Components for low-voltage power distribution

SENTRON protection, switching, measuring and monitoring devices

Answers for infrastructure.
Managing energy intelligently

People need electrical energy. Whether lighting systems, household appliances or machinery, a reliable power supply is the basis for comfort and progress. So what's the secret? A challenging set of demands are placed on low-voltage power distribution systems for industrial applications, infrastructure or buildings. Smart grids and a full range of integrated, communication-capable components ensure safety, functionality and minimum power consumption. Protection devices provide maximum safety for people and assets. Switching devices control energy flows. Measuring and monitoring devices provide status information on the electrical system. These products give you the basis you need for a safe and cost-efficient power supply.
Safety and flexibility

■ Outstanding technology - approved since years
Protecting, switching, measuring and monitoring are the basic functions of a low-voltage power distribution system. In this segment and in many others, the name Siemens has been synonymous with innovation and outstanding technology for the past 160 years. Customers around the world know that they can rely on our extensive product and system portfolio.

■ Keeping power supply under control
The SENTRON product portfolio contains a broad selection of perfectly coordinated components along with a wide range of accessories. The spectrum includes protection, switching, measuring and monitoring devices. These products deliver maximum flexibility, comfort and safety of low-voltage power distribution for industrial applications, infrastructure and buildings.

■ Totally Integrated Power for complete, integrated solutions
The low-voltage power distribution product portfolio plays a key role in the Totally Integrated Power™ concept. Communication-capable switches and modules can link the products and systems to building or industrial automation systems. They report how much energy is being used where and notify the higher-level systems about risks and critical states. The benefits to the user are obvious: higher plant availability and opportunities to achieve savings potentials and long-term reductions in costs.

■ Excellent support
As a competent and reliable partner we offer you comprehensive support – from initial information, planning, configuration and ordering through to commissioning, operation and technical support. We know the requirements to be met in your area of work and day-to-day business. Based on this, we give you flexible and high quality support, which allows you to concentrate fully on your customers and their needs.

Highlights

■ Safe, reliable power distribution based on coordinated protection, switching, measuring and monitoring devices from a single source

■ Communication-capable products and systems support integration into your building and industrial automation systems

■ Modular design maximises configuration and operational flexibility

■ Comprehensive support – from planning to operation

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A coordinated set of components for low-voltage power distribution
Siemens is the only supplier worldwide which offers a comprehensive protection concept: the product range includes protection devices such as circuit breakers, miniature circuit breakers, residual current protective devices, fuse systems and overvoltage protection devices as well as switching devices, switch disconnectors, measuring and monitoring devices.

High application flexibility
Whether industrial application, infrastructure or buildings, you are sure to find the product you are looking for in the SENTRON family. The components are perfectly matched. Modular design facilitates fast, simple configuration and installation of the low-voltage power distribution system.

It is exceptionally easy to maintain and upgrade systems with the SENTRON product series and the extensive range of modular accessories.

Safe and economical configuration and engineering
The professional SIMARIS planning tools and ALPHA SELECT configuration software are highly useful tools which will support you at your project. These software tools facilitate fast, safe and economical planning, configuration and deployment of power distribution systems and electrical networks.

Worldwide use
Many of the products comply with IEC/EN and UL standards and can be used world-wide. This facilitates the export of electrical systems.

A set of perfectly coordinated components
IEC/EN and UL standard compliant products for worldwide use
A comprehensive protection concept for low-voltage power distribution systems in industrial application, infrastructure and buildings

Consistent, safe and intelligent power distribution
A perfectly coordinated set of components ensures maximum availability, economy and flexibility.

Reliable power distribution is essential to keep operations running smoothly.
SENTRON protection, switching, measuring and monitoring devices

Keeping a firm hand of the electricity supply.

Protecting

Switching

Measuring

Monitoring

Low-voltage power distribution

modular, flexible, expandable

Industry

Infrastructure

Buildings

powermanager - software for energy management
SIMARIS software tools for planning and dimensioning
ALPHA SELECT – configuration software
Protecting, switching and communicating

Circuit breakers send key information over standard bus systems, indicating the grid status and enhancing system availability.

- **Cost-efficient power distribution**
  Air circuit breakers 3WL and molded-case circuit breakers 3VL provide vital switching and protection functionality in the power distribution of industrial applications, infrastructure and buildings. These devices also communicate with higher-level control systems over standard bus systems such as PROFIBUS, ETHERNET and Modbus, creating transparency in the power distribution system. Users have access to key information on energy flows, faults and risks, providing the basis for sustained reduction in operating costs.

- **Air circuit breakers 3WL**
  Air circuit breakers 3WL are designed to meet increasingly demanding expectations worldwide. They are used as incoming-feeder, distribution, coupler, and outgoing-feeder circuit breakers. They are easy to handle and provide integrated communication capability. In combination with an electronic control system, they provide a comprehensive window on what is happening in the grid.

- **Sizes and accessories**
  With only three sizes and an extensive amount of accessories, the ACCB 3WL covers the power range from 630 A to 6,300 A. All versions feature the same basic design and share the same complete range of standard accessories.

**Air circuit breakers 3WL**

<table>
<thead>
<tr>
<th></th>
<th>3WL11</th>
<th>3WL12</th>
<th>3WL13</th>
<th>3WL12 DC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For AC up to 6,300 A</td>
<td>For AC up to 6,300 A</td>
<td>For DC up to 4,000 A</td>
<td>For DC up to 4,000 A</td>
</tr>
<tr>
<td>Rated current Iₚ [A]</td>
<td>630, 800, 1,000, 1,250, 1,600, 2,000</td>
<td>800, 1,000, 1,250, 1,600, 2,000, 2,500, 3,200, 4,000</td>
<td>4,000, 5,000, 6,300</td>
<td>1,000, 2,000, 4,000</td>
</tr>
<tr>
<td>Size</td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>II</td>
</tr>
<tr>
<td>Rated ultimate short-circuit breaking capacity [kA]</td>
<td>55/66/85 At 415 V/500 V AC</td>
<td>66/80/100 At 415 V/500 V AC</td>
<td>100/1150 (3-pole) At 415 V/500 V AC</td>
<td>35/30/25/20 At 20/300/600/1,000 V DC</td>
</tr>
</tbody>
</table>
Information used for diagnostics, troubleshooting, maintenance or cost center management is forwarded to a central control room.

- **Molded-case circuit breakers 3VL**
  Compact dimensions and excellent communication capabilities are the outstanding features of the molded-case circuit breakers 3VL. The space-saving circuit breakers are rated between 16 A and 1,600 A, and they are ideal for a number of different applications: For system and motor protection, for starter combinations or as switch disconnectors depending on requirements.

- **Sizes and accessories**
  Molded-case circuit breakers 3VL are available with thermal-magnetic or solid-state overcurrent release. The product portfolio also contains two series of internal accessories.

- **Highlights**
  - Communication capability provides connectivity to higher-level management systems
  - An extensive range of accessories for the air circuit breakers 3WL offers great versatility
  - Compact dimensions of the molded-case circuit breakers 3VL

### Molded-case circuit breakers 3VL

<table>
<thead>
<tr>
<th>Series</th>
<th>3VL1</th>
<th>3VL2</th>
<th>3VL3</th>
<th>3VL4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current $I_u$ at 50 °C ambient temperature [A]</td>
<td>16 ... 160</td>
<td>26 ... 160</td>
<td>80 ... 250</td>
<td>125 ... 400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Series</th>
<th>3VL5</th>
<th>3VL6</th>
<th>3VL7</th>
<th>3VL8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current $I_u$ at 50 °C ambient temperature [A]</td>
<td>250 ... 630</td>
<td>320 ... 800</td>
<td>400 ... 1,250</td>
<td>640 ... 1,600</td>
</tr>
</tbody>
</table>

**Sentron**

- Protecting
- Switching
- Measuring
- Monitoring
Comprehensive protection concept

Fuses and safety switching devices support intelligent concepts which provide protection and safe switching in low-voltage power distribution systems.

- **Fuse systems for all applications**
  Fuses reliably shut circuits down when a short circuit or overload condition occurs, providing maximum protection for humans, systems, equipment and lines. The following systems are available:
  - LV HRC fuse systems
  - Fuse system DIAZED and NEOZED
  - Fuse Systems Class CC and cylindrical fuse systems
  - Semiconductor fuses SITOR

- **Semiconductor fuses SITOR**
  These fuses effectively protect power semiconductors from the effects of short circuits, preventing damage to expensive devices and equipment such as converters, which have fuses at the input and in the intermediate DC circuit, as well as UPS systems and soft starters for motors. A number of different designs are available.

- **Switch disconnectors with LV HRC fuses 3KL/3KM**
  Used as main or EMERGENCY-STOP switches, the switch disconnectors 3KL/3KM provide maximum safety, because the double contact break and isolating distance ensure that no voltage is applied to the fuse in the OFF position.

- **In-line switch disconnectors with LV HRC fuses 3NJ62**
  These in-line switch disconnectors feature an integrated double-break switching mechanism. They are ideal for applications with multiple cable outlets which run in a very confined space. The devices feature intelligent plug-in design for safe and easy installation.

- **MINIZED switch disconnectors 5SG7, D02**
  MINIZED switch disconnectors with fuses 5SG7 rated up to 63 A are primarily used in switchgear and controlgear assemblies. They can also be used in households upstream from the meter in accordance with TAB 2007 guidelines.

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Fast mounting and efficient power distribution with busbar system 8US rated at up to 630 A:

1. Busbar supports
2. Device adapters for motor feeder with SIRIUS components
3. Standard mounting rail adapters
4. LV HRC fuse switch disconnectors 3NP1
5. Bus-mounting bases DIAZED
6. Infeed modules
7. Terminals
The fuses and safety switching devices are well matched and ensure reliable disconnection in addition to their protection functions.

■ LV HRC fuse switch disconnectors 3NP1
The fuses are clearly visible through the large inspection window. The clearly visible isolating distance facilitates safe and easy maintenance. Additional functions such as electromechanical or mechanical fuse monitoring and grid monitoring functions maximise system availability.

■ LV HRC fuse switch disconnectors 3NJ4
These compact in-line devices can accommodate multiple connections in a confined space. They are designed for the occasional manual switching and isolation of load feeders and power distributions in industry applications and infrastructure.

■ MINIZED fuse switch disconnectors 5SG7, D01
Due to their compact design (only 18 mm per pole), MINIZED fuse switch disconnectors 5SG7, D01 are used primarily in controlgear applications.

Highlights

■ Effective short circuit and overload protection enhances operational reliability and system availability
■ A comprehensive protection system portfolio which contains the right product for any application
■ Semiconductor fuses SITOR safeguard high-value equipment and subsystems

Symbols for switch-fuse devices based on IEC 60947-3

<table>
<thead>
<tr>
<th>Device</th>
<th>Switch on/off</th>
<th>Disconnect</th>
<th>Switch on/off and disconnect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load switch with fuses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuse-switch</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Miniature circuit breakers for protection against overload and short circuit, overvoltage protection to protect against lightning strikes.

Enhanced safety for people and assets in buildings.

Safety and reliability you can count on

Comprehensive personal and asset protection in industrial applications, infrastructure and buildings.

■ Comprehensive product range
A complete range of miniature circuit breakers is available.
- For standard applications: 5SL in 6 kA from 0.3 to 63 A
- For quick installation: 5SJ6 ...-KS with plug-in terminal up to 6 kA from 10 to 20 A
- For little installation spaces: 5SY6 0, 1+N in 1 MW up to 6 kA from 2 to 40 A
- For very high requirements: 5SY up to 25 kA from 0.3 to 80 A, 5SP from 80 to 125 A, also for universal current applications
- For worldwide use, certified to UL 489 and IEC: 5SJ4 ...-HG from 0.3 to 63 A

■ Overload and short circuit protection
Miniature circuit breakers offer protection against damage caused by overload and short circuits. The broad product portfolio is used in industrial applications, infrastructure and buildings around the world. The products feature convenient installation and connection technology, standard accessories and integrated design.

■ Multi-level lightning protection
Lightning arresters type 1 provide protection against overvoltage and power surges that may be triggered by a direct or indirect lightning strike. Surge arresters type 2 are used after lightning arresters type 1 to protect against transient overvoltage.
Surge arresters type 3 are used downstream of surge arresters type 2 in sub-distribution boards near the loads to protect those loads.

■ Effective residual current protection
Residual current protective devices are used for the protection of people and assets, fire protection and to provide additional protection in case of direct contact. They protect human lives and prevent fires started by electrical ignition.

Simple configuration of applications thanks to multiple combination options
1. RC unit 5SM2 for personal protection and prevention of electrically ignited blazes
2. 4-pole miniature circuit breakers 5SY
3. Remote operating mechanism 5ST3 for remote switching of the MCB
4. Undervoltage releases 5ST3 protect downstream loads in the circuit against risks from undervoltage
5. Auxiliary switches 5ST3 and fault signal contacts 5ST3 for signaling switching state or protective tripping
Residual current protective devices for personal safety, fire protection and additional protection against direct contact.

- **A multitude of designs**
  In addition to RCCBs, combination RCBOs and RC units are also available. RCBOs and RC units in combination with miniature circuit breakers combine personal, fire and overload protection in a single device.

- **The right version for every residual current**
  RCCBs type A can be tripped by a fault which is detected in AC sine wave current as well as in a pulsating DC current. They are used in most cases. Current-sensitive RCCBs type B+ also react to faults in smoothed DC which can occur with power semiconductors.

- **Versions that suit every requirement**
  The super-resistant version prevents unwanted power cuts by briefly delaying the tripping action of the RCCB, thereby avoiding unnecessary interruptions. The selective version features time-delayed tripping and a sliding scale of tripping times and rated residual currents to selectively shut down separate parts of a system.
  The patented RCCB SIGRES has built-in condensation protection to ensure maximum safety and durability even under harsh conditions such as gas or moisture in the ambient air.

### Highlights
- Complete range of miniature circuit breakers for all applications worldwide
- Multi-level lightning and overvoltage protection
- Comprehensive portfolio of residual current protective devices

### Proper functioning residual current protective devices Type AC, A, B, B+

<table>
<thead>
<tr>
<th>Current waveform</th>
<th>AC</th>
<th>A</th>
<th>B</th>
<th>B+</th>
<th>kHz</th>
<th>Tripping current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.5 … 1.0 I_n</td>
<td>0.35 … 1.4 I_n</td>
<td>0.25 … 1.4 I_n</td>
<td>0.11 … 1.4 I_n</td>
<td>max. 1.4 I_n + 6 mA</td>
<td>0.5 … 2.0 I_n</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Start angle 90°:</td>
<td>Start angle 135°:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.25 … 1.4 I_n</td>
<td>0.11 … 1.4 I_n</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Start angle 135°:</td>
<td>0.11 … 1.4 I_n</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>max. 1.4 I_n + 6 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 … 2.0 I_n</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Manual switching devices for a wide range of industrial and infrastructure applications including solar power systems.

Safe switching of loads and control events to ensure smooth production.

Switching functions for safety and comfort

Electrical and manual switching of systems and loads for a very wide range of applications.

- **Simple manual switching**
  Manual switching devices can be reliably used in electrical systems that are switched on and off manually. The product range includes switch disconnectors, On/Off switches, control switches and pushbuttons.

- **Manifold switching functions**
  Control switches handle a variety of tasks used as two-way switches, group switches and control switches. Two-way switches are used in control cabinets and distribution boards for switching small loads on/off or switching them over. Group switches with center position permit the positions open/stop/closed, for example to control anti-clockwise rotation - OFF - clockwise rotation. Control switches have an integral control lamp for the ON position. ON/OFF switches 5TE8 are used to switch lighting, motors and other electrical devices. Pushbuttons 5TE4 are used primarily in control systems, e.g. to switch on seal-in circuits or as pushbuttons with maintained-contact function for manual use.

- **Safe isolation from the grid**
  Switch disconnectors 3KA/3KE can be used for fuseless isolation in any low-voltage grid. They function as main control, EMERGENCY-STOP, repair or transfer switches. Available in three or four pole versions, they can be used for disconnecting or switching under load. After disconnection, main and EMERGENCY-STOP switches 3LD can be used to safely isolate electrical systems or to switch induction motors or air-conditioning systems up to 132 kW as well as solar systems.

- **Safe switching of solar modules**
  IEC 60364-7-712 specifies the use of special DC isolators 5TE2 for isolating solar modules in photovoltaic systems. With a high rated voltage of DC 1,000 V, DC isolators 5TE2 are the ideal solution for this application.

### A selection of products from the manual switching portfolio

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Rated operational current [A]</th>
<th>Design/version</th>
<th>Contact type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pushbuttons 5TE4</td>
<td>20</td>
<td>Pushbuttons, control pushb., double pushb. with maintained- or momentary-contact function</td>
<td>1 NO/1 NC, 1NO+1 NC, 1 NO+1 NO, 1 NO, 2 NO, 3 NO+N, 4 NC, 1 NO/1 N, 2 CO, 2 NO, 1 NO/1 NC</td>
</tr>
<tr>
<td>Control switches 5TE8</td>
<td>20</td>
<td>Two-way switches, group switches with center position and control switch</td>
<td>1 NO/1 NC, 2 NO/2 NC, 3 NO/3 NC, 1 CO, 2 CO</td>
</tr>
<tr>
<td>ON/OFF switches 5TE</td>
<td>16, 25, 32, 36, 63, 80, 100, 125, 160, 200, 250, 630, 1,000</td>
<td>Gray handle, red handle</td>
<td>1 NO, 2 NO, 3 NO, 3 NO+N,4 NO, 3 NO+N+AS</td>
</tr>
<tr>
<td>Switch disconnectors 5TE1</td>
<td>100, 125, 160, 200</td>
<td>Transparent enclosure, gray knob</td>
<td>2 NO, 3 NO, 4 NO, 3 NO+N</td>
</tr>
<tr>
<td>Switch disconnectors 3LD, 5TE, 3KA/3KE</td>
<td>16 ... 1,000</td>
<td>Front and floor mounting, standard rail mounting, moulded plastic enclosure</td>
<td>2-pole ... 6-pole</td>
</tr>
</tbody>
</table>
Electrical switching devices and timers for on-demand system and load control using electrical signals.

- **Remote switching**
  Electrical switching devices such as remote control switches, switching relays or Insta contactors are used where systems and loads are controlled by means of electrical signals. Remote control switches 5TT4 tripping in the event of current inrushes, i.e. pulses, and then electromechanically save the switching position, even in the event of a power failure. Switching relays 5TT4 are used as contact multipliers for switching large loads with low control circuit power. Insta contactors 5TT5 are suitable for switching heating, lighting and motors. In industry, they are being used to an increasing extent to switch motors in applications such as heat pumps or HVAC.

- **Time switching**
  Time switches are used in a huge variety of applications including dryers, production lines, exterior lighting on office buildings and residential heating systems. They ensure maximum comfort and safety and reduce power consumption. The extensive product portfolio ranges from mechanical and digital time switches 7LF and industrial timers 5TT to timers for buildings 7LF. They are also used to switch staircase lighting, ventilation systems and circulation pumps.

**Highlights**

- Extensive portfolio of electrical and manual switching devices
- IEC 60364-7-712 compliant
- DC isolators for solar modules
- Timers provide comfort, safety and reduce energy consumption

**A selection of products from the electrical switching portfolio**

<table>
<thead>
<tr>
<th>Version</th>
<th>Contact type</th>
<th>Rated control voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote control switches 5TT4</td>
<td>AC, AC central, AC series, AC shutters/blinds, AC group, DC</td>
<td>1 NO, 2 NO, 3 NO, 4 NO, 1 NO + 1 NC</td>
</tr>
<tr>
<td>Switching relay 5TT4</td>
<td>AC, DC</td>
<td>1 NO, 2 NO, 3 NO, 4 NO, 1 NO + 1 NC, 1 CO, 2 CO</td>
</tr>
<tr>
<td>Timers 7LF</td>
<td>digital, analog</td>
<td>1 ... 4 NO, 1 CO</td>
</tr>
<tr>
<td>Insta contactor 5TT5</td>
<td>AC: 20 ... 63 DC: 24 ... 63</td>
<td>AC: 4 NO, 3 NO + 1 NC, 2 NO + 2 NC, 4 NC DC: 2 NO, 1 NO + 1 NC, 1 NC, 4 NO, 3 NO + 1 NC, 2 NC + 2 NC, 4 NC</td>
</tr>
</tbody>
</table>
Protecting  Switching  
Measuring  Monitoring

The right measuring device to suit every requirement.

Energy flow tracking creates transparency
Measuring devices deliver reliable electricity consumption and system status information. Their data acquisition capabilities provide the basis for efficient energy management.

A Informed to detail
Whether for industrial applications, infrastructure or buildings, the measuring devices 7KT/7KM PAC measure the power values for the infeed, outgoing-feeders or individual loads. In addition, they provide important data for assessing the system state and power quality. The communication-capable devices can be very easily integrated into automation and energy management systems to process the acquired data. Communication with higher-level energy management systems takes place via PROFIBUS-DP, Modbus RTU, Modbus TCP, M-Bus and KNX.

A All-purpose devices for worldwide use
Thanks to their wide range of functions, the measuring devices can be used everywhere, where electrical energy is distributed and used. Built-in and optional multifunctional digital inputs and outputs make it simple to adapt the devices to the particular application. Plug-in modules can be added at a later time to provide extra inputs/outputs and bus interfaces. A comprehensive range of monitoring functions provides early warning of malfunction or overload conditions. With international approvals and nine language versions the devices are perfectly suitable for worldwide use. IP65 protection for front-panel mounting as a standard feature allows them to be applied even in harsh environments.

<table>
<thead>
<tr>
<th>Measuring devices</th>
<th>7KT PAC1500</th>
<th>7KT PAC3000</th>
<th>7KM PAC3100</th>
<th>7KM PAC3200</th>
<th>7KM PAC4200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compliant with EN 50470-1, -3, versions: calibrated (MID), direct connection (up to 80 A), transformer conn. (5 A)</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Basic measured values (&gt;30) e.g. V, I, P, Q, W, f, ...</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Extended range of measured values (&gt;50) e.g. THD, asymmetry</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Basic power quality (&gt;200) e.g. phase angle, single harmonic up to order 31</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Load profile record with time stamp, min./max.</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Inputs/Outputs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DI</td>
<td>■ 2</td>
<td>■ 1</td>
<td>■ 2 plus 8</td>
<td>■ 1</td>
<td>■ 2 plus 4</td>
</tr>
<tr>
<td>DO</td>
<td>■ 2</td>
<td>■ 1</td>
<td>■ 2 plus 8</td>
<td>■ 1</td>
<td>■ 2 plus 4</td>
</tr>
<tr>
<td>Pulse inputs for counters</td>
<td>■ 2 (Q, W)</td>
<td>■ 1 (W)</td>
<td>■ 2</td>
<td>■ 1</td>
<td>■ 2 plus 4</td>
</tr>
<tr>
<td>Pulse outputs</td>
<td>■ 2 (Q, W)</td>
<td>■ 1 (W)</td>
<td>■ 2</td>
<td>■ 1</td>
<td>■ 2 plus 4</td>
</tr>
</tbody>
</table>

■ available as standard  ■ available as option

Highlights

A Vital information about energy flows, consumption and system status
A Communication with higher-level automation and energy management systems
A International approvals for worldwide use
Everything in view with monitoring devices

You are in firm control of your power supply systems twenty-four-seven. Intelligent monitoring devices increases system availability.

**Detection of faults in good time**
High plant availability and low downtimes help keep costs low. Residual current monitors help detect and remedy faults before the plant is shut down. They check for residual currents and issue a warning when the predefined threshold is exceeded, making a vital contribution to operational reliability.

**Uninterruptible power supply**
Hospitals and medical centres have a lot of medical equipment which in many cases performs life-critical functions. In areas conform to group 2 (e.g. intensive care units or operating rooms), switchover devices 7LQ3 monitor the IT network and provide switchover functionality for two redundant supply lines to ensure a continuous supply of power.

**High operational reliability**
The transfer control device 3KC ATC5300 increases the reliability of the power supply through automatic or manual switching between two power supply systems. It is deployed everywhere where a power failure is especially critical, e.g. in hospitals, UPS systems and industry.

**Mobile monitoring and control**
The GSM alarm module 5TT7 lets you keep a constant watch on your system from everywhere. The functionality includes equipment failure and fault notification and simple issuing of commands by SMS to up to 5 mobile phones.

**Highlights**
- Monitoring equipment increases system availability
- Switchover devices ensure power supply continuity in medical premises
- GSM alarm modules 5TT7 support mobile system monitoring and SMS notification of faults

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### A selection of products from the monitoring device portfolio

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer switches</td>
<td>Transfer switches 3KC, Transfer control device 3KC ATC5300</td>
</tr>
<tr>
<td>Monitoring of electrical values</td>
<td>Residual current monitors, voltage relays, current relays, priority switches, fuse monitors, phase and phase sequence monitors, insulation monitors, monitoring of medical premises</td>
</tr>
<tr>
<td>Monitoring of plants and devices</td>
<td>GSM alarm module, fault signaling units, EMERGENCY-STOP modules, level relays, line circuit relays, dusk switches, temperature controllers, p.f. controllers, thermistor motor protection relays</td>
</tr>
</tbody>
</table>
Always completely in the know due to intelligent measurement methods

The measuring devices 7KT/7KM PAC detect and document energy values of infeeds, outgoing feeders or individual loads in a precise and reliable manner. They also provide important measured values that can be used to analyze the status of the system and the power quality. To further process the measured data, the devices, due to their versatile communication capability, can easily be integrated into higher-ranking automation and energy management systems.

Efficient energy management with integrated portfolio

Compatible hardware and software components provide efficient energy management that meets all requirement, from standard solutions to customized applications.

Switching and protection devices with communication capability

The air circuit breakers 3WL and the molded-case circuit breakers 3VL provide measured values and important information for the diagnostic, fault, maintenance, or energy management, and thus offer new possibilities with regard to the implementation of profitable and highly available power distribution systems.

Integration of other components into the energy management system

Other switching, protection, or measuring devices can be integrated into the energy management system, either via its own communication interface or its S0 interface. This way, for example, consumption values of non-electrical energy carriers such as gas or water, and the switching state of devices without communication capability can be analyzed in the energy management system.
The software for energy management powermanager can be used for all infrastructural applications. Already with the standard package with functions for the gathering, analyzing and monitoring of various measured values, it is easy to set up an energy management system. Other customer-specific requirements can be met with option packages. With powermanager, you keep all your options open and, thanks to a flexible licensing concept, you can expand the project with additional functions or devices at any time without losing any data.

Software add-ons for the SIMATIC environment
The SIMATIC powerrate add-on for WinCC and PCS 7 as well as device-specific block libraries make it possible to integrate various energy management functions such as a structured visualization and archiving of consumption data, cost center allocation or load management as well as low-voltage power distribution components into the systems of the process and manufacturing industry.

Highlights

- Greater transparency and energy-efficient supply of power in industrial applications and infrastructure
- Reliable collecting, providing and evaluation of all consumption data
- Integrated, coordinated product portfolio geared towards all customer requirements
Systematic approach to power distribution

A comprehensive range of high-performance components enables switchboards and distribution boards to meet any requirements.

- **SIVACON S8 power distribution boards** – safe, flexible and cost-efficient
  The SIVACON S8 power distribution board sets new standards in power distribution or as a motor control center (MCC) for industrial applications or infrastructure. The power distribution board system rated up to 7,000 A for easy and integrated power distribution ensures maximum safety for human beings and plants by design verification by verification tests in accordance with IEC 61439-1. The optimized power distribution board design offers great versatility.

- **ALPHA distribution boards** – integrated platform structure
  Small, wall or floor-mounted ALPHA distribution boards are all based on a proven system. They comply with all safety regulations and offer reliable quality. The integrated platform structure gives them great versatility for use in industrial applications, infrastructure and buildings. A range of sub-distribution products is available to meet user needs.

- **Reliable power distribution dimensioning**
  A tender process takes place prior to contract award for public or other large buildings. Siemens provides a set of defined specification texts. The software SIMARIS design runs calculations and performs dimensioning for the electrical distribution network based on the structure that has been defined and entry of technical data in accordance with recognized rules of technology and applicable standards.

Completely coordinated components for low-voltage power distribution and electrical installation technology

SENTRON protection devices
Continuous power distribution from the distribution board to the load using SENTRON protection, switching, measuring and monitoring devices.

Definition of necessary devices and comparison of tripping characteristics

Based on the equipment and the distribution boards needed, the software SIMARIS project determines the system space requirements and helps you define the budget. You generate the technical specifications for the entire project with a single click of the mouse. SIMARIS provides tripping characteristic curves as well as let-through current and let-through energy characteristics.

Planning, configuration and ordering of distribution boards

The free configuration software ALPHA SELECT makes distribution board configuration faster and easier than ever before. The software program covers the complete product portfolio of the electrical installation technology and accompanies you step-by-step through the entire project, from planning to installation. Configuration errors are virtually impossible thanks to collision tests and configuration rules saved in the program.

Highlights

- Comprehensive portfolio for switchboards, distribution boards and small distribution boards
- Compliance with standards for added safety
- Software tools and comprehensive support for planning and installation of power distribution systems

SENTRON switching devices
SENTRON measuring devices
SENTRON monitoring devices
Answers for single- and multi-family homes

Power distribution systems are expected to deliver high levels of comfort, safety and energy efficiency. Well thought-out electrical installations meet this requirements.

- **Protecting people and assets**
  A comprehensive protection concept keeps people and property safe in apartment buildings. Siemens components give homeowners all the protection they need, and they comply with all current standards.

- **Line protection is a must**
  In the event of a short circuit or overload, the miniature circuit breaker cuts off power to the affected circuit. They can be found installed in every house.

- **Effective residual current protection**
  Residual current protective devices prevent accidents caused by direct or indirect contact with electrical voltage and offer additional protection against fires started by electrical ignition. Electrical outlet circuits should have 30 mA residual current protection. Upstream residual current circuit breakers are provided for other circuits, for example lighting. Distributed protection, which shuts off only the affected circuit when a fault occurs, increases the overall availability of the electrical system.
Foresight during the electrical planning and installation phase keeps the whole family safe: The cooker will not work if the indicator light is not illuminated. A pushbutton which activates the timer has to be pressed before the cooker can be used.

- Overvoltage protection is worth the investment
  Lightning strikes or overvoltage can cause serious damage to electrical equipment and systems. Even minor voltage peaks in the power lines can have grave consequences. Multi-level overvoltage protection prevents damage to the electrical installation and terminal equipment.

- Electrical and time switching
  Timers are simple and effective tools for saving energy. They can be used in a variety of ways, for example to switch lighting, ventilation and heating on and off in response to load conditions. The room remains comfortable and energy consumption decreases significantly. Remote control switches enable users to turn off the lights from multiple push-buttons.

- Charging Unit for electric vehicles
  Standard IEC 61851 defines the requirements for the design and operation of electrical vehicle charging stations. Tried-and-tested, high-quality SENTRON protection, switching, measuring and monitoring devices deliver maximum design reliability and safety.

### Highlights

- Protection against electrical shock due to residual current protective devices in acc. with IEC 60364-4-41
- Electrical and time switching for efficient use of energy
- High-quality components for safe charging station design

### Components used

<table>
<thead>
<tr>
<th>Applications</th>
<th>1 Distribution board: 1 2 3 4 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 Small distribution board: 1 2 3 5 7</td>
</tr>
<tr>
<td></td>
<td>3 Charging Unit: 1 8</td>
</tr>
</tbody>
</table>

### Protecting people and equipment

Personal safety is the top priority in residential buildings. Complete protection is provided for equipment which is attached to mains power.

- Overvoltage protection type 1 and type 2
- Overvoltage protection type 2 and type 3 provides fine protection for sensitive equipment
- GSM alarm module for remote system monitoring and control
- Remote control switches
- RCCBs type B
Against both in the office and on the production floor, SENTRON components protect people and ensure system availability even in change-of-use situations.

Answers for flexible building usage

To keep operations running smoothly throughout a mid-tier company, it must be possible to safely adapt the power distribution system to changing needs.

■ Personal safety in the office
Many mid-tier companies have both office and production areas. As a result, the power distribution system has to meet very different needs. RCCBs protect electrical outlet circuits in office areas. RCBOs are recommended to provide combined personal, fire and system protection.

■ Smooth production operations
Every production unit should have its own power distribution subsystem to ensure a reliable supply of power to the machines on the production floor. Each machine also has its own control cabinet which contains for example frequency converters and the controllers. If required, switch disconnectors with LV HRC fuse systems cut off power to individual machines. Universal current-sensitive RCCBs type B and type B+ ensure a high level of personal safety. They are unaffected by capacitive leakage current from devices such as frequency converters and provide guaranteed protection against the effects of residual current. Measuring devices capture both active and reactive energy data with a high degree of precision. The data is acquired via a LAN coupler with an expansion module RS485 and forwarded over an Ethernet link for analysis on an office PC.
Components from the SENTRON portfolio keep the production running smoothly and ensure high system availability.

- **Efficient system protection**
  Fuse switch disconnectors are installed for occasional manual switching/isolating of machines, sub-distribution boards and cables. Providing “load switching” and “disconnect” functions, they are able to switch on, control and switch off the specified rated current. They can also handle a specific short-circuit current over a certain period of time.

- **Safe photovoltaic systems**
  Due to the current source characteristics of solar modules, disconnecting DC power in PV systems presents greater difficulties compared to normal home installations. The standard IEC 60364-7-712 specifies the use of special switch disconnectors for isolating solar modules in photovoltaic systems. The compact switch disconnector 5TE1 rated at 1,000 V DC meets the requirements of this standard.

- **Mobile monitoring and controlling**
  A GSM alarm module lets you keep a constant watch on your building, supplying information about the system status when you are not on site. You can also use it to switch parts of the electrical system on and off as needed.

### Highlights
- Flexible, safe and scalable power distribution systems for mid-tier companies
- Coordinated portfolio to keep things running without a hitch
- Protection of your investment due to durable, high-quality products

### Flexible building usage
Personal protection similar to residential buildings is standard in office environments. On the production floor, safe machine operation and minimization of downtime are also priorities.

### Applications

<table>
<thead>
<tr>
<th>A</th>
<th>Switchboard: 1 3 4 5 6 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control cabinet: 1 2 3 4 5 11</td>
</tr>
<tr>
<td>5</td>
<td>Distribution board: 1 2 4 7</td>
</tr>
<tr>
<td>6</td>
<td>Molded-plastic distribution board: 4 8 9 10</td>
</tr>
<tr>
<td>7</td>
<td>Charging Unit: 1 6</td>
</tr>
</tbody>
</table>

### Components used

<table>
<thead>
<tr>
<th>1</th>
<th>MCBs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>RCCBs type A</td>
</tr>
<tr>
<td>3</td>
<td>RCCBs type B</td>
</tr>
<tr>
<td>4</td>
<td>Overvoltage protection devices</td>
</tr>
<tr>
<td>5</td>
<td>LV HRC fuse switch disconnectors</td>
</tr>
<tr>
<td>7</td>
<td>Measuring devices</td>
</tr>
<tr>
<td>8</td>
<td>Photovoltaic fuses</td>
</tr>
<tr>
<td>9</td>
<td>DC isolators</td>
</tr>
<tr>
<td>10</td>
<td>MCBs, universal current</td>
</tr>
<tr>
<td>11</td>
<td>GSM alarm module</td>
</tr>
</tbody>
</table>
Answers for the manufacturing industry

Maximum system availability ensures cost-efficient production. A comprehensive protection concept guarantees personal, asset and fire protection.

- **System availability and safety**
  Production is expected to run continuously without interruption. Power distribution systems in the manufacturing industry have to avoid power cuts and guarantee high system availability. Intelligent products monitor system status and power loads and communicate those with standardized bus systems such as PROFIBUS, PROFINET or Modbus to higher-level management systems.

- **High current switching**
  Soft starters are deployed to avoid peak loads caused by motor startup current. Devices with high switching capacity are used for line protection. Good up-front planning of the power distribution system regarding selectivity ensures that only the nearest protective device activates when a fault occurs rather than bringing down all of the motors.

- **Monitoring the system status**
  Measuring devices 7KM PAC, protection and switching devices communicate over standardized bus systems with higher-levels in the system hierarchy. Sensor data such as motor temperature can also be transmitted to these devices providing system transparency. RCDs are also installed, which detect residual currents long before the protective device activates.
High system availability in industrial applications avoids downtimes and the associated high costs.

Enhanced functionality
A wide selection of auxiliary components, such as remote control switches and fault signal contacts, is available for industrial applications, and they support integration into control systems.

Efficient planning
SIMARIS design simplifies planning and dimensioning of the electrical power supply. The software tool performs the grid calculations, selects the appropriate products and generates a suitable, safe and economical solution to meet the needs of the application. The tool also quickly calculates short-circuit current, load flow, voltage drop and energy balance.

Easy system documentation
The My Documentation Manager tool enables users to efficiently generate reliable system documentation by putting together customized handbooks. www.siemens.com/lowvoltage/mydocumentationmanager

System availability and international approvals
Selective protection of the individual components is essential to maintain high system availability. International approvals facilitate problem-free machinery and system export.

<table>
<thead>
<tr>
<th>Applications</th>
<th>Low-voltage main power distribution:</th>
<th>Switchboard:</th>
<th>Control cabinet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 2 3 4 5</td>
<td>2 4 5 6 7</td>
<td>1 3 5 6 7</td>
</tr>
</tbody>
</table>

Components used
1. Switch disconnectors with high switching capacity and auxiliary components
2. Air circuit breakers
3. Molded-case circuit breakers
4. LV HRC fuse switch disconnectors to protect machinery
5. Cylindrical fuses
6. Measuring devices for monitoring which also support energy management
7. Busbar systems

Highlights
- Reliable monitoring of system status and network load
- Communication-capable products ensure perfect coordination between all components
- My Documentation Manager - the ideal tool for simple, reliable system documentation

Schutz-, Schalt- und Messtechnik der Niederspannungs-Energieverteilung V4.indd   25.03.11   10:25
Answers for non-residential buildings

Office and administration buildings, hospitals, airport terminals and stadiums all need tailored solutions which are as individual as the buildings themselves.

■ Planning ahead
A coordinated set of products and integrated systems creates synergies and supports high-performance concepts. These concepts contain various types of systems: power distribution, building management, HVAC, lighting and sun protection control, fire protection systems, access control, intrusion systems, safety systems and video surveillance. Energy sources such as PV systems or charging stations for electric vehicles are also included in the concept. Effective protection of persons, assets, hardware and software in the building are other important aspects of the overall concept.

■ Spezification texts and configuration-relevant CAX files
The range of specification text blocks includes power distribution products and systems and technical building equipment including such things as lift and lighting systems and uninterruptible power supplies. Project-relevant CAX files (commercial and technical product data) are also available.
Planning and design of power distribution systems for infrastructure applications have to satisfy stringent safety, flexibility and cost criteria.

Support during the planning, specification phase and ongoing operation
A meticulous planning, implementation and ongoing operating phase is needed for every infrastructure project. A selection of software tools and comprehensive support is available for all three levels.

**Applications**

- Configuration/planning: 1 2 3
- Energy management: 4 5 6

**Components used**

1. SIMARIS design
2. SIMARIS project
3. SIMARIS curves
4. Central energy supply switchboard with air circuit breaker 3WL
5. Distribution board with measuring devices for accurate allocation of power consumption to the individual cost centers
6. Small distribution board with measuring devices
7. Energy management software power-manager supports user-friendly graphic analysis of power consumption displayed on load curves as well as generation of statements and cost reports

- **Data acquisition and analysis**
  Communication-capable products can be integrated into higher-level systems such as the DESIGO building management system. The air circuit breaker 3WL sends data over Modbus RTU, PROFIBUS or ETHERNET. Data analysis can provide early fault warning, avoid peak loads and help maintain a constant load on the grid.

- **Integration of intelligent grids**
  Power for the electricity grid is normally supplied from a central generation station, but the current trend is towards distributed generation. PV systems, wind turbines and biogas systems can feed the gained electrical power directly into the low-voltage grid. Smart grids which automatically manage and control the loads match power infeed with the load. Smart grids incorporate loads such as heat pumps, hot water tanks, freezers and electric car batteries into the grid management.

**Highlights**

- Tailored overall concepts for public and non-residential buildings
- Energy management minimizes energy consumption and reduces costs
- Software tools and specification texts simplify the planning process
A suitable version of a broad spectrum of products can be supplied to meet a wide range of requirements.

Answers for industrial estates and business parks

Planning for industrial estates and business parks takes a lot of skill, because machinery, office and storage facilities present quite a range of different challenges.

**High system availability**
The electricity supply at industrial estates and business parks has to meet a number of challenges. Production lines, office buildings and logistics centres have to run without interruption at all times. High system availability increases the efficiency of the production process and enhances business competitiveness.

**Planning flexibility**
In many cases, buildings at an industrial estate are leased, so change of use is a frequent occurrence. Machinery is installed in a different place, and production buildings are converted into office space or vice versa. The power distribution system has to have the flexibility to accommodate these changes. Busbar trunking systems ensure safe, reliable power distribution and facilitate change of use. Circuit breakers or miniature circuit breakers with a higher switching capacity ensure safety and flexibility. Intelligent software tools such as the SIMARIS family and ALPHA SELECT support reliable, flexible and economical dimensioning of electrical power distribution systems.
The flexibility to react to change in use is an important consideration at industrial parks, and the power distribution system must have flexibility to adapt as well.

Transparency through energy management
To intelligently manage energy flows, it is essential to have an insight into them. Low-voltage power distribution measuring devices and components such as circuit breakers with communication capabilities provides data which can be processed, monitored and archived using the software powermanager. The received data can be displayed individually in user-friendly visualizations to provide transparency in your energy flows. This information permits considerable savings.

Tomorrow’s electricity supply
Smart grids include the networked communication and control of energy sources and loads. The goal is to ensure continuity of supply based on efficient, reliable system operation. Our products ensure effective communication between power sources and loads in smart grids. Power is fed in from PV systems and wind turbines. Intelligent energy and building management systems make efficient use of the energy on the load side.

Thinking ahead
Concepts like smart grids reflect evolving demands placed on the power supply. You can stay on the safe side by choosing modular components which accommodate change of use at a later time.

Applications
- Office applications: 2
- Production applications: 2

Components used
1. Switch disconnectors with high switching capacity and auxiliary components
2. Air circuit breakers
3. Molded-case circuit breakers
4. LV HRC fuse switch disconnectors to protect machinery
5. Cylindrical fuses
6. Measuring devices for monitoring and energy management
7. Busbar systems
8. Monitoring devices

Highlights
- Flexibility in the power distribution system through intelligent anticipatory planning and highly versatile products
- Communication-capable components provide transparency in the energy flows
- Safe, cost-effective dimensioning of electrical grids using the software tools SIMARIS
As an international supplier, our products can be used world-wide thanks to numerous certifications.

Standards - the ticket to the world

The components in the SENTRON portfolio can be used worldwide without any problems as they comply with numerous applicable standards and are widely certified.

- **Standards bodies**
  Two organisations, the International Electrical Commission (IEC) and the American National Standards Institute (ANSI) in North America, issue standards which govern the use of electrical power and appliances. UL regulations (published by Underwriters Laboratories®) apply in areas which are under the influence of ANSI. IEC standards, published in Europe as European standards (EN), are used in other regions.

- **UL (Underwriters Laboratories Inc.®)**
  The UL listed or UL recognised marking on products which have been designed in compliance with IEC standards confirms that the products may be used in accordance with UL guidelines. This is of particular importance to European exporters of electrical switchboards and equipment for machines who export to the USA, as their products will only be accepted if they meet the relevant UL standards.

### Highlights

- **Continuous portfolio of IEC-compliant products**
- **Development of innovative products and systems according to customer requirements**
- **Worldwide application of a large number of SENTRON components according to IEC/EN and UL standards**
Comprehensive support from A to Z

For more efficiency on all counts – comprehensive support and quick and easy access to service-proven tools at any time via the Internet.

<table>
<thead>
<tr>
<th>Product Information</th>
<th>Product Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td>Service &amp; Support Portal</td>
</tr>
<tr>
<td>Newsletter</td>
<td>Comprehensive technical information - from planning to configuration through to operation: <a href="http://www.siemens.com/lowvoltage/support">www.siemens.com/lowvoltage/support</a></td>
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<tr>
<td>Product Information/Product &amp; System Selection</td>
<td>CAx Data</td>
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<tr>
<td>Information and Download Center</td>
<td>Compilation of the commercial and technical master product data: DVD Order No.: E86060-D1000-A207-A6-6300 (via Industry Mall) <a href="http://www.siemens.com/lowvoltage/support">www.siemens.com/lowvoltage/support</a></td>
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<td>Collection of product photos and graphics such as dimensional drawings and internal circuit diagrams: <a href="http://www.siemens.com/lowvoltage/picturedb">www.siemens.com/lowvoltage/picturedb</a></td>
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<tr>
<td>Product &amp; System Engineering</td>
<td>Product Training</td>
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<td>SIMARIS Software Tools</td>
<td>SITRAIN Portal</td>
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<td>Comprehensive training program on our products, systems and engineering tools: <a href="http://www.siemens.com/lowvoltage/training">www.siemens.com/lowvoltage/training</a></td>
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<tr>
<td>Configuration software ALPHA SELECT</td>
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<td>Technical Support</td>
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<td>Support for all technical queries concerning our products: E-mail: <a href="mailto:support.automation@siemens.com">support.automation@siemens.com</a> <a href="http://www.siemens.com/lowvoltage/technical-support">www.siemens.com/lowvoltage/technical-support</a></td>
</tr>
</tbody>
</table>
Answers for infrastructure.

Megatrends driving the future
The megatrends – demographic change, urbanization, climate change, and globalization – are shaping the world today. These have an unprecedented impact on our lives and on vital sectors of our economy.

Innovative technologies to answer the associated toughest questions
Throughout a 160-year history of proven research and engineering talent, with more than 50,000 active patents, Siemens has continuously provided its customers with innovations in the areas of healthcare, energy, industry, and infrastructure – globally and locally.

Increase productivity and efficiency through complete building life cycle management
Building Technologies offers intelligent integrated solutions for industry, commercial and residential buildings, and public infrastructure. Over the entire facility’s life cycle, our comprehensive and environmentally conscious portfolio of products, systems, solutions, and services for low-voltage power distribution and electrical installation technology, building automation, fire safety and security ensures the: – optimum comfort and highest energy efficiency in buildings, – safety and security for people, processes, and assets, – increased business productivity.

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