Innovative Power Distribution in Hotels

Cost-effective and reliable power distribution

Totally Integrated Power

Answers for infrastructure.
Requirements and Trends in the Hotel Industry

The hotel industry is facing some major challenges. In 2010, around 1 billion vacation travelers and an increasing number of business travelers will be in transit around the world. This prospect is resulting in the expansion of hotel services, particularly in tourist growth areas, and in heightened competition among hotels to gain customers. Hotel guests today travel around the world with a wealth of experience in their trunks. As a result, their expectations regarding service, comfort and environmental friendliness of hotels are also increasing.

A building’s energy consumption is an important factor in its environmental friendliness. But this is not the only reason why hotel operators need to pay close attention to overall energy consumption. The increased cost of oil, gas and electricity around the world means that energy is becoming an increasingly significant expense for the hotel industry. As a result, hotel operators are finding themselves forced to cut their energy consumption, or to maintain it at a low level.

Savings from the outset

A hotel’s electrical fittings represent significant savings potential. Energy management systems and tools can be instrumental in cutting power costs, as can innovative building automation systems. However, the foundations for a cost-effective supply of electricity are laid right from the planning phase of a hotel, during the design of its electric distribution boards. It is at this point that decisions are taken as to the future power consumption of the electrical systems, and the components that will be required for these applications. Innovative software tools from Siemens support engineering consultants in calculating precise and therefore economically optimal dimensions. A design tailored to the hotel’s specific requirements and a corresponding invitation to tender for the power distribution components are the key to keeping investment costs as low as possible in this area.
Focus on Energy Efficiency

Buildings account for around 40% of current worldwide energy consumption. The European Union Directive 2002/91/EC of December 16, 2002 regarding the overall energy efficiency of buildings (effective as of January 4, 2003) was introduced in a bid to improve the energy efficiency of real estate. Some of the most important measures prescribed in the directive are the creation of energy certificates for buildings and the drawing up of minimum requirements for buildings.

An energy certificate must be produced when buildings or parts of buildings are sold, leased, or rented. This applies, for example, if a new hotel operator takes over the running of a hotel. The energy certificate contains clear information on a building’s energy consumption, broken down into specific categories in a similar way to that in which energy information is displayed for large domestic appliances. In the case of buildings, the certificate contains information on the energy loss through the installations and the building shell, energy requirements per energy source, and CO₂ emissions.

Outside Europe, too, in the face of dwindling resources, rising energy prices, and goals of reducing carbon dioxide (CO₂) emissions, many countries are placing more emphasis on the energy efficiency of buildings and are issuing country-specific regulations to this end. The “Green Building Council” in the United Arab Emirates, for example, stipulates that the energy consumption of buildings must be clearly indicated and that an energy consumption certificate must be provided for new buildings.

Step by step to an energy certificate

The member states of the European Union are required to establish minimum requirements for the overall energy efficiency of new and existing buildings, and ensure that energy certificates are created for buildings. This is stipulated within the European Parliament and the European Council Directive 2002/91/EC of December 16, 2002 regarding the energy profile of buildings. This directive must be implemented in each country’s national regulations. In Germany, the energy certificate for new buildings was introduced back in 2002. In 2007, the amended Energy saving regulation (EnEV) came into force, implementing the EU directive 2002/91. In association with this, there has been a gradual introduction of energy certificates for existing buildings. Since July 2008, energy certificates have been obligatory for buildings built before 1965. From January 1, 2009, an energy certificate will also be required for more recent buildings.
The Technology Platform:
Totally Integrated Power

Integrated power distribution from the infeed to the consumer

Totally Integrated Power™ (TIP) refers to integrated electrical power distribution in commercial and industrial buildings; from the medium voltage supply fed in by the utility company right up to the final electrical consumer.

Totally Integrated Power is underpinned by an array of helpful tools and support for accurate design, dimensioning and configuration of electrical power distribution within buildings. A coordinated product and systems portfolio for the construction of these systems is rounded off by standardized interfaces between the system components and the higher-level human-machine interface systems as well as for the connection to control and management systems.

In this way considerable savings can be made across the whole project cycle – from the planning stage, installation and start-up right through to operation – in both new buildings and renovations. The necessary investments in the hotel’s electrical infrastructure can be optimized in line with demand and also with subsequent operating costs. This optimization potential represents significant added value for everyone involved in the project.

Optimum planning for cost- and time-effective solutions

An optimally dimensioned power distribution system is a key economic factor for hotels. Unused capacities cost money. The tried-and-tested TÜV-certified SIMARIS® design dimensioning software by Siemens provides electrical engineering consultants with an indispensable tool for planning the electrical network for a new or renovated hotel.

SIMARIS design brings many benefits, including simpler network calculation and selectivity verification. The software also recommends suitable coordinated devices from the integrated Siemens power distribution product portfolio. Electrical network upgrade reserves can be incorporated right from the planning stage to allow for later changes of use or hotel extensions. Electrical engineering consultants can make time savings of up to 100% by using SIMARIS design for the various network planning stages. Thereafter, SIMARIS configuration supports power distribution board manufacturers and installation contractors in the configuration of low-voltage power distribution boards. ALPHA SELECT, on the other hand, makes the selection of suitable distribution boards fast, safe and easy.

In addition, Siemens also provides advice and support for electrical engineering consultants through virtually all the planning stages.
Hotels can be divided into three sectors, each with very specific requirements with regard to power supply.

**General guest area**

Whether in the reception area, the conference rooms, the spa area or the car park – in other words, all areas in which the hotel guests can move around without restriction during their stay – a reliable electricity supply that meets building conditions and regulations is required for the parts of the technical building equipment needed for evacuation and rescue in an emergency. Siemens offers an integrated and type-tested system for reliable power distribution in this hotel sector. The individual components, such as SIVACON low-voltage power distribution board assemblies and busway systems, ALPHA distribution boards, and SENTRON and BETA protection devices, are optimally coordinated with each other – and satisfy the highest demands in terms of safe and cost-effective power distribution.

**Personal guest area**

About 30% of a hotel’s total energy demand is taken up by the guest rooms. Given the large surface area occupied by the personal guest sector in hotels, this represents a significant cost factor. With the right building automation and building management system, enormous savings can be made in this area – without sacrificing the guests’ well-being in any way. Quite the reverse: the DESIGO™ INSIGHT building automation system fulfills the many and varied demands made of regulation, control and monitoring systems for heating, ventilation and air-conditioning facilities, room automation and other building services systems. The intelligent GAMMA building management system facilitates user-friendly lighting and shutter control in the hotel rooms. Whether in a modest single room or an upmarket suite, the individual room control and window monitoring system, combined with automatic shutter control, can bring about energy savings of up to 10%. 

**Hotel areas**

Simple Solutions for Complex Requirements
Supply and logistics area

Logistics areas such as the reception and the reservation center, or supply areas such as the kitchen perform important functions in a hotel. Uninterrupted availability is absolutely essential in these areas. To guarantee operation even in the case of mains power failure, an uninterruptible power supply is necessary side by side with the normal power supply and the safety power supply required by building regulations. What is important here is that these processes internal to the hotel must be incorporated into the overall power distribution concept. The proven SIMARIS design dimensioning tool supports electrical engineering consultants in carrying out this task quickly and accurately.
A gas-insulated medium-voltage power distribution board as a transfer station in basement level 1; type 8DH10:
- Compact, space-saving configuration with SF₆ insulation (occupying 30% to 50% less space than air-insulated systems)
- Maintenance-free design ensures high availability and low operating costs
- Reduced fire load
- Individual panels and panel blocks lined up as desired and expandable without gas work on site
- Type-tested and individually tested
- Casing touch safe and hermetically sealed
- Switchgear interlocking with logic interlocks
- Only requires small pressure-equalization openings in case of accidental arcing

Two cast-resin air-cooled transformers 800 kVA as distribution transformers in basement level 1; type GEAFOL
- High operating efficiency in continuous operation thanks to loss-optimized features (e.g. aluminum winding instead of copper)
- Easier choice of installation location thanks to high ambient, climatic and fire classes (e.g. flame resistant, self-extinguishing)
- Up to 50% better performance thanks to add-on of cross-flow fans
- Installation permitted in power distribution board room together with main low-voltage distribution board, if separated using F90A fire protection walls (no further fire protection walls required)
- Long service life, minimal noise output
- Assembled, type-tested transformer connections for busbar connection to optimize operational safety (EMC, fire load, short-circuit protection etc.)

Three type-tested power distribution boards (IEC 60439-1) with advanced testing for behavior in cases of accidental arcing (IEC 61641) as low-voltage main distribution board in basement levels 1 and 2; type SIVACON S8
- Extreme system safety thanks to type-tested switching device combinations
- Space-saving with footprints from 400 mm² x 3500 mm²
- Variable position of main busbar (above/behind)
- Cable/busbar connection from above, below or behind
- Combination of different installation techniques in a single panel
- Test and isolating position with closed door in compliance with protection class IP54
- Flexible adjustment of inner distribution to suit individual requirements
- Uniform user interface for all drawable units
- Universal hinges (right/left) – also available for retrofit
- Highly efficient ventilation system with maintenance benefits
- High-quality industrial design for perfect integration into modern room concepts

Busbar trunking system to connect low-voltage main distribution board to the transformers and as rising main distributor in the technical cores; type SIVACON 8PS
- 20% less fire load than cabled version
- Easy to install and extend, no expensive supporting structure required, outgoing current feeders can be plugged on almost anywhere, also when retrofitting
- Low weight (aluminum frame), clear power feed, EMC friendly
- Complies with short-circuit-proof cabling, no additional cabling work
- Part of integrated power supply as type-tested “transformer/main low-voltage distribution board” and “main low-voltage distribution board/sub-distribution board” unit
- Optional communication-capable components in the outgoing current feeders for connection to the central building control system

Distribution boards as floor-by-floor sub-distribution boards on all floors; type ALPHA DIN floor/wall-mounted distribution board from 160 to 630 A
- Type-tested and partially type-tested distribution system
- ALPHA SELECT software for fast and easy configuration
- 63 A small low-voltage distribution board as sub-distribution board near the respective consumer load centers; focal points; type ALPHA SIMBOX
- Particularly suitable as a sub-distribution board in guest rooms due to its reduced installation depth
- ALPHA SELECT software for fast and easy configuration
Basic Network Operation Types

The diagram shows the key components in a hotel’s electrical power distribution and the way in which they interact to ensure optimum security of supply and operation for all electrically operated fittings and consumers. This general power distribution concept is then adapted to the specific requirements of each application.

Normal power supply

For the areas of the hotel on the normal power supply, Siemens offers complete electrotechnical solutions with optimally coordinated products and systems: these range from the utility company’s transfer point (generally a medium-voltage supply) right down to the consumer, light and power outlet circuits. This end-to-end integration ensures optimum supply security and thereby reliable hotel operation. Optimum coordination of the individual system components also means an extremely cost-efficient solution. The normal power supply is tailored to the hotel’s electrical equipment and configured in such a way that all electrical consumers have a reliable power source around the clock. This affects, for instance, the availability of electrical energy for the air-conditioning system around lunch-time and in the afternoon, particularly in holiday hotels.

Safety power supply (SPS)

If the normal supply fails due to external circumstances, the hotel’s emergency power supply must be designed in such a way that operation is ensured without any interruptions. Technical problems should not affect the guests.

In line with a hotel’s specific requirements, the design of the emergency power supply ensures that – where necessary – an uninterrupted power supply is also available via batteries and an emergency generator, for instance for the emergency lighting of escape and emergency routes, the PA system or for the reservation systems. In this way, a mains failure will have relatively little impact, and the hotel can continue to operate almost as normal.
Normal supply and emergency generator

- The normal power supply system is fed in from the medium-voltage grid (20 kV) via distribution transformers.
- With the emergency generator, the choice of power sources is made on the basis of the admissible interruption time:
  - Emergency generators for safety power supply (SPS)
  - Uninterruptible power supply (UPS) as static UPS, consisting of a rectifier and inverter unit and a battery

A typical supply to hotel areas with the two separate types of power supply: the normal power supply and the Safety power supply (SPS). The typical connections between the SPS and the normal supply in the two main low-voltage distribution boards make it possible to switch from normal supply to SPS operation.

All power distribution devices with communication-capable modules can be connected to the building automation system and controlled.
Main power distribution components

Siemens low-voltage-protection switching devices for power distribution board and distributor construction

**SENTRON® type**
- Circuit breakers and switch disconnectors to switch on and off electrical system parts and to protect the electrical system and downstream cables in the event of a short circuit

**BETA type**
- Comprehensive protection concept with coordinated device portfolio for protection, switching, measuring and monitoring applications
- Protects electrical system parts and consumers against short circuits and overloads
- Protects people against dangerous shock currents on direct and indirect contact
- Lightning and surge protection for system parts and consumers
- Coordinated protection characteristics ensure selective disconnection of a network section affected by a fault

Low-voltage motors as drives for pumps, fans, sprinklers, lifts, revolving doors etc.; type Siemens IEC low-voltage motors in the EFF1 efficiency class

- Compact configuration
- Highly efficient
- Up to 40% less power loss than conventional motors

Switches and power outlets; type DELTA®

- Numerous designs (modern, classic, exclusive) and materials (natural wood, metal, glass, plastic) to suit every interior decoration style and budget
- Extensive functions
- Hotel card switch: indispensable for energy savings in the guest rooms
- Activation of basic functions (powering up/down of heating, air-conditioning etc.)
- CENTRAL ON/OFF for light and power outlet circuits (lighting, televisions etc.)
- Central recording of guests’ presence

Building automation system for optimum regulation of heating, ventilation and air-conditioning (HVAC); type DESIGO™

- Steplessly upgradable from a small system to a complex, distributed building automation system
- Suitable for all types of establishment, from simple guest houses right up to hotel complexes consisting of several buildings
- Various access and control options for the HVAC system

Building system technology for easily operated light, shutter, heating and air-conditioning controls; type GAMMA

- Single-room control for heating/air-conditioning with energy-saving window monitoring system
- Optimized energy consumption of lighting in corridors, restrooms and service rooms and increased service life of illuminants, e.g. through:
  - Motion sensor-based lighting control system for outside peak usage times
  - Motion sensor-based control of minimum brightness during peak usage times
- Daylight-dependent, energy-saving lighting and shading control with sun tracking system for optimum shading and climate control
- Constant light regulation for optimum use of daylight; manual adjustment possible at any time

More efficient products, systems and building automation systems can lead to savings on electricity and maintenance costs for the power distribution components.
Power Distribution Design within the Hotel

With an integrated planning, instead of breaking down the hotel’s requirements into the various installations and considering them separately, they are coordinated. Only when requirements are networked can an optimized solution be found. The electrical network structure is established on the basis of what the power is needed for. It is important to place the power sources as close as possible to the consumers, in order to avoid transmission losses.

To comply with the installation contractor’s specifications and the building’s use as well safety and comfort standards, the available electrical power must be divided between the normal power supply and the safety power supply. In order to achieve a high level of efficiency, the system components should work at approx. 70%–80% of their maximum capacity: undersizing often leads to malfunctions, oversizing to excessive costs. If redundancy is required, an additional reserve must be included in the design.

Safety power supply design

Considerable demands are placed on the emergency power supply and its distribution network, such as continued functionality in the event of a fire and a selective protection concept that ensures that only the network section affected by a fault is switched off. The safety power supply is provided via the emergency generator. The system parts that are always eligible for safety power are those that support or safeguard the required evacuation measures in the event of an emergency. Here supply times of at least 30 to 90 minutes are generally necessary. Small consumers in these system parts are supplied by SPS sub-distribution boards, which in turn are supplied by fireproof cable routes (red lines). Consumers that are typically connected include safety and emergency-exit lights. In addition, system parts of the building facilities that carry out safety functions are also allocated to the safety power supply. These consumers or their sub-distribution boards are also supplied with functional endurance via cables and wires (red lines).

When designing the safety power supply, care must be taken that there are sufficient power reserves in the emergency generator and that there is continuous functional endurance in the energy supply routes. Well thought-out power cable routing can result in cost savings during installation. Special solutions, based on busbar trunking systems, offer further advantages in the event of an emergency: longer supply times together with lower fire and smoke loads increase operational safety and reduce risks during evacuation.

Normal power supply design

Consumers and/or distribution boards that are not connected to the safety power supply are powered from the normal power supply via transformers. Certain consumers powered by the normal power supply are often also assigned to the backup power
This wiring diagram gives an overview of the most important areas within a six-floor hotel and provides an example of electrical power distribution.

supply due to operational requirements (e.g. heating/air-conditioning, kitchens, administration). Here it is important that where the safety and backup supply systems are powered by a single generator, the safety power supply has absolute priority, something that must be assured through such measures as load shedding. A safer and more flexible option is to isolate these consumers from the safety power supply by providing energy via an additional safety generator. It is not necessary for such units to meet the same safety standards as for the safety power supply. The power supply to the guest rooms is provided via small distribution boards, which are supplied using radial cables via a centralized main distribution board for the normal power supply. The overall figures for the energy required, together with the distribution and structuring with regard to the different power sources, provide the basis for dimensioning the individual network components.
Integration is Key

Siemens works together with electrical engineering consultants to develop solutions for power distribution in hotel buildings that take into account all the hotel operator’s requirements from the outset. The coordinated products and systems that make up the integrated solution all come from a single source. The following are a few examples of successful implementation and use of Totally Integrated Power for power distribution within hotels:

**Sungate Port Royal Hotel, Kemer, Turkey**
- Identical power distribution systems for the hotel, swimming pools, shopping center, and conference center
- Transparent operation helps to lower energy consumption
- Power supply safeguarded in all supply situations
- On-schedule project completion and handover despite significant time pressure during execution

**Hotel Splendid, Becici, Montenegro**
- Life-cycle concept for the electrical engineering, building automation and building security
- Considerable reduction in investment costs
- Cost-effective solutions for power distribution right through to the building system technology

**Hotel Colosseo in Europapark, Rust, Germany**
- Integrated power distribution products and systems ensure maximum system availability
- Minimized risk for people and systems
- Reduced operating costs
Planning electrical power distribution for commercial and industrial buildings has never been as complex as it is today. The planning process demands a great deal of specialized knowledge and experience. With an experienced partner at their side, electrical engineering consultants can implement their conceptual expertise more quickly and easily and concentrate on the important things. SIMARIS design and technical manuals from Siemens offer comprehensive support, from the preliminary planning stage right through to implementation planning.

**SIMARIS design**

The SIMARIS design dimensioning software supports our complete, integrated and high-quality portfolio from medium voltage technology through to wall outlets. The user-friendly TÜV-certified tool also generates the necessary selectivity verification, for instance for emergency power supply systems. It also lightens the load enormously in routine work such as implementing changes and considering variants.

**Application manuals**

Siemens application manuals offer electrical engineering consultants a wide knowledge and information base to draw on when designing electrical power distribution systems.

There are three volumes, available from regional Siemens contact partners (www.siemens.com/tip/support):

- The application manual “Basic Data and Preliminary Planning of Power Distribution Systems” provides electrical designers with in-depth information to support them in their work during these two phases.
- The application manual “Draft Planning of Power Distribution Systems” provides useful information on this project phase.
- The application manual “Planning a High-Rise Building” documents concrete applications of the power distribution products and systems using the example of an office tower.
All-Round Protection for People and Valuables

Alongside the integrated Totally Integrated Power™ technological platform for electrical power distribution, Siemens also offers a full range of building security systems. Our holistic approach to building security covers both possible sources of danger and all at-risk areas, objects and people. The Siemens building security portfolio includes the following individual systems:

**Video surveillance**

Whether in restaurants, casinos or foyers – dome cameras are installed wherever there is an increased need for security and discreet surveillance. The portfolio includes a total of ten different models that can be installed both indoors and outdoors. Around-the-clock surveillance and sabotage and vandalism protection are as much part of the benefits of the cameras as the clear picture quality even in poor lighting conditions.

**Voice alarm systems**

Evacuation systems automatically transmit voice messages through loudspeakers to the people inside the hotel. Experience shows that voice messages are complied with more quickly and consistently than alarm sirens. Evacuation systems therefore effectively reduce the risk of panic. Modern systems are capable of a staggered evacuation – directly endangered zones/floors are evacuated first, thus significantly reducing the danger of congestion along the escape routes.

**Fire protection**

The purpose of preventive fire protection in a hotel is to effectively protect guests, personnel and hotel furnishings from the dangers and consequences of fires. Good fire protection is based on coordinated structural, technical and organizational fire-protection measures.

**Extinguishing systems**

Extinguishing systems are made to measure for each area of application, for instance for the server rooms, the IT area and the stockrooms. The portfolio includes dry, wet or foam extinguishing agents, or M Novoc 1230 extinguishing fluid – or a combination of these extinguishing systems.

3M™ and Novoc™ are trademarks of 3M
The information provided in this brochure contains merely general descriptions or characteristics of performance which in actual case of use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.

All product designations may be trademarks or product names of Siemens AG or supplier companies whose use by third parties for their own purposes could violate the rights of the owners.