

Engineering Specification

Multiparameter Analyzer/Transmitter and Sensors (Mettler-Toledo Thornton 770MAX Instrument)

The multiparameter analyzer/transmitter shall accept input from six sensors simultaneously. Four channels shall have the choice of sensors for conductivity/resistivity/TDS, percent concentrations of hydrochloric acid, sulfuric acid or sodium hydroxide, pH, ORP, dissolved oxygen, flow, temperature, pressure and tank level. Two additional channels shall be available for pulse flow inputs.

From these input channels, up to 16 measurements shall be available, including temperatures (with conductivity, resistivity, pH, or dissolved oxygen), percent rejection, ratio, difference, totalized flow or percent flow recovery, as well as measurements in various units. For deionization capacity monitoring, the instrument shall be able to compute total accumulated grains or equivalents based on integration of flow and TDS measurements. For conductivity, the same model transmitter shall be capable of measurement from pure water to acid and sodium hydroxide concentrations, changing only the sensor.

The transmitter shall provide indication of up to 16 measurements identified with custom names and shall provide up to 16 setpoints, 4 or 8 isolated analog (0/4-20 mA) outputs, and 4 SPDT relays, as specified. RS232 communication shall be available for all measurements and configuration.

Sensors for the four multiparameter channels shall include "smart" NVRAM (non-volatile random access memory) with sensor type, serial number, factory calibration data and date stored. The transmitter channel shall configure and calibrate itself automatically to the sensor as soon as the sensor is connected. Subsequent field calibration data as well as original factory calibration data shall be retained in the sensor NVRAM for future access.

High purity water resistivity/conductivity temperature compensation shall fully compensate the non-linear properties of changing water ionization using the Thornton/Light conductivity data published in the 1994 Ultrapure Water Journal. In addition, selection shall be available for cation/acid and ammonia/ETA temperature compensation of power industry sample characteristics and for a user set linear temperature coefficient. Specialized temperature compensation shall match characteristics over the ranges of measurement of percent concentrations of acids or sodium hydroxide.

pH temperature compensation capabilities shall include adjustable solution temperature compensation for the ionization of water in addition to conventional electrode temperature compensation.

Dissolved Oxygen temperature compensation shall account for the changing diffusion rate of oxygen through the sensor membrane as well as the changing solubility of oxygen in water. Automatic pressure measurement and compensation shall be provided during air calibration.

Instrument security shall be provided by multi-level security codes. A single model of the indicating transmitter shall operate from 100-240 VAC. It shall provide a vacuum florescent or backlit LED display, as specified, for maximum visibility under installation conditions. It shall be provided with hardware for panel mounting or with an optional kit for wall or pipe mounting, as specified. All inputs and outputs shall use plug-in connectors for convenient wiring. The resistance measurement circuit shall use 4-wire technology and shall allow overall sensor-to-transmitter wiring distances up to 300 feet (91 m) for most sensors.

The transmitter shall have available an accessory "smart" calibrator which provides NIST-traceable resistances, voltages and frequency along with their precise values identified digitally. The calibrator shall automatically calibrate and verify all ranges of the transmitter by simple push-button operation. It shall be able to retain all calibration information from multiple transmitters for subsequent connection to a computer for download and printing certificates of calibration.

The instrument and its calibrator shall be ISO9001 factory calibrated to NIST-traceable standards and be provided with certificates of calibration. Conductivity/resistivity sensors shall be factory calibrated with traceability to ASTM D1125.

The analyzer/transmitter, sensors, and calibrator shall be Mettler-Toledo Thornton model 770MAX instrument, Smart Sensors, and 1875 Automatic Smart Calibrator.

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