Degassed Cation Conductivity

THORNTON
Leading Pure Water Analytics

DCC1000e System

- All conductivity measurements
- Calculated pH, ammonia and CO_2
- Trend graphs
- Resin health monitoring

Degassed Cation Conductivity Measurement

Reliable and Accurate Cycle Chemistry Monitoring

METTLER TOLEDO

DCC1000e System for
Precise Detection of Corrosive Contaminants

The METTLER TOLEDO Thornton DCC1000e System offers an enhanced design for conductivity measurement for power cycle chemistry monitoring. By providing conductivity measurement in compliance with ASTM D4519, the DCC1000e is an easy to use system that ensures water purity to maximize power production and minimize corrosion.

Features	Benefits
• Precise detection of corrosive contaminants	• Faster plant start-ups and simpler turbine warranty compliance
• Multi-parameter M800 Transmitter with single-screen display of all measurements	• Easy displaying and monitoring of sample conditions
• Integrated flow sensor with automatic heater shut-off if flow stops	• Protects the DCC1000e System from thermal damage and reduces maintenance
• Resin deionization monitoring	• Provides warning of resin exhaustion before it is too late
• Trend graphs for all measurements	• Understand plant conditions better to avoid unplanned shutdowns with proactive maintenance.

Applications

Feed water and steam monitoring during plant startup enable the best decisions to be made on increasing load. By monitoring specific, cation and degassed conductivity, the technician can ensure the water quality is adequate to bring the plant online.

Power steam quality monitoring ensures contaminant limits specified in turbine warranties are met. By eliminating interference from CO_2 and ammonia, the degassed cation conductivity measures the level of contaminants that turbine manufacturers are concerned about.

Power condensate monitoring can help distinguish air in-leakage from cooling water leaks. Any CO_2 leakage into the condensate will be detected by comparing the cation conductivity to the degassed cation conductivity on the DCC1000e System.

The M800 provides an easy to use, touch sensitive interface that provides a simple readout of all measurements:

- Specific conductivity
- Cation conductivity
- Degassed conductivity
- Flow
- Temperature
- Calculated pH
- Calculated ammonia
- Calculated CO_2
- DI-Cap™ (resin deionization)

The M800 even includes the option for CO_2 concentration readout based on the difference between the cation conductivity measurement and degassed cation conductivity measurement, according to ASTM D4519.

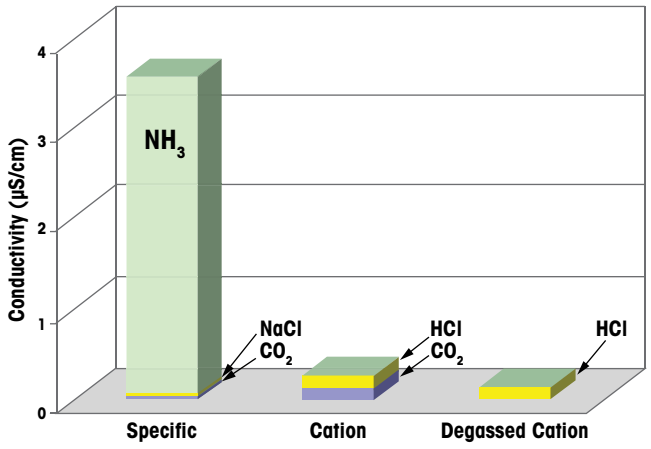
DCC1000e System for
Conductivity and Contamination Detection

With accurate and reliable conductivity measurements using UniCond Sensors with ISM, the DCC1000e System confirms water purity to maximize power production and minimize corrosion.

Conductivity – a key measurement
Conductivity measurement is the method for determining the concentration of dissolved ionic species present in sample water. Ultrapure water is very poorly ionized with conductivity as low as of 0.055 uS/cm. Even if a small amount of contaminant (for example, NaCl) is added, the conductivity increases substantially. Such salts are corrosive and their levels need to be monitored to ensure minimal corrosion.

Importance of identifying corrosive contaminants
An increase in conductivity also occurs with the addition of water treatment chemicals, such as ammonia or amines, which are not corrosive. These chemicals and their conductivity effects are removed using a cation resin column. The conditioned sample may also contain carbon dioxide, which has very low corrosivity. CO_2 adds to the conductivity measurement and obscures the actual conductivity from key corrosion-causing contaminants such as chlorides and sulfates. By using degassed cation conductivity to remove carbon dioxide interference a more accurate picture of the levels of chlorides and sulfates is provided (Figure 1).

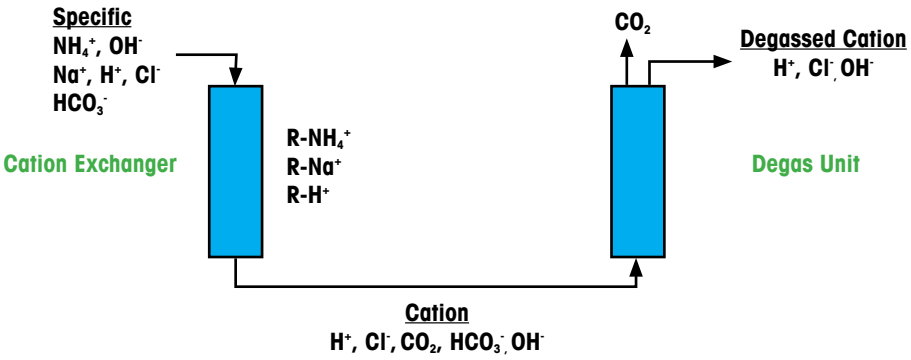
Figure 1: Typical Specific, Cation and Degassed Cation Conductivity Response



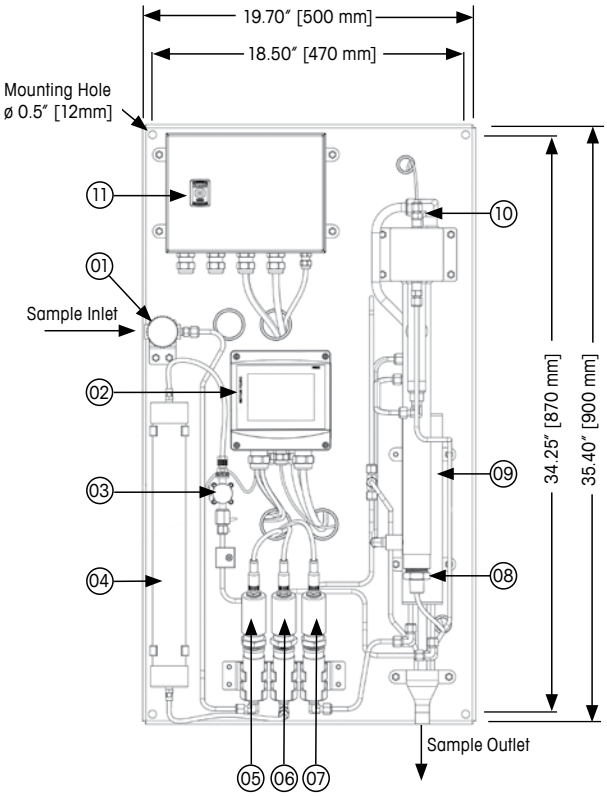
Optimized design to meet the challenge

The DCC1000e System uses the latest technology in conductivity measurement to accurately and reliably measure conductivity at each stage of sample conditioning to give insight into the cycle chemistry (Figure 2). UniCond® Sensors used in the DCC1000e are the best available for the measurement of conductivity in pure waters, giving the greatest accuracy at the lowest levels of detection. With ISM® features such as having the measurement circuit close and inseparable from the sensor elements, the UniCond Sensor can deliver enhanced accuracy and greater range of measurement. The DCC1000e System measures the conductivity after the cation resin column as well as after degassing to provide comprehensive information on various contaminants in the water. The degassing is accomplished by raising the sample water temperature to near boiling which releases the CO_2 from the water (the CO_2 is expelled through the unit's vent tube). The sample water is then cooled and its conductivity is measured. The reading obtained is the actual level of remaining corrosion-causing contaminants such as chlorides and sulfates.

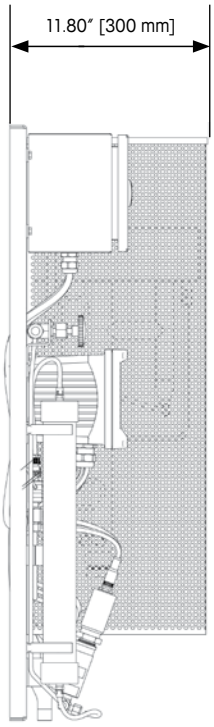
Figure 2: Specific, Cation and Degassed Cation Conductivity Measurements



DCC1000e System
Product Specifications



Front View



Side View

Item No	DESCRIPTION
01	ISOLATION VALVE
02	M800 TRANSMITTER
03	FLOW SENSOR
04	CATION COLUMN
05	SPECIFIC CONDUCTIVITY SENSOR
06	CATION CONDUCTIVITY SENSOR
07	DEGASSED CONDUCTIVITY SENSOR
08	1600W HEATING ELEMENT
09	COOLING UNIT
10	PID TEMPERATURE SENSOR
11	ELECTRICAL BOX

NOTE:
1. All dimensions are in inches (mm) unless otherwise noted.
1. Sample tubing: 1/4″ OD
2. Sample inlet connection: 1/4″ OD SS-316 bulkhead union
3. Sample outlet connection 1/2″ MNPT

UniCond Sensor with ISM

Specifications	
Accuracy	± 1% for 0.02-5,000 µS/cm; ± 3% > 5,000 µS/cm
Repeatability	± 0.25%
Temperature sensor	Pt 1000 RTD, IEC 60751, Class A, with NIST-traceable calibration
Temperature accuracy	± 0.1 °C at 25 °C
Wetted materials	Titanium, PEEK
Response time	90% of value in <5 s
Signal to transmitter	Digital (modified RS485)

Multi-Parameter M800 Transmitter with ISM

Electrical Specifications	
Current (analog) outputs	8 X 0/4 to 20 mA, 22 mA alarm, galvanically isolated from input and from earth/ground
Analog output accuracy	± 0.05 mA over 1 to 20 mA range
Analog output configuration	Linear, bi-linear, logarithmic, autoranging
Analog output load	500 Ω max.
Digital communication	USB, Type B connector
User interface	Color touchscreen 5.7″ Resolution 320 X 240 px 256 colors
Update time (meas. update rate)	1 per second
Hold input	Selectable
Alarm control delay	Selectable, 0 to 999 s
Connection terminal	Spring cage terminals appropriate for AWG 16-24/0.2 mm^2 wires
Relays	4-SPST mechanical rated at 250VAC, 3 Amps (Relay 1 NC, Relay 2 to 4 NO); 4-SPST Type Reed 250 VAC or DC, 0.5 Amps (Relay 5 to 8)
Digital input	6 with switching limits 0.00 VDC to 1.00 VDC for low level 2.30 VDC to 30.00 VDC for high level
Main fuse	2.0 A slow blow type FC, not replaceable

System Specifications	
Power supply	100-140 VAC and 200-240 VAC, 1600 W
AC frequency	50 to 60 Hz
Sample flow rate	150-350 mL/min
Sample temperature	20-60 °C (68-140 °F)[1]
Sample pressure	0.3-4 bar (5-58 psig)
Cation resin	600 cm^3
Ambient operating temperature	5-50 °C (41-122 °F)
Humidity	10 - 90% non-condensing
Dimensions (HxWxD)	900 x 500 x 300 mm (35.4 x 19.7 x 11.8″)
Weight	29 kg (63.9 lb)
Rating / approvals	CE

[1] Option for external cooling for temperatures above 60 °C

DCC1000e System
Ordering Information

Description	Order No.
DCC1000e System, 100-140 VAC	**30 421 478**
DCC1000e System, 200-240 VAC	**30 421 480**
DCC1000e System with separate cooling input ports, 100-140 VAC	**30 421 479**
DCC1000e System with separate cooling input ports, 200-240 VAC	**30 421 481**

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