

Power/Steam



Pure Water and Process Analytics

Specifically designed for the Power Industry

METTLER TOLEDO



Mettler-Toledo Thornton

Committed to the Power Industry

Our fundamental innovations in high purity water measurements since 1964 have brought significant progress into the power industry. Thornton developed the robust coaxial conductivity sensor which completely replaced the traditional fragile glass/platinum cells for process use. Thornton also pioneered microprocessor-based conductivity/resistivity instrumentation with computed ultrapure water temperature compensation for the semiconductor industry, paving the way for similar capabilities in power applications.

In 2001, Thornton joined the Mettler-Toledo Process Analytics group and gained world-class technology for pH, ORP, and dissolved oxygen. We have grown to become the major supplier of instrumentation for makeup water treatment systems in the U. S. and many other countries. These include both conventional and mobile trailer treatment systems. Thornton now provides top performance in measuring cycle chemistry and stator cooling parameters around the world. Capabilities have expanded further to include instrumentation for cooling towers, scrubbers and wastewater monitoring and control.

Mettler-Toledo Thornton Industry Participation

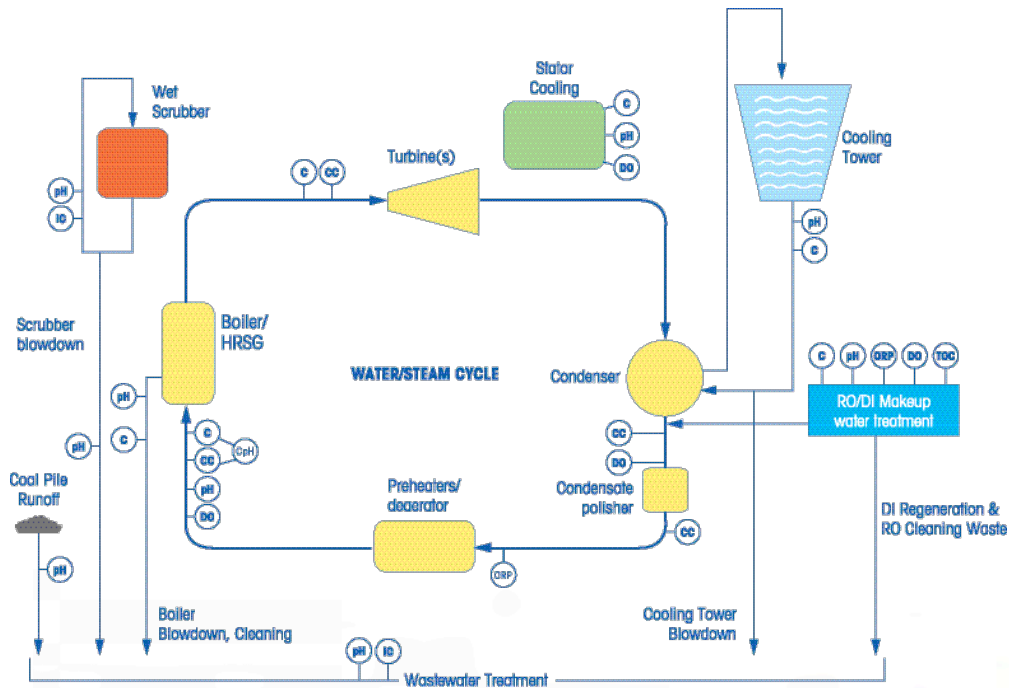
We have extensive expertise in power applications, sharing information through participation in organizations, conferences and publications. Mettler-Toledo Thornton supports its staff members' participation in:

- Ultrapure Water Conferences
- Electric Utility Chemistry Workshops
- Southwest Chemistry Workshops
- Energy Generation Conferences
- International Water Conferences
- Sciencetech Chemistry Instrumentation Seminars
- EPRI, VGB, IAPWS, Eskom Conferences
- Power Company and A&E Training Seminars
- ASTM D19 Water Committee
- ASME Power Cycle Performance Test Code Committee



Use of Thornton instrumentation assures you the best available technology to meet cycle chemistry guidelines and turbine manufacturers' warranty requirements. Capabilities such as much higher accuracy cation (acid) conductivity temperature compensation and high performance pH and dissolved oxygen equipment can make the critical difference when questions of compliance arise. High-level support at startup and continuing during operation assures a fully functioning installation, meeting the long-term needs for which it was designed.

Capabilities to meet the specific needs of Power/Steam Generation



Key to Measurements	
C	specific conductivity
CC	cation (acid) conductivity
CpH	calculated pH
IC	inductive conductivity
DO	dissolved oxygen
ORP	redox
pH	pH
TOC	total organic carbon

For illustration only – actual locations and measured parameters depend on the type of plant, materials of construction, cycle chemistry, etc.



Instrumentation Designed for Exacting Industry Requirements

Thornton 770MAX



A single 770MAX Multiparameter Analyzer/Transmitter can simultaneously measure display, alarm and provide outputs for cycle chemistry parameters of:

- Specific Conductivity
- Cation (acid) Conductivity
- Calculated pH (from above measurements)
- pH (direct electrode)
- Dissolved Oxygen or ORP
- Sample Temperature
- Sample Flowrate
- or any other combination using four analytical sensors plus flowrate

A four-line, multi-page display includes custom labeling of each measurement for easy identification. Options for up to four relays, eight analog outputs, RS232 and Profibus provide ready access to measurement data.

The 770MAX is also widely used in make-up water treatment systems where it conveniently integrates the diverse measurement signals, including total organic carbon (TOC)*. The 770MAX uses Smart Sensors that have identification and calibration information stored in integral non-volatile memory. This information is transferred directly to the instrument as soon as they are plugged in, for error-free startup, operation and diagnostics.

* See page 5 for details.

Thornton M300 Series

Thornton's M300 Series instruments provide two channel measurement of conductivity, pH, ORP and dissolved oxygen in any combination, plus temperature. They use precisely calibrated sensors with traceable calibration data on the sensor labels and certificates. Calibration and temperature compensation accuracy far exceed other instrumentation capabilities.

The M300 system provides outstanding performance for cycle chemistry, stator cooling, makeup water treatment, scrubber, cooling tower and wastewater measurements.



Mix & Match Sensors

Offer Accurate, Reliable Options

Thornton's acknowledged expertise in conductivity and total organic carbon is complemented by the vast capabilities of Mettler-Toledo Process Analytics for pH, ORP and dissolved oxygen. Together we provide long-lived, highly reliable sensors for the key parameters measured in cycle chemistry, stator cooling, makeup water treatment, cooling towers, scrubbers and wastewater treatment.

Conductivity

Thornton has optimized process conductivity measurement beginning with individually calibrated and certified sensor cell constants and temperature elements, traceable to ASTM and NIST standards in our ISO9001-certified factory. For the critical cation conductivity measurement as well as specific conductivity, Thornton's temperature compensation has been shown to be more than an order of magnitude more accurate than competitive instrumentation. Capabilities extend to both 4-electrode and inductive measuring techniques for cooling water, waste water and scrubbers.

Total Organic Carbon (TOC)

To guard against organic contamination in makeup water, Thornton offers the ppb-range 5000TOC Sensor for use with the 770MAX instrument. It measures conductivity before and after UV oxidation of organics to conductive bicarbonates. The difference is directly related to TOC concentration in low conductivity waters. The 5000TOC Sensor provides rapid response with truly continuous measurement to detect contamination before it fouls D.I. resin or reaches the water/steam cycle. The sensor approach to TOC analysis is economical enough to allow multiple measurement points in the water treatment system.



pH/ORP

Thornton provides application-specific pH and ORP sensors for optimum performance. For high purity water pH, the Mettler-Toledo Thornton pHure Sensor™ provides a low volume stainless steel flow chamber with unique self-pressurized gel reference electrode. It produces rapid response stability and ease of installation and calibration in this demanding measurement. A similar OR electrode is increasingly used with all-volatile treatment to guard against excessively reducing conditions and flow-accelerated corrosion. For scrubbers, cooling towers and wastewater, a robust Xerolyt® polymer-electrolyte reference system minimizes fouling and plugging to reduce maintenance.

Dissolved Oxygen

Thornton Dissolved Oxygen capabilities include both high-performance polarographic and long life galvanic sensor technologies. The compact high performance DO sensor with guard-ring electrode provides exceptionally fast downscale response of 98% in 90 seconds, for closely tracking plant startups and cycling. The long-life DO sensor allows measurement in stator cooling without interference from dissolved hydrogen and with extremely low maintenance requirements. Both sensor types have much lower cost of operation compared with competitive equipment.



A Sampling of Power Users

AEP	Eon	Pacific Klamath Energy
AES	Eskom	Pathfinder Energy Services
Alabama Electric Cooperative	Exelon	Pinnacle West Energy
Alliant Energy	FPL Energy	Pittsfield Generating
Arkansas Electric Cooperative	GE Osmonics	Portland General Electric
Associated Electric Cooperative	Georgia Power	Primesouth
Bahrain Ministry of Electricity	Gordonsville Energy	Rathdrum Power
Bechtel	Grosskraftwerk Mannheim	Reliant Energy
Black & Veatch	Gulf Power	Salt River Project
Calpine	Hamakua Energy Partners	Santee Cooper
Carolina Power & Light	Hsin Tao Power	Saskpower International
Chenega Power	Indeck Power Equipment	Sempra Energy
Citizens Thermal Energy	Indiantown Cogeneration	Sentry Equipment
City of Austin	Intergen Sidi Generating	Slippery Rock Municipal
City of Torrington	Johnson March Systems	Stone & Webster
City Water Light & Power	Kansas City Power & Light	Sunrise Power
CLECO	Kelly Electric Group	Tenaska Frontier Partners
Cochran Power Co.	Klamath Cogeneration	TIC
Cogentrix	Lakeland Electric & Water	Toledo Edison
Constellation Energy	Louisville Gas & Electric	Trans-Canada Power
Cordova Energy	LSP Energy	Transalta
Delphi Control Systems	Mass Power	Tri-City Electric
Dominion Virginia Power	Midland Cogeneration	Trigen Colorado Energy
DTE Energy	Mirant	Trigen St. Louis Energy
Duke Energy	Mobile Energy	TVA
Duke Fluor Daniel	Nevada Power	TXU
Duquesne Light	Nilit	U.S. Filter
Dynegy	Northern California Power	U.S. Gen New England
Ecolochem/Ionics	Northern Indiana Public Service	Water & Power Technologies
Eldorado Energy	Ontario Power	Waters Equipment
Empire District Electric	Oregon Electric Group	Western Farmers Electric
Energysave	Orlando Utilities	Western Mass. Electric
Entergy	Pacific Gas & Electric	Yuba City Cogen



Outstanding Training & Technical Services

Empower the Thornton User

On-Site Instrument Operation & Calibration Training Workshops

Thornton's Operator Training Courses are tailored to each customer's requirements. The course is conducted in a classroom setting where interaction between instructor and participants is encouraged. Each attendee is supplied with material detailing the course content. Instruments are provided for hands-on participation. The areas covered in this training program focus on Thornton instrumentation, calibration, and maintenance specific to your facility. Additional technical topics may be added or substituted as requested.

Traceable Instrument Calibration

Thornton offers instrument calibration and validation services traceable to national standards, industry guidelines, and/or regulatory requirements (including USP <645>, USP <643>, and EP 2.2.44). Services using factory-trained technicians are available at our facilities in Bedford, Massachusetts or on-site at your location. Each calibrated/validated instrument is supplied with the appropriate calibration documents.

Specialized Conductivity Calibrations

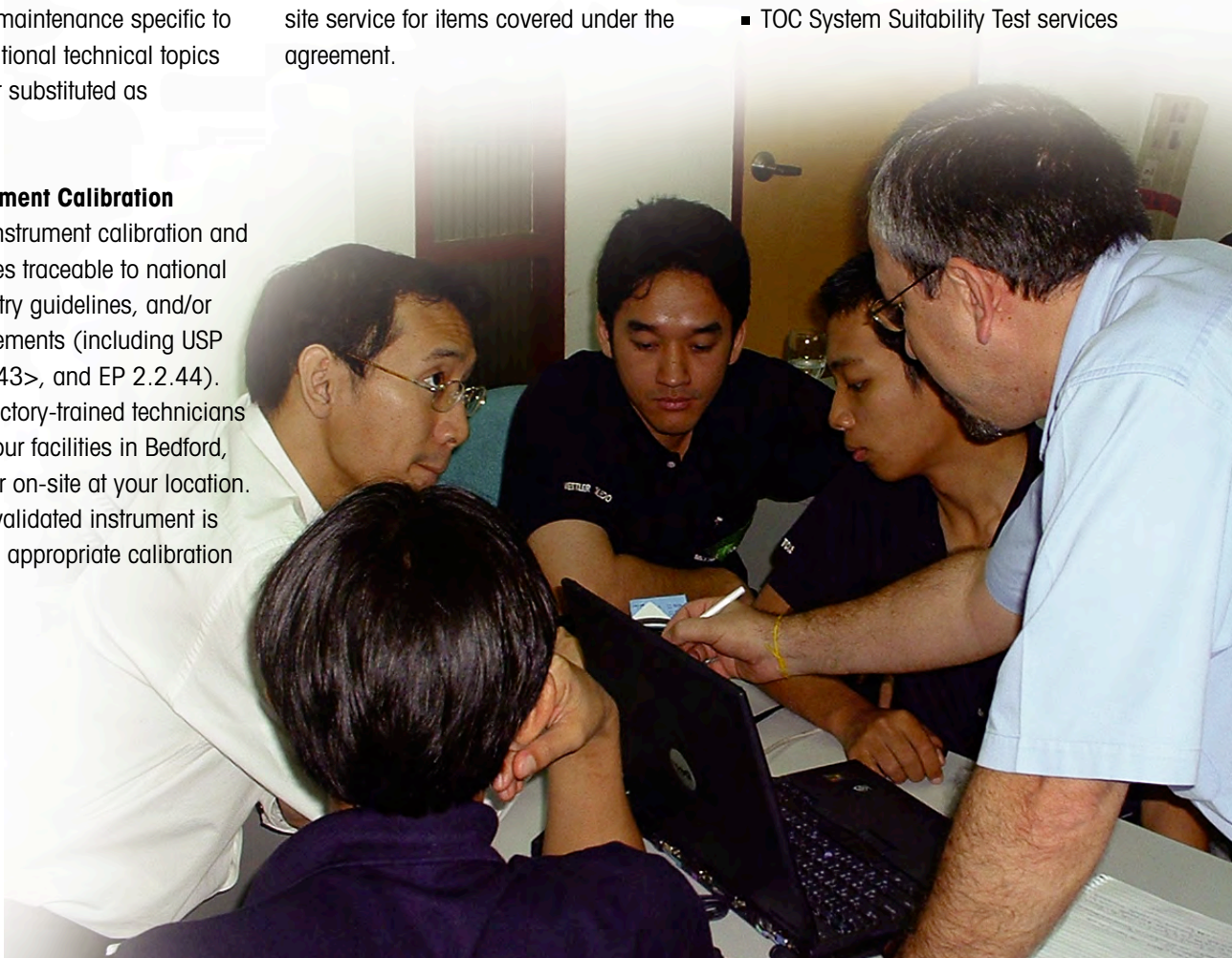
Choose one of seven unique conductivity calibrations to fit your application needs, from standard calibrations to customer-specified temperature and ASTM verification points. System calibrations are also available where the instrument and sensors are calibrated together, optimizing system accuracy.

Service & Calibration Contracts

A Thornton representative will provide on-site service for items covered under the agreement.

These services include, but are not limited to:

- Calibration/validation of instrument and sensor system
- Issuance of appropriate documentation
- Identification and verification of all software revisions
- Minor repairs or adjustment of instruments at a discounted labor rate
- Installation and validation support services
- TOC System Suitability Test services



Worldwide Offices

Ensure Prompt, Local Sales Support.

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