Irrigation

Efficient water distribution and conservation for a sustainable future

How to improve distribution and prevent scarcity

Freshwater is one of the world's most important resources, but it is limited. Up to 70 percent of water is used for irrigation purposes, making careful distribution and conservation crucial to ensure a sustainable supply.

Original equipment manufacturer (OEM)

"I need components and supply chains that I can rely on."
OEM

Tackle diverse manufacturing demands...
OEMs require safe, reliable and resilient components, with global and local after-sales support to help manufacturers build effective systems.

...using best-in-class technology and services

Matched VSD and motor ensures correct dimensioning of the pair and guaranteed package efficiencies.

Wide power range gives OEMs flexibility to offer broad product range.

ABB Ability™ Smart Sensors for pumps and/or low voltage motors helps to spot energy saving opportunities among motors running pumps.

Digital services brings remote support and predictive maintenance, enabling early warning of issues and rapid remedy before failure occurs.

Compact VSD footprint enables installation into smaller panels or additional functionality to be built into larger panels.

Genuine spares available globally, with online ordering providing 24-hour access.

Fast delivery of parts and support via ABB's channel partner network, providing local expertise and training through specially selected technical partners.

Irrigation System Builders

"We require quality equipment to efficiently manage pressure, and ensure that we don't waste a single drop."
System Builder

Build in resilience...
Energy use in irrigation systems is directly proportional to the volume of water being moved and the pressure against which the pumps operate. While reducing volume or pressure lowers energy consumed, using a pressure relief valve to do so is wasteful.

...with effective motor-driven solutions

High efficiency VSD-motor package lowers energy usage by between 20 and 60 percent and reduces CO_2 emissions.

Wheeled module drives can be rapidly manoeuvred into a panel, eliminating manual lifting while ensuring fast, easy installation in lift irrigation systems.

Soft pipe filling function of a VSD protects pipe networks from pressure peaks when starting pump systems, allowing pipelines to fill smoothly. This prevents overpressure which reduces burst pipes and damaged sprinkler heads.

VSD built-in smart pump functions ensure that pressure is accurately kept to the required level 24 hours a day, 365 days a year.

Ease of retrofit allows VSDs to be installed seamlessly into existing applications, while still delivering significant energy savings.

Engineering support provided by ABB and its local partners can help to ensure timely, cost-effective project delivery by providing expertise at all stages.

Growers / Farmers

"I need to ensure high quality of crops, while avoiding excess loss of water."

Farmer

Know where to look...
Irrigation is often required in remote areas where water supplies are already scarce. Ensuring maximum reliability and resilience is crucial for stability of supply.

...and how to unlock the saving potential

Precise motor speed control allows the supply of water to be adapted immediately to the demand as well as adjusting for seasonal variations, saving energy.

Preventive maintenance plan provides regular inspections and component replacements according to farming schedules.

Service agreements are available to tackle proactive and reactive maintenance needs.

Soft pipe filling prevents overpressure, reducing damage to pipelines through water hammer and leakage.

Digital services like remote condition monitoring, automatically and continuously collects performance data from drives and motors and provides alerts and information to enable issues to be predicted before failure occurs.

Channel partner network provides access to ABB-accredited experts around the world to ensure minimum downtime.

Real-time clock in the VSD makes it simple to program pumps and fans to run at different speeds depending on the time of day and day of the week, while trips can be time stamped to help with fault-finding.

Engineering optimization ensures that the VSD control panel communicates in a language you can understand, providing information in layman's terms to help end users understand precisely how to mitigate fault conditions.

Utilities

"We need high resilience and low total cost of ownership to maximize return on investment."

Operations Manager

Lower operational overheads...
As irrigation is often in hot climates, evaporation can result in wastage. Leak prevention and building-in resilience is, therefore, critical to help maximize water availability.

...with high efficiency VSD-motor packages

Fast payback times as energy efficiency savings can can result in VSD payback in under six months, with future ongoing savings.

IE5 and higher efficiency class motors are among the most efficient available, contributing to further energy reduction.

Synchronous reluctance motors (SynRMs) reduce total losses by up to 40 percent, bringing optimal efficiency, reliability and resilience.

Life cycle assessment provides a clear understanding for all stakeholders of the drive/motor installed base, detailing how assets will evolve over the next few years.

Total cost of ownership is reduced by lowering energy costs when motors are running, while limiting the cost of not running (i.e. damaged crops, reputational damage) by ensuring maximum uptime.

Precision control of pumps mitigates pressure peaks and troughs, reducing damage to pipework and ensuring that minimum water is lost to evaporation, etc.

Improving operational efficiency helps boost output and profitability

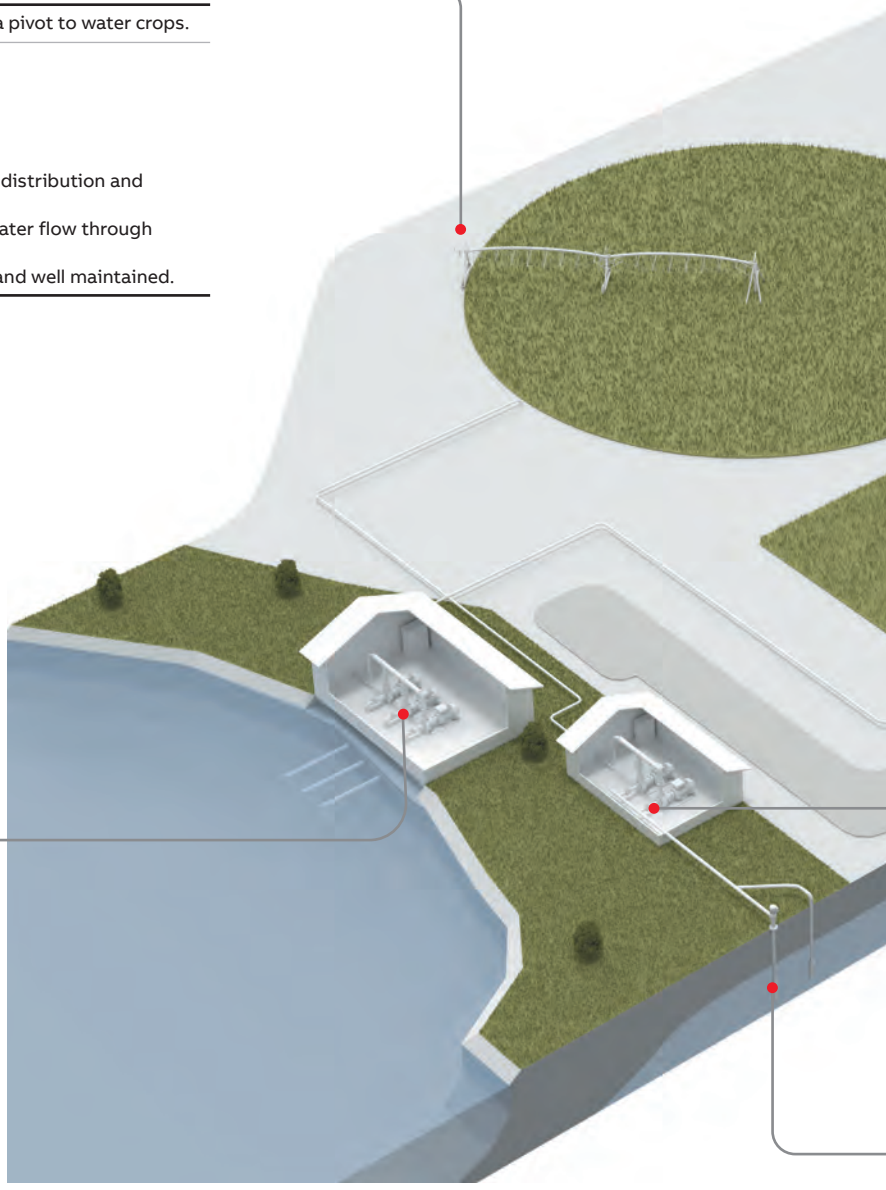
Each stage of irrigation can be fine-tuned to improve productivity, increase sustainability and enhance safety.

4 CENTER PIVOT IRRIGATION

Sprinklers fixed to a frame rotate around a pivot to water crops.

Applications:
- Centrifugal pumps
- Pivot motors

Requirements:
- Smooth operation to ensure even water distribution and prevent equipment damage.
- Constant pressure to maintain proper water flow through nozzles/spray heads.
- Pumps must be robust, highly efficient and well maintained.

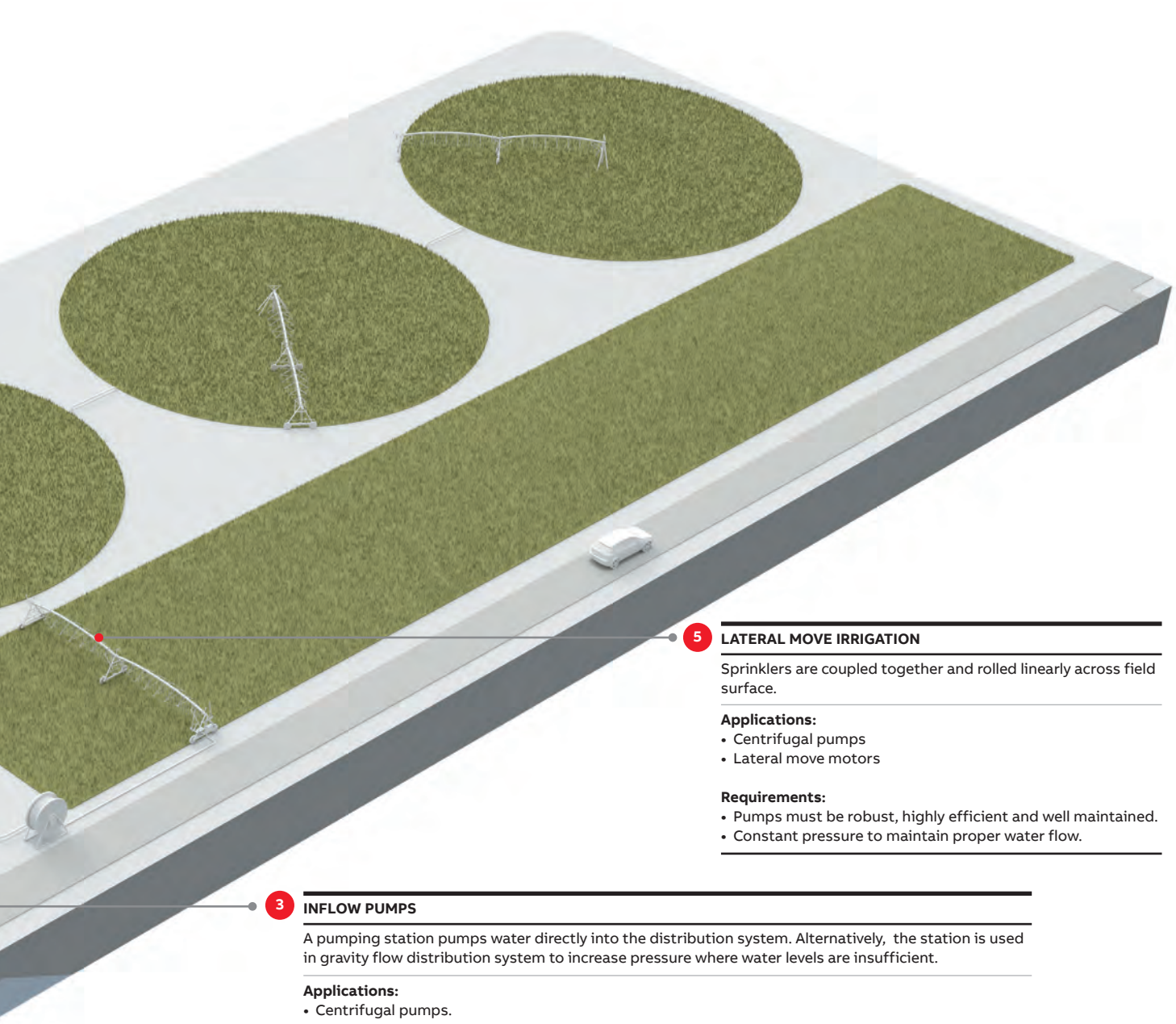


1 RAW WATER PUMPING

Raw freshwater is delivered by intake pump and sent into pumping station.

Applications:
- Centrifugal pumps.

Requirements:
- Pumps are required to raise freshwater to level of facility.
- Piston and centrifugal pumps are best suited for single and multiple well-point systems.
- Submersible pumps can be used with larger diameter well-points. Here, the pump is installed directly within the well-point.



5 LATERAL MOVE IRRIGATION

Sprinklers are coupled together and rolled linearly across field surface.

Applications:
- Centrifugal pumps
- Lateral move motors

Requirements:
- Pumps must be robust, highly efficient and well maintained.
- Constant pressure to maintain proper water flow.

3 INFLOW PUMPS

A pumping station pumps water directly into the distribution system. Alternatively, the station is used in gravity flow distribution system to increase pressure where water levels are insufficient.

Applications:
- Centrifugal pumps.

Requirements:
- Capital costs are high, but energy is the costliest aspect of running pumps.
- Pumps must be highly efficient and well maintained.

2 BOREHOLE PUMPING

Groundwater is extracted from aquifers, which are subterranean water-bearing rocks.

Applications:
- Multi-stage mixed flow pump with special submersible motor.
- Vertical turbine pumps

Requirements:
- Submersible centrifugal pumps are used to raise water to point of use.
- Pump and motor are installed directly in the well.
- Gradual ramps to reduce turbidity.
- High installation costs focuses attention on protecting well and pump to ensure a long life time.

Unlock the potential in irrigation systems

Alongside energy saving, improved productivity and greater safety, there are many other benefits from using variable speed drives (VSDs) and high efficiency motors on motor-driven applications

	Challenge	Solution	Benefit
 **Pumps**	• Wide variations in pumping requirements due to seasonal changes, demand, etc • Constant pressure to maintain flow	• Drive: Built-in multi-pump control function ensures operation of pumps according to actual demand • Drive: Displays the current optimal process conditions for flow and pressure set-points • Drive: Adapts output to react to seasonal swings in demand and available supply	• Fast response to changing demand • Optimized energy consumption • Optimal performance achieved even in worst case scenarios
	• Irrigation equipment is often installed in remote, difficult to access locations	• Motor-drive: Intelligent drives and smart sensors enable remote control and monitoring of pumps • Drive: Pump protection functions use data from pump curves and pressure transmitters to detect any abnormalities	• Anticipate operating lifetime of pumps • Reduce travel costs • Protects pumps against faults including overload and dry running to prevent failures and prolong pump lifetime
	• Pipes and sprinkler heads must be protected to prevent leakage and water waste	• Drive: Soft pipe filling protects networks from pressure peaks when starting pump systems and prevents water waste by alerting if the target pressure is not reached in the set time	• Reduced water hammer and other mechanical stress • Avoids pipe burst • Increased equipment lifetime
	• Complex and mechanically controlled water networks	• Motor-drive: Simplify the water network by eliminating need for control valves, by-pass lines and instrumentation, with speed control, built-in protections and functions	• Reduces wear on motors • Reduces leaks caused by pressure surges • Lower maintenance and life cycle costs
	• Cavitation caused by changes in pressure shortens impeller lifetime	• Drive: Detect inlet pressure to predict occurrence of cavitation	• Allows for planned maintenance
	• Maintaining reliability in multistage/borehole pumps	• Drive-motor: Fast ramp to minimum speed	• Increased uptime • Increased service intervals • Protects motor bearings
	• Unplanned interruptions because of power outages or weak networks	• Drive: Ability to keep pumps running during short power outages and automatic restart after longer power cuts	• Avoid mechanical stress on the pump with repetitive starts and stops • Avoid unnecessary visits for manual pump startup

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01 Lift irrigation system

		Challenge	Solution	Benefit
	Sprinklers (inc. center pivot & lateral movement irrigation systems)	• Pressure spikes leading to water hammer and leakage	• Motor-drive: Adjusts motor speed to constantly achieve required pressure	• Protects sprinklers from damage and prolongs their lifetime
		• Flow can be affected by low pressure caused by broken pipes or sprinklers	• Drive: Pump protection functions use data from pump curves and pressure transmitters to detect any abnormalities	• When running in constant pressure mode automatically turns off the system in case of low pressure at the output
		• Cavitation caused by changes in pressure shortens pump lifetime	• Drive: Inlet pressure measurement allows potential cavitation to be detected before it can cause damage	• Turns off the pump in case of low inlet pressure, protecting the pump from cavitation
		• Dry running causes damage to pumps and sprinklers	• Drive: Dry run protection function	• Turns off the pump in case of dry run condition
	Lift irrigation (inc. gravity fed irrigation & pump fed irrigation)	• Controlling the water level in the dam	• Motor-drive: Matches pump speed to actual demand	• Maintains the level in the dam • Supports the secondary supply of water to gravity fed or pump fed irrigation systems
		• Cavitation caused by changes in pressure shortens pump and impeller lifetime	• Drive: Inlet pressure measurement allows potential cavitation to be detected before it can cause damage	• Turns off the pump in case of low inlet pressure, protecting the pump from cavitation
		• Pressure spikes leading to water hammer and leakage	• Motor-drive: Adjusts motor speed to constantly achieve required pressure	• Reduces pipe bursts and leakage
		• Flow can be affected by low pressure caused by broken pipes	• Drive: Pump protection functions use data from pump curves and pressure transmitters to detect any abnormalities	• When running in constant pressure mode automatically turns off the system in case of low pressure at the output
	Drip irrigation	• Pressure spikes leading to water hammer and leakage	• Motor-drive: Adjusts motor speed to constantly achieve required pressure	• Protects pipes from damage and prolongs their lifetime
		• Managing different demand levels for different drip irrigation sections	• Drive: Intelligent Pump Control (IPC)	• Allows more pumps to be started if demand is increasing, with no need for external controller
		• Flow can be affected by low pressure caused by broken pipes	• Drive: Pump protection functions use data from pump curves and pressure transmitters to detect any abnormalities	• When running in constant pressure mode automatically turns off the system in case of low pressure at the output
		• Cavitation caused by changes in pressure shortens pump lifetime	• Drive: Inlet pressure measurement allows potential cavitation to be detected before it can cause damage	• Turns off the pump in case of low inlet pressure, protecting the pump from cavitation

Optimized functions that benefit irrigation systems

Drives, soft starters, motors, gearing and mounted bearings all play a vital part in keeping water flowing. Choosing the right product feature for the right environment is essential in ensuring an optimized production.

Variable speed drives

Energy efficiency
- Control operating costs by seeing energy costs in local currency, kWh and CO_2 emissions.

Communication
- Use information such as water flow rates to get the VSD to adjust motor speed and torque.
- Get detailed insight into flow performance through fieldbus comms connecting VSD with plant monitoring systems.

Ingress protection
- IP55 for wet and corrosive environments.

Low harmonics
- Eliminate supply disturbances that could trip production with built-in active supply unit and integrated low-harmonic line filter.
- Makes design and operation of the back-up generator easy and reliable.

Pressure and flow control
- Ensures optimal operation of water asset using built-in VSD features.
- Maintain constant pressure or constant flow.

Multi-pump control
- Ensures stable and uninterrupted production with multi-pump controls by optimizing the speed and number of running pumps.

Soft pipe filling
- Increases piping and pump system lifetime by avoiding pressure peaks.

Flow and pressure protection
- Protects pumping system from a low and / or high pressure and flow and prevents pump from running dry.

Quick ramps
- Reliable operation of submersible pumps and smooth operation of check valves.

Solar pump drive

Maximum uptime
- Operates without grid directly from photovoltaic (PV) cells.

Ease of installation
- Compatible with all pump types and set up for serial production.

Return on Investment (ROI)
- Superior ROI compared to diesel-powered pumping.

Softstarters

Prolong pipe and pump life
- Uses torque control to gently open and close valves and reduce water hammer during starts and stops.

Protect pump system
- Motor preheat ensures a dry and warm motor, prolonging pump life and increasing uptime.
- Coated boards and IP66 / UL Type 4x externally mounted keypads for harsh conditions.

Simplify use
- Application wizards simplify commissioning and control of pump.

Motors

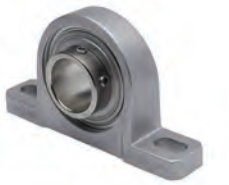
Designed for harsh environments
- Protection against external conditions.
- IP55-IP56 protection against wet and corrosive environments.
- Wide range of surface treatment and corrosion protection solutions available.

Energy efficiency
- High efficiency to support emissions reduction - up to IE5 efficiency levels.
- Suitable for frequency converter operation.
- High power density and efficiency reduces cost of ownership.

High reliability
- Robust design.
- Bearing locked at D-end to avoid axial play.
- Bearings can be regreasable, fitted with grease relief systems.
- Fan and motor fins optimized for low noise level.
- Provides same output power with a smaller frame size - less weight, a smaller installation footprint and lower costs.

Easy installation
- Oversized terminal box as standard for ease of installation.
- Flexible cabling solutions.
- Horizontal or vertical mounting.

Bearings



- Stainless steel or corrosion resistance bearings in stainless or polymer housing.
- Sealed and lubed for life bearings to minimize maintenance costs.
- Multiple housing styles, bore sizes and locking mechanisms.
- Variety of sealing options to protect the bearing from contamination.
- Roller bearings have patented easy-on, easy-off adapter mounting and removal system.

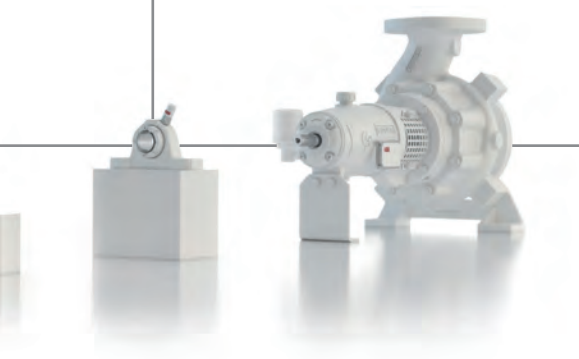
Drive and motor packages

Synchronous reluctance motor and drive (SynRM)
- Save energy across the water treatment process with IE5 synchronous reluctance low voltage motors.
- Better partial load efficiency and more precise process control.

Globally certified drives and motors packages
- Protect plant and people and conform to global regulations using tested and certified motors and drives for potentially explosive atmospheres.

Gearing

- Two-piece harsh duty seal.
- 13-step coating system.
- Provides 3x the corrosion resistance of epoxy paint.
- Premium sealing systems used to keep contaminants out and lubrication in.



From the water facility to the cloud and beyond

ABB Ability™ Condition Monitoring service for powertrains optimizes the performance and efficiency of rotating equipment. It enables full transparency on key parameters for drives, motors, mounted bearings and pumps, and can also be used in applications such as compressors, conveyors, mixers and extruder main shafts.

1

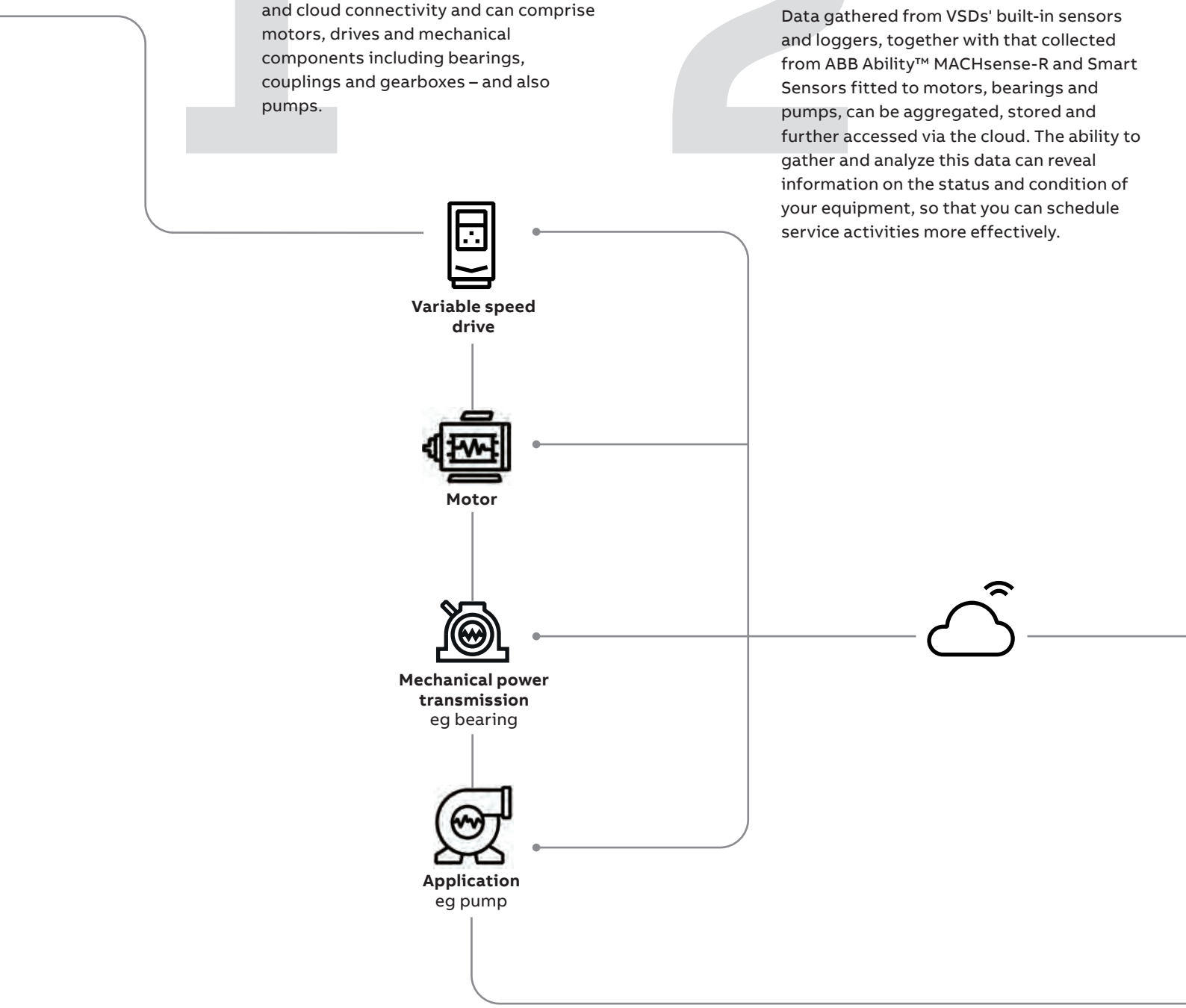
Intelligent powertrain

The powertrain is equipped with sensors and cloud connectivity and can comprise motors, drives and mechanical components including bearings, couplings and gearboxes – and also pumps.

2

Turning data into valuable information

Data gathered from VSDs' built-in sensors and loggers, together with that collected from ABB Ability™ MACHsense-R and Smart Sensors fitted to motors, bearings and pumps, can be aggregated, stored and further accessed via the cloud. The ability to gather and analyze this data can reveal information on the status and condition of your equipment, so that you can schedule service activities more effectively.



3

Accessing data for analytics

By accessing a monitoring portal it is possible to view key operational parameters of individual assets as one unified system. Detailed dashboards give full transparency so actions can be taken 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 has the right information at the right time brings:

- Appropriate response to production challenges, minimizing operating costs and wastage of products.
- Greater insight into various aspects of your process, thereby improving quality and reducing variations, errors and waste.
- Lower risk of production downtime while maintenance is changed from reactive to predictive.

OEM

Irrigation System Builders

Growers

Utilities

Keep your irrigation system 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.

Even before you buy a drive, motor or bearing, 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 operations and maintenance phases of the products life cycle, providing preventive maintenance programs tailored to your irrigation plant needs.

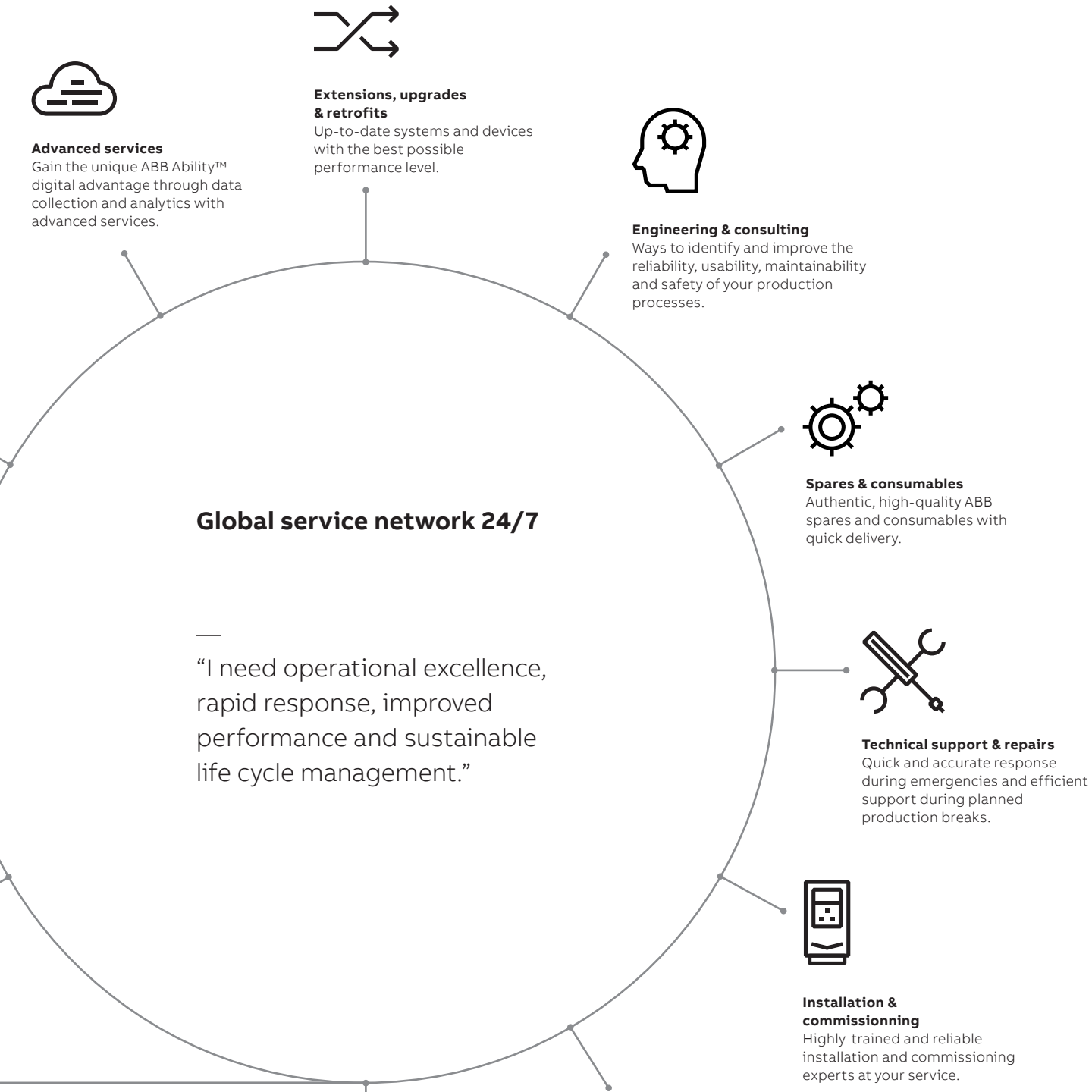
ABB ensures that you are aware of any upgrades or retrofit opportunities. By registering your drives and motors ABB's engineers will proactively contact you and advise on your most effective replacement option.

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
Ways to identify and improve the reliability, usability, maintainability and safety of your production processes.

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 production breaks.

Installation & commissionning
Highly-trained and reliable installation and commissioning experts at your service.

Training
Comprehensive and professional training either at ABB premises or your own.

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 Value Providers 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, we work closely with irrigation providers to develop custom products, services and solutions to help standardize processes across multiple sites and streamline your supply chain.

We have seven global R&D centers with more than 8,000 technologists and invest $1.5 billion annually on innovation.

End-to-end product portfolio
Alongside its variable speed drives, motors, soft starters, bearings and couplings, ABB's automation offering includes a wide range of scalable PLCs, a selection of HMIs, instrumentation and robotics. With functional safety options, from built-in safe torque off to safety PLCs, you can readily implement bespoke safety requirements.




ABB's offering includes:

- **Power protection and power quality solutions** to safeguard equipment and processes
- Industry leading **robotic automation solutions** that improve your speed-to-market, flexibility and help make packaging a differentiator
- A complete range of **protection, connection and wire management solutions** that withstand harsh environments and extreme temperature swings, and provide the reliability needed for continuous operations

Streamline sourcing

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




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

www.abb.com/drives
www.abb.com/drivespartners
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