

Analyze your feed water with H₂O Select

Thermo Scientific™ Barnstead™ H₂O Select Program is used to analyze feed water to recommend the proper water purification equipment based on the customer's application, lab usage and unique feed water supply. The program also estimates the expected cartridge life based on the customer's feed water.

H₂O Select Program reports the following test results: Specific Resistance, Conductivity, Total Ionized Solids, Total Organic Carbon and Turbidity.

Specific resistance

The tendency of water without ions to resist conducting electricity. Expressed in ohms with higher purity expressed as Megohm centimeter (often shortened to MΩ or “meg”), resistivity is generally used for the measurement of high purity water. The lower the ionic content the higher the resistivity with the highest purity of water at 18.2 MΩ.cm at 25°C.

Conductivity

The tendency of water that contains ions to conduct electricity. The unit of measure is micro-Siemens/centimeter (μS/cm) or micromho/cm. Conductivity is often used to measure tap water or lower quality purified water. The more ions present in the water, the higher the conductivity. This is measured by a conductivity meter. Conductivity and resistivity measurements are inversely related to each other.

When samples are taken from a pure water source, the water will naturally absorb CO₂ and other contaminants which can change the specific resistance and conductivity.



Total Ionized Solids (TIS)

H₂O Select calculates TIS based on the conductivity of the water sample. Inorganic ionic impurities such as calcium, magnesium, sodium, chlorides, fluorides, bicarbonates, sulfates, phosphates, nitrates and ferrous compounds are present as cations (positively charged ions) and anions (negatively charged ions). Water with a high concentration of ions will conduct electricity readily and have high conductivity and low resistivity. Ions can adversely affect the results of inorganic analyses such as IC, AA, ICP/MS and may retard cell and tissue growth in biological research. They can also affect the cartridge life in deionized water systems.

ASTM Type 1 and 2 vs. Typical H₂O Select Results for Specific Resistance, Conductivity and Total Ionized Solids

Water source	Specific resistance (ohm-cm)	Conductivity (uS/cm)	Total ionized solids (ppm) T.I.S.
Ultrapure water (ASTM Type 1 based on inline reading)	>18,000,000	<0.056	<0.03
Pure water (ASTM Type 2 based on inline reading)	>1,000,000	<0.10	<0.5
Purified water range ^{1, 2, 3} (Based on grab sample)	50,000 - 3,000,000	0.33 - 20	0.2 - 11
Tap water range (drinking) ²	500- 20,000	50-2000	25-1000

¹H₂O Select results for purified water are typical for grab samples because of during exposure to environment during sampling

² It is recommended to verify the water source meets the feed water specification for Thermo Scientific Barnstead water system

³ Purified water by one or more of the following technologies: Reverse Osmosis, Distillation, or Deionization

Total Organic Carbon (TOC)

Measurement of the organic contaminants found in water. Organic solids may include proteins, alcohols, chloramines and residues of pesticides, herbicides and detergents. They foul ion exchange resins, interfere with organic analyses including HPLC, gas chromatography and fluoroscopy. They can also hinder electrophoresis, tissue and cell culture. The unit of measure is parts per million (ppm) or parts per billion (ppb). Tap feed water can be in the 1-5 ppm range and high purity water in the ppb range. Measurement of TOC is done using an in-line analyzer or a grab sample. When a grab water sample is taken from an ultrapure water system, TOC results can change during sampling as it is picking up contaminants from the air and the plastic bottle during transit.

Turbidity

Sand, silt, clay, rust and other suspended particles cause water to be turbid. These suspended particles can interfere with instrument operation, plug valves and other narrow flow paths, and foul reverse osmosis membranes. They typically range from 1 – 10 µm in size and measured with a turbidity meter in units called NTU.

Summary

H₂O Select gives general information about the impurities in the water at the time of sampling. The feed water quality could change over time. The higher level of impurities in the water the greater the impact on the water purification system. Note: impurities in the water not tested by H₂O select such as hardness, chlorine, chloramine, and silica can also impact consumable life as well. In some cases, additional pretreatment of the water may be recommended.

ASTM Type 1 and 2 vs. Typical H₂O Select Results for Total Organic Carbon

Water source	Total Organic Carbon (ppm) T.O.C.
Ultrapure Water (ASTM Type 1 and 2 based on in-line reading)	<0.05
Purified Water TOC Range based on grab sample ^{1, 2}	0.07 - 1
Purified Water - High level TOC ^{1, 3}	>1
Tap Water Range	0.1 - 5
Tap Water - High level TOC ³	>5

¹ Purified water by one or more of the following technologies: Reverse Osmosis, Distillation, or Deionization

² H₂O Select results for purified water are typical for grab samples because of during exposure to environment during sampling

³ High levels of TOC can impact ion exchange capacity, therefore additional pretreatment is recommended

Typical H₂O Select Program Results for Turbidity

Water source	Turbidity (NTU)
Tap and Purified ¹ Water Range	0.00 - 1
Tap or Purified Water - High level of turbidity ²	>1

¹ Purified water by one or more of the following technologies: Reverse Osmosis, Distillation, or Deionization

² High levels of turbidity can impact RO membranes, filters and mechanical components, therefore additional pretreatment is recommended

Find out more at thermofisher.com/purewater

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