

WATER

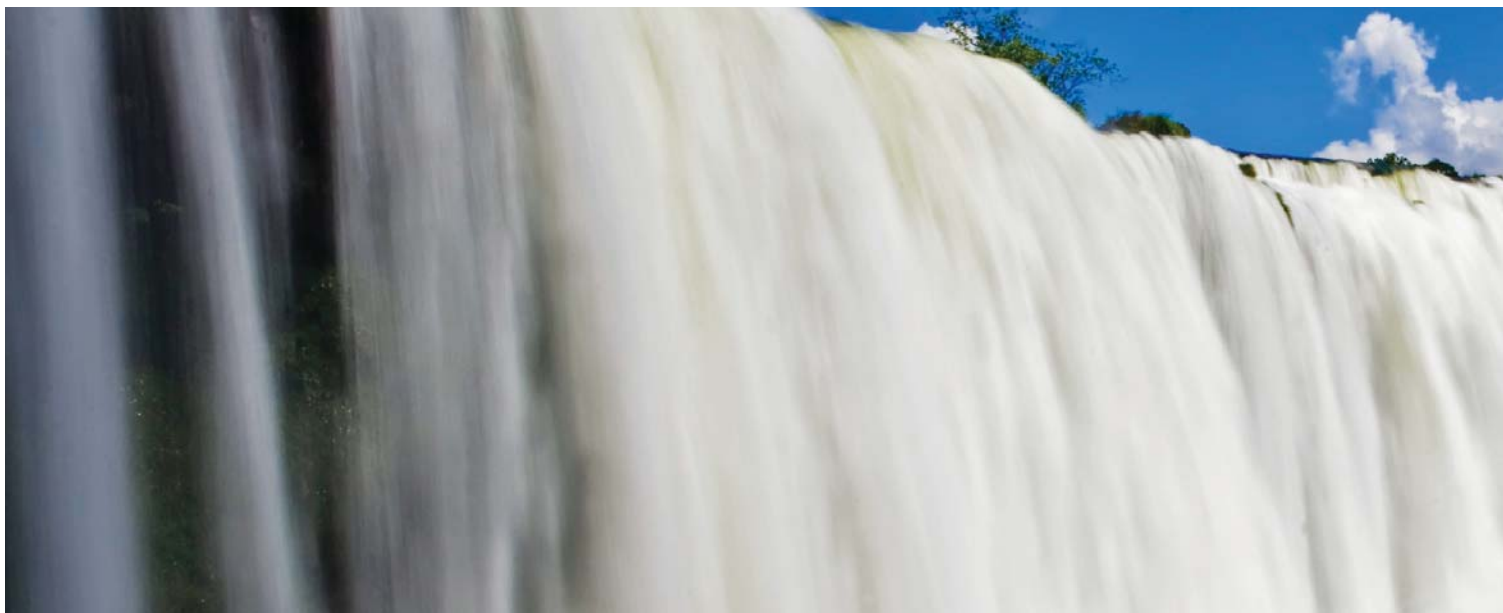
Automation Solutions

**Keeping our
lifeblood flowing**



Treatment /// Waste water /// Flood control ///
Tailored solutions /// Energy conservation ///
Minimized risk /// Supply security /// Compliance ///

Harnessing one of the forces of nature



Controlling, managing, using - water; a resource for life



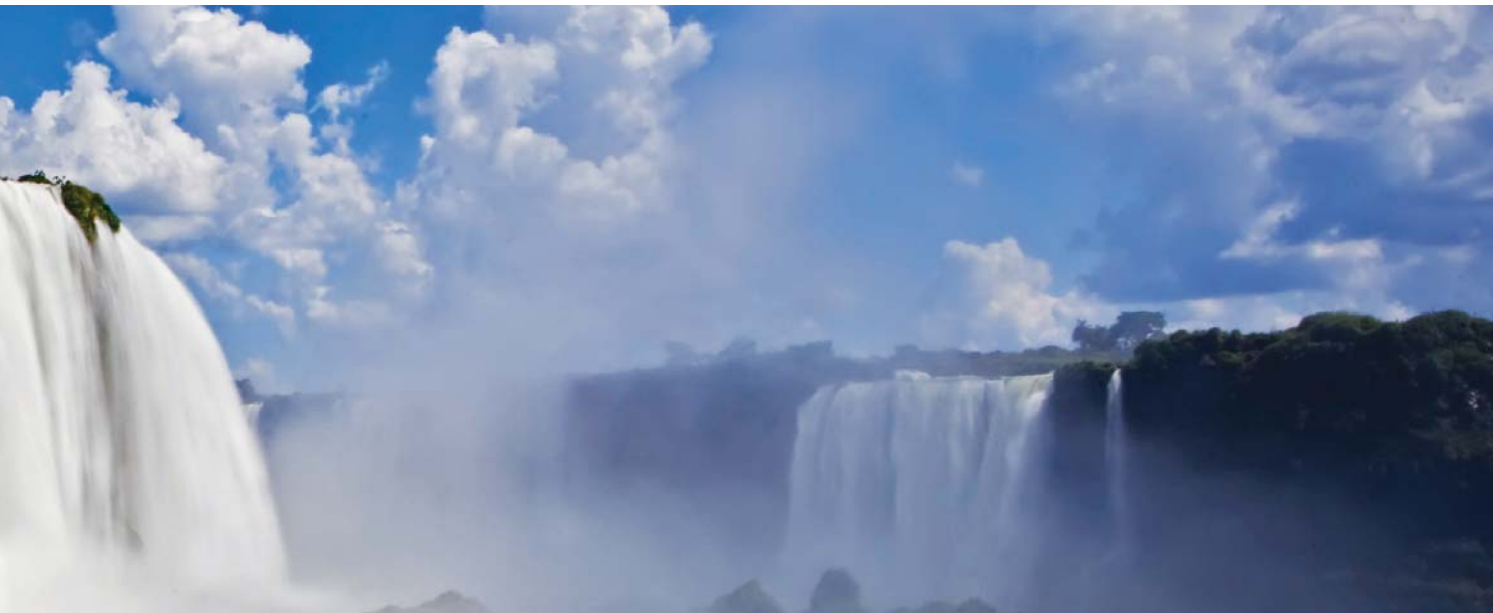
Mitsubishi Electric can offer solutions not just for safeguarding water supplies, but also for safeguarding the communities that depend on it.



Control equipment from Mitsubishi Electric delivers reliable systems for effluent treatment, giving your company the assurance of meeting effluent discharge regulations and minimizing environmental impact.



Modern water plant control systems built around Mitsubishi Electric control systems can help water companies reduce energy costs and boost operational efficiencies.



Responding to change

Water is our most precious resource, and one of our biggest challenges. While half the world takes water for granted, the other half is facing chronic water shortages. And global water use is increasing at a rapid rate, putting ever greater pressure on supply and treatment infrastructure. At the same time, the seemingly unchecked urbanisation of the global landscape and the impact of climate change have increased the likelihood of and our vulnerability to flooding.

How we respond to this changing picture will be one of the defining characteristics of our age. Water management strategies have to tackle the full spectrum of drinking water provision and security, wastewater treatment and pollution control, bathing water quality, the management of waterways and reservoirs, and the provision of flood defences – all against a picture of increasingly stringent standards and legislation.

Protecting resources

As our water consumption continues to increase, water is becoming an ever more precious resource. The goal is to strengthen the water industry on a long-term basis, balancing and reconciling the requirements of its stakeholders with the needs of nature.

How we manage and protect our water resources to ensure adequate provision and facilities to meet agricultural, urban and energy requirements and to preserve natural ecosystems will impact on global society long into the future. Protecting this valuable resource effectively will demand innovative thinking and innovative engineering.

Minimising risk

Whatever area of the water industry you are working in, and whatever pressures for change you are facing, Mitsubishi Electric works with you to help you manage change and minimise risk. Trusted across the globe and proven across all fields of the water industry, Mitsubishi's automation technology can optimise plant performance, increase availability, reduce installation and operational costs, and help you address not just current needs, but future demands.

We're with you every step of the way

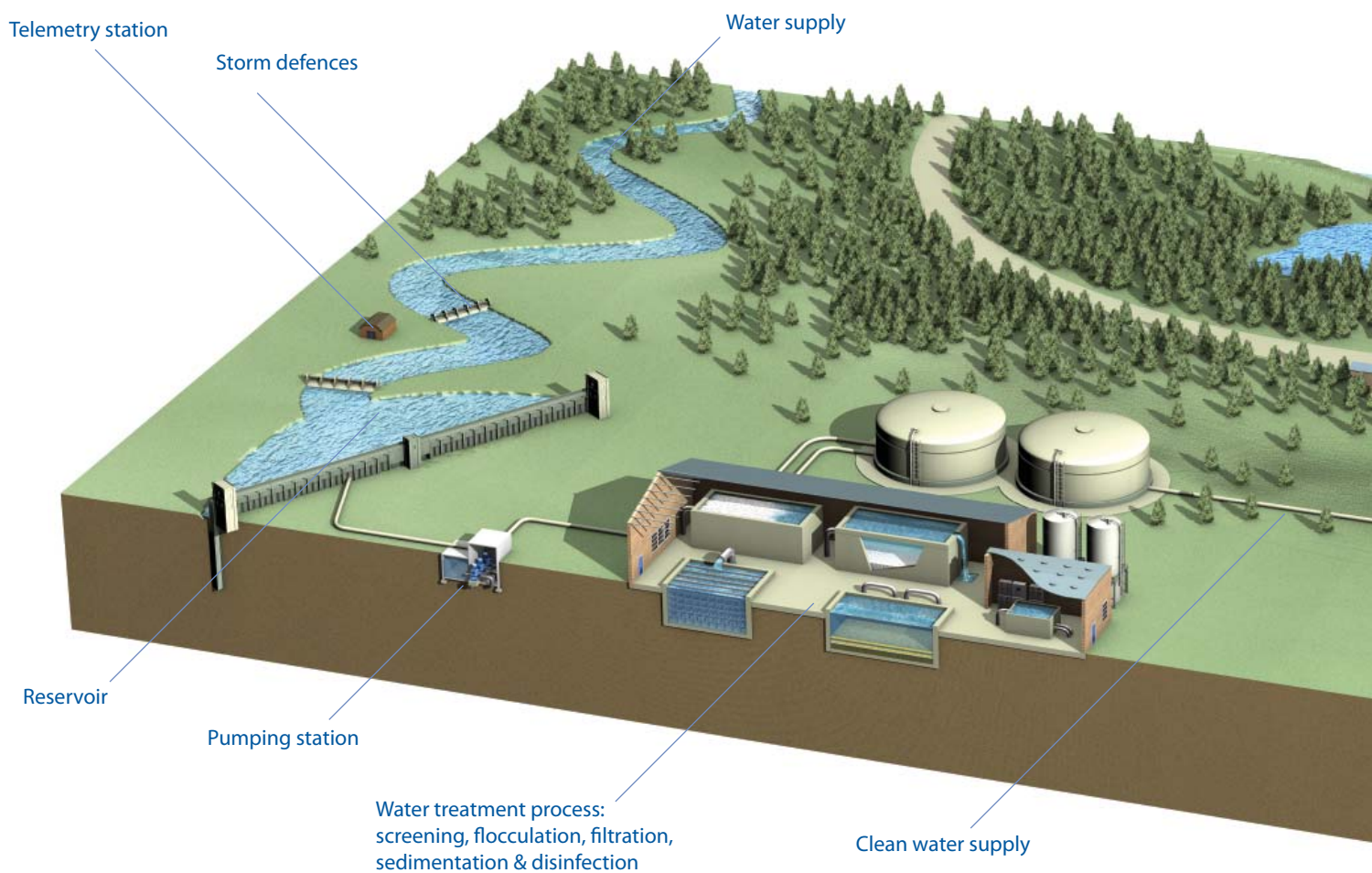
As an industry, the supply, collection and management of water resources faces some unique challenges. It is a resource many consumers almost take for granted, bringing pricing pressures that impact investment and operational costs. In addition population growth is creating new challenges for both water supply and waste water management.

Processes must operate within strict EU regulatory guidelines to maintain the safety of supply and protect the environment.

Hence any company in this industry needs to be able to turn to a partner that understands these challenges, and has the necessary solutions to be able to address them consistently around the clock, year after year with complete confidence.

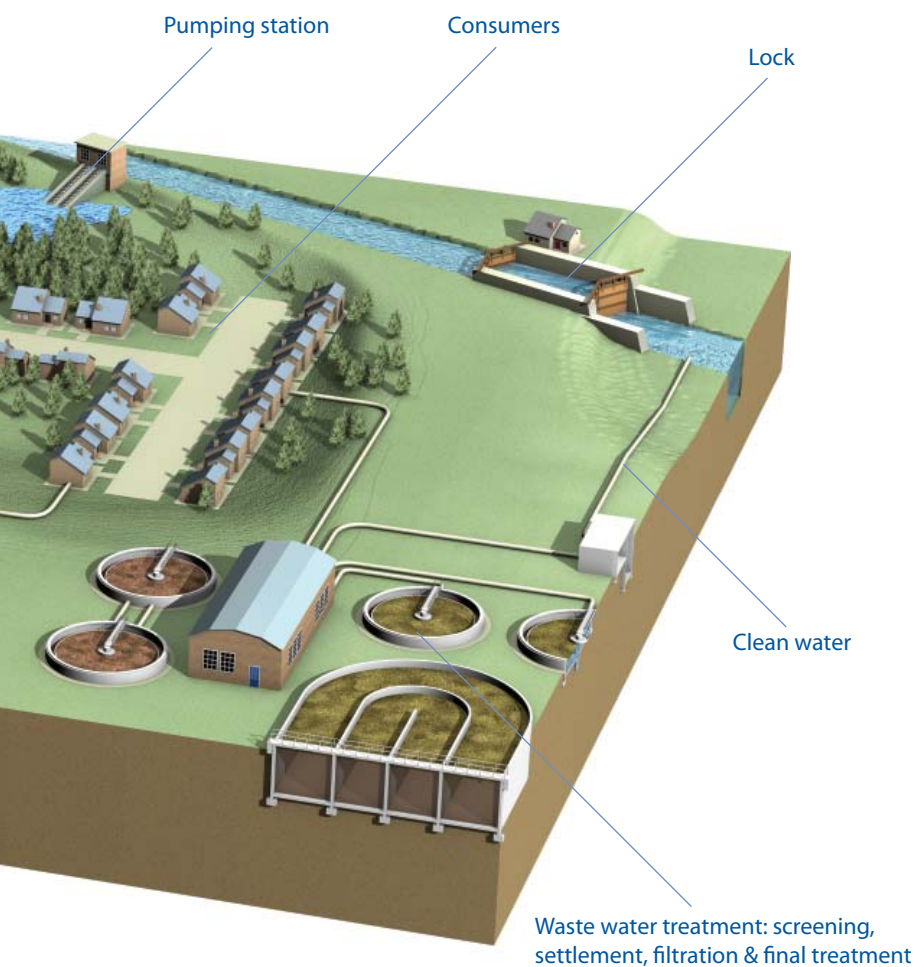
Mitsubishi Electric is such a partner. We can offer a range of systems that have the necessary flexibility and dependability to meet these demands, while backing it up with many years of experience working with customers in the water resources industry.

We understand the key processes involved in all stages of water management.



We are also experienced in dealing with the associated tasks that are not directly related to water supply, such as flood control and protection of the environment in which the industry operates and serves. We leverage this expertise to develop tailored solutions that are easily customizable to meet the special needs of water industry.

This publication introduces the solutions we offer for all stages of water supply management. For more information, please contact us or our local representative. We will be able to put together an innovative, reliable and attractively-priced solution for you.



iQ Automation Platform

An industry leading modular controller platform with powerful software tools often, used as a central process control station.



FR-700 Series Inverters

Optimized for pump and fan applications up to 630 kW, and can also provide power regeneration.



GOT Series HMI Units

A transparent window into any process, also capable of being networked.



FX Series Compact PLCs

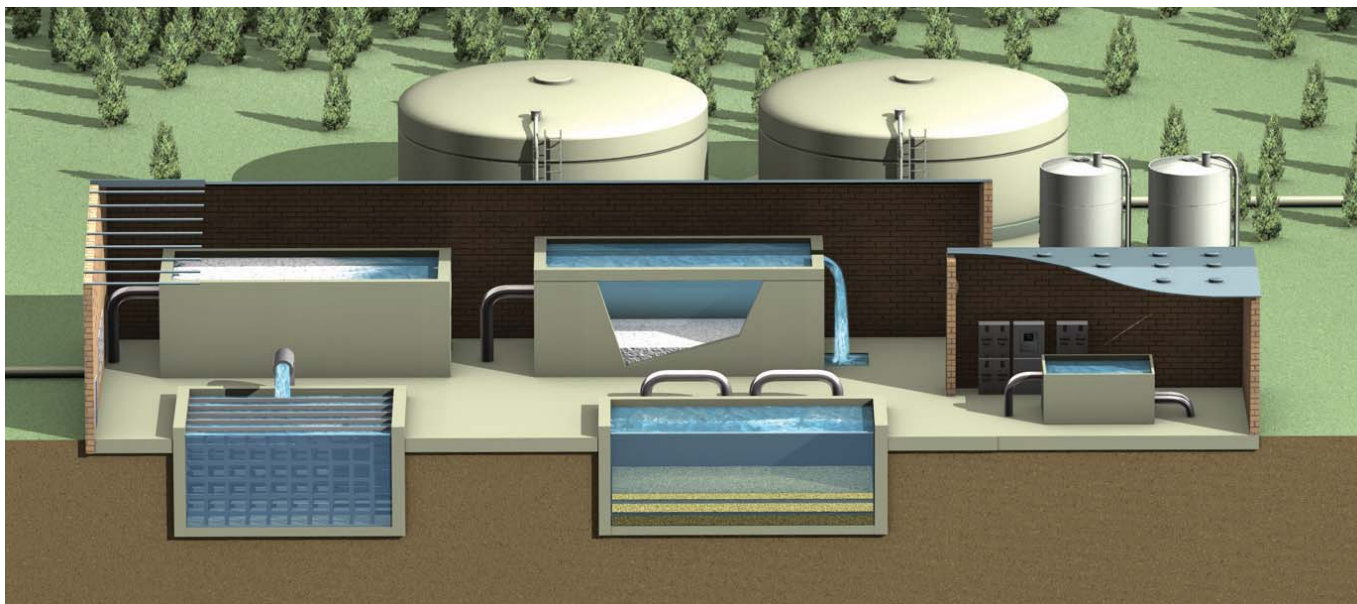
Powerful, expandable decentralized control capability that supports protocols for use as a remote terminal (RTU).



MELSEC ST - Remote I/O

Highly-flexible modular slice-type I/O terminals for a wide range of input and output signals.

Collect, clean and supply



Maintain effective control over all aspects of water treatment



Ensure supply is maintained within regulatory boundaries

Dependable control

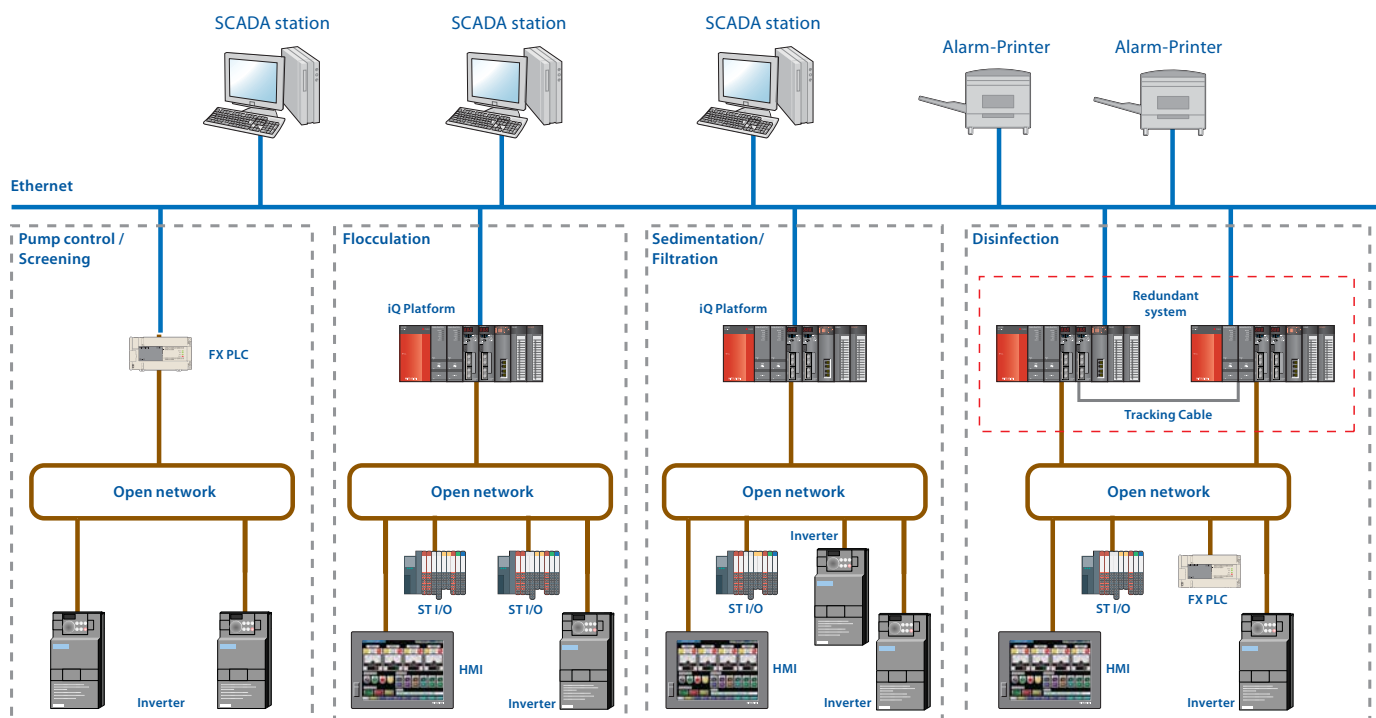
The EU's Drinking Water Directive and related member state legislation, set strict regulations, which Mitsubishi Electric has solutions for, in all process stages. With its flexible modular architecture and power, the Mitsubishi iQ Platform is the foundation of the entire system. Combining PLC and process control functions on a single backplane, iQ Platform is a highly-effective and inexpensive solution.

Powerful programming tools and software solutions help you to get your projects deployed fast. The iQ Works integrated development environment includes all the functions you need for every phase of the target system, from graphical system design and programming to the operation and maintenance of the system following deployment. The testing and simulation for the integrated PLC, HMI and inverter systems help to optimize the system and reduce errors. This reduces project lead time and cuts costs.

Using a uniform system for all processes increases efficiency and simplifies maintenance of the installed solution.

A wide sphere of influence

The iQ Platform can interface with almost all of the open network systems and protocols used in automation today. These advanced distributed solutions help to cut costs when compared to systems with conventional wiring, without reducing reliability. Powerful diagnostics functions also enable fast and effective troubleshooting.



A wide variety of assets distributed throughout the installation can all be integrated into a single connected system.

Since water exposure is unavoidable in many applications, a selection of IP67 I/O types allows control to be deployed almost anywhere in the plant for maximum flexibility.

Networking also extends beyond just I/O. Virtually all our automation products, including inverters and HMIs can also be networked to meet the demands of a distributed application. The controllers can also be networked to enterprise IT systems to provide a direct connection to higher level reporting, monitoring and control systems without the risk of introducing vulnerable intermediary PC systems.

A window into the process

When it comes to process visualization, Mitsubishi Electric offers what is probably the most comprehensive selection of HMI units and industrial PCs currently available. By taking advantage of the operators and service staff can always access all the information and process data they need immediately – on site or from a central location. Simple, user-friendly operation coupled with exceptional flexibility bring transparency to the operation of your systems while integrated diagnostics facilitate maintenance.

The GOT 1000 series HMIs have an IP67 ingress protection rating for reliable operation under even the most heavy-duty conditions.

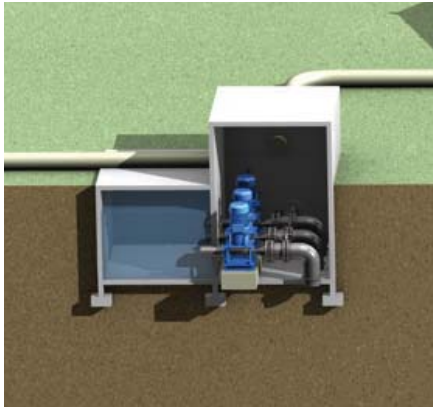
Know-how

The final part of the puzzle is a partner who understands the industry and has the expertise and resources needed to implement projects quickly and within the set budget. With its exceptional engineering competence and long experience in water industry projects both in Europe and worldwide, Mitsubishi Electric can make a key contribution to successful solutions.

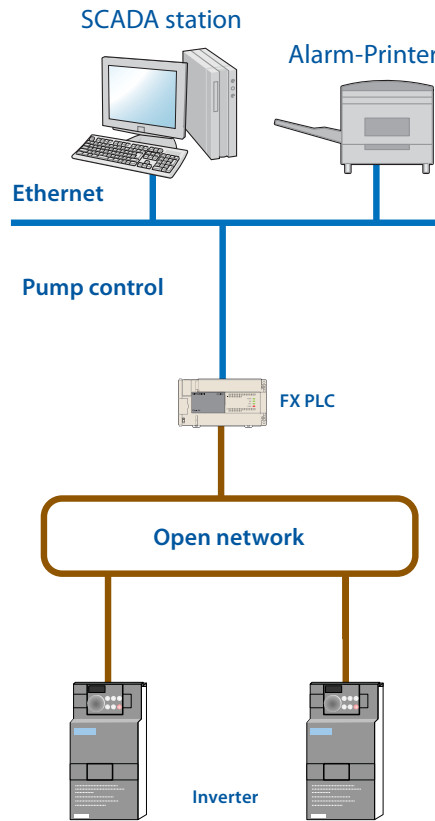


Always have the information needed, when it's needed

Pump Station/Screening



Boosting performance and saving money



■ Energy efficient, intelligent pumping

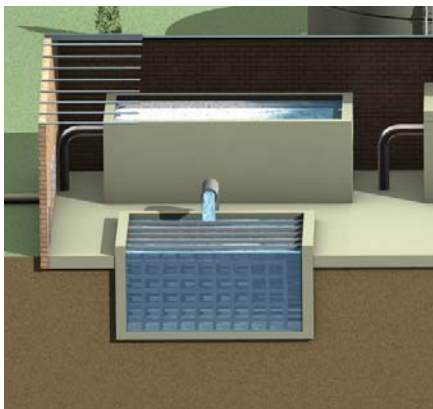
The pump station is the beginning of the process, it transports the water to the treatment plant.

Mitsubishi Electric's frequency inverters are exceptionally energy-efficient and provide dependable power and control for a wide range of pump sizes. They are also outstandingly reliable, delivering decisive input for all the downstream installations served by the pumps.

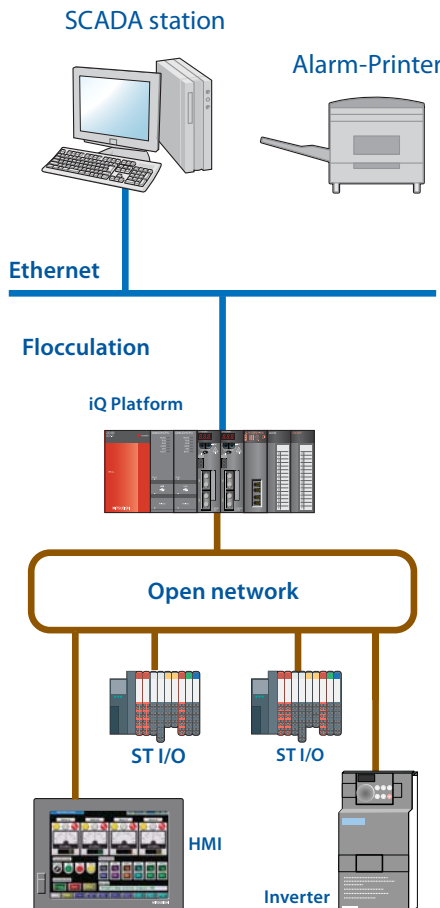
The pumps can be controlled from a central location or remotely via fieldbus networks.

Mitsubishi's FR-F700 inverter family is optimized for pumping applications up to 630 kW, covering a very broad spectrum of application requirements. Their advanced Optimum Excitation Control (OEC) technology delivers power savings of up to 60 %.

Flocculation



Quality control

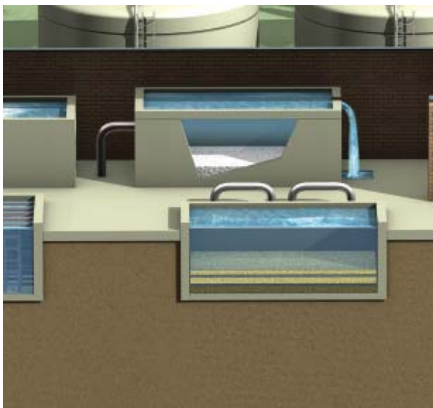


■ Economical distributed control

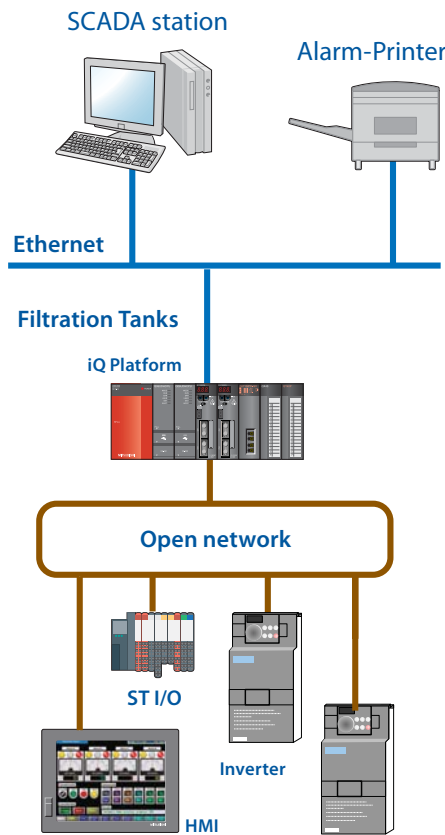
Following initial screening, flocculation removes turbidity and discoloration. Precise metering of the flocculants is essential to maintain tolerances and ensure optimum results. Mitsubishi's iQ controllers provide the reliability and flexibility needed for this task. Controllers with dual redundant architecture are also available for maximum system integrity.

Distributed remote I/Os enable enhanced flexibility combined with easy connection to the controllers. This also helps to ensure optimum performance at the local metering stations.

Filtration/Sedimentation



Both local or distributed control can be implemented easily

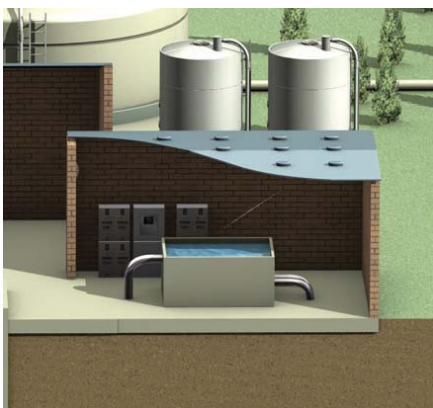


■ Maximum flexibility

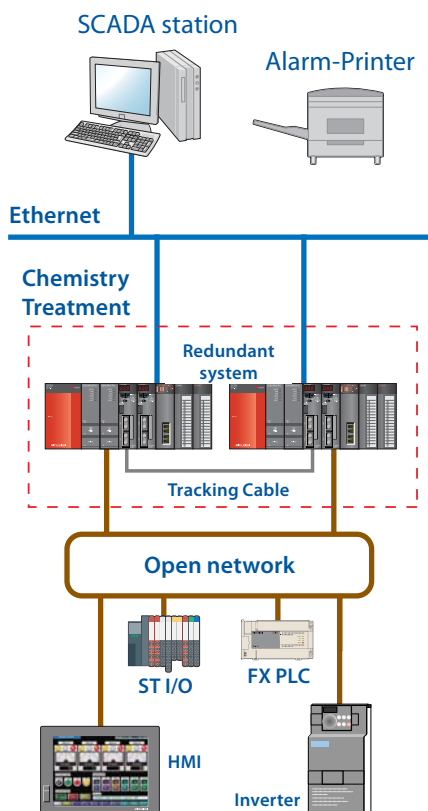
The water is transported through the filtration systems by pumps of various sizes which if driven by Mitsubishi inverters, can ensure maximum efficiency and keep power consumption low. Additionally, the mechanical systems required to clean sedimentation sludge can be integrated into this control scheme, providing a seamless solution. Pump control for back flushing filters is also easily achieved.

The modular PLC is the central control station and the FX family of PLCs are the ideal choice for the local control functions: Compact and powerful with extensive network support, FX controllers can handle all the tasks needed for controlling and monitoring the filtration tanks.

Disinfection



Uptime when most needed



■ Redundant architecture – high availability

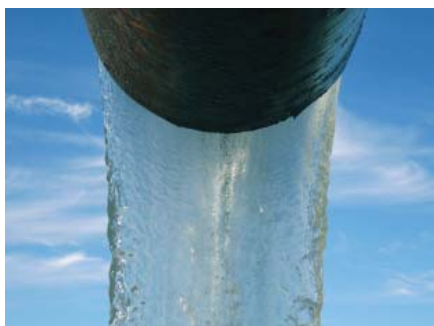
Particularly high reliability is required in the final stages of water treatment before delivery of the water to the consumers. With its failsafe redundant architecture, the iQ Platform controller system provides the reliability needed for these critical tasks. Real-time central logging and processing of the data collected by the local stations are also crucial for keeping the system effective and ensuring that the required tolerances are maintained at all times.

The individual local metering stations communicate reliably with the central controller system via a redundant network architecture like CC-Link IE.

Collect, clean and return



Effectively handle the mechanical, electrical and biological tasks involved in waste water treatment



Ensure discharges are maintained at required levels

No room for error

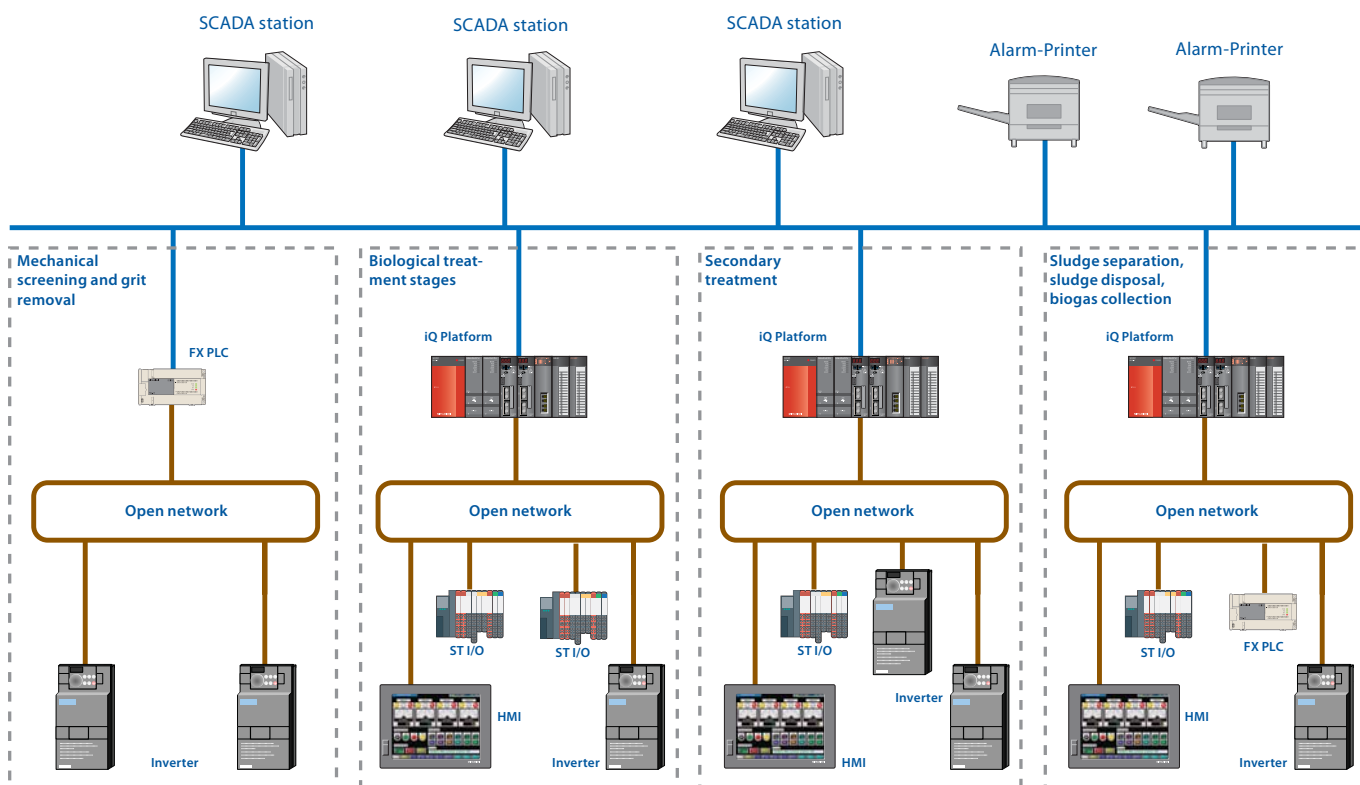
While providing a clean supply of water to the consumer is an essential process, dealing with the waste produced is critical. Strict regulatory requirements such as the Urban Waste Water Directive and the Bathing Water Directive provide a compliance framework that is just as demanding as those governing supply.

You need a partner who can deliver flexible solutions catering to the needs of all aspects of the process. This simplifies engineering and maintenance, but also reduces costs. Use of standardized systems throughout further cuts costs by reducing both staff training overheads and the number of spares that must be stockpiled.

As explained, the flexible and modular iQ Platform is the heart of the automation system. Leveraging iQ Platform's multiple CPU architecture enables you to avoid the additional engineering hours required to get controllers from multiple manufacturers to work together smoothly. The combination of PLC and process control functions on a single backplane gives you highly cost-effective solutions with standard products.

Powerful programming tools and software solutions help you to get your projects deployed fast. The iQ Works integrated development environment includes all the functions you need for every phase of the target system, from graphical system design and programming to the operation and maintenance of the system following deployment. The many testing and simulation functions of the integrated PLC, HMI and inverter systems are supported and help to optimize the system and reduce errors.

This reduces project lead time and cuts costs.



A scalable, comprehensive solution for all waste water applications

Reach across the plant

Large waste water treatment facilities need both networked central monitoring and distributed control systems. The iQ Platform forms the core of the Mitsubishi Electric network hierarchy, by offering support for a comprehensive array of the most common open networks used in automation today. No matter what network types are in use, Mitsubishi systems can normally be configured to work with them, making it very easy to integrate our solutions with existing installations.

Precise pump control

As with supply, a key application is to move the waste water reliably and with the lowest energy consumption. Frequency inverters like the FR-F700 get optimum performance from a wide range of pump systems. Their exceptional reliability make them the first choice for unattended and remote stations. The large number of network options ensures that even the most remote installations can be monitored and controlled reliably. Inverters are available with outputs up to 630kW (and even higher, if needed) to accommodate even the most demanding requirements.

Support for the operators

Continuous, up-to-date information on all operations is essential to enable fast response to errors in the processes. This is made possible by a combination of a centralized process visualization system and local control panels, which are known as HMIs.

The GOT touch screen HMI panels deliver the performance needed and are available with a wide choice of screen sizes for different processes and requirements. Here too, comprehensive networking support makes it possible for the same information to be made available both to the local HMI panels and the central control station. This ensures the data consistency that is so crucial for really reliable operation. Our many strengths also include integrated multimedia-based help speeding up the resolution of malfunctions, which reduces down time; support for remote maintenance features; and optimized communications for access to all our controllers, frequency inverters and HMI panels.

Experience

Mitsubishi has many years of experience working with water authorities and system integrators in countries all over the world. We have the expertise you expect from a dependable partner and system provider for a wide range of waste water treatment applications.

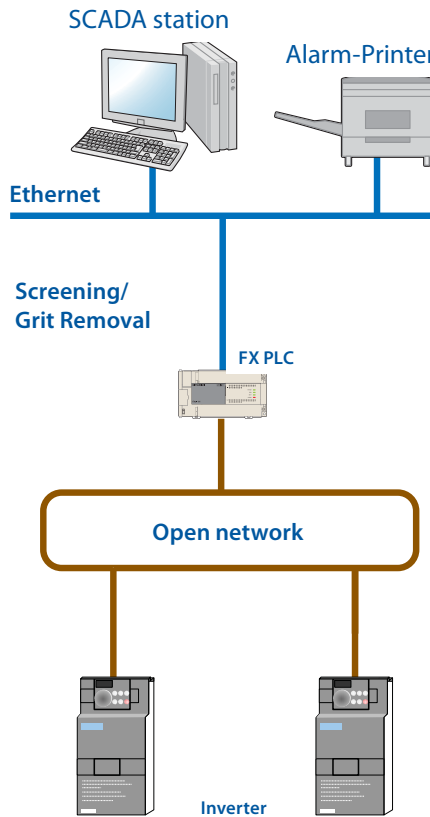


Environmental protection is a key part of the industry's responsibility

Screening and Primary Sedimentation



Peace of mind



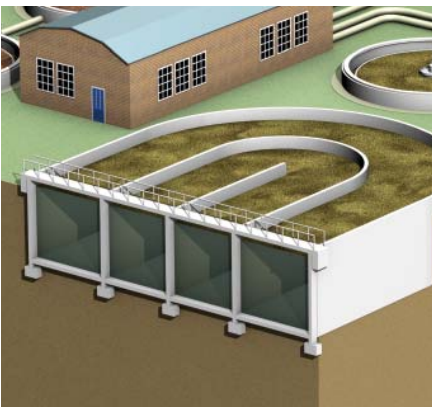
■ Mechanical screening

Raked bar screens remove coarser and finer particles from the water. The solids are then removed by screw conveyors for drying and storage.

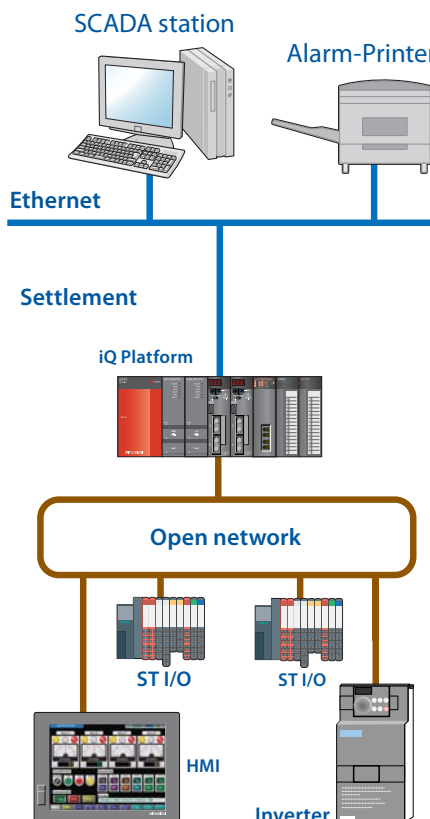
Next the water flows through an aerated sand channel, where heavy solids settle out and are then collected, cleaned and disposed of. Lighter substances are skimmed off in the primary settling tanks and also disposed of. After this the pumping stations transport the water on to the biological treatment stations.

All the processes are monitored and controlled by PLC controllers and the networked frequency inverters, which drive the optimized aeration pumps. In addition to cutting operating costs, the inverters have a service life of over 10 years giving an excellent return on investment. Integrated diagnostic systems enable operators to schedule needed maintenance well in advance, making planning easier and further increasing overall reliability.

Aeration



Flexible network architecture



■ Biological treatment

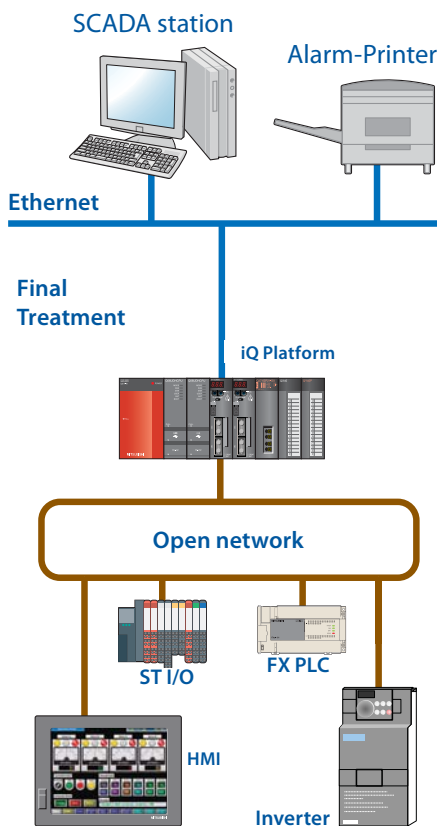
In the activated sludge tanks agitators mix the biomass with the waste water. Next, an aeration system oxygenates the water to enable the bacteria to do their work.

Mitsubishi PLCs easily control the processes and Mitsubishi frequency inverters drive the inlet and outlet pumps, maintaining the optimum environment for the bacteria cultures.

Final treatment



Dependable control

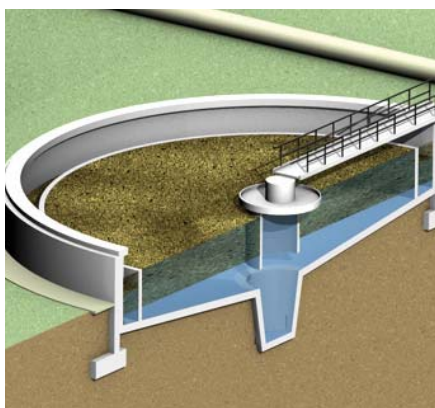


■ Secondary treatment

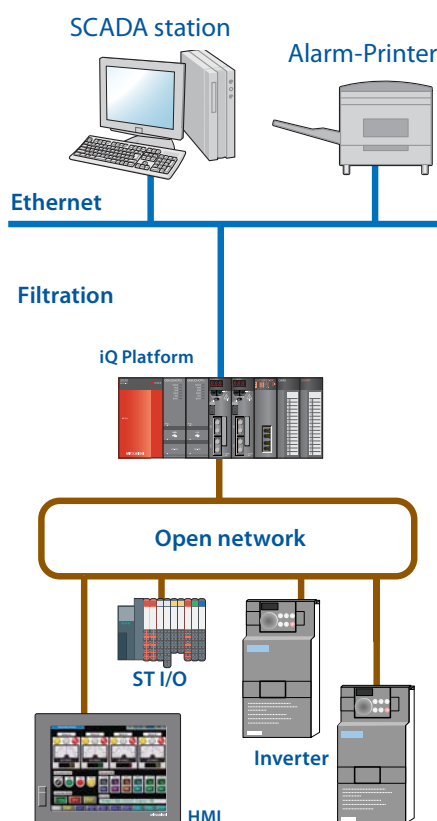
In this stage, nitrogen and phosphorus based nutrients are removed from the water. This is followed by additional filtration to further reduce any possible pollution of water resources.

All the processes are controlled by an iQ Platform system with a dual redundant architecture that prevents possible failures in these critical phases.

Final Clarification



Minimized energy consumption



■ Sludge separation

In this stage, the sludge is separated from the purified waste water. Some of the sludge is pumped off, the rest undergoes further treatment. Frequency inverters are also used here to drive the pumps that maintain the flow rates and also the rotating sprinkler arms and sprinkler pumps for the trickle filter systems. As with other parts of the treatment process, the F700 inverter is an ideal match being optimized for pump applications up to 630 kW.

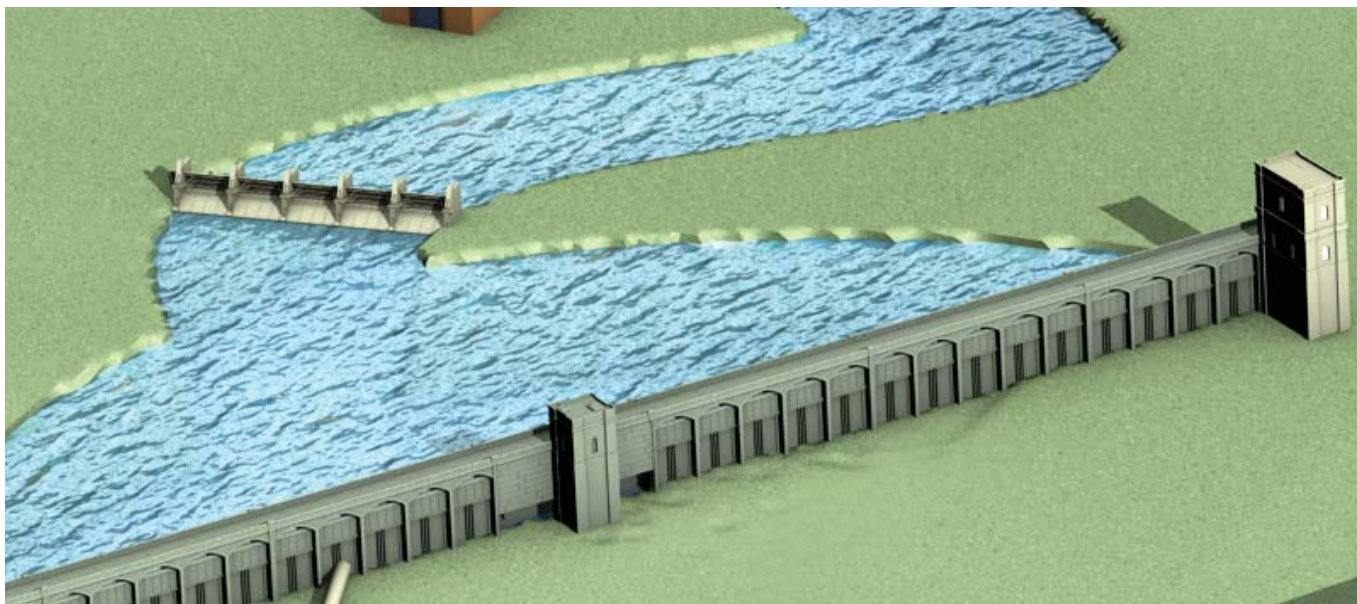
■ Sludge disposal

The sludge collected in the separation stations is concentrated and the water removed is pumped back into the process. The concentrated sludge is then run into the anaerobic digestion tanks, where it is broken down almost completely in the absence of oxygen. After drying, the remaining treated sludge can be used as a fuel.

■ Biogas collection

After being purified, the biogas generated in the digestion and fermentation processes can be used to produce heat and electricity in local cogeneration power plants.

Protecting our communities



While water is essential to life, it must be effectively managed to avoid adverse effects.



A comprehensive flood control infrastructure requires reliable monitoring and control systems.

Being prepared

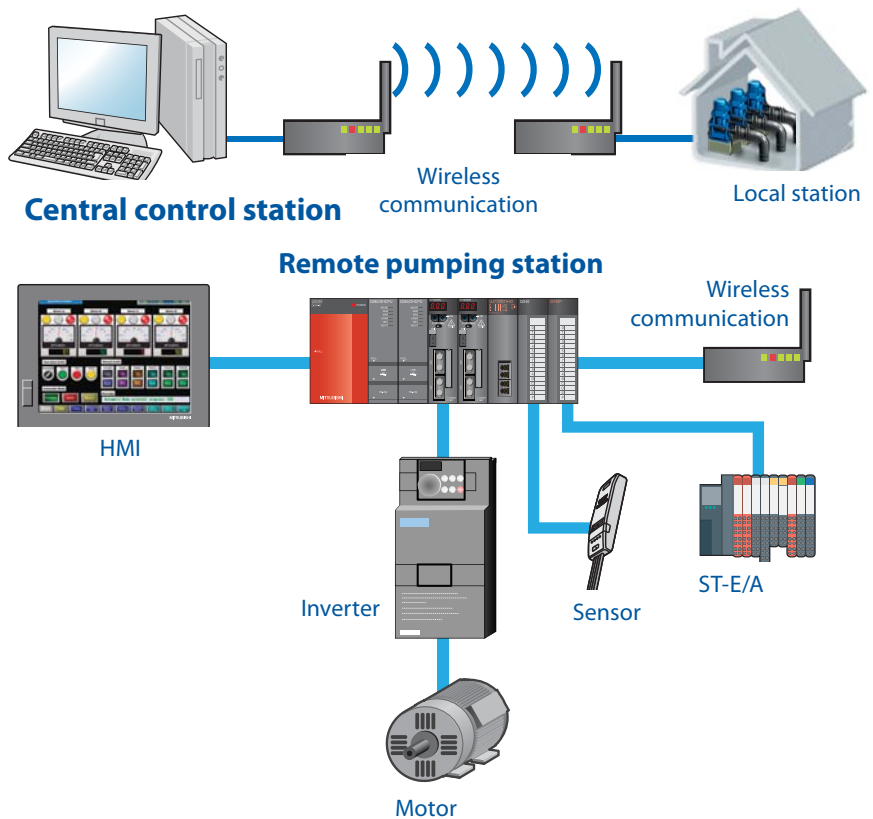
A paradox of the water industry is that while maintaining supplies is critical, occasionally the supply itself can be the problem. Rare weather events, seasonal changes, wind and even infrastructure failure can lead to natural water resources threatening the security of the very communities they serve. Aside from the obvious damage flooding can cause, more subtle effects such as erosion must also be guarded against. The water industry plays a key role here, deploying a wide range of technologies and strategies for flood control and prevention.

In general, flood control methods are concerned with containing water and controlling the amount and direction of flow. Hence infrastructure such as dams, weirs and sluices are employed. Usually a key challenge in applying controls to these applications is their wide geographical distribution; installations may be separated by miles along the course of a river, or widely spread over a watershed. Hence a solution needs to incorporate the necessary elements to cope with this. Mitsubishi Electric offers a variety of remote communication solutions to meet these needs, such as radio modems and RTU (remote terminal unit) systems that are easily integrated with controllers such as the iQ Platform and the FX Family.

A further challenge is the need to actuate heavy loads presented by sluice gates or flood barriers quickly and dependably. Mitsubishi frequency inverters are so robust that they can handle overloads of up to 250% for short periods, enabling fast response to rapidly changing water levels. This overload capacity also enables the drives to handle high starting torques when necessary. Centralized wireless architecture simplifies system design and remote access further reduces maintenance overheads. A PID controller is integrated in the FR-F700 inverter and in many cases, this makes it possible to configure a complete system using just the inverter for both the drive and control functions.

Similar criteria also apply to control of floodgates for regulation of water flow over dams and onto spillways. While dams are engineered to retain normal water levels, in flood conditions it is necessary to release the resulting additional flows to prevent dangerous conditions occurring. From a mechanical point of view, the application challenges are somewhat similar; hence the solutions can also be applied here too.

Although locks in rivers and canals are not usually regarded as flood control systems, they are also an important part of the infrastructure. It was locks that made large-scale shipping possible on inland



Even distant infrastructure can still be controlled effectively

Aqua Control Pack

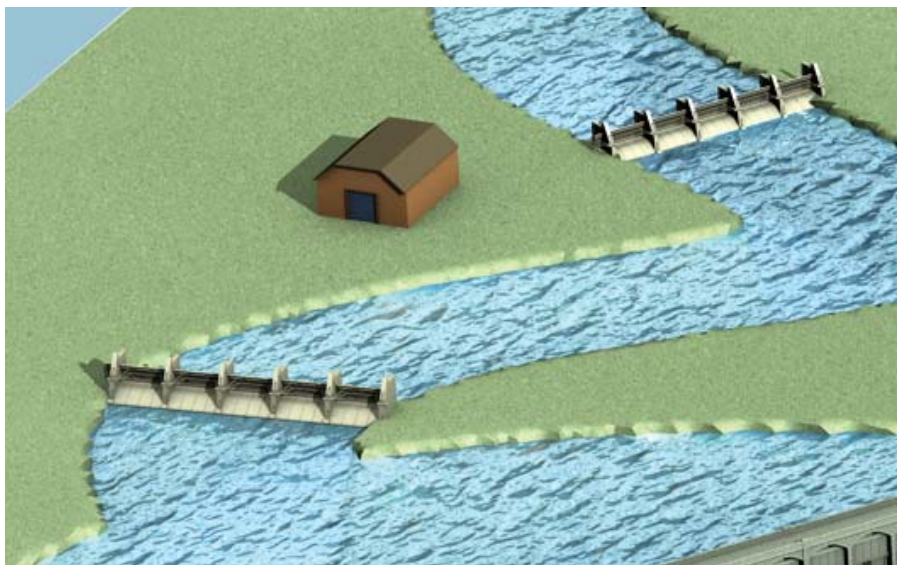
Mitsubishi Electric's Aqua Control Pack helps to simplify facility development and reduce engineering overheads. Designed specifically for water industry applications, it saves both time and money. Despite its efficient standardization, Aqua Control Pack is also flexible enough to cater to the needs of customized applications. It handles the drudgery, giving your engineers more time to focus on the creative work. You can find more information on the package at the end of this brochure.



Flood control system

waterways, and the massive lock gates have extremely high starting torques that require very powerful drive systems.

Weir Management



Control even remote locations



Weirs are essential for controlling flow

■ Comprehensive weir solutions

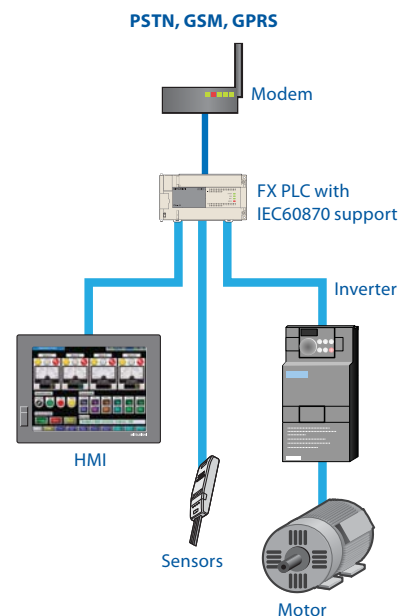
An essential part of controlling the flow of water through the landscape is by use of weirs. While the principle of a weir is quite simple mechanically and from a control perspective, the main challenges are power supplies and communications. Typically, a weir may be in a remote location with no convenient source of power or communication nearby. Technologies like solar modules are an ideal solution here: they generate no additional running costs, have extremely low power consumption and are robust enough to be allowed to run for long periods without supervision.

The Aqua Control Pack package includes a customized solution for the automation of weirs and their integration into a remote SCADA system. Mitsubishi's solution portfolio includes all the hardware and software components needed for reliable communication, maintaining water levels and positioning the mechanical weir components.

Mitsubishi PLCs support industry protocols like DNP3 and IEC 60870 along with user-friendly function block programming for fast implementation. A compact PLC can also be used as an RTU (remote terminal unit) if required. Here too, the ready-to-use function blocks significantly speed up development.

The communications protocols can be integrated in an existing telecommunications infrastructure, including both wired systems and wireless systems such as GSM and GPRS. The systems can thus be deployed in any location where these services are available.

Finally, to address the power issues, Mitsubishi Electric is also one of the world's leading manufacturers of photovoltaic panels, offering a solution for power in "off the grid" situations as is frequently found with weirs.



Typical weir or pump system

Pump control



Optimized use of energy

Control requirements will often fall within the capabilities of an FX Family PLC, which also has the capability to function as an RTU, or if required, a dedicated unit can be used. The pump size can vary widely depending on the requirements. The F700 inverter was designed with pumping applications in mind, and offers capacities up to 630kW. The F700 offers the ability to reduce energy usage by up to 60% by virtue of its Optimum Excitation Control (OEC) feature. Hence with a designed service life of 10 years, the F700 can pay for itself many times over in virtually all pump applications.

Finally, if HMI capabilities are required on site, the GOT HMI provides a flexible touch screen solution to assist maintenance staff with routine tasks as well as detailed system diagnostics.

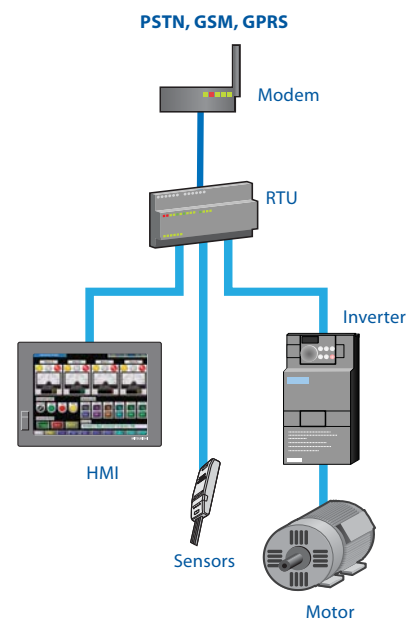


Powerful centrifugal pumps and other pump types are used to protect against flooding.

Flexible pump control

As with weirs, often pump stations may be located in remote locations far away from convenient sources of communication. However, unlike a weir, the power requirements for pumping usually means a source of power is available. While different types of pump may be used depending on the situation, from a control point of view, the requirements are often quite similar. The Aqua Control Pack solution package is also available in a pump control version to provide a pre-configured solution for most pumping applications.

To maintain the link to central control stations, wireless modems are available, both in GSM or GPRS versions, giving a very wide service area. This is supported by industry standard protocols such as DNP3 and IEC60870 being supported, insuring compatibility with existing systems and infrastructure and making integration simple.



Alternative weir or pump system

Fast project implementation



Pre-defined solutions allow shorter implementation and reduced cost



The e-F@ctory Alliance

The e-F@ctory Alliance is the result of Mitsubishi Electric partnering with carefully selected industry leading companies to provide solutions to specific industry applications. The partnerships address a wide variety of different industry needs, from IT connectivity to enterprise IT systems from major ERP vendors to specific pump and weir applications. By partnering with third party companies, Mitsubishi Electric is able to deliver our industry leading automation technology combined with complementary “best of breed” solutions to deliver the most comprehensive answers to all application issues.

Aqua Control Pack

The Aqua Control Pack (ACP) is specially designed for the needs of the water industry. It provides support throughout the entire life cycle of water management systems, from the original idea and quotation to planning, development, installation, operation and maintenance. Most of the tasks needed for the development and deployment of such systems are already implemented in the package. Much is pre-configured, eliminating the need to write programs and many other time-consuming tasks. All you need to do is configure the parameters for your individual installation.

The ACP was developed in real installations, working hand in hand with leading water industry companies. As a result, it is already a mature, tried and tested solution that you can depend on.

Telemetry is a key requirement in most water applications and the ACP includes support for a comprehensive range of SCADA functions. This enables remote control and maintenance of widely distributed sites distant from the central control station.

The key components of the ACP package include:

- Engineering drawings for facility design (EPLAN)
- Programmes for PLC, HMI and inverter hardware
- Parameter settings for inverters and modems
- Technical manuals
- Quotation texts
- Commissioning documentation



Implement projects faster at lower cost

The ACP handles the following key functions:

- Water level monitoring and pump control
- Local testing functions for maintenance
- Alarm handling
- Remote communications (line or GSM for remote maintenance)
- Data logging

Finally, key operation metrics for reporting are also available:

- Operating hours counter
- Number of starts
- Trend graphs for power consumption, levels and flows

The end result is a pre-configured solution that reduces the design and implementation work for pump and weir applications by up to 80 %, while still maintaining the required degree of flexibility to meet specific installation requirements.



Remote maintenance solutions



Staying in control

Remote monitoring

Given the distributed nature of most water industry infrastructure, it's essential to be able to monitor systems remotely. The Extend 7000 mobile visualization solution from e-F@ctory partner Schad makes innovative use of mobile handset technology for remote monitoring. Extend 7000 keeps plant technicians, maintenance personnel and management updated on plant status round the clock with the popular BlackBerry® handset, ensuring fast response times.

Fast response

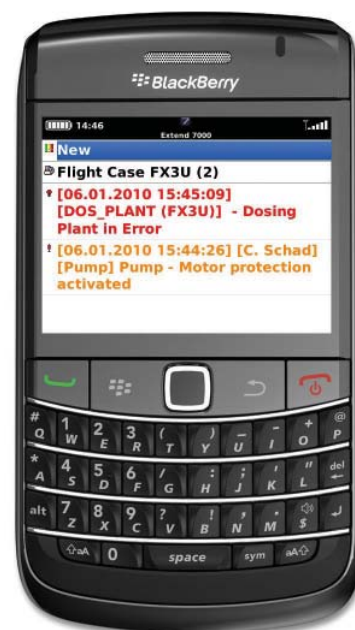
The Extend 7000 solution uses several key components to provide this real time overview. The backbone of the system is the System Server, which includes the Device Manager and System Manager. These components provide communications to the BlackBerry® wireless infrastructure while also exchanging information with the Project Server.

The Project server incorporates Communication, Notification and Trend Servers, who collectively handle communications with plant equipment like the Mitsubishi programmable controller product line. The architecture uses proven Microsoft® SQL Server technology to operate the System and Project information databases and runs under Windows Server operating systems. This ensures easy installation, configuration and maintenance. End-to-end 256-bit AES encryption assures maximum security. Extend 7000 is sold as a complete solution package.

Location independent access

The Extend 7000 software makes it possible to keep all personnel informed of equipment status and incidents in real time. Nearby workers are able to respond directly, allowing potential problems to be addressed before serious issues can develop. And since Extend 7000 includes control functions as well as monitoring, technicians can also take corrective action remotely when immediate site access is not possible.

Another important feature is the ability to establish remote video links with the solution.



Experience you can rely on



Success at all stages



Weir control system

Mitsubishi Electric's pedigree in the water industry stretches back over the past 20 years. We have extensive relationships with major water utilities throughout Europe and have been responsible for the automation of some of the largest installations in the region. Our projects are reliably meeting the requirements of literally millions of people, safely handling both supply and treatment needs, day in day out. The testimonials on this page are just a selection of our satisfied customers.

■ **Hamburg Municipal Waterworks and Sewage Treatment Plant, Hamburg, Germany**

The plant serves 2.2 million people in Hamburg and is the city's main waterworks and sewage treatment plant. Key requirements for the project included distributed architecture, high data processing capacity and maximum availability. The firm KH Automation Projects GmbH updated the sewage treatment plant with a new system based on the Mitsubishi iQ Platform, installing a total of over 100,000 I/O points and around 120 controllers.

■ **Nuremburg Municipal Sewage Treatment Plants 1 and 2, Nuremburg, Germany**

These two plants serve the Greater Nuremburg area, which has a population of around 1.4 million. Here too, a distributed architecture was essential due to the size of the plants. The distributed process control system installed by KH Automation Projects delivers the goods with the help of Mitsubishi's iQ Platform. A total of around 80,000 I/O points and 92 controllers were installed in this system.

■ **ARA Sindlingen Sewage Treatment Plant, Frankfurt, Germany**

"The ease of installation, especially in existing measurement and control installations, combined with the simple operation and extremely high reliability, were a major decision maker for Mitsubishi Electric." H.P. Schneider, Head of Maintenance

■ **Aha Waste Management Association, Hannover, Germany**

FR-F740 inverters used in the association's water treatment plant have delivered a two year pay back period, while raising the efficiency of the entire plant, driving 12 rotary piston pumps around the clock, 365 days a year.

■ **Vestfold Intermunicipal Waterwork Authority, Vestfold, Norway**

"Mitsubishi products provide good quality. So far we have not experienced any failures of the iQ Platform controllers in our installation." John Hagen, Operations Manager

■ **Lillevik Wastewater Treatment Plant, Lillevik, Norway**

"Start up of the facility and staff training went smoothly thanks to good products and skilled employees with in-depth knowledge of the industry." Sven Seierstad, Operations Manager

■ **Alexander Bröckle Gruppe, Electrical Wholesalers covering SW Germany, E France, Austria and Switzerland**

"The uniform structure of parameters and menus between different inverter models, combined with the simple operation, allows a high degree of harmonization across different installations in a plant. Our installations have many satisfied customers, partly due to the unbeatable Mitsubishi reliability" Christian Beilke, Electrical Technician/Sales Staff

Glossary

Aqua Control Pack: A pre-configured solution for pump and weir applications that permits rapid project implementation, supported by system documentation.

Remote I/O: Input and output devices intended to function as part of a control system while being located remotely from the main PLC. Provides greater installation flexibility and reduces cost by reducing the amount of actual controller hardware required. Usually connected to the main PLC via a network.

DNP3: A dedicated communications protocol used widely in the water industry (Distributed Network Protocol 3)

Frequency inverter / energy efficiency/regeneration: Frequency inverters regulate the speed and torque of electrical motors, for example the motors that drive pumps. Inverters are often used because they reduce power consumption, improve motor regulation characteristics and also increase reliability. The inverters of the FR-F700 series used in the examples in this brochure are designed specially for the needs of pump applications.

Regenerative frequency inverter: These devices can further reduce power consumption by feeding unused power from the DC bus back into the mains. Inverters that can transfer power in both directions – between the DC bus and the motor and from braking energy back into the DC bus – are referred to as four-quadrant inverters.

Harmonics: These are sinusoidal fluctuations in the power supply whose frequencies are whole multiples of the 50Hz mains frequency (e.g. 100, 150, 200, 250 Hz etc.). They distort the normal sinusoidal mains voltage. Harmonics are caused by dedicated devices that do not have sinusoidal power consumption. Both passive and active filters are deployed to reduce harmonics.

FDT/DTM: An open standard technology for the configuration of field devices used in automation technology. The FDT technology defines the communication and configuration interface between all field systems and host devices. The Device Type Manager (DTM) is essentially a driver. The term FDT (Field Device Tool) refers to an interface definition rather than a specific program.

EMC: Electro-Magnetic Compatibility is an important objective in the design of electrical systems. Devices that are electromagnetically compatible keep electrical and electro-magnetic interference with each other to a minimum.

Global System for Mobile communications (GSM): De-facto standard for mobile telephony systems. Used by remote system modems to maintain communication with central control stations.

General Packet Radio Service (GPRS): A mobile data service using packet switching to transfer data.

HART: The HART (Highway Addressable Remote Transducer) protocol is a global standard for sending and receiving digital information between control and monitoring devices and systems via analog lines.

HART modules: Enable simple optimized configuration and monitoring of connected devices such as sensors using digital signals overlaid on the standard 4-20mA loop current on legacy two-wire instrumentation cables.

Human Machine Interface (HMI): A display panel that provides an indication of the state of a process, while also usually allowing operator input, often via a touch sensitive screen. The GOT Series is a typical example of a touch screen HMI.

IEC 61131-3: A standard for PLC programming. Makes it possible to write standardized, reusable PLC programs and function blocks.

IEC 60870: International standard defining control and monitoring communications for electrical power systems.

Modem: Short for Modulator/ Demodulator. An electronic device which transmits and receives data either over wired or wireless links by adding digital data to an analogue signal.

NAMUR: One of the central requirements of NE 124 is that manufacturers should provide standardized solutions to enable maximum inter-operability and exchangeability between systems from different manufacturers.

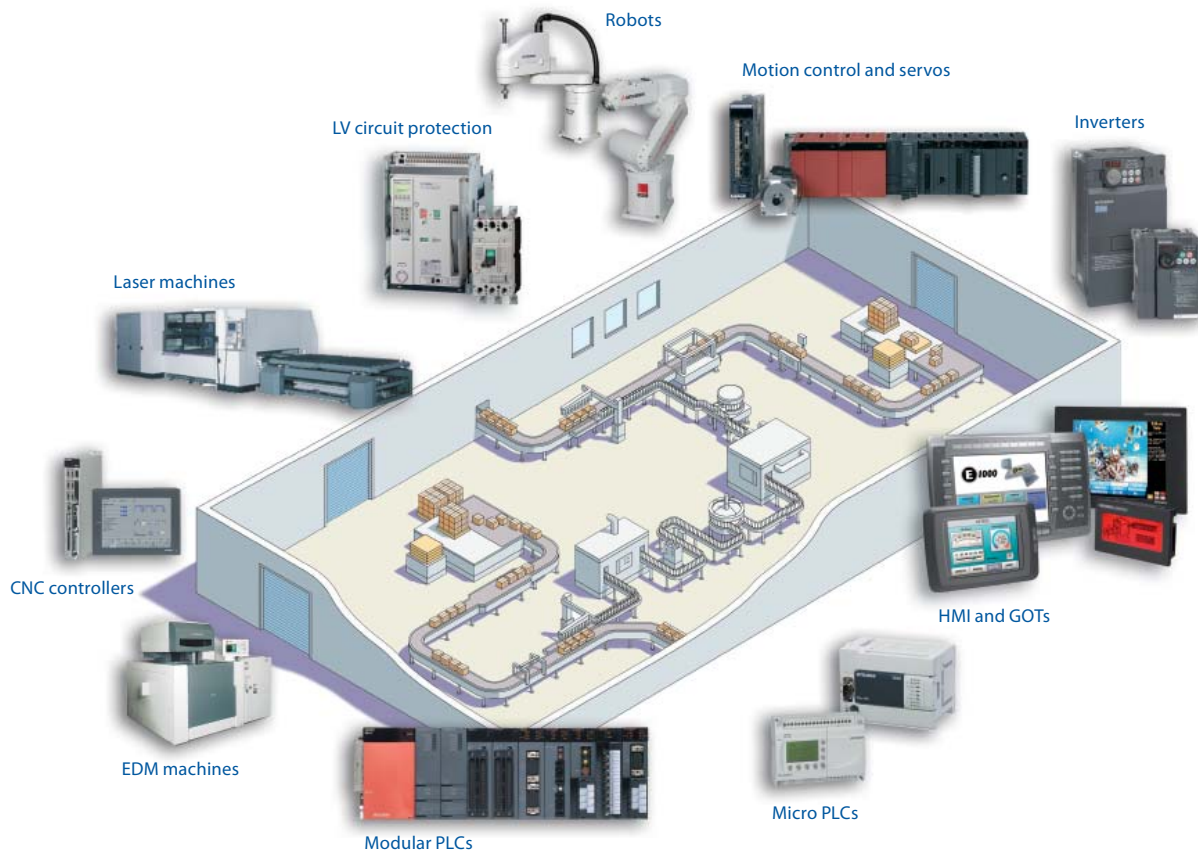
Network: An electronic scheme for communicating with remote devices and transferring information. Can be connected using cables or wirelessly. Usually reduces the cost of installations by decreasing the amount of cabling required. Typical networks include CC-Link IE, Ethernet and Profibus.

Programmable Logic Controller (PLC): Electronic apparatus running a stored program to maintain control of a system via monitoring the state of input devices and varying the state of output devices. Typical examples include the iQ Automation Platform and FX PLC.

Telemetry: Process of monitoring and/or controlling remote assets, typically via radio or telephone/data link.

Distributed process control system: A process control system developed by KH Automation Projects GmbH. It is based on a distributed architecture and enables full integration with the help of Mitsubishi iQ Platform. It is a central engineering environment for control systems and Mitsubishi iQ Platform. Implements the single-source principle (text and TAG name for plant identification system only need to be entered once).

A world of automation solutions



Mitsubishi offer a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines

A name to trust

Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation represents space development, transportation, semiconductors, energy systems, communications and information processing, audio visual equipment, home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on a Mitsubishi automation solution – because we know first hand about the need for reliable, efficient, easy-to-use automation and control.

As one of the world's leading companies with a global turnover of 4 trillion Yen (approximately \$40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.

Global partner. Local friend.

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Specifications subject to change // Art. no. 235007-A // 09.2010
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