

## M-SYSTEM CO., LTD.

Headquarters, International Department & Factory

5-2-55, Minamitsumori, Nishinari-ku, Osaka  
557-0063 JAPAN  
Tel: +81-(0)6-6659-8201  
Fax: +81-(0)6-6659-8510  
E-mail: info@m-system.co.jp

## M-SYSTEM CHINA CO., LTD.

Room03, 12/F Building II, No533,  
Loushanguan Road, ChangNing District,  
Shanghai 200051 P.R.China  
Tel: +86-(0)21-6237-2015, 2016  
Fax: +86-(0)21-6237-2017  
E-mail: info-c@m-system.co.jp

## MG KOREA CO., LTD.

9F, Yungseong Bldg., 230-1, Bangbae-ro,  
Seocho-gu, Seoul, 137-060, Korea  
Tel: +82-(0)2-548-8203  
Fax: +82-(0)70-8282-8262  
E-Mail: mgkorea@m-system.co.jp

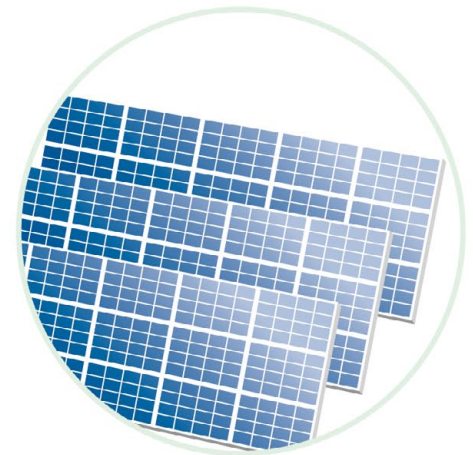
## MGTEC ASIA PTE. LTD.

Penthouse Level  
Suntec Tower Three  
8 Temasek Boulevard  
Singapore 038988  
Tel: +65-6866-3202 & 6866-3207  
Fax: +65-6866 3838

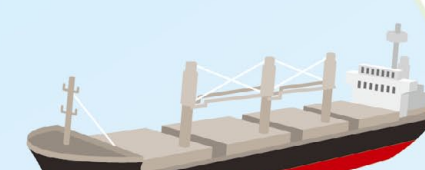
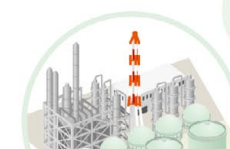


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Tel: +81-(0)6-6659-8201 Fax: +81-(0)6-6659-8510

URL [www.m-system.com](http://www.m-system.com) E-mail [info@m-system.co.jp](mailto:info@m-system.co.jp)



# Application Examples




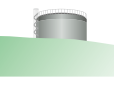


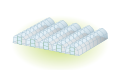


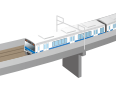
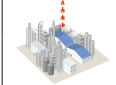

Application Examples\_R1\_150311

Specifications are subject to change without notice. When ordering, use the latest data sheets available at M-System web site: [www.m-system.com](http://www.m-system.com)






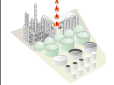
[www.m-system.com](http://www.m-system.com)



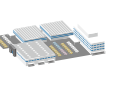
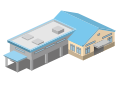


# APPLICATION MAP

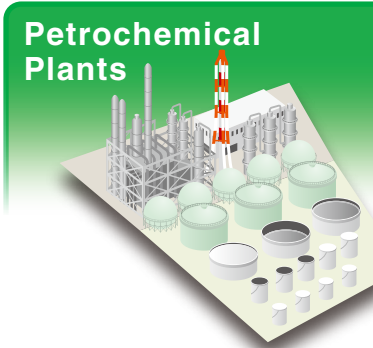
 <b>1 Photovoltaic Generation</b> <b>Page 7</b> <ul style="list-style-type: none"> <li>Lightning Surge Protection for Photovoltaic Systems</li> </ul>	 <b>3 Highway Systems</b> <b>Page 6</b> <ul style="list-style-type: none"> <li>Power Monitoring Systems for Motorway Service Stations</li> </ul>
 <b>2 Wind Power Generation</b> <b>Page 6</b> <ul style="list-style-type: none"> <li>Turbine Blade Angle Detection and Power Output Determination</li> </ul>	 <b>4 Distribution Reservoir</b> <b>Page 9</b> <ul style="list-style-type: none"> <li>Remote Monitoring of Distribution Reservoir(s)</li> </ul>

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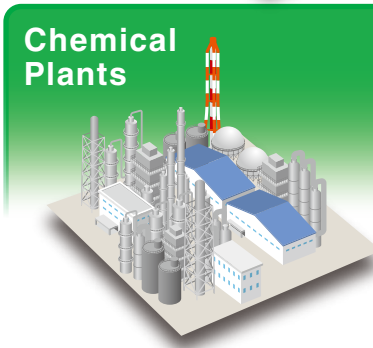
**Petrochemical Plants**

**Measuring Fluid Temperature**

Protection tubes like thermowell or sheath are commonly used to provide isolation between temperature sensors (thermocouple, RTD) and the environment. **Head-mounted 2-wire signal conditioners** are mounted in the connection head of protector tube, converting input from the sensor into a 4-20 mA DC signal. Transmitting with 4-20 mA current signal provides for the measurement accuracy without needing to invest for expensive extension wires.

**Displaying Tank Liquid Level in Hazardous Area**

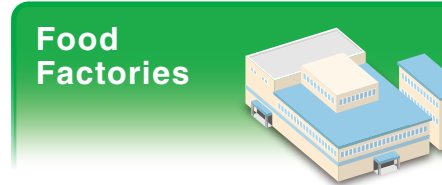
In a hazardous area that must "eliminate conditions to induce explosions caused by electric energy", it is avoided to use an indicator that requires high-energy consumption. The **6DV-B Loop Powered Indicator** requiring only low energy from the current loop provides a bright display in hazardous locations.



**Chemical Plants**

**Controlling Pneumatic Valves Opening**

In places like oil or chemical plants, many control valves are installed in the premise to control the liquid flow volume. The **SC100/200 Series Multi-function PID Controller** controls the valve opening by the PID control based on the measured values from the flowmeter. Actuators for pneumatic control valves have two different types of input (control signal): pneumatic pressure signal and electric signal. For the pneumatic pressure signal, an **I/P transducer** is used to convert electric signal of the **multi-function PID controller** into pneumatic pressure signal.



**Food Factories**

**Sensor Signal Input to PLC**

**Signal conditioners** are used to process measured signals at the front end of PLC system. Typically they convert sensor specific signals into standard instrumentation signals, provide limit alarm contact outputs, or apply simple math functions such as ratio calculation.



**Waste Incineration Plants**

**Waste Incineration and Energy Reuse**

At waste incineration plant, there are a wide range of control and monitoring processes for combustion control, flue gas treatment, waste heat utilization by cogeneration, for which **signal conditioners** and **limit alarms** are utilized in various areas.



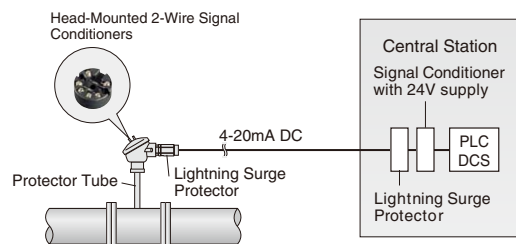
**Public Aquaria**

**Sea-Water Circulation System and Temperature Control**

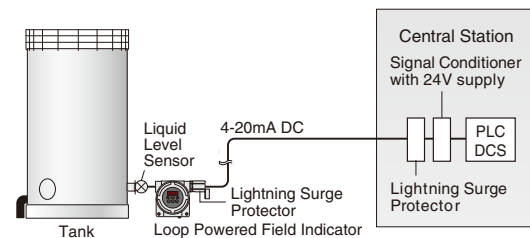
In an aquarium where a large volume of seawater must be circulated and controlled at adequate temperature, there are many points of flow control and temperature monitoring. That also consumes a large amount of energy, for which **power transducers** and power monitoring systems are used.

**Head-Mounted 2-Wire Signal Conditioners, Loop Powered Field Indicator, Lightning Surge Protector**

**Measuring Fluid Temperature**



**Displaying Tank Liquid Level in Hazardous Area (explosion-proof area)**



**Head-mounted 2-wire Signal Conditioner 27RS**



**Loop Powered Field Indicator 6DV-B/6DVI-B**



**Signal Conditioner with 24V supply M2DY**



**Lightning Surge Protector for Standard Signal Line & Pulse Use MDP-24-1**

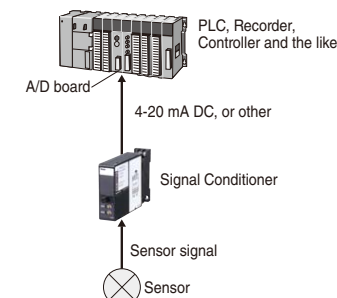


**Lightning Surge Protector for Standard Signal Line & Pulse Use (Conduit Mount, Weather-proof, 24 V DC Line Voltage) MD6N-24**



**Signal Conditioner, Power Transducer, Limit Alarm**

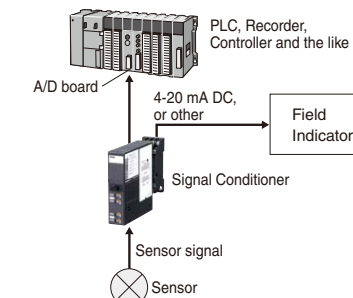
**Converts Sensor Outputs into Signals for PLCs and Recorders**



**Compact Plug-in Signal Conditioners Mini-M Series**



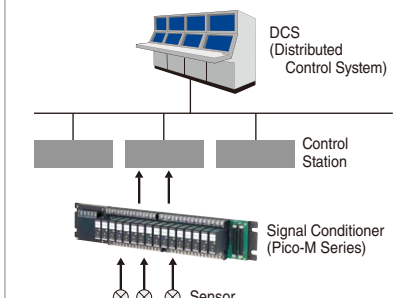
**Outputs Digital Signals for Field Indicators in addition to PLCs or Recorders**



**Compact Plug-in Signal Splitters Mini-MW Series**



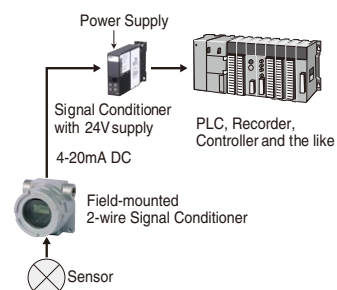
**For Replacement of Existing Field DCS**



**Dual Output Super-mini Signal Conditioners Pico-M Series**



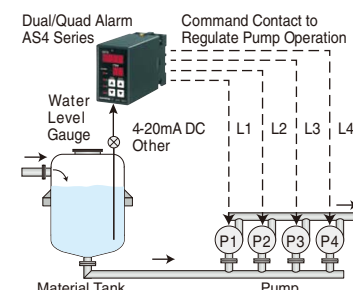
**2-Wire System Converts and Transmits On-site Sensor Signals**



**Field-mounted 2-wire Signal Conditioners B6-UNIT Series**



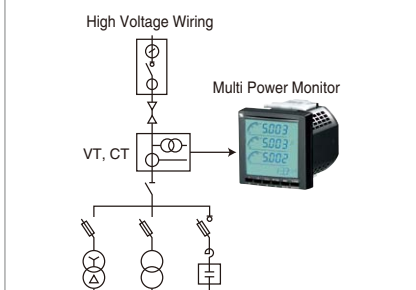
**4-point Alarm System Optimizes the Number of Pumps being Operated**



**Digital Adjustments Dual/Quad Alarms AS4 Series**



**Power Monitoring System**

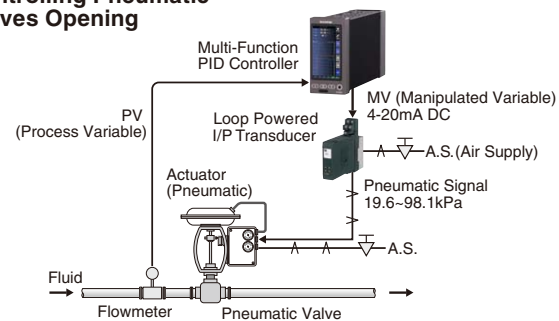


**Multi Power Monitors 53U Series**



**Multi-Function PID Controller & I/P Transducer**

**Controlling Pneumatic Valves Opening**



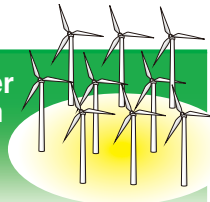
**Multi-Function PID Controller SC Series**



**Loop Powered I/P Transducer HVPN**



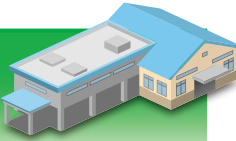
**Wind Power Generation**



**Turbine Blade Angle Detection and Power Output Determination**

2-wire potentiometer transmitters are used to detect wind turbine blade angles so that they are controlled depending upon the wind force for optimal operations of a wind power generation system. Multi power monitors and transducers are used to measure generated electric power.

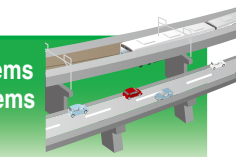
**Fishery Harbor**



**Power Monitoring of Ice Machines and Cold Storage Warehouses**

Equipment such as deep-freezers or ice machines are indispensable for fish and seafood processing facilities or storages in a fishery harbor. These facilities implement systems to control temperature and monitor power consumption, utilizing a wide range of signal conditioners and multi power monitors.

**Railroad Systems Highway Systems**

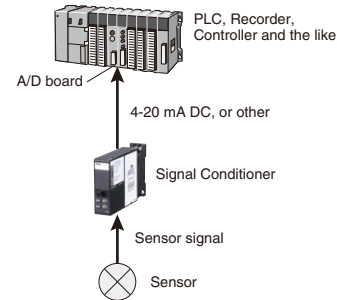


**Power Monitoring Systems for Railroad Stations or Motorway Service Stations**

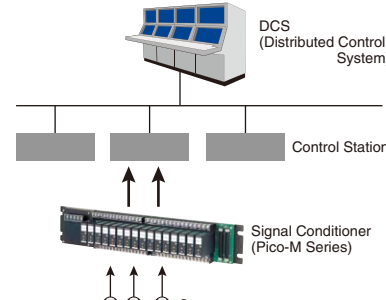
Power monitoring systems are implemented for efficient use of energy in railroad stations and motorway service stations, where power transducers and multi power monitors are used.

**Signal Conditioner, Power Transducer, Limit Alarm**

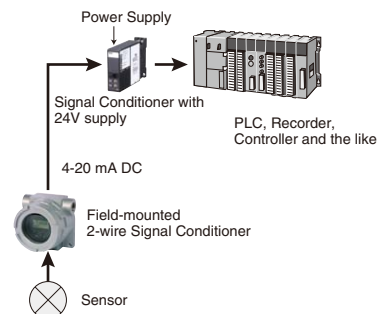
**Converts Sensor Outputs into Signals for PLCs and Recorders**



**For Replacement of Existing Field DCS**



**2-wire System Converts and Transmits On-site Sensor Signals**



**Compact Plug-in Signal Conditioners Mini-M Series**



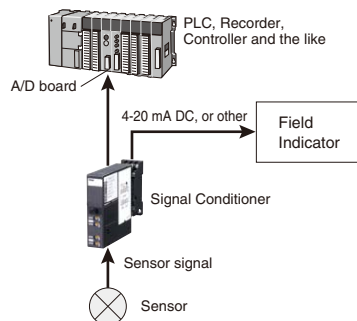
**Dual Output Super-mini Signal Conditioners Pico-M Series**



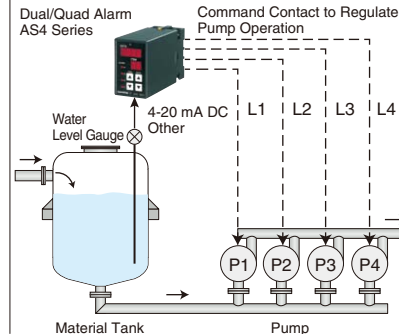
**Field-mounted 2-wire Signal Conditioners B6-UNIT Series**



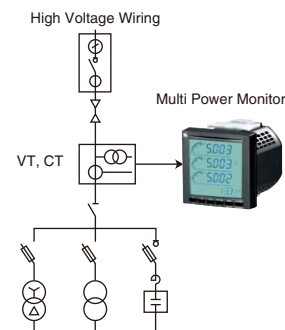
**Outputs Digital Signals for Field Indicators in addition to PLCs or Recorders**



**4-point Alarm System Optimizes the Number of Pumps being Operated**



**Power Monitoring System**



**Compact Plug-in Signal Splitters Mini-MW Series**



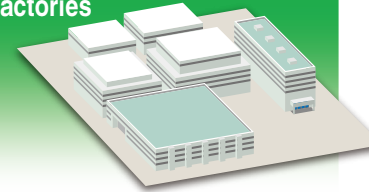
**Digital Adjustments Dual/Quad Alarms AS4 Series**



**Multi Power Monitors 53U Series**



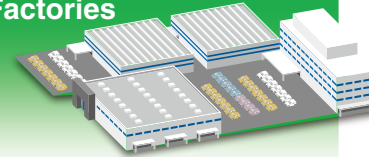
**Semiconductor Factories**



**Semiconductor Cleaning Equipment I/O and Safety Measures**

Various signal conditioners are used in semiconductor related manufacturing processes. In addition, we introduce here an application of the R8 Series Remote I/O modules with interlocking function, which have been developed by a customer's requirement for cleaning equipment. In normal conditions, I/O signals are processed via network (EtherCAT). However, in an event of malfunction, specific or all output signals can be turned off by an interlocking command contact input. The equipment can be halted by direct local control without using the communication network.

**Automotive Factories**



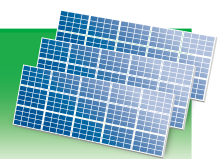
**Automotive Coating System**

Coatings applied to automotive parts or components require sophisticated technologies. The remote I/O system that supports HLS, ultra high-speed, high-reliability field network, is adopted in coating processes as a solution to provide high-speed and high-accuracy control of multiple coating spray nozzles.

**High-Speed Sampling Tests of Automotive Engines**

High-speed isolation amplifiers are adopted for the development of high-speed voltage input boards for the automotive engine testing equipment.

**Photovoltaic Generation**

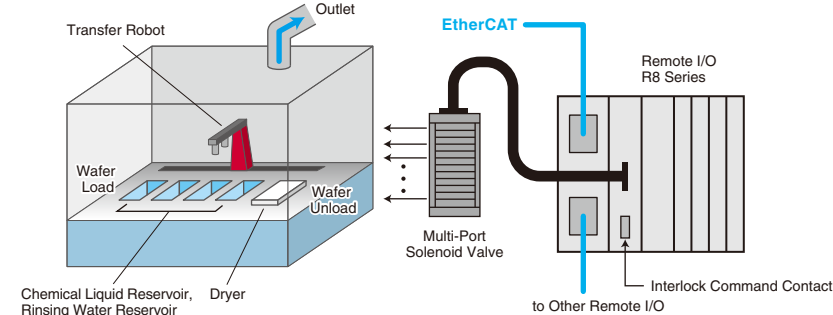


**Lightning Surge Protection for Photovoltaic Systems**

Tidily aligned photovoltaic modules and their wiring installed in a vast site are highly susceptible to induced lightning. Lightning surge protectors protect photovoltaic modules and power conditioners used in solar generation systems.

**Remote I/O**

**Remote I/O for Semiconductor Cleaning Equipment**

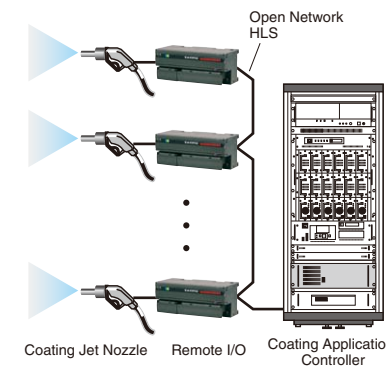


**Slice Type, Mixed Signal Remote I/O R8 Series**



**Remote I/O**

**Automotive Coating System**

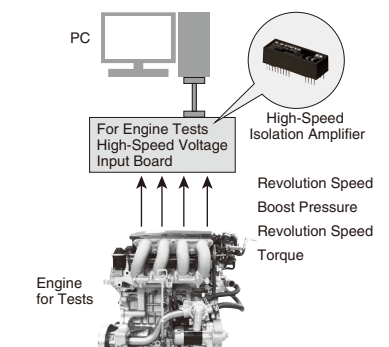


**Compact Remote I/O for HLS R7HL Series**



**Isolation Amplifier**

**Tests and Measurements of Automotive Engine Performance**

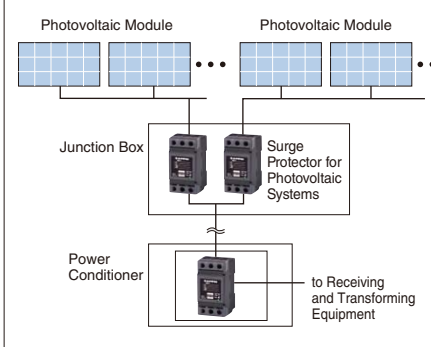


**High-Speed Isolation Amplifier 20VF**



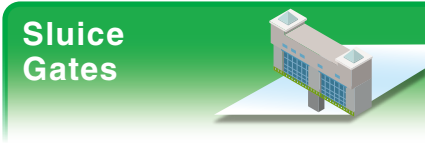
**Lightning Surge Protector**

**Lightning Protection for Photovoltaic Systems**



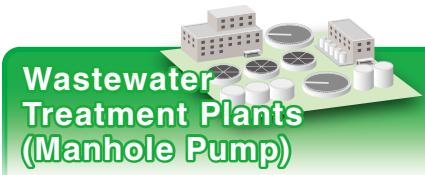
**Surge Protector for Photovoltaic Systems MATP**





### Sluice Gate Automation and Remote Monitoring

Sluices are built at river confluences where tributaries flow into the main stream. To prevent flowback of water into feeder streams, sluices are closed when the water level of a river rises high. Though most sluices are unmanned except at such times, once a rapid water level rise is observed, the gates require immediate operation. The DL8 Series Web Data Loggers provide a systematic solution for monitoring and recording of river water levels, and for opening/closing water gates automatically if an abnormality is detected.



### Wide-Area Remote Monitoring of Manhole Pumps

Sewers are generally gravity powered, though pumps may be used when necessary; for instance, where pressurized force is needed to convey water through undulating land or over long distances. A manhole pump lifts up sewer water to a higher elevation and then discharges the water to another gravity sewer. Terrain conditions in some areas require many pumps, however, which need time-consuming routine maintenance work. The DL8 Series Web Data Loggers provide an unmanned monitoring and reporting system to cover a number of manholes installed in a wide area.



### Remote Monitoring of Distribution Reservoir(s)

Service water filtered at a water purification plant is typically lifted up to a distribution reservoir, then re-distributed downstream by gravity power for domestic use. The DL8 Series Web Data Loggers provide a monitoring system for distribution reservoirs, most of which are unmanned during operation.



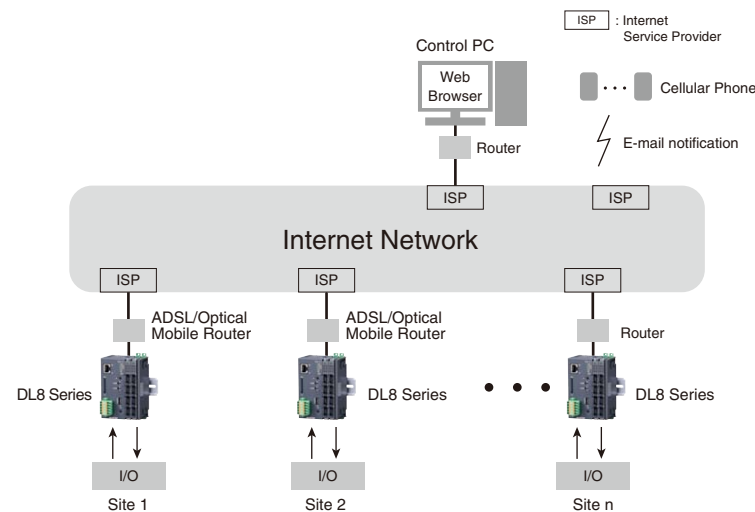
### Centralized Monitoring System

Data collected from sluices and distribution reservoirs, as well as local water purification plants or pumping stations, is centrally monitored at water purification plants or local government offices.

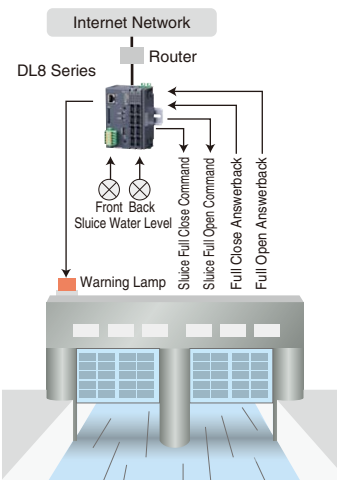
#### Web Data Logger, Remote I/O

##### Wide-Area, Remote Monitoring

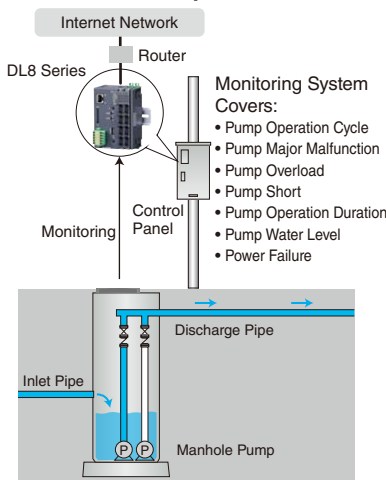
DL8 Series Web Data Logger with web server function monitors sites and provides data logging and event alerts. Operators only need internet access to grasp real-time water levels.



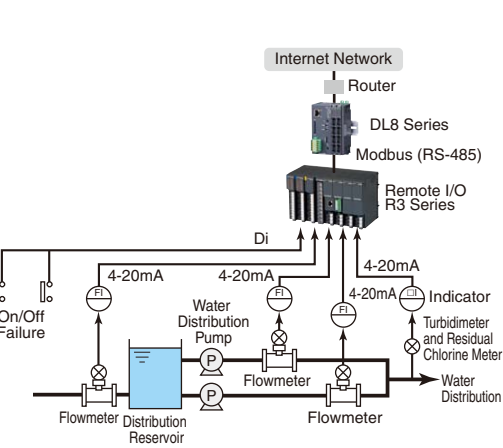
##### Remote Monitoring and Control of Sluice Gates



##### Remote Monitoring of Manhole Pumps



##### Remote Monitoring of Distribution Reservoir(s)



#### Web Data Loggers DL8 Series



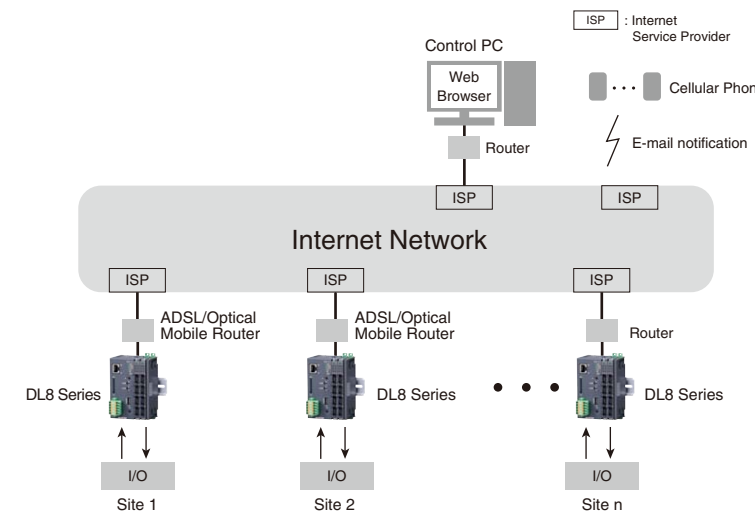
#### Multi-channel, Mixed Signal Remote I/O R3 Series



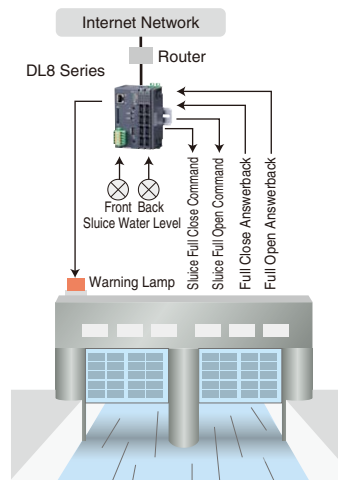
#### Web Data Logger, Remote I/O

##### Wide-Area, Remote Monitoring

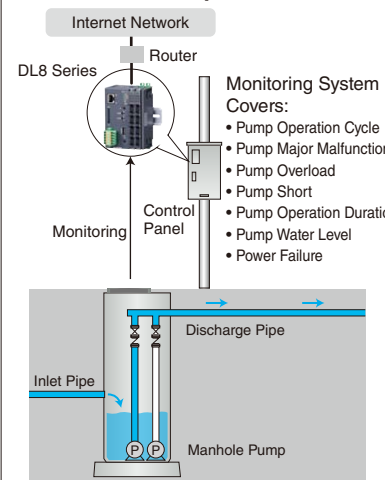
DL8 Series Web Data Logger with web server function monitors sites and provides data logging and event alerts. Operators only need internet access to grasp real-time water levels.



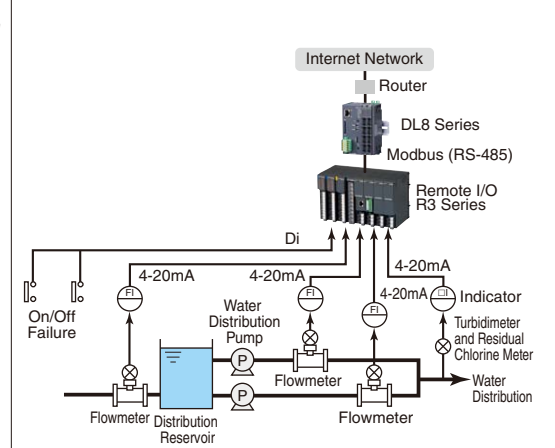
##### Remote Monitoring and Control of Sluice Gates



##### Remote Monitoring of Manhole Pumps



##### Remote Monitoring of Distribution Reservoir(s)



#### Web Data Loggers DL8 Series



#### Multi-channel, Mixed Signal Remote I/O R3 Series



Office Buildings

**Air Conditioning Control for Large Offices**

In large buildings, heat source equipment such as boilers and freezers are commonly installed in machine rooms to provide overall air-conditioning. Each story has an air handling unit (AHU) that distributes cooled (or heated) air to the floor. The air flow from the AHU is increased or reduced at a damper motor that is controlled by a **variable air volume (VAV) controller**. It receives the readout on the wind sensor and the temperature setting on the remote controller, and adjusts the aperture of the damper to keep room temperature as close to the preset one as possible.

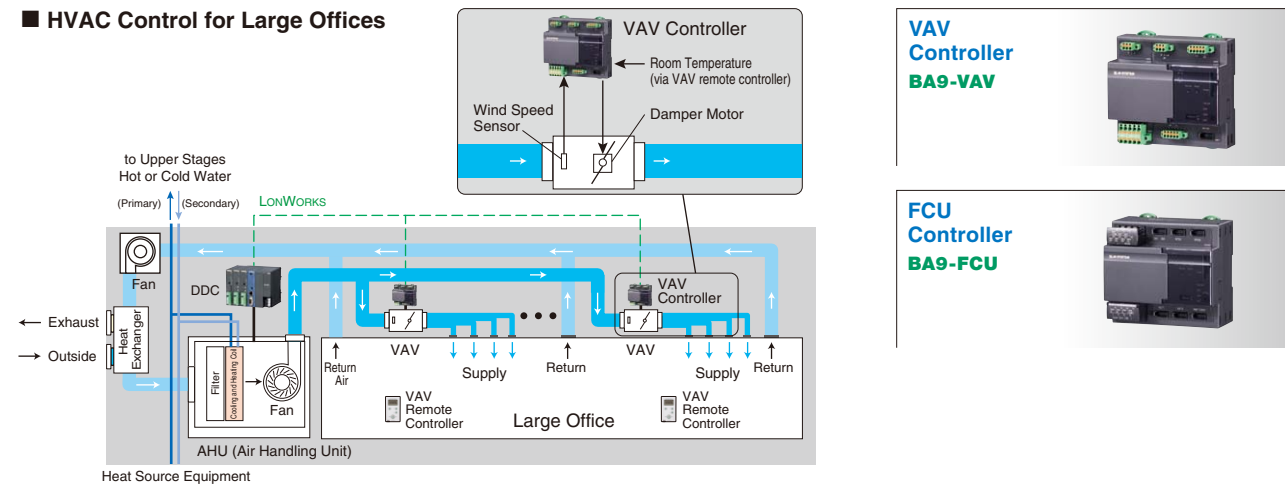
**Air Conditioning Control for Small Rooms and Window Perimeter**

In small office rooms or places where temperature conditions vary due to exposure to sunlight, fan coil units (FCU) are in common use. Heat source (hot and/or cold water) is supplied per unit to control temperatures of individual rooms. The **FCU controller** provides control of hot and/or cold water valves and a fan of the FCU in the room so that the room temperature is stabilized at as close to the preset one as possible.

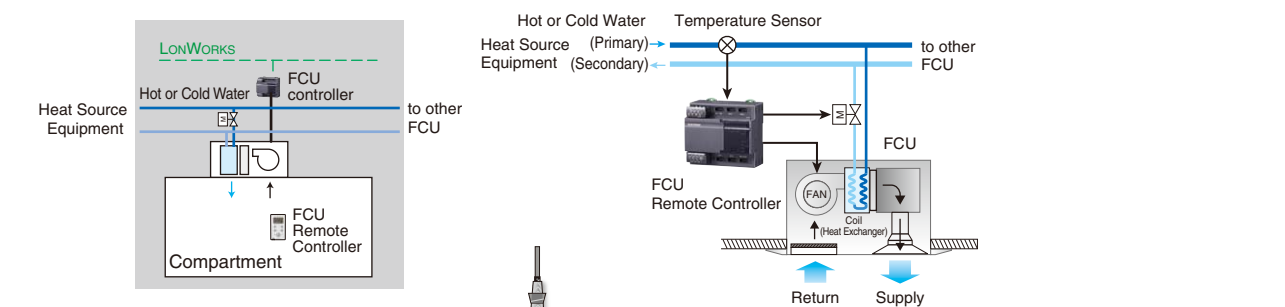
Applications introduced in this page are only available in Japanese market or for limited example outside Japan.

BA Controller

■ HVAC Control for Large Offices

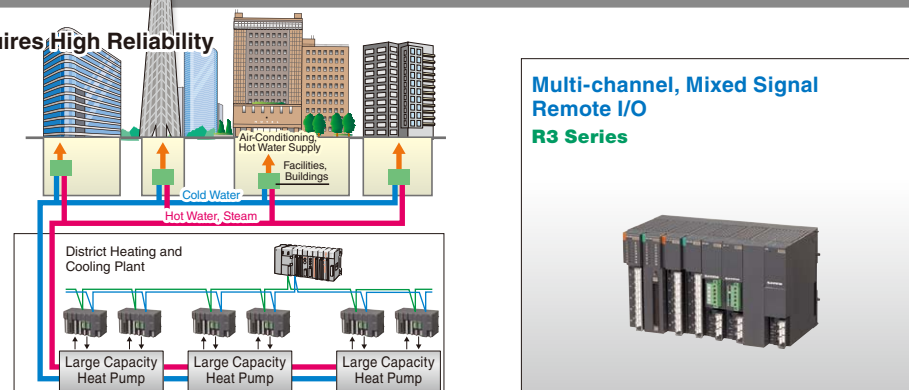


■ HVAC Control System for Cubicles and Window Areas



Remote I/O

■ Signal Transmission that Requires High Reliability



Business Districts

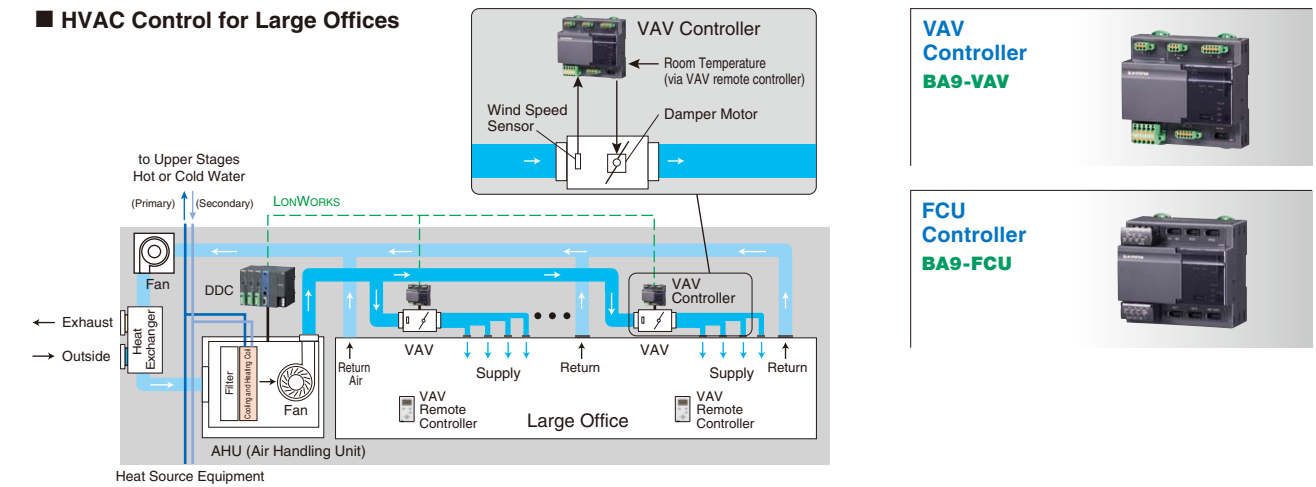
**Signal Transmission that Requires High Reliability**

District Heating & Cooling (DHC) is a system for distributing cool/hot water or steam generated in one or more heat generator plants via local piping network to residential and commercial locations within its supply area for cooling, heating and/or water heating. For heat generator plant operation, reliability counts more than anything. Its nature also requires temperature measurements with excellent accuracy as well as versatile compatibility to support various signal types. The **R3 Series Remote I/O** supports communication redundancy and offers a wide range of input module types including high accuracy temperature input, all of that contributing to widespread use among many DHCs.

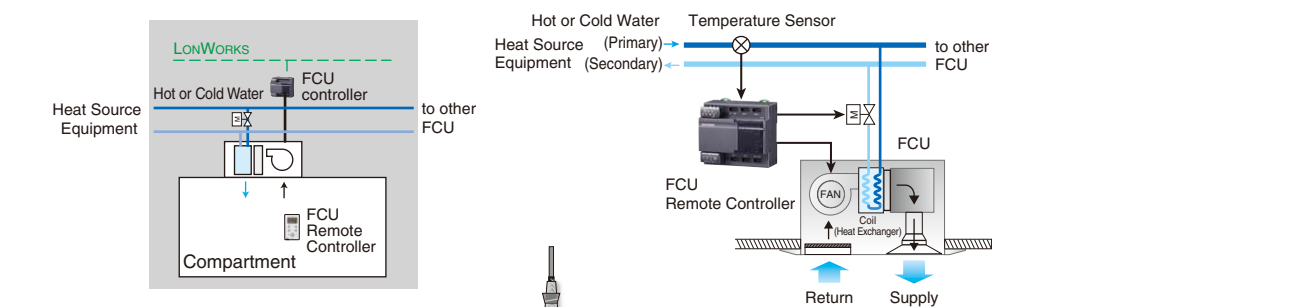
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BA Controller

■ HVAC Control for Large Offices

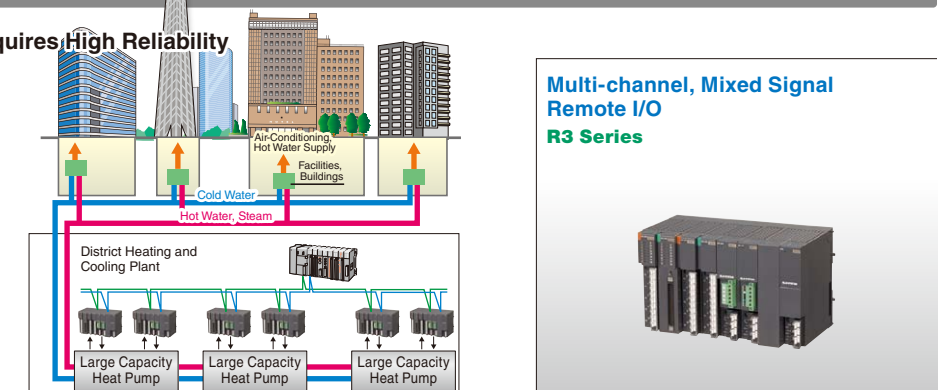


■ HVAC Control System for Cubicles and Window Areas

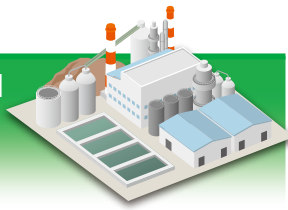


Remote I/O

■ Signal Transmission that Requires High Reliability



**Pulp and Paper Mills**



**CP Controller of Paper Machines**

A CP controller is a device that provides systematic control for uniformized distribution of paper weight in  $gsm^{*1}$ . To the controller, a large number of dilution water lines are connected, and each line has a control valve attached to it. Accurate control of these control valves enables fine adjustment of the dilution water flow passing through each line, consequently producing a uniform transverse weight of paper per unit area. The **MSP Series Electric Actuators** are in use as electric actuator for the control valves. Typically, one CP controller needs 50-100 control valves. The **MSP Series** with communication function allows all network wiring to be allocated in series reducing wiring work.

\*1: weight of paper per unit area

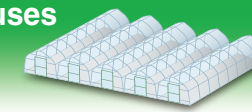
**Vessels**



**Cooling Control System for Marine Engines**

**Rotary motion electric actuators** are in use for cooling systems of marine diesel engines. They control pure water temperatures to cool diesel engines, as well as 3-way valve apertures that maintain adequate sea-water temperatures for cooling air. For marine use, equipment must endure harsher conditions than those for onshore equipment so as to assure safe navigation of the vessels. Approval certificates of classification societies are granted for electric devices or equipment that can endure such conditions. The **PRP Rotary Motion Electric Actuator** has been accredited by Lloyd's Register Marine classification, the certification of longest standing among the international classification societies.

**Greenhouses**

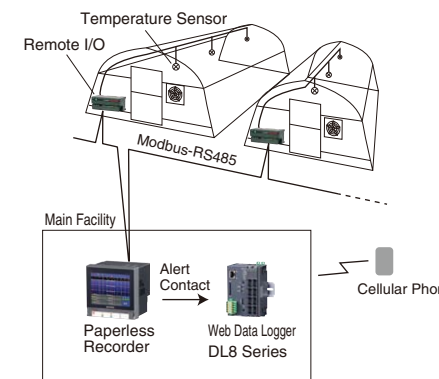


**Temperature Log and Monitoring of Greenhouses**

Sophisticated agricultural management for greenhouse cultivation requires good control of temperature monitoring and recording. **Paperless recorders** that support network connection provide an economical solution that cover multi-point temperature logs in large greenhouses. The **DL8 Series Web Data Logger** sends out e-mail notification to cellular phones when it detects high temperature in a greenhouse.

**Paperless Recorder, Web Data Logger**

**Temperature Log and Monitoring of Greenhouses**



**Paperless Recorder 73VR1100**

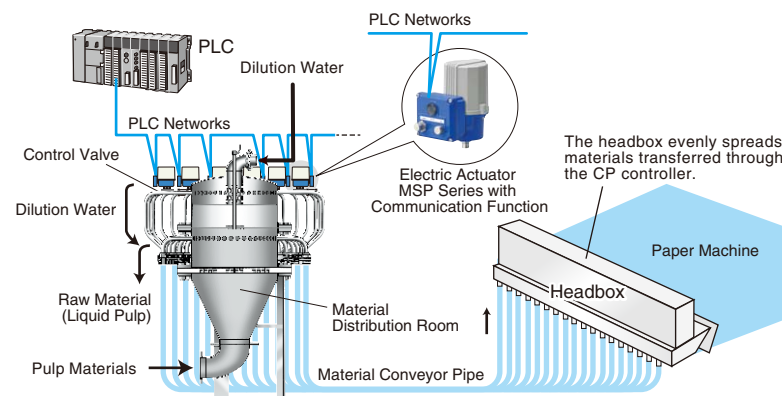


**Web Data Logger DL8 Series**



**Electric Actuator**

**CP Control System of Paper Machines**



**Open Network Capable Linear / Rotary Motion Electric Actuators MSP/ MRP Series**



**Electric Actuator PRP Series (rotary type; max. torque 200 N·m, Lloyd's Register type approved)**



**Cooling Control System for Marine Engines**

