EMERSON

Instrumentation for the Water and Wastewater Industry
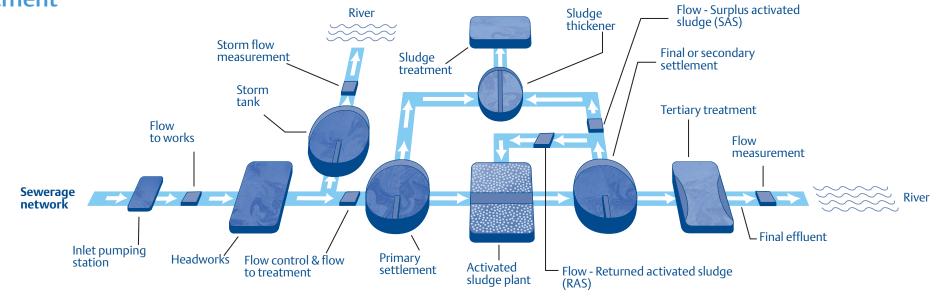
Application Solutions

EMERSON™

Best-in-class instrumentation for wastewater treatment

Today's plant manager doesn't have the time to study specifications and suppliers to find the solution to specific application requirements.

Emerson offers a complete product portfolio for water industry applications, along with the expertise of instrument consultants who understand your process and the issues that you face.

Emerson has been providing reliable measurement and control products to the water and wastewater treatment industry for over 50 years. Our instrument consultants can help you with the selection process and provide the support, advice, and fast response that you need.

Diagram labels:
River · Storm flow measurement · Storm tank · Flow to works · Sludge treatment · Sludge thickener · Flow - Surplus activated sludge (SAS) · Final or secondary settlement · Tertiary treatment · Flow measurement · Sewerage network · Inlet pumping station · Headworks · Flow control & flow to treatment · Primary settlement · Activated sludge plant · Flow - Returned activated sludge (RAS) · Final effluent · River

HEADWORKS

Inlet pumping station
3100 Ultrasonic level, 9700 hydrostatic pressure transmitters with 3491 programmable pump controllers for automated control of up to 4 pumps
2051 Pressure transmitter for pumping main pressure

Inlet flow measurement
8700 Magnetic flow meters for full pipes, Smart Meter Verification and diagnostics
3100 Ultrasonic transmitter and 3493 flow controller for open channel flow

Automatic screen control
3100 Ultrasonic level transmitters and 3492 differential level controllers for automatic control of screen rake system

PRIMARY TREATMENT

Automatic desludging
MSM400 Sludge density monitor for automatic desludge control

Sludge density measurement
MSM400 Sludge density measurement directly in tank or in-line pipe measurement

Primary/secondary clarifiers
5400 Non-contacting radar level
3100 Ultrasonic level for open tanks
9700 Hydrostatic pressure transmitters
2051 Pressure transmitter with 1199 diaphragm seals for DP level measurement
3491 Controllers for level measurement and control

Sludge transfer
8700 Magnetic flow meters for full pipes, Smart Meter Verification and diagnostics

Sludge digester
5400 Non-contacting radar level

BIOLOGICAL TREATMENT

Aeration flow monitoring
485 Annubar® averaging pitot tubes
405 Compact orifice plates
2051 Differential pressure transmitters for volume and mass flow of air to aeration lanes

SECONDARY TREATMENT

Final settlement blanket monitoring
433 Fixed sludge interface level for final and secondary settlement tanks

Dissolved air flotation (DAF)
2051 Pressure transmitters for air pressure measurement

TERTIARY TREATMENT

Level measurement
3100 Ultrasonic level transmitter
9700 Hydrostatic pressure transmitters
3491 Controllers for level measurement and control

Sand filter backwash control
2051 Differential pressure transmitters for head loss across filters

Backwash solids detection
433 Ultrasonic interface level sensors and controllers

Final effluent discharge monitoring
3100 Ultrasonic level transmitter and 3493 flow controller
8700 Magnetic flow meters for full pipes, Smart Meter Verification diagnostic
2051 Pressure transmitter for pump discharge monitoring

Chemical treatment
3100 Ultrasonic level
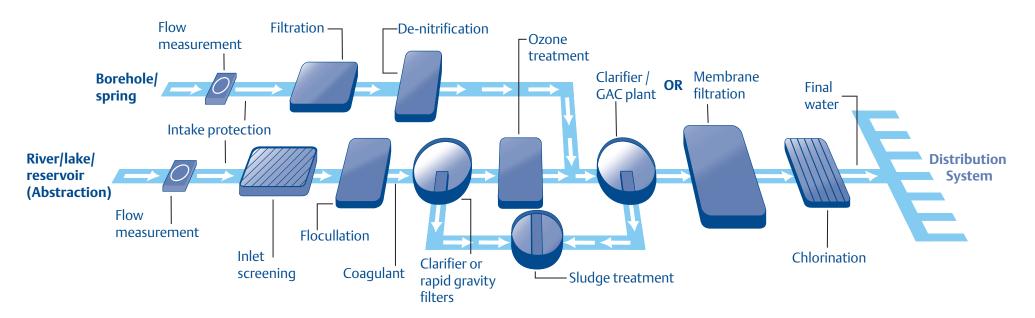5400 Non-contacting radar level
2051 Pressure transmitter with diaphragm seal for tank level
3491 Controllers for level measurement and control

Submerged Water Treatment Plant

5400 Digester

3107 Open channel flow

3100 and 3300 on effluent sump

485 Annubar air flow to aeration

433S Sludge interface level

Best in class instrumentation for clean water treatment

Process Flow Diagram

Borehole/ spring
- Flow measurement
- Intake protection
- Filtration
- De-nitrification
- Ozone treatment
- Clarifier / GAC plant **OR** Membrane filtration
- Final water

River/lake/ reservoir (Abstraction)
- Flow measurement
- Inlet screening
- Coagulant
- Flocullation
- Clarifier or rapid gravity filters
- Sludge treatment
- Chlorination

Distribution System

SURFACE & WELL WATER

Flow measurement: open channel and closed pipe
3100 Ultrasonic transmitter and 3493 open channel flow controller
8700 Magnetic flow meters for full pipes, Smart Meter Verification diagnostic

INLET MONITORING and SCREENING

Level measurement
3100 Ultrasonic level
9700 Hydrostatic pressure transmitters
3491 Controllers for level measurement and control

Flow measurement
8700 Magnetic flow meters for full pipes

FILTRATION

Level measurement
3100 Ultrasonic level transmitters
9700 Hydrostatic pressure transmitters
3491 Controllers for level measurement and control

Filter backwash control
2051 Differential pressure transmitters for measuring head loss across filters

Backwash solids detection
433 Ultrasonic interface level sensors and controllers

Flow to filters and backwash flow
8700 Magnetic flow meters for full pipes

GAC PLANT

GAC interface level
433 Fixed alarm interface level sensors

Level measurement
3100 Ultrasonic level transmitters
9700 Hydrostatic pressure transmitters
3491 Controllers for level measurement and control

Backwash solids detection
433 ultrasonic interface level sensors and controllers for detecting backwash solids and/or blanket lifting during backwash

CHEMICAL TREATMENT

Level measurement
3100 Ultrasonic level transmitter
2051 Pressure transmitter with diaphragm seal
3491 Controllers for level measurement and control
5708 Solids scanner

Flow Measurement
Coriolis mass flow, density, concentration 8700
Magnetic Flow Meters

CLARIFIER

Clarifier level
3100 Ultrasonic level transmitters
9700 Hydrostatic pressure transmitters
3491 Controllers for level measurement and control

SLUDGE TREATMENT (Waste)

Automatic desludging
MSM400 Sludge density monitor for initiation of automatic desludge control

Sludge density measurement
MSM400 Sludge density measurement for in-tank or in-line pipe measurement

Digester
5400 Non-contacting radar level
5300/3300 Guided wave radar for lime dosing level
3100 Ultrasonic level transmitters
9700 Hydrostatic pressure transmitters
3491 Controllers for level measurement and control in closed and open tanks

DISTRIBUTION SYSTEM

Network pressure
2051 Pressure transmitter for pump discharge and network pressure

Network flow
3051S Differential pressure for DP flow
8700 Magnetic flow meters for full pipes, Smart Meter Verification diagnostic
485 Annubar averaging pitot tubes
405 Compact orifice plates

2051 Sludge pump pressure

3100 Raw intake level

3108 High accuracy flow over weir

3300 Reservoir level

3107 Pumping station level

Instrumentation for water industry applications

3100 Series Ultrasonic Level Transmitters

Transmitters for level measurement, wetwell, sump pump control and open channel flow measurement.

- Reference accuracy ±0.25%, measuring range up to 40ft (12m)
- FM, CSA, ATEX, IECEX Hazardous area approval, HART® digital communication
- 2 Wire 24V dc loop powered
- Measures liquid height, distance to liquid, volume or flow in open channels
- Automatic temperature compensation

3490 Series Universal Controllers

Wall and panel mounting control units for any 4-20mA or HART compatible transmitter.

- Five fully field programmable relays
- Programme wizards to assist configuration and set-up for level, pump control and flow
- Pre-configured flow curves for weirs and flumes in accordance with ISO / BS standards
- 4-20 mA output, 5 x SPDT relay contacts on controllers
- FM, CSA, ATEX, IECEX Hazardous area approval, HART digital communication
- Data logging of up to 7000 events plus totalized flow

Rosemount Level Transmitters

Direct level measurement, virtually unaffected by process conditions.

- Repeatability: ±0.04" (±1mm)
- 4-20mA output with digital HART communication
- IS or explosion proof FM, CSA, IECEx, ATEX

5400 Series Non-contacting Radar

Pulsed, free propagating radar for level measurement in liquids

- Wide range of antennas and mounting connections.
- Measuring range up to 98ft (30m)
- Reference accuracy:
  Model 5401: ±0.4" (±10mm) - Model 5402: ±0.12" (±3mm)

3300 and 5300 Series Guided Wave Radar

Top mounted, level and interface measurement for liquids or solids.

- Wide variety of probe styles and mounting connections
- Measuring range up to 164ft (50m)
- Reference accuracy:
  3300: +/- 0.2" (±5mm), 5300: +/- 0.12" (±3mm)
- Fully integrated wireless model

5708 3D Solids Scanner

- Inventory applications and visualization
- Measuring range up to 230ft (70m)
- Reference accuracy: Distance ±0.6" (±15mm), directional ±2 degrees

2100 Series Vibrating Fork Level Switches

Level switches using vibrating fork technology for level alarm and control applications.

- 4-20mA output with digital HART communications
- IS or explosion-proof FM, CSA, IECEX, ATEX
- WirelessHART™ options
- Extended length to 10ft (3m) available
- Stainless steel wetside with ECTFE/PFA coating option for corrosive applications
- 24-264V dc or ac powered with relay or solid state output

Micro Motion ELITE CMFS Meter

Reliable two-phase mass flow measurement for ultimate performance in even the most demanding field and plant applications.

- ±0.0002 g/cm³ liquid density accuracy
- Best-in-class gas mass flow accuracy of ±0.25%
- Entrained gas diagnostic
- 30:1 flat spec optimum turndown and scalability
- Immune to process, mounting, and environmental effects
- Best accuracy for chemical feed applications

MSM400 Ultrasonic Sludge Density Measurement

Sludge density measurement for primary and secondary sludge and industrial slurries.

- Sludge density measuring ranges up to 20% solids
- 316SS Tank mounted sensors NEMA type 6P (IP68) rating
- Flanged pipe sections with in-line sensors:
  4", 6", 8" (DN100, DN150, DN200)
  Other sizes on request
- Back lit LCD display on weatherproof wall mounting enclosure
- 4-20 mA output, 2 x SPDT relay output contacts
- Simple calibration using pre-programmed sludge types

Smart Wireless Gateways

Easily integrate network wireless data into your host system or architecture for industry-leading security, scalability, and data reliability.

- Redundancy guarantees system availability
- Effortlessly manage your expanding wireless infrastructure with Smart Wireless Navigator
- Layered security ensures that the network stays protected
- Additional devices can be added at any time
- No need to configure communication paths because the Gateway manages the network automatically

9710 Hydrostatic Level Transmitters

Level measurement for arduous conditions.

- Flush mount ceramic sensor in tough 316SS body
- 2 Wire 24V dc loop powered, 4-20mA output
- Measuring range up to 650ft (200m)
- Low cost installation

Pressure Transmitters

All models available with flexible Coplanar™ design which helps reduce engineering and installed costs.

Pressure Measurement:

- Reference accuracy ±0.075% Span (0.065% optional)
- Installed stability = 2 years (5 year optional)
- 100:1 Rangedown

Differential Pressure Flow Measurement:

- Rosemount 3051S Ultra for flow enables up to 14:1 flow turndown with a single transmitter
- Annubar technology has ±0.8% of volumetric flow rate accuracy, ideal for large lines due to minimal pressure loss

Differential Pressure Level Measurement:

- Rosemount Tuned Systems™ optimize performance and lower installed costs
- Multiple direct mount and capillary options to match vessel mounting requirements

Magnetic Flow Meters

Best-in-class performance coupled with advanced diagnostics deliver enhanced reliability, unparalleled process insight, and reduced lifecycle costs.

- All-welded construction
- Simple design to enhance reliability
- Available in standard line sizes .15" to 48" (4mm to 1200mm), larger line sizes available on request
- Wide selection of wetted materials for compatibility with virtually all conductive fluids
- Advanced diagnostic capabilities, in HART or Fieldbus protocols, reduce commissioning and maintenance time
- NSF approved
- Rosemount Smart Meter Verification diagnostic allows users to verify calibration without additional equipment
- Verifies both transmitter and flowtube sensor calibration
- No need to remove the meter from the line

Instrumentation for drinking water

Rosemount FCL Free Chlorine System

Reagentless free chlorine system including continuous pH measurement and correction.

- Eliminates costly and messy reagents, lowering operating costs
- Full color display pinpoints warnings and diagnostics
- Complete with data logger so data can be easily downloaded in Excel format using USB drive

Rosemount T56 Turbidity System

The Rosemount T56 Turbidity System continuously monitors water turbidity in drinking water applications.

- Compliant with U.S. EPA 180.1 and ISO 7021 Standards
- Best in class NTU measuring range allows for greater resolution and confidence in the reading
- No wiring needed which allows for quick startup and easy maintenance

Rosemount 56 Transmitter

A 4 wire transmitter capable of 2 simultaneous pH, Conductivity, Dissolved Oxygen, Chlorine, or Ozone measurements in any combination.

- Full color display pinpoints warnings and diagnostics for any out of limit parameter
- Process data can be downloaded in Excel format using a USB drive
- Extensive help screens for intuitive and rapid start up
- Process disruptions can be pinpointed in color trending process graphs
- Proportional, Integral, and Derivative (PID) Control and data logging

pH

Emerson offers a wide variety of sensors to exceed the standards of the water treatment industry.

- Designed with a solution ground to minimize stray current and increase measurement accuracy
- Threaded housing which allows for submersible installation
- Compatible with a low-flow panel which allows for high-purity water applications

Rosemount Low
Flow Cell

Rosemount
3900/3900VP

Ozone Oxygen and Chlorine Measurement

The Rosemount 499 series of amperometric sensors combines accuracy and dependability for all chlorine, dissolved oxygen, and dissolved ozone measurements.

- Rugged and robust design allows for ease of maintenance
- Use the oxidation-reduction reaction principle for repeatable water purity calculations
- 499AOZ and 499ACL are perfect for the monitoring of disinfection processes in the water treatment industry

Rosemount 499AOZ
Amperometric Ozone Sensor

Rosemount 499ADO
Dissolved Oxygen Sensor

Rosemount 499ACL
Chlorine Sensor

Conductivity

The Rosemount 400 and 228 conductivity sensors meet high standards for clean water and high suspended solids.

- Rosemount 400 Contacting Conductivity Sensor is out of the box ready to measure, no calibration necessary
- A reinforced metal frame gives the Rosemount 228 Toroidal Conductivity Sensor high vibration tolerance in slurries and suspended solids
- Rugged body and optional junction box allow for use in processes up to 200°C

Rosemount 228
Conductivity Sensor

Rosemount 400
Conductivity Sensor

Water industry products from Emerson include:

Rosemount Pressure, Temperature, Flow, and Level

The Rosemount product offering includes a complete line of pressure, temperature, flow, level, and safety measurement instrumentation. Throughout the process industries, Rosemount devices are specified more often than any other brand of process instrumentation.

Rosemount Analytical

Rosemount Analytical offers a comprehensive line of process gas and liquid analyzers, sensors and systems for efficiency, quality, and environmental analysis solutions. Rosemount Analytical instruments and systems will help you maximize performance, productivity, and profitability.

Smart Wireless Networks

Emerson's Smart Wireless networks enable a cost effective solution for measurements that were unattainable previously. The self-organizing network ensures an interoperable, adaptive, and flexible approach to wireless. It is secure, robust, and infinitely configurable, with data reliability of greater than 99%.

Instrument and Valve Services

Offering an extensive network of service centers and field service technicians in North America, Emerson's Instrument and Valve Services help build reliability programs to help plants achieve maximum capacity and minimal risk of downtime.

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