the eDNA time series database to provide organization and access of the data through use of an object or metadata model. eDNA’s client applications, eDNA programming interfaces and eDNA Web technology provide real-time company-wide access to this information.
Avantis enterprise asset management

The Avantis enterprise asset management solution and extension offerings form the core of the Asset Performance Management (APM) solution set.

These maintenance, repair and operations solutions provide maintenance management, spares and inventory management and a complete procurement capability.

When coupled with the powerful Avantis Condition Manager solution, Schneider Electric is uniquely positioned to offer customers real-time answers to help reduce costs while continuing to maximize asset reliability and performance.

The overall APM solution set helps customers realize outstanding return from all their assets, including people, processes and equipment, and thereby enables true Asset Excellence.

Avantis .Pro

Avantis enterprise asset management solutions improve overall asset availability and reliability and proactively manage and plan maintenance while lowering inventory costs and streamlining the supply chain.

Avantis forms a solid base, providing maintenance management, spares and inventory management and a complete procurement capability. It helps customers secure their future, protect the operational integrity of their plants, enhance the operational insight of their people and enables them to adapt easily and affordably to change. These are a few of the are many reasons Wonderware software is the world’s favourite and brings value to thousands of organizations.

Avantis Condition Manager

Avantis Condition Manager is a unique, intelligent real-time condition management solution that collects and analyzes real-time diagnostics from all plant production assets and drives appropriate action to improve overall asset performance.

Avantis® PRiSM is a predictive asset analytics solution that can provide early warning notification and diagnosis of equipment issues days, weeks or months before failure. PRiSM helps asset-intensive organizations reduce equipment downtime, increase reliability and improve performance while reducing operations and maintenance (O&M) expenditures.
Notes
Notes