

Generate better performance.



Combined Cycle Power Generation

Leverage Emerson's valves, actuators, regulators, and services to reduce operating costs and improve your plant flexibility, availability, and reliability.





How will you continue to meet your targets in the face of such dramatic change?

As a power producer, you're facing dynamic times. You're now cycling your plant more often to meet load balancing requirements, optimize fuel costs, and accommodate renewables on the grid. These operating conditions create increased thermal and mechanical stresses on your equipment and can push them to failure.

Yet to meet your commitments, you need to drive higher plant availability while being challenged to do more with constrained resources and a diminishing workforce.

Conditions are now more difficult than ever for you to achieve your generation and financial targets. But what if there was an expert partner you could turn to, that could help you navigate these challenging times?

Focused productivity investments are needed to meet generation targets and control operating costs.

60-80% of all power plant failures are related to cycling operations.

– “Make Your Plant Ready for Cycling Operations”
Power Magazine, August, 2011



A typical 400MW plant loses \$1.175M each year due to unplanned outages.

– “Quantifying the Cost of Unplanned Outages”
Energy-Tech, August, 2012



In the US alone, 25% of electric utility workers will be ready to retire within 5 years.

– Transforming the Nation's Electricity System
QER Task Force, January, 2017



Meet load demands faster and more reliably with the help of a trusted expert

To remain competitive and meet both your generation and financial targets, you need to adapt. Emerson's power industry experts can show you how optimizing final control solutions, such as control valves, critical isolation valves, pressure relief valves, regulators, actuators, steam traps, and instrumentation can reduce your operating costs and enhance plant generating efficiency.



Optimize your plant for cycling operations

- Improve the speed, quality, and accuracy of your fuel gas delivery system
- Design in flexibility to improve ramp rates and boost unit responsiveness
- Increase plant efficiency with precise measurement and control solutions

The Fisher™ fuel regulator provided responsive pressure control without a single unit trip for more than two years and required no maintenance.
– Results for one US Power Plant



Improve plant availability while reducing operating costs

- Implement solutions that perform longer in increased cycling conditions
- Minimize downtime with solutions that are engineered for rapid maintenance
- Monitor valve performance to predict and proactively address potential failures

Emerson's Yarway™ Welbond repairable valve can reduce costs by 58% over 3 repair cycles.
– “Cost Benefits of Critical Valve Repair” - Power Engineering, 2015



Harness the expertise and resources of a Main Valve Partner™

- Leverage Emerson's smart technologies to unburden your workforce
- Engineer efficiency into your plant with the help of Emerson's power experts
- Reach new heights of performance with genuine OEM training and support

“Having a remote monitoring system means we don't have to worry as much about valve failures.”
– Valve Technician, City of Ames Electric Ames, Iowa, USA

Combined Cycle Power Solutions

Fuel Storage & Distribution

- Optimize control of fuel delivery ▶ p6
- Reliable isolation of fuel ▶ p6
- Tank blanketing and pressure management ▶ p6

Heat Recovery Steam Generator

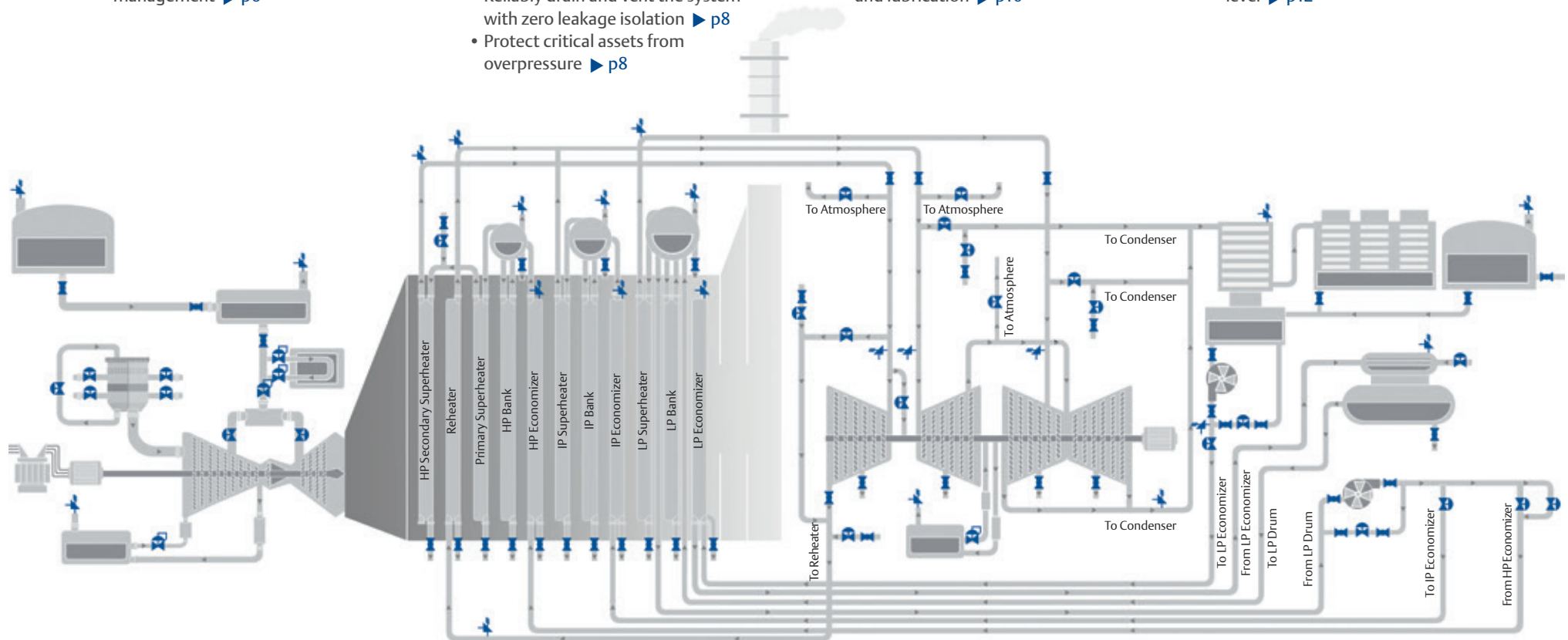
- Extend equipment life with accurate drum level control ▶ p8
- Maintain precise steam temperature control ▶ p8
- Reliably drain and vent the system with zero leakage isolation ▶ p8
- Protect critical assets from overpressure ▶ p8

Steam Turbine

- Improve plant flexibility with reliable isolation of your steam turbine ▶ p10
- Ensure efficiency and longevity of your turbine with effective sealing and lubrication ▶ p10

Condensate System

- Protect pumps from overheating and prevent cavitation ▶ p12
- Handle extreme flow rates to maintain consistent deaerator level ▶ p12



Combustion Turbine

- Improve speed of response and accuracy of fuel control ▶ p6
- Condition fuel for optimal combustion performance ▶ p6

Emission Control

- Reliably store and control the flow of ammonia for SCR ▶ p12
- Reduce fugitive emissions with FE compliant solutions ▶ p12

Feedwater System

- Achieve smooth transition from startup to full load ▶ p12
- Protect your turbine from possible water induction ▶ p12

Balance of Plant

- Control the flow of water through your plant ▶ p12
- Control, isolate, protect, and regulate BoP processes ▶ p12



Combustion Turbine Solutions

Improve the operational flexibility of your combustion turbine to respond rapidly to load changes, allowing you to realize greater efficiency and equipment longevity. ▶ [p5](#)

Heat Recovery Steam Generator Solutions

Achieve optimal steam generation performance with solutions that increase thermal efficiency and deliver controlled, stable steam to the turbine while protecting your equipment and reducing tube leaks. ▶ [p7](#)

Steam Turbine Solutions

Increase the flexibility of your plant with the ability to reliably bypass your steam turbine during transient operations and allow your combustion turbine and heat recovery steam generator to operate independently. ▶ [p9](#)

Balance of Plant Solutions

Gain greater insight into inefficient Balance of Plant (BoP) systems and faulty plant components to take corrective action before your operations are impacted. ▶ [p11](#)

Combustion Turbine Solutions

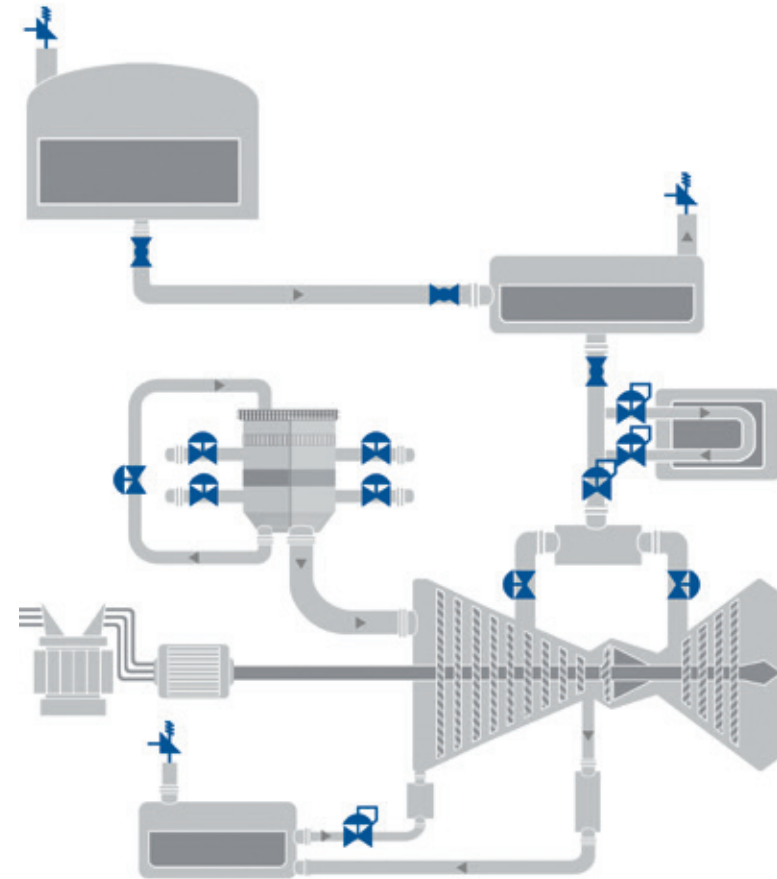
Your combustion turbine is the key to your plant's ability to drive profitable operation. How efficiently your turbine is able to respond to load change requirements is critical.

These variable conditions from baseload capacity, to cycling operations, to peaking support stress equipment and it is your turbine and surrounding equipment's ability to perform reliably for extended periods that determines the success of your operations.



What's your opportunity?

- Improve turbine flexibility with more responsive fuel control
- Increase combustion efficiency with higher quality fuel supply
- Reduce turbine trips with smooth pressure control
- Minimize product loss with zero leakage isolation



Operate your combustion turbine with confidence with expert support

Our combined cycle power generation experts work with you to optimize your combustion turbine performance. From safeguarding the purity of fuel during storage and distribution, through to fuel conditioning and control that provides optimal delivery to the combustion chamber.



Services offered...

- Digital valve monitoring and analysis
- Control valve calibration
- Regulator configuration and repair
- Tank blanketing system design
- Pressure relief valve configuration and repair
- Technology upgrades and retrofit
- Product and system training

Featured Combustion Turbine Solutions

Fisher™ Fuel Control Valves



Improve the efficiency of your combustion turbine with a fuel control solution that works seamlessly with supporting fuel and air control valves. These valves eliminate startup issues related to inaccurate level of the control valve and enhance a turbine-driven generator's ability to respond to step changes.

Features:

- Quick response
- Proven, optimized, and customized designs
- Rotary, globe, and angle valves available
- Custom trim designs for extended life

Vanessa™ Fuel Isolation Valves



Isolate the flow of fuel to your combustion turbine with ultimate dependability. These valves provide reliable, repeatable, zero leakage shutoff over an extended life in erosive, high pressure, and high temperature applications.

Features:

- Rapid stroke times
- High level operability and tightness
- High resistance to galling, abrasion, erosion, and corrosion
- Extended service life with triple offset geometry

Fisher | Keystone™ | Vanessa Air Extraction Valves



Prevent compressor surge or stall with automated air extraction valves for compressor protection and improved turbine performance.

Features:

- Fast acting performance under extreme pressure and temperature conditions
- Tight shutoff to prevent costly leakage and pressure loss in your system

Fisher | Vanessa Anti-Icing Valves



Prevent ice formation and divert air to the inlet guide vane in low operating conditions to protect the compressor and manage turbine speed.

Features:

- Advanced sealing provides tight shutoff
- Reduced noise levels for smooth operation
- Meets critical stroking speed requirements

Fisher | Tartarini™ Fuel Pressure Regulators



Deliver reliable, stable fuel to your combustion turbine with dependable, smooth, and quiet operation in extreme service conditions.

Features:

- Rapid speed of response
- Absolutely no atmospheric bleed
- Excellent particle erosion resistance
- Minimized maintenance downtime

Fisher Pressure Control Regulators



Suitable for use in fuel gas header, nitrogen filter, lubrication oil, and sealing system applications.

Features:

- Rapid speed of response
- Rugged construction for extended life
- Simple in-line maintenance



For more information, visit [Emerson.com/FinalControl](https://www.emerson.com/FinalControl)

Heat Recovery Steam Generator Solutions

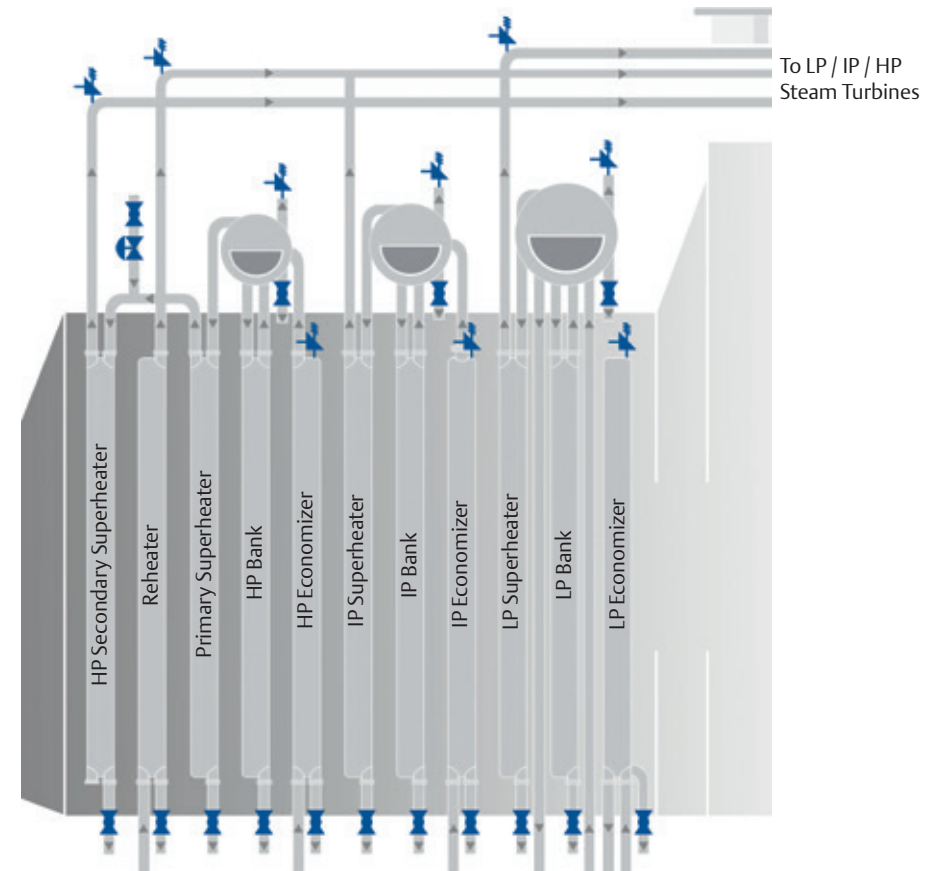
With reliable final control solutions, you can run your Heat Recovery Steam Generator (HRSG) at optimal efficiency while managing steam output to the turbine with precise control.

Designed to operate with certainty in even the most challenging applications, you can rely on solutions from Emerson to help your HRSG perform in increased cycling operations, for longer.

What's your opportunity?



- Accurately control drum levels
- Improve steam temperature control
- Enhance thermal efficiency
- Reduce heat loss with zero leakage drain and vent valves
- Protect critical assets with proven pressure relief valves



Don't let your challenges boil over. Talk to an Emerson expert today.

Let one of Emerson's final control experts help you optimize your HRSG performance. With extensive experience in the power industry, our experts can walk through your operations and take on any engineering challenge you need to solve.



Services offered...

- Digital valve monitoring and analysis
- Control valve calibration
- Desuperheater configuration
- Safety valve configuration and repair
- In-line drain and vent valve repair
- Parts management
- Product and system training

Featured Heat Recovery Steam Generator Solutions

Fisher | Sempell™ Spraywater Control Valves



Accurately control the amount of water injected into the steam attemperators, providing optimal main steam temperature control and stability.

Features:

- High rangeability for excellent system control
- Advanced sealing technology
- Anti-cavitation trim reduces noise and vibration
- Quick change trim

Fisher | Yarway™ Attemperators



Variable geometry spray ensures rapid vaporization of spray water to provide optimal steam temperature and stability. Suitable for exposure to high thermal cycling, high steam velocities, and flow induced vibration.

Features:

- Ring or insertion style design
- Integrated design minimizes pipework

Fisher | Sempell Drum Level Control Valves



Deliver precise and responsive control of water levels in your HP/IP drums, improving boiler efficiency and protecting associated equipment.

Features:

- Trim design reduces damaging cavitation
- High rangeability provides smooth transition from startup to full operation
- Advanced sealing provides tight shutoff

Anderson Greenwood™ | Crosby™ Pressure and Safety Relief Valves



High capacity, high pressure valves excel in drum, superheater, reheater, and economizer applications to limit product loss and improve unit efficiency.

Features:

- Spring and pilot operated
- Small opening and closing differential
- Fewer parts and fast, simple adjustment

Sempell Main Steam Isolation Valves



Gate, globe, and check valves for main steam isolation provide reliable, repeatable shutoff in high pressure, high temperature conditions.

Features:

- Extended service life
- Reduced maintenance
- Low pressure drop
- Designed for cycling service
- Outstanding hard facing process

Sempell | Yarway | Fisher Drain and Vent Valves



Rugged, low maintenance isolation valves efficiently facilitate the removal of liquid from steam lines while providing tight shutoff to minimize product loss.

Features:

- Robust, severe service design
- Rapid maintenance
- Simple automation

Yarway Boiler Trim Valves

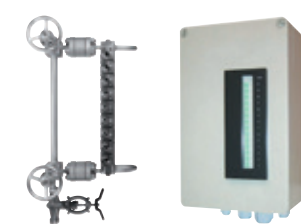


Blow-off and throttling valves designed for continuous blowdown. These valves provide reliable and longer lasting service in high velocity and erosive applications.

Features:

- Robust construction
- Efficient operation
- Rapid in-line repair

Yarway | Penberthy™ Liquid Level Indication



Mechanical and electronic level gauges provide cost-effective water sensing.

Additional products

- Electric, pneumatic, and hydraulic actuators
- Sky vent valves
- Steam traps



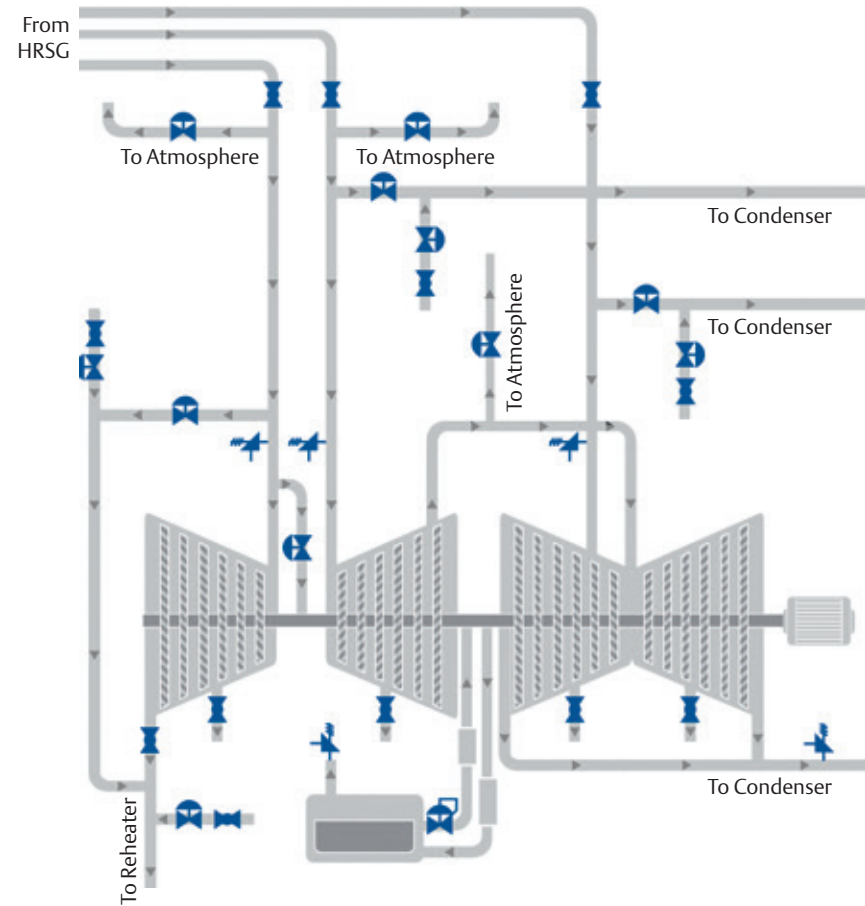
For more information, visit Emerson.com/FinalControl

Steam Turbine Solutions

Steam turbines represent one of the most substantial investments for a power plant, but as they age, more precise and reliable control technology is critical to maintain performance. Emerson's final control products and services help ensure the continued reliability, responsiveness, efficiency, and protection of these critical plant assets.

What's your opportunity?

- Reliably isolate the turbine during startup, shutdown, and plant upset conditions
- Precisely control bypass steam temperature
- Reduce heat loss with zero leakage isolation
- Protect your turbine from overpressure



Operate your steam turbine with confidence

Improper control, monitoring, and protection of your turbine could prove catastrophic to your operations. Talk to an Emerson expert about the final control products and services that will help ensure your turbine runs efficiently with ultimate reliability.



Services offered...

- Digital valve monitoring and analysis
- Control valve calibration
- Desuperheater configuration
- Safety valve configuration and repair
- In-line isolation valve maintenance
- Emergency technical and onsite support
- Product and system training

Featured Steam Turbine Solutions

Fisher | Sempell Complete Turbine Bypass Solutions



Improve your plant flexibility by reliably isolating your steam turbines during startup, shutdown, and plant upset conditions allowing the combustion turbine and steam generator to run independently.

Emerson offers a complete and integrated turbine bypass solution designed to isolate the turbine, whilst controlling and reducing up to full load main steam pressure and temperature.

Emerson's integrated solution is engineered to withstand high pressure drops, reduce the harmful effects of noise and vibration, and withstand the impacts of frequent cycling.

Vanessa Turbine Trip and Throttle Valves



Safely and reliably perform steam turbine trip and throttle functions with a fully engineered solution that provides both zero leakage shutoff and modulating service.

Features:

- High speed closing
- SIL3 capability
- Compact valve and actuation
- Long service life with low maintenance

Sempell | Fasani Turbine Steam Extraction Valves



Gate, globe, and check valves designed in conjunction with major turbine OEMs to provide reliable shutoff in critical turbine applications.

Features:

- Low pressure drop
- Designed for cycling duty
- Outstanding hard facing process
- High speed closing

Sempell | Vanessa Reheat Isolation Solutions

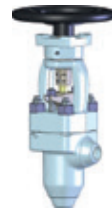


Reliably isolate the reheater unit with proven solutions including reheat balancing valves, non-return valves, and reheater isolation valves.

Features:

- Extended service life
- Reduced maintenance
- Designed for cycling duty
- Outstanding hard facing process

Sempell Drain Control Valves



Perform quick acting and effective drainage of the turbine during startup and preheating of the turbine body.

Features:

- Available in carbon, stainless, and alloy steel
- Compatible with DIN and ASME standards
- Low noise trims
- Single or multi stage pressure reduction

Fisher Steam Seal Regulator Valves



Improve turbine efficiency and prevent turbine trips with controlled delivery of reduced pressure steam to the turbine steam sealing system in low load conditions.

Features:

- Design handles extreme pressure drops
- Trim reduces effects of noise and vibration
- Class V shutoff extends service life

Fisher Pressure Control Regulators



Provide highly reliable pressure control of turbine lubrication and sealing systems that improve turbine efficiency, protect critical components, and extend service life.

Additional products

- Electric, pneumatic, and hydraulic actuators
- Gate, globe, and check valves
- Drain valves, vent valves, and steam traps
- Steam extraction and induction valves



For more information, visit [Emerson.com/FinalControl](https://www.emerson.com/FinalControl)

Balance of Plant Solutions

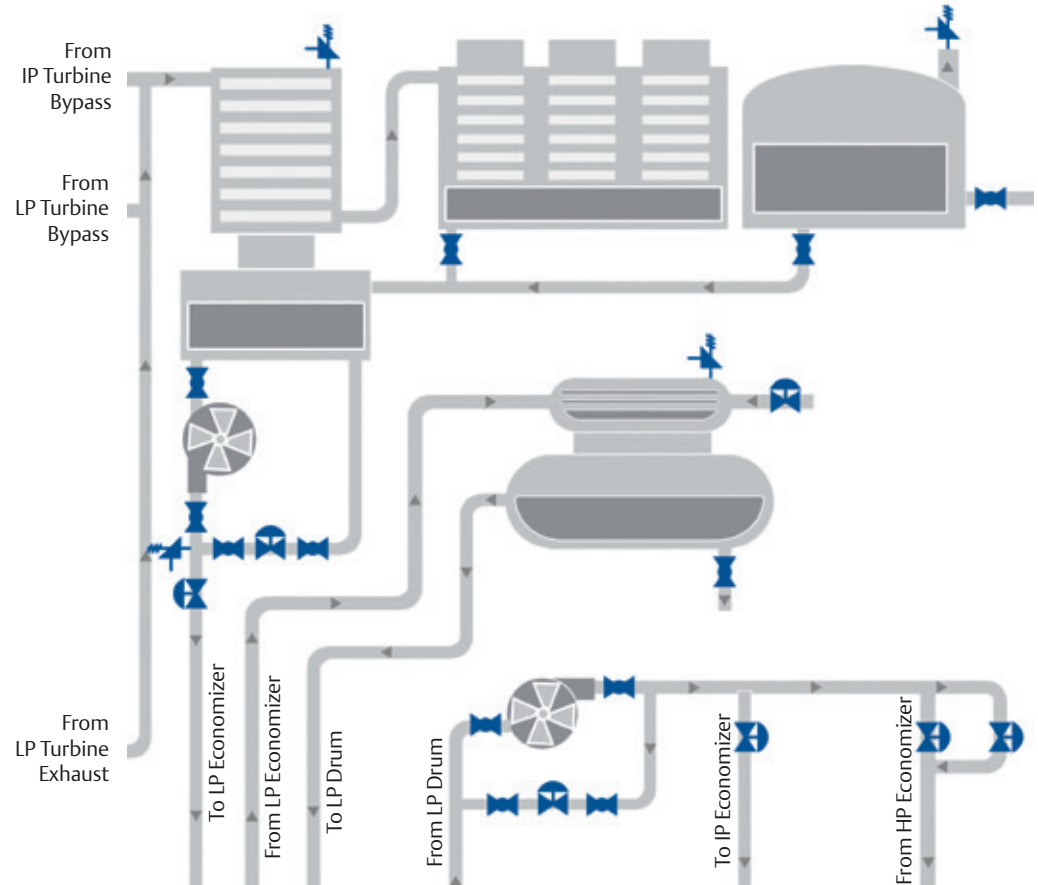
Maintaining your plant while ensuring it operates at peak efficiency requires attending to more than your heat recovery steam generators and turbines.

Emerson's valves, actuators, regulators, and instrumentation can improve the efficiency and safety of your Balance of Plant processes, helping you reduce forced outages and derates as well as improve overall plant heat rate.



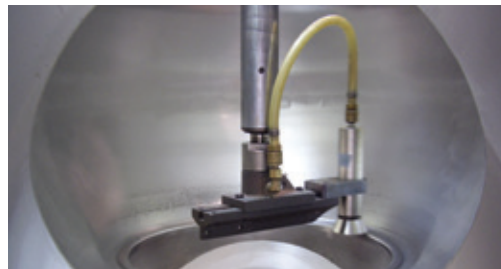
What's your opportunity?

- Efficiently manage fuel supply and storage
- Meet regulations with reliable emission control
- Optimize water intake, treatment, and circulation
- Maximize turbine output with more reliable condenser cooling



Capture efficiency gains by selectively upgrading your Balance of Plant assets

If you're looking for performance improvements in your Balance of Plant processes, get in touch with an Emerson expert who can review your operations and suggest enhancements that will most cost effectively increase process efficiencies.



Services offered...

- Digital valve monitoring and analysis
- Control valve calibration
- Desuperheater setting
- Safety valve configuration and repair
- In-line isolation valve maintenance
- Product and system training
- Startup, shutdown, turnaround, and outage support

Featured Balance of Plant Solutions

Fisher | Sempell Boiler Feedpump Recirculation



Ensuring adequate flow is passing through the pump at all times. These valves are engineered to handle extreme cavitation caused by high temperature and pressure drops.

Features:

- Advanced sealing technology
- High turndown handles extreme flow rates
- Trim design reduces noise and vibration

Fisher | Sempell Condensate Pump Recirculation



Prevent overheating and cavitation by providing the recommended minimum flow of condensate through the pump while withstanding varying outlet conditions.

Features:

- Advanced sealing technology
- High rangeability for excellent system control
- Trim design reduces noise and vibration

Fisher Deaerator Level Control Valves



Maintain consistent deaerator level while handling extreme flow rates and minimizing the effects of cavitation.

Features:

- Advanced sealing technology
- High turndown handles extreme flow rates
- Trim design reduces noise and vibration

Anderson Greenwood | Crosby Pressure Relief Valves



Protect your Balance of Plant pressure vessels against overpressure events while minimizing product loss with high performance spring and pilot operated pressure relief valves.

Features:

- Highly customizable to exact specifications
- Fast installation, adjustment, & replacement
- Full compliance with major global standards

Bettis™ | EIM™ Electric & Pneumatic Actuators



Designed for the harsh environments of power generation, these actuators provide reliable actuation in high heat, high thrust, and more frequent cycling.

Features:

- Higher operating efficiency
- Superior position accuracy
- Robust, low maintenance, long life designs

Keystone Cooling Water Isolation Valves



Ensure the reliable delivery of water throughout your plant from intake to treatment through to cooling and recirculation.

Features:

- Zero leakage isolation
- Superior materials for corrosion resistance
- Lower operating torques requiring smaller actuation and reduced energy consumption

Fisher | Sempell | Fasani BoP Isolation Valves



Reliable, repeatable shutoff suitable for all of your Balance of Plant isolation applications.

Features:

- Robust design
- Rapid maintenance
- Simple automation

Yarway ARC® Pump Protection Valves



Protect your centrifugal pumps against thermal damage and destruction with reliable, self-contained, and low maintenance automatic recirculation control valves.

Additional products

- Liquid level gauges
- Instruments and controllers
- Fire and air utility system regulators
- 3-way feedwater heater bypass valves



For more information, visit [Emerson.com/FinalControl](https://www.emerson.com/FinalControl)

Continuous support in the face of changing market and operating conditions

Emerson leads the way with industry-defining end-to-end digital service experiences, helping you achieve superior outcomes through our maintenance, reliability, and performance offerings. The tools we've developed support the digital transformation of the power industry, providing the confidence to extract the maximum value from your service and technology investments. Our teams partner with you across the globe to help you maintain safe operation, improve reliability, and optimize plant performance.

With over 100 regional service centers and 60+ mobile service centers worldwide, local experts are available to work with you to understand your unique challenges and help you find a solution. Our broad portfolio of service offerings allows us to tailor our support to align with your specific business goals.



Connected Services

Leverage smart valve technology and Emerson expertise to help your workforce make informed performance and reliability decisions at speed.



Outage Services

Identify, prioritize, and plan long term plant reliability improvements to reduce maintenance events and improve generation performance.



Education and Training

Train new hires, improve your current workforce skills, and help your team adapt to new technology or products.



Startup and Commissioning

Certified technicians meticulously work through approvals, calibration, testing, and certification to deliver a comprehensive handover, on time and on budget.





With locations worldwide, Emerson local experts are never far away. Get in touch today to arrange a site walk and see the value Emerson can bring to your operations.

Improve your plant availability, flexibility, and reliability.



Emerson delivers time-tested and innovative power generation solutions designed to help you address the reliability, flexibility, compliance, and resource scarcity of your operations. Contact us for world-class technologies and services that can maximize your efficiency and profitability, and meet the industry's most rigorous standards. Getting started is easy. Visit: [Emerson.com/FinalControl](https://www.emerson.com/FinalControl)

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