Heating, ventilation and air conditioning in hospitality

Taking care of comfort and safety for guests, while optimising costs for owners

Taking building performance to a new level

Heating, ventilation and air conditioning (HVAC) systems have a significant impact on both comfort and costs in the hospitality sector. Modern hotels require smart HVAC that creates comfortable, healthy and safe environments for both guests and personnel, while aiming for net zero carbon emissions. At the same time, costs must be managed so that business profits aren't compromised.

Hotel owner / Developer

"To make a hotel attractive to guests, it is essential to invest in comfort"

Modern hotels demand a comfortable and smart environment...

- Comfort inside hotel facilities is vital for guests since it has a major impact on the quality of their stay.
- Digitalization of everyday life is increasing continuously, and hotels are no exception. Smart hotels promptly react to ever-changing conditions to maintain a higher level of individual comfort, while running the systems in an optimal way.

... at optimized total cost of ownership...

- High initial investments increase the payback period, while high operating costs make it difficult to reach profit targets.
- Control solutions for HVAC like variable speed drives (VSDs) can significantly influence both capital and operating costs.
- The return on investment can be improved with ultra-low harmonic drives – they reduce the size meaning costs of transformers and backup generators.

... while minimizing carbon footprint

- VSDs for HVAC provide optimal control of the hotel environment, while perfectly matching HVAC energy consumption to the specific hotel needs.

Consultant

"I design HVAC systems in compliance with the industry standards"

From occupant health and safety...

- In-hotel technical systems primarily aim to provide a healthy and safe environment.
- Under everyday conditions, HVAC systems maintain favorable air temperature, humidity and CO_2 levels for the hotel occupants' comfort, resulting in better recreation.
- In case of a fire, the hotel systems must respond accordingly – to ensure smoke-free exit routes, help suppress the fire, and provide access to the fire location for emergency services.

... to increased energy efficiency...

- HVAC systems have high operating costs, since they consume on average 30 to 70 percent of the hotel energy. Making them energy efficient is a clear priority.
- Power quality influences the efficiency of a building's electrical network, so power equipment including VSDs should be chosen carefully.

... utilizing best-in-class technologies

- VSDs allow accurate control of CO_2 concentration, temperature and humidity of the air inside by automatically adjusting HVAC processes.
- In a fire emergency, a VSD's override mode makes ventilation a part of the fire suppression strategy, mitigating the fire while providing safe evacuation routes.
- Ultra-low harmonic (ULH) drives prevent disturbances on the power supply, maintaining an efficient and reliable electrical network.

Energy manager

"We need to cut our energy bill to minimize business carbon footprint"

Know where to look...
- HVAC systems with their pumps, fans and compressors can easily account for over 60% of hotel energy use.
- These systems also tend to be oversized for peak loads, so their efficiency at partial loads can be significantly compromised, resulting in wasted energy.

... to unlock energy saving potential
- HVAC application speed control by means of drives saves, on average, 25% of energy use.
- Drive-based energy optimizer can further reduce motor energy consumption at partial loads. The total efficiency can be improved by an extra 2% to 10%.
- Energy monitoring features in drives can calculate energy savings in kWh, MWh, and kg of CO_2 for increased transparency.
- IE5 efficiency synchronous reluctance motors offer up to 40% lower energy losses, compared to IE4 efficiency motors.
- ABB Ability™ Smart Sensors help identify energy saving opportunities among low voltage motors running pumps, fans and compressors.

Maintenance manager

"Continuous operation of a hotel's technical systems is of the utmost importance"

Eliminate malfunctions in hotel HVAC...
- Depending on the weather conditions, failure of HVAC can make the hotel challenging for continued occupancy.
- Proper functioning of the hotel systems goes beyond comfort, since it also can directly impact the guest's health.

... by utilizing smart functionality
- Monitoring of temperature, overload, overcurrent and other protection features built into VSDs helps prevent failures in HVAC control and ensure continuous operation.
- Drive-based safe-torque-off functionality allows safe maintenance on mechanical parts of the HVAC equipment, without shutting down the whole system.

"How can I optimize my operating costs?"

Lower expenses...
- Costs can be optimized without compromising hotel comfort and safety.
- Smart hotels require operational transparency, which can be achieved by use of digitized systems and components.

... through advanced solutions and maintenance regimes
- VSD use in HVAC eliminates both mechanical and electrical shocks, providing smooth control for pumps, fans and compressors and extending their lifetimes.
- ABB Ability™ Condition Monitoring remotely delivers information on drive and motor events and proposes targeted maintenance actions.

Demands on hotel systems during normal operation and in emergencies

A hotel's HVAC system should ensure a comfortable and healthy everyday environment for its guests and personnel, and also be able to support fire suppression and evacuation systems, should an emergency situation arise.

1 VENTILATION

In hotels, ventilation is an essential part of maintaining indoor air quality. In combination with air-conditioning, it manages temperature, humidity and CO_2 levels for the comfort and safety of the guests.

Applications:
- Supply, return and exhaust fans

Requirements:
- Air quality maintenance in accordance with an ever-changing environment
- Efficient energy use by adjusting fan speed to current needs
- Fan performance monitoring for predictive maintenance planning

2 SMOKE EXHAUST, ESCAPE ROUTE MAINTENANCE

Large hotels often have dedicated smoke extraction and pressurization fans for smoke exhaust and escape route maintenance.

Applications:
- Smoke exhaust fans, stairway pressurization fans

Requirements:
- Monitoring of the fan availability, so it is always ready in case of need
- Prompt reaction to any emergency situation, so the fan can achieve full load speed in a short time
- Control redundancy in case of communication loss
- Override mode, which ignores faults and warnings, thus allowing extended runtime in emergencies
- Control of air flow rate and pressure for safe evacuation

3 FIRE SUPPRESSION

Water-based fire suppression systems must be ready to supply water to fire sprinklers in a hotel, should an emergency occur.

Applications:
- Pumps

Requirements:
- Prompt response in case of emergency
- Continuous monitoring of the pump availability
- Secure stable pressure on the sprinkler nozzles, both in standby and during a fire situation
- Easy integration into a hotel fire suppression system

Scan or click to learn what ABB offers for hospitality sector

4 HEATING

District heating often involves a heating substation installed in the basement. It receives the heating carrier from a heat generating station and via a heat exchanger makes it available for the hotel heating system.

An individual heating system in many cases consists of a boiler heating water up to required temperature for further distribution in the building heating system.

Applications:
- Boiler burner, circulation pumps

Requirements:
- Burners with a variable fuel throughput require a corresponding volume of combustion air, so variable speed control of the blower is needed for efficient combustion
- Pumps should adjust the circulation rate in the heating system to the current heating need

5 AIR CONDITIONING

In hotels, cooling energy is often generated on site by chillers, and then distributed throughout the building.

Applications:
- Chiller compressor, circulation pumps, condenser
- and cooling tower fans

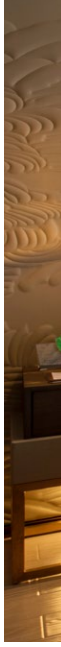
Requirements:
- Cooling load varies throughout the day, season and number of guests, so using variable speed control for air conditioning ensures energy savings
- When using VSDs on chillers, apply ultra-low harmonic drives to also improve the building power network by lowering harmonics and maintaining unity power factor

6 DOMESTIC WATER SUPPLY

Domestic water comes from clean water treatment plants. Cold water goes directly to the tap. Hot water is heated either in an individual boiler or using district heating. If extra pressure is needed to deliver water to higher floors, booster pumps are used.

Applications:
- Circulation pumps and booster pumps

Requirements:
- Domestic water use is never uniform, often peaking in the mornings and evenings. Water supply needs to be adjusted accordingly, for increased efficiency
- Sleep mode for pump control saves energy, as it stops the pump during low demand, instead of running it slowly below its efficient operating range
- Maintain the required water pressure in the system
- Multi-pump support to reach the highest efficiency and handle demand variations
- Pump performance monitoring, to support predictive maintenance



Unlock greater potential in your hotel building systems

Motors equipped with variable speed drives and controllers that run heating, ventilation and air conditioning applications are excellent at providing comfort and safety. But there are many other important and profitable benefits to be gained as well.

Application	Challenge	Solution	Benefit
Air handling units/ fans	• High energy use	• VSDs adjusting fan speed to the hotel's current needs • Motors with IE5 efficiency • Filter monitoring via a VSD, with warning if the filter is clogged and the pressure drop too high	• 20 to 60 percent energy savings with VSDs compared to damper control systems • Up to 30 percent improved efficiency at partial loads with ABB synchronous reluctance ferrite assisted motors
	• Air handler uptime	• VSD protection includes overcurrent, overvoltage, motor overheating and under/overload control • Lowest mechanical and electrical stress with VSD control, as opposed to direct-on-line start • VSDs and smart sensors collect information on fan performance, for predictive maintenance	• Air conditioning runs correctly and continuously for greater occupant comfort
	• Air quality in the hotel	• Managing temperature, humidity and CO_2 levels by adjusting fan speed, humidification rate and circulation in heating/cooling coil via VSD	• Healthy and comfortable environment • Increased productivity in meeting spaces
	• Building automation system overcomplexity	• VSD-based control capabilities to enhance external controller tasks and improve failure redundancy • VSD-based fieldbuses without employing external gateways	• Decreased infrastructure complexity and costs, low risk of error • Simplified hardware integration
	• Fan acoustic • noise	• VSD-based resonance control • VSD switching frequency adjustment for lower motor noise	• Quiet environment for enhanced comfort and productivity
	• Electrical • harmonics in the power network	• ULH drives reduce harmonics content in the network to an absolute minimum	• Hotel network stability and elimination of costly active filters for harmonics mitigation • Elimination of non-wattage financial penalties from the utility
	• Fire emergency	• The VSD fireman's override makes the regular ventilation fans a part of a fire/smoke suppression system – shut them down, or turn them into smoke exhaust or pressurization units to maintain a safe escape route	• Enables access to the fire location for firemen • No undesired tripping of drives in extreme conditions • Flexibility in evacuation/smoke suppression
	• Escape route management in case of emergency	• Override mode in VSDs is implemented in a way so that the required pressure or fan speed can be maintained to prevent smoke from entering the evacuation spaces	• Eliminate door blockage or smoke propagation due to too high or low pressure • Safe evacuation for people
Smoke exhaust fans	• Availability	• VSDs and softstarters allow fans to start without power system overload • VSD or softstarter-based phase loss monitoring	• Smoke extraction system is always available • Occupants' safety
	• High temperatures	• VSDs are tested for operating 1 h at 70 °C • Smoke extract motors are tested for operating at 200 °C for 120 min, 300 °C for 60 min, 400 °C for 120 min, 250 °C for 120 min	• Smoke extraction process continuity, even at high temperatures
	• Control reliability	• Control backup in VSDs – in case of an external communication loss, VSDs can take over the control	• Fan will continue running in a preset for local control mode speed, until the external communication is recovered

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01

Application		Challenge	Solution	Benefit
	Boilers	• Heating / hot water temperature control	• VSD-based burner control ensures the hot water for heating or domestic use has the required temperature	• Hotel occupants and personnel comfort, hygiene and safety
	Circulation pumps and booster pumps	• Pump uptime	• VSD supervisory functions indicate potential mechanical failures, such as bearing wear or events like a stalled impeller or dry pump run • Smart sensors measure pump motor health parameters like vibration and temperature • Auto-restart after power failure	• Continuous comfort for hotel occupants
		• Pressure shocks	• Soft pump start and stop thanks to a VSD helps avoid water hammer	• Increased lifetime for the pump and piping system, and decreased maintenance costs
		• Pipe leakage	• Leakage monitoring via the VSD indicates the pressure drop in a pipe, thus sending an alarm	• No infrastructure damage and associated costs due to leakage
		• Booster set lifetime	• VSD-based intelligent pump control distributes the pump work hours equally over several pumps	• Optimized operation for extended • equipment life
	Fire pump station	• Pressure maintenance	• Jockey pump control via VSDs to eliminate: - overpressure in the sprinkler system causing damage to its components - underpressure in the sprinkler system due to e.g. incidental leakages	• Elimination of costly water damage in a no-fire situation • Elimination of sprinkler system component damage, which might not be realized until proven ineffective in case of a fire
		• Availability	• Pump start without causing power system overload, if using VSD or softstarter control • VSD and softstarter-based phase loss monitoring	• Successful fire extinguishing, guest and personnel safety
		• System cost	• VSD use eliminates pressure-reducing valves and break tanks, and can reduce the generator size by up to 50 percent	• Optimized costs without compromising reliability and safety

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01 VSDs help ensure a comfortable room environment, while providing tremendous energy savings.
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02 Variable speed drives bring many economic and safety benefits to ventilation and air conditioning equipment.

Features and functions that give tangible benefits to HVAC systems in hotels

ABB offers an extensive range of devices for heating, ventilation and air conditioning applications in hotels, extending from motors and drives to full building management systems. It's easy to choose the right products and features for your specific needs, making any hotel more comfortable, safe and energy efficient.

Variable speed drives

Low harmonics
- Built-in active front end and integrated line filter mitigate electrical harmonics to a minimum of 3 percent

Real-time clock
- Trips and faults are time stamped, to know what has happened and when

System efficiency
- Increases efficiency by adjusting motor speeds to the current needs
- Active front end drives reduce system losses due to almost non-existent harmonics and unity power factor

Electromagnetic compatibility
- Compliance even with the strictest EMC standards requiring C1 filtering

Built-in PID control
- Controls applications without external controllers, decreasing automation complexity and costs

Fireman's override mode
- Makes ventilation part of a fire suppression system, protecting people and property
- Disables warnings and faults, allowing the drive to run even in adverse conditions

Built-in redundancy
- External communication loss is handled seamlessly by a VSD taking control until the external communication is recovered

Embedded communication
- Control, monitoring and diagnostics for applications through embedded Modbus RTU or BTL-listed BACnet MS/TP, and other optional protocols like BACnet IP

Intelligent pump control
- Control of multiple pumps in the set for higher efficiency – next pump steps in when the load increases
- Distribution of work hours equally between all pumps in the set for extended lifetime
- Redundancy – in case one of the pumps fails, the others take over the load

Safe torque off
- Built-in feature for safe maintenance of the mechanical parts of HVAC equipment

Resonance control
- Helps to avoid fan, pump or compressor resonance, by skipping resonant frequencies

Sleep function
- Stops the motor during low demand where the efficiency is minimal and starts it again when the demand increases

Sensorless flow calculation
- Eliminates the need for an external flow meter, for reduced system cost

Motors

High reliability
- Protection against external conditions with IP55
- Wide range of surface treatment and corrosion protection solutions
- Protection against bearing currents with insulated bearings and shaft grounding
- Bearings locked at D-end to avoid axial play

Efficiency
- Up to IE5 efficiency level to reduce energy consumption and improve total cost of ownership

Easy installation
- Oversized terminal box as standard to ease installation
- Flexible cabling solutions
- Various mounting arrangements including direct drive, belt or transmission
- Horizontal and vertical mounting

Integrated motor drive packages

- IE5 efficiency – highly efficient at full and partial load conditions
- Integrated design saves control cabinet space and reduces wiring costs
- Tune and control the package with wired keypads and PC tools as well as Bluetooth communication
- Plug and play concept with the pre-programmed drive
- High power density with more power available from the same frame size

Building management solutions

Flexibility, scalability, ease of integration
- BTL-certified BACnet/IP and MS/TP controllers for building's mechanical and electrical systems control
- Support for routing of communication protocols including BACnet MS/TP and Modbus RTU to IP layer without the use of external gateways
- Easily extend I/Os to meet the most complex HVAC strategies
- Freely programmable with available pre-engineered application libraries

Better and more cost-efficient energy use
- Cloud-based energy management
- Access energy monitoring, anytime, anywhere via web enabled smart devices
- Optimize operational costs
- Reduce the building's CO_2 footprint

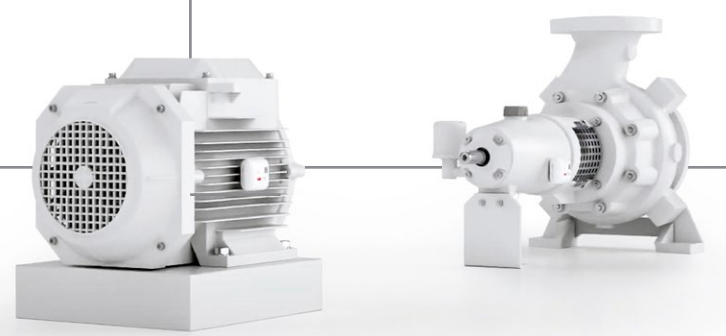
Improved occupant comfort
- Embedded schedules and trend logs for tuning the building environment
- On-site operator control via touch screen display
- Receive alerts on mobile devices anywhere in the world

ABB Ability™ Smart Sensors for motors and pumps

Minimized unplanned downtime
- Failures can be detected well before equipment needs to be shut down, avoiding unplanned downtime

Reduced maintenance costs
- By changing from scheduled to condition-based maintenance, service costs can be considerably reduced

Improved safety
- Eliminate the need for manual motor/pump/bearings check-ups in locations that are hard-to-reach



From the facility to the cloud and beyond

ABB Ability™ Condition Monitoring for powertrains optimizes the performance and efficiency of electric motor-driven rotating equipment. It enables better decision making by providing real-time access to data on all parameters for drives, motors and general machinery.

1

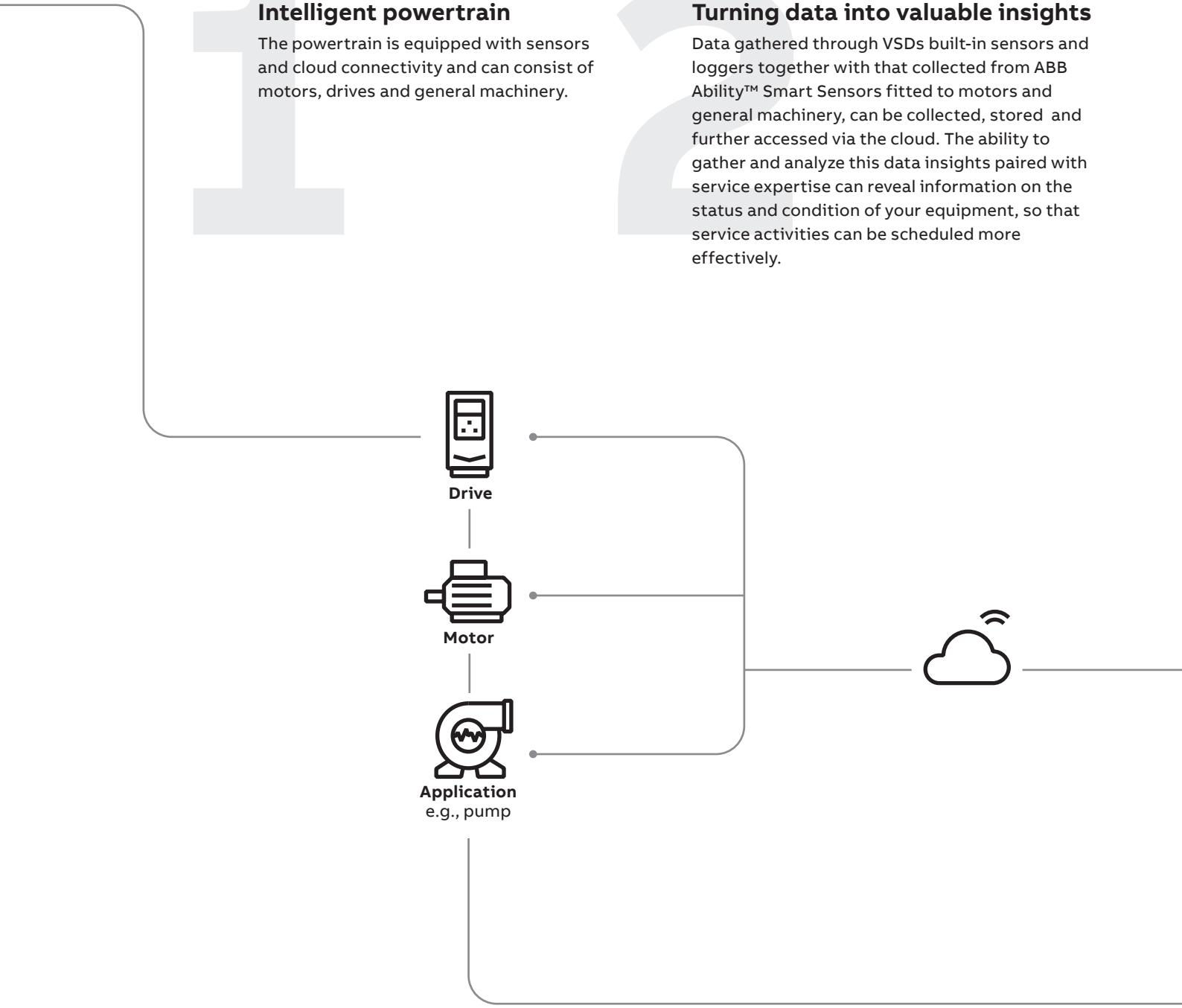
Intelligent powertrain

The powertrain is equipped with sensors and cloud connectivity and can consist of motors, drives and general machinery.

2

Turning data into valuable insights

Data gathered through VSDs built-in sensors and loggers together with that collected from ABB Ability™ Smart Sensors fitted to motors and general machinery, can be collected, stored and further accessed via the cloud. The ability to gather and analyze this data insights paired with service expertise can reveal information on the status and condition of your equipment, so that service activities can be scheduled more effectively.



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Accessing data for analytics

You have access to a monitoring portal to view key operational parameters of individual assets as one unified system. Detailed dashboards give full transparency so that you can take actions that lead to less downtime, extended equipment lifetime, lower costs, safer operations and increased profitability.

4

Gain a digital advantage

Ensuring that the right person is exposed to the right information at the right time brings:

- Appropriate response to process challenges, minimizing operating costs
- Greater insight into various aspects of the process, thereby improving system performance
- Lower risk of process failure, while changing your maintenance from reactive to predictive

Building owners / Developers

Consultant

System integrator

Facility manager

Keep your facility running

From spare parts and technical support to cloud-based remote monitoring solutions, ABB offers the most extensive service offering to fit your needs. The global ABB service units, complemented by external Value Providers, form a service network on your doorstep. Maximize performance, uptime and efficiency throughout the life cycle of your assets.

With you every step of the way
Even before you buy a generator, drive, motor, bearing or softstarter, ABB's experts are on hand to offer technical advice from dimensioning through to potential energy saving.

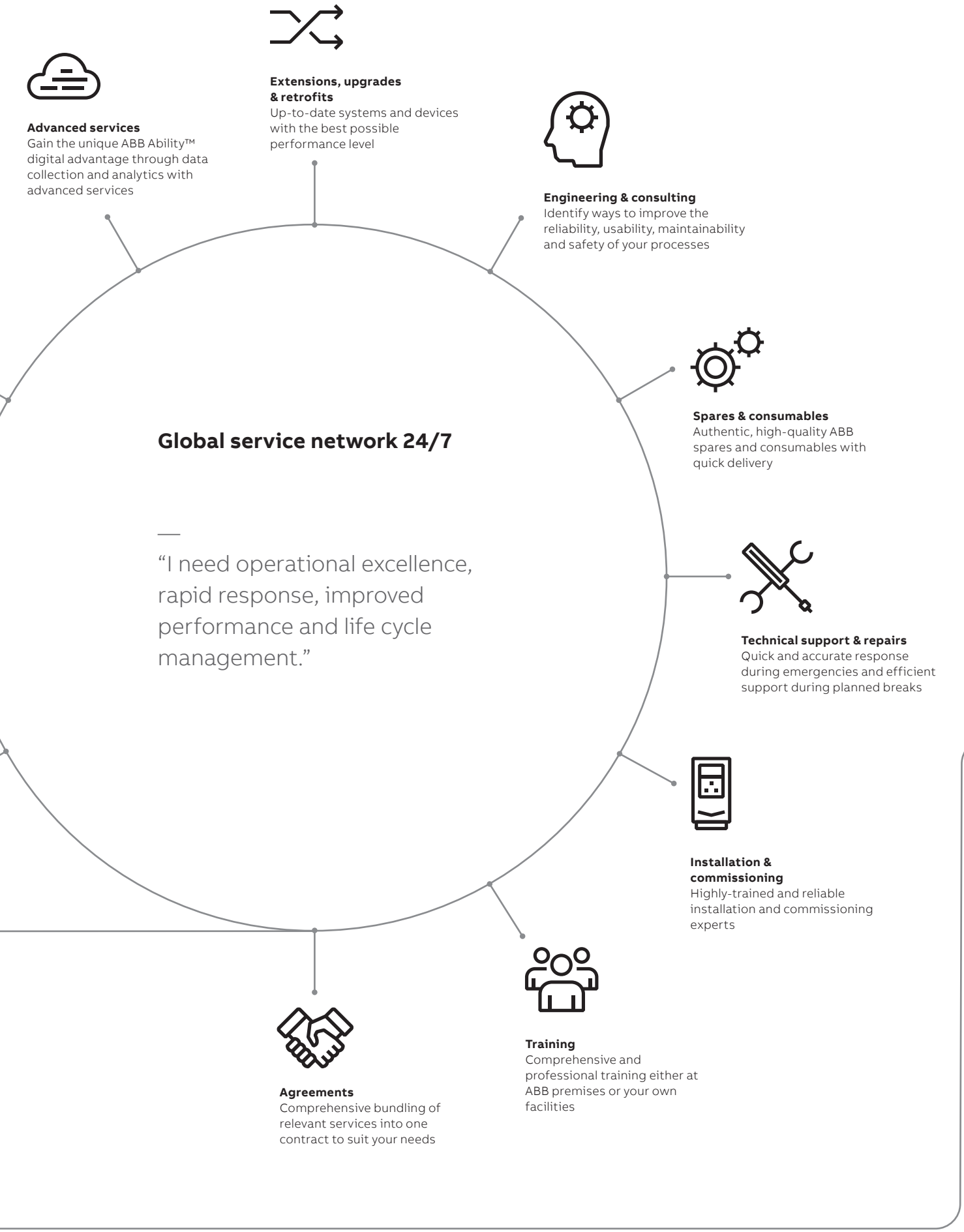
When you've decided on the right product, ABB and its global network of Value Providers can help with installation and commissioning. They are also on hand to support you throughout the operation and maintenance phases of the product's life cycle, providing preventive maintenance programs tailored to your facility's needs.

ABB will ensure you are notified of any upgrades or retrofit opportunities. If you've registered your drives and motors with ABB, then our engineers will proactively contact you to advise on your most effective replacement option. All of which helps maximize performance, uptime and efficiency throughout the lifetime of your powertrain.

Replacements
Fast and efficient replacement services to minimize production downtime

End-of-life services
Responsible dismantling, recycling and reusing of products, according to local laws and industrial standards

Maintenance
Systematic and organized maintenance and support over the life cycle of your assets


Advanced services
Gain the unique ABB Ability™ digital advantage through data collection and analytics with advanced services
Extensions, upgrades & retrofits
Up-to-date systems and devices with the best possible performance level
Engineering & consulting
Identify ways to improve the reliability, usability, maintainability and safety of your processes
Global service network 24/7
“I need operational excellence, rapid response, improved performance and life cycle management.”
Spares & consumables
Authentic, high-quality ABB spares and consumables with quick delivery
Technical support & repairs
Quick and accurate response during emergencies and efficient support during planned breaks
Installation & commissioning
Highly-trained and reliable installation and commissioning experts
Training
Comprehensive and professional training either at ABB premises or your own facilities
Agreements
Comprehensive bundling of relevant services into one contract to suit your needs

With you, wherever you are in the world

Partnering with ABB gives you access to some of the world's most innovative technology and thinking.

Global reach
ABB operates in over 100 countries with its own manufacturing, logistics and sales operations together with a wide network of local channel partners that can quickly respond to your needs. Stock availability is good, with short delivery times for many products, backed by 24-hour spare parts delivery.

In addition, ABB interacts closely with building and HVAC industry players including consultants, system integrators, safety inspectors and engineering societies and organizations. This helps increase building safety and engineering systems reliability and efficiency to an absolute maximum, while providing healthy and comfortable environments for the occupants.

ABB has seven global R&D centers with more than 8,000 technologists and invests $1.5 billion annually on innovation.

End-to-end product portfolio
Alongside its diverse portfolio of VSDs, softstarters, motors and generators, ABB offers buildings:

- Medium voltage components and systems such as air- and gas-insulated switchgears, uninterruptible power supply units, relays, ultra-fast earthing switches, Is-limiters to reduce high short-circuit currents, and more.

- Low voltage components and systems such as switchgears, uninterruptible power supply units, breakers, industrial plugs and sockets, RCD blocks, power distribution units, remote power panels, EV charging, a wide range of scalable PLCs and HMIs, and more.
- Room management systems, lighting and shading control, emergency lighting, HVAC control are offered specifically for hospitality.
- Digital solutions including ABB Ability™ cross-product and system offering providing intelligence all the way to the component level, improving overall visibility and making the system safe, reliable and efficient.

Streamline sourcing
ABB's end-to-end product and services portfolio streamlines your sourcing and purchasing activities and standardizes processes across multiple sites, saving you money on spare part inventories while reducing maintenance costs.

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For more information, please contact your local ABB representative or visit

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