



## *Steam Generation, Waste Heat and Condensate Recovery Level Applications*



### **A Special Applications Bulletin to Optimize the Steam Generation Process for Profit**

Steam generation is a core operating function in many industries including pulp and paper, chemicals, petroleum refining and food processing. Companies in these markets rely on Magnetrol® as a trusted instrumentation partner who can improve operational efficiency and total cost of ownership.

We are experts in the application of high-performance level and flow control solutions for power generation. We can help you optimize your steam generation processes – and your bottom line.



# Proven, High-Performance Solutions for Steam-Intensive Industries

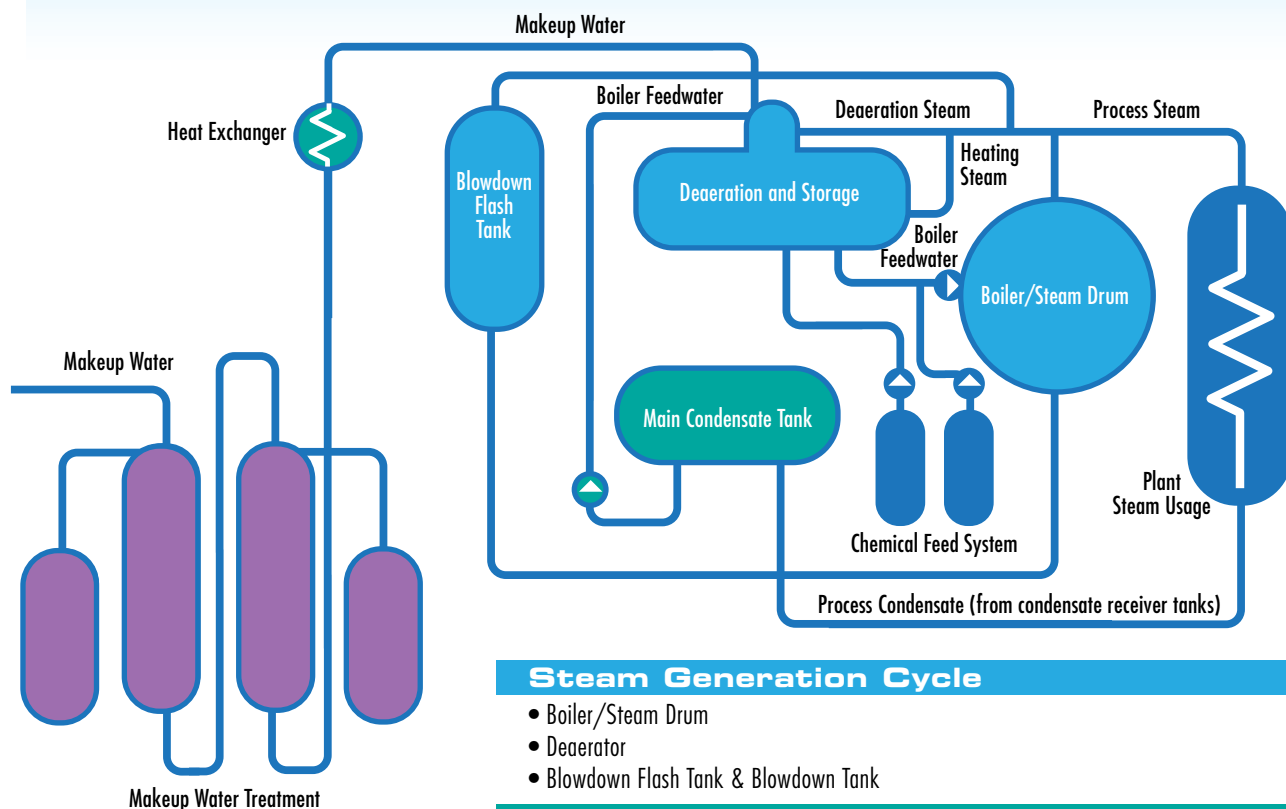
from the Power Generation Experts at Magnetrol® International

Too often, level and flow control technologies are not suitable for the day-to-day operational demands of their applications. The inefficiencies and true cost of ownership of these control devices can go undetected.

By leveraging the strengths of a process control technology, steam generators can maximize their return on hardware investment throughout their steam, waste heat and condensate recovery processes.



## Steam Generation and Condensate Recovery System



### Steam Generation Cycle

- Boiler/Steam Drum
- Deaerator
- Blowdown Flash Tank & Blowdown Tank

### Condensate & Waste Heat Recovery

- Condensate Receiver Tank & Main Condensate Tank
- Condensate Pumps & Associated Valves
- Shell & Tube Heat Exchangers/Condensers

### Makeup Water Treatment

### Energy Management

## Explore Strategic Level and Flow Control Solutions for Steam Generation

### **Eclipse® Model 706 Guided Wave Radar Transmitter**

Best-in-class two-wire, loop-powered, 24 VDC level transmitter. Unaffected by changes in process conditions, requires no calibration and is indifferent to specific gravity for absolute data certainty regardless of the application. Available with coaxial, twin rod and single rod probes, including coaxial steam probe optimized for level control in saturated, HTHP steam environments.

### **Pulsar® Model R96 Non-Contact Radar Transmitter**

Loop-powered, 24 VDC liquid level transmitter offering low power consumption, fast response time and simplified operation. Performance independent of process conditions including specific gravity and dielectric. Operating frequency provides superior performance in tougher applications that include turbulence, foam and heavy vapors.

### **Aurora® and Atlas™ Visual Indicators**

Orion Instruments® magnetic level indicators (MLIs) offer single or redundant level measurement. ATLAS provides basic, float-based visual indication. AURORA features redundant, diverse, and independent control with both float and guided wave radar (GWR).



**ORION**  
INSTRUMENTS

### **Jupiter® Magnetostrictive Transmitter**

ORION INSTRUMENTS magnetostrictive transmitter provides 4-20 mA output, proportional to liquid level, or Foundation fieldbus™ output. Designed to attach quickly to MLIs or for direct insertion into process vessel.

### **Echotel® Contact and Non-Contact Ultrasonic Switches**

Ideal for high or low level alarms for overflow prevention. Contact provides superior performance in applications where foam, aeration, heavy turbulence and suspensions containing solids can occur. Non-contact is the perfect solution for less extreme applications for economical installations.

### **Thermatel® Thermal Dispersion Switches and Flow Meter**

Thermal dispersion switches are easily adjusted to detect flow (gases and liquids), level or liquid-liquid interface. Thermal dispersion mass flow meters provide reliable mass measurement for air and gas flow applications. It is the perfect solution for pump protection and mass flow where energy management is critical.

### **Mechanical Buoyancy Switches**

Magnetrol® offers the widest range of hard-working float-actuated level instrumentation in the industry. External cage type, HTHP, side-mounted, single-stage and ASME and NACE rated are among the many options available. The proven reliability of mechanical level technologies make them ideal for critical alarm and emergency shutdown applications.

### **E3 Modulelevel® Displacer Transmitter**

Versatile displacer transmitters measure level, density or clean interface, using proven range spring technology to deliver superior output stability, accuracy and reliability.



## STEAM GENERATION



### Boiler/Steam Drum

Efficient separation of water and steam in the boiler or steam drum is critical to steam quality and operational profitability. Fluctuations in demand have dramatic effects on instrumentation performance, due to “shrink” and “swell” caused by pressure changes.

**Continuous Level:** Eclipse® Model 706 Guided Wave Radar Transmitter with a 7YS Steam Probe

**Point Level:** Model B40 Float-Actuated or Series 3 External Caged Switches

**Visual Indication:** Atlas™ or Aurora® Magnetic Level Indicators can be supplied with switches or transmitters



### Deaerator

The deaerator removes impurities (oxygen and other corrosive gases) from feed water and leverages steam to preheat feed water prior to boiler entry. Accurate, reliable measurement ensures sufficient supply of feed water for the boiler.

**Continuous Level:** ECLIPSE Model 706 Guided Wave Radar Transmitter with a 7YS Steam Probe

**Point Level:** Model B35 External Caged Float-Actuated Switch, ASME B31.1 Construction

**Visual Indication:** ATLAS or AURORA Magnetic Level Indicators can be supplied with switches or transmitters



### Blowdown Flash Tank & Blowdown Tank

Continuous or manual blowdown of the boiler minimizes scaling and corrosion caused by water impurities and also facilitates heat and energy recovery through the use of flash steam. Effective level control technology at the boiler side eliminates energy losses from unnecessary blowdown to prevent false carryover conditions.

#### BLOWDOWN TANK:

**Continuous Level:** ECLIPSE Model 706 Guided Wave Radar Transmitter with a 7YS Steam Probe, or E3 Modulevel® Displacer-Actuated Transmitter

#### FLASH TANK:

**Continuous Level:** ECLIPSE Model 706 Guided Wave Radar Transmitter with a 7YS Steam Probe

**Point Level:** Model B40 Float-Actuated Sealed Caged Switch

**Visual Indication:** ATLAS or AURORA Magnetic Level Indicators can be supplied with switches or transmitters



# 49%

*Up to an estimated **49%** of energy can be recovered through the use of flash steam routed to heat exchangers or the deaerator, to preheat boiler makeup water or support the deaeration process, respectively.*



## CONDENSATE & WASTE HEAT RECOVERY



### Condensate Receiver Tank & Main Condensate Tank

Level control of condensate tanks is critical to optimize condensate and waste heat recovery, as well as protect hardware.

**Continuous Level:** ECLIPSE Model 706 Guided Wave Radar Transmitter, or Jupiter® Magnetostrictive Transmitter

**Point Level:** Echotel® Model 961 Single Point Ultrasonic Level Switch, or Series 75 Sealed External Caged Float Actuated Level Switch, or Model B40 External Caged Float-Actuated Level Switch

**Visual Indication:** ATLAS or AURORA Magnetic Level Indicators can be supplied with switches or transmitters



### Condensate Pumps & Associated Valves

Level/flow control plays the important role of protecting condensate pumps from dead head, run out, overheating and cavitation.

- **Flow Detection:** Thermatel® TD1/TD2 Thermal Dispersion Flow/Level/Interface Switch

### Shell & Tube Heat Exchangers/Condensers

Shell and tube heat exchanger/condenser allows what would otherwise be waste energy to be recovered in the form of flash steam from the receiver tank to preheat makeup water or other process fluids through the heat of condensation.

- **Continuous Level:** ECLIPSE Model 706 Guided Wave Radar Transmitter

- **Point Level:** Series 3 Sealed External Caged Float Actuated Level Switch

- **Visual Indication:** AURORA Magnetic Level Indicator

**\$244K**

*Conservatively, the effects of poor level and flow control performance on the condensate recovery system can cost from **\$78K** to **\$244K** annually in hidden maintenance expenses.*

## MAKEUP WATER TREATMENT



Level instrumentation for chemical storage monitoring should resist chemical attack, remain unaffected by changes in the vapor space and provide performance verification and visibility during product transfer.

- **Continuous Level:** ECLIPSE Model 706 Guided Wave Radar Transmitter, or Pulsar® R96 Non-Contact Radar Transmitter, or JUPITER Magnetostrictive Transmitter

- **Point Level:** Model T20 Single Stage Float Level Switch, or ECHOTEL Model 961/962 Ultrasonic Contact Switch, or ECHOTEL Model 355 Ultrasonic Non-Contact Switch (for non-chemical water treatment applications)

- **Visual Indication:** AURORA Magnetic Level Indicator

## ENERGY MANAGEMENT

Effective flow control technology can optimize air-to-fuel ratio, manage energy consumption by monitoring fuel gas flow and prevent wasted electricity by detecting compressed air leaks.

- **Flow Measurement:** THERMATEL TA2 Thermal Mass Flow Meter





## KONTAKTA OSS GÄRNA FÖR MER INFORMATION

Hugo Tillquist AB  
Mejl: [info@tillquist.com](mailto:info@tillquist.com)  
Telefon: + 46 8 594 632 00



705 Enterprise Street • Aurora, Illinois 60504-8149 • 630-969-4000 • Fax 630-969-9489 • [www.magnetrol.com](http://www.magnetrol.com)

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