



THORNTON

Leading Pure Water Analytics

THORNTON can help protect your stator cooling system

Reliable and efficient power generation depends on stator cooling system integrity. Proper cooling water monitoring and treatment can minimize copper corrosion and plugging with corrosion products. THORNTON multiparameter instrumentation conveniently enables measurement of the most-needed parameters in a compact and reliable package.



Deposits of copper oxides restrict and even plug the narrow flow channels of stator bars. The results can range from a mild increase in stator pressure drop, to significant efficiency loss, to partial meltdown of the stator bars. Protection from copper corrosion must be taken seriously. A modest investment in monitoring can save the much higher costs for inefficiency, cleaning and repair.

Corrosion influences

The corrosion rate of copper is strongly influenced by dissolved oxygen concentration, pH and temperature. The relationships have been thoroughly studied and there is now an increasing appreciation for the need to monitor these critical parameters. In addition, conductivity must be maintained very low, usually $< 3 \mu\text{S}/\text{cm}$, to

prevent electrical flash over as well as to reduce corrosion. Dissolved oxygen influence is unusual because either very low or very high concentrations will minimize corrosion, but mid-range concentrations are most detrimental. This leads to two strategies for handling dissolved oxygen. It must be controlled to either $< 20 \text{ ppb}$ or $> 2000 \text{ ppb}$. Concentrations between these levels promote rapid copper attack and it is important that any excursions into this "no man's land" are very limited. Slightly elevated pH, between 8 and 9 also has great benefit and a small but growing number of plants are making pH adjustments to take advantage of that. See Figure 1. Continuous, reliable measurements are the key to assuring the right conditions.



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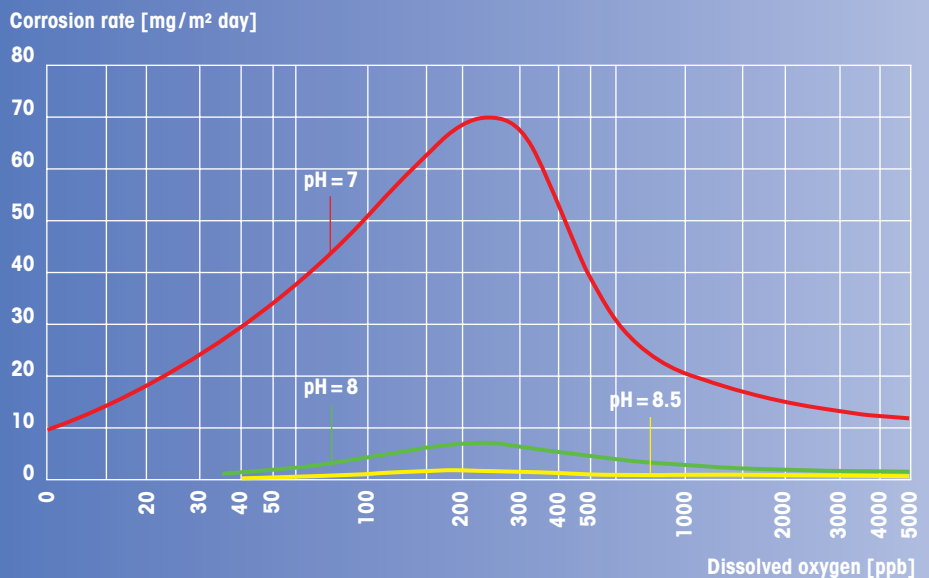
Monitoring

The THORNTON 770MAX Multiparameter Analyzer/Transmitter was specifically designed to measure conductivity, dissolved oxygen and pH simultaneously in low conductivity waters. Its four-line display provides clear indication of each parameter. A second display page can show the temperatures measured by each sensor. Analog and digital outputs are available for all parameters and temperatures. The THORNTON 770MAX is well-suited and widely used in makeup water treatment and cycle chemistry measurements as well, providing the convenience of instrument standardization throughout the plant.

Sensing


High purity sensors, combining the best of THORNTON and METTLER TOLEDO expertise, complement the 770MAX to give highest performance (See Figure 2). Conductivity sensors are calibrated and certified with ASTM and NIST traceability. THORNTON instruments provide the highest accuracy conductivity temperature compensation available. The THORNTON Long Life Dissolved Oxygen Sensor has no interference from dissolved hydrogen which is usually present in stator cooling samples – a critical requirement for this application. This sensor can measure reliably at low ppb concentrations for

Figure 1: Copper corrosion influences.



several years without any maintenance. A life-time supply of spare parts are included with the original sensor so there are no hidden costs. The THORNTON pHure Sensor™ provides greatly simplified measurement of pH in low conductivity samples. It is optimized with a pressurized gel flowing junction reference electrode with no cumbersome electrolyte reservoir, a Vario Pin connector for ease of installation, and a high performance preamplifier that allows sending a robust amplified pH signal a long distance to the instrument, where needed.

As you review your needs for monitoring stator cooling water, consult THORNTON for an innovative and dependable solution. ■



The corrosion rate of copper is strongly influenced by dissolved oxygen concentration.

Figure 2: THORNTON 770MAX with sensors for conductivity, dissolved oxygen and pH.



Some reasons to implement monitoring with the THORNTON 770MAX Multiparameter Analyzer / Transmitter

● Extensive measurement capabilities

6 channels: 4 Smart Sensors, including conductivity, temperature, flow, pH, ORP, dissolved oxygen, TOC, plus 2 pulse flow sensors for cycle chemistry and makeup water

● Cost effective

- Low cost per measurement point, with 6 sensor inputs
- One panel cutout replaces 6 for single function devices
- One instrument – reduces training and spares
- Plug-in sensor connections reduce wiring time

THORNTON now provides configuration and data logging software for the 770MAX

Configuring and maintaining a 770MAX Multiparameter Analyzer/Transmitter installation is now easier than ever. With measurements from up to six sensors, there are many settings to be entered into the instrument. This can now be performed well in advance of startup on a laptop computer using Windows. This method of configuration provides an overview of all settings to optimize displays and functioning for the convenience of operators.



THORNTON 770MAX Configuration Software is provided on a CD for convenient installation.

Configuration

All settings, for measurements, analog outputs, setpoints, relays, display, security, etc. can be established and viewed simultaneously, without pushing keys on the transmitter itself. Then with a mouse click, the optimized configuration is downloaded from the computer to the 770MAX at any time. In similar manner, the configuration of any 770MAX can be uploaded to the computer. Any number of configurations can be stored on the computer for backup security. They may be downloaded to duplicate configurations elsewhere or to set up a replacement instrument quickly if needed.

5000TOC Sensor joins the 770MAX configuration software package

Along with the introduction of the new 5000TOC Sensor for total organic carbon, the 770MAX Configuration and Data Logging software now has the enhanced capability to incorporate TOC parameters from the 5000TOC Sensor, including TOC concentration units, display resolution, and measurement averaging selections.

Data logging

In addition to configuration, this software includes a data logging feature that collects measurement data at a selectable interval from a 770MAX. The data is stored in a file accessible to spreadsheet software such as Excel which allows easy graphing. Data logging also allows entry of comments into the file at the time they occur to note any system changes or calibrations for later review. This built-in data logging capability can be especially valuable for troubleshooting a monitoring system during startups or changes.

THORNTON 770MAX Windows Configuration Software runs on computers using Microsoft Windows 98 or later versions and connects to the 770MAX with an RS232 cable. It is available for individual use or with site license for more widespread use.



THORNTON sensors – drawn from the best

Mettler-Toledo Thornton provides long-lived, highly reliable sensors for the key parameters conductivity, pH, ORP and dissolved oxygen measured in cycle chemistry, stator cooling, makeup water treatment, cooling towers, scrubbers and wastewater treatment.



Conductivity

Conductivity sensors offer individually calibrated and certified 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, Our temperature compensation has been shown to be more than an order of magnitude more accurate than competitive instrumentation.



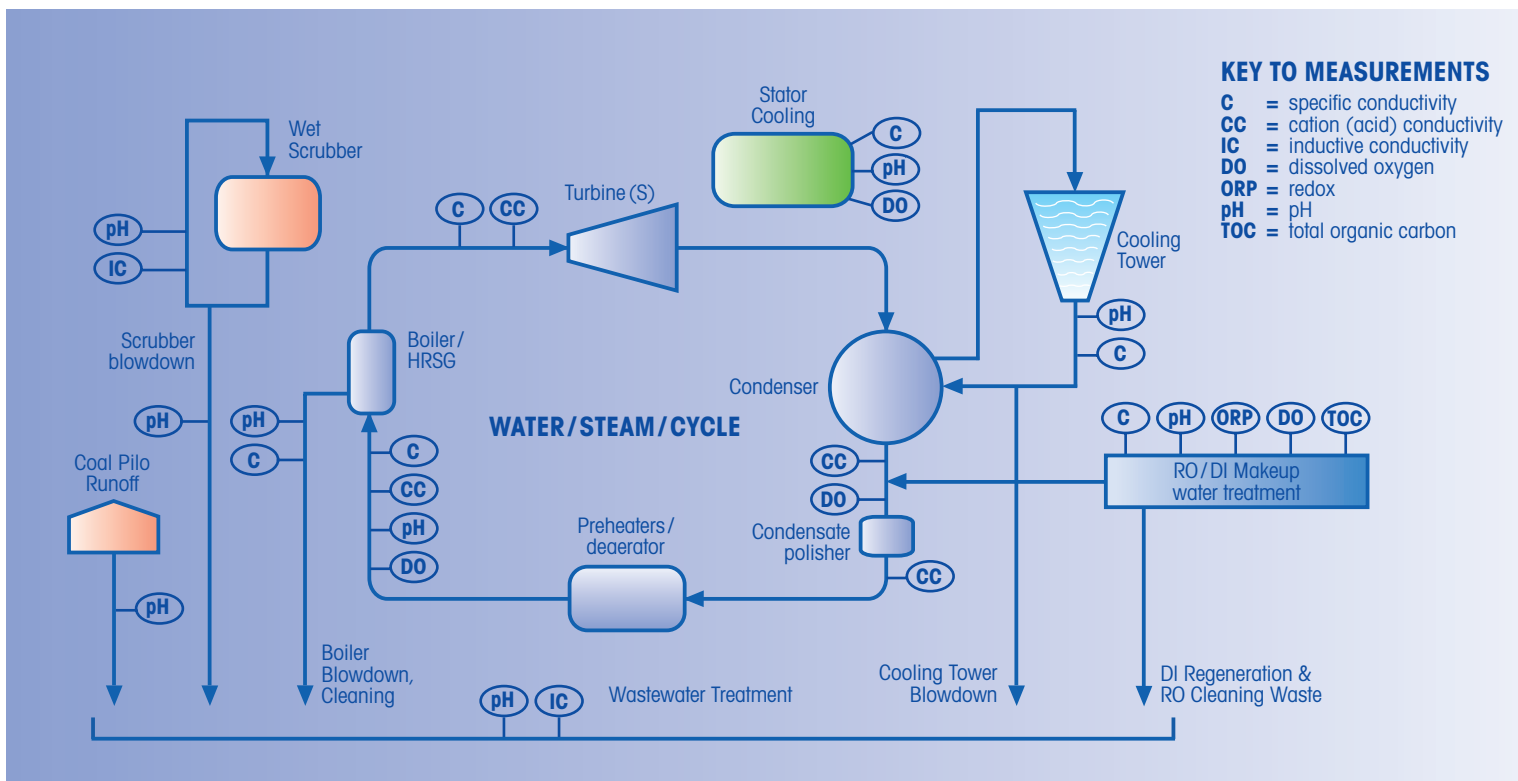
pH and ORP

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. For scrubbers, cooling towers and wastewater, a robust Xerolyt® polymer-electrolyte reference system minimizes fouling and plugging to reduce maintenance.



Dissolved Oxygen

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 hydrogen interference and with extremely low maintenance requirements. ■



Training and technical services

On-site instrument operation and 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. 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 and 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 test services

Conference	Location	Dates 2005
Southwest Chemistry Workshop	Scottsdale, AZ	July 26 – 28
International Water Conference	Orlando, FL	October 9 – 13
Ultrapure Water Conference	Portland, OR	October 25 – 26
Eskom Int'l Conf on Power Plant Chemistry	Mabalingwe, S Africa	November 8 – 11
Scientech Process Instrumentation Seminar	Clearwater, FL	November 16 – 18

Mettler-Toledo Thornton

36 Middlesex Turnpike
Bedford, MA 01730, USA
Tel: +1-781-301-8600
Fax: +1-781-301-8701

For local distributors please visit:
www.thorntoninc.com/ reps.htm

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