

# Engineering Specification

pH, ORP, Conductivity and Dissolved Oxygen Indicating Transmitter (Mettler-Toledo Thornton 2000 Series)

The indicating transmitter shall be capable of measuring one or two channels of pH, ORP, conductivity and/or dissolved oxygen in compatible combinations identified by the manufacturer. Both measurements shall be made simultaneously, with indication, alarm and output signals available for both. Optional comparison of the two measurements shall be provided with internal computation, display, alarm and output of percent rejection, ratio or difference. Instrument security shall be provided by user set security code and allow user selection of function menus to be locked.

The same model instrument shall be capable of pure water conductivity measurements as well as high conductivity measurements, with appropriate sensors. It shall be capable of measuring from two- or four- electrode conductivity sensors and shall allow readout in conductivity or percent concentration units for hydrochloric acid, sulfuric acid or sodium hydroxide.

Conductivity temperature compensation for pure water shall fully accommodate the non-linear properties of changing water ionization using the most recent Thornton/Light conductivity data published in Ultrapure Water Journal. In addition, selection shall be available for cation and ammonia/ETA temperature compensation of power industry sample characteristics and for a user set linear temperature coefficient. Specialized temperature compensation shall also be provided when measuring percent concentrations of acids or sodium hydroxide.

pH temperature compensation shall include conventional Nernst electrode temperature compensation and adjustable solution temperature compensation for high purity water measurements, if needed. The transmitter shall have the options of setting a manual temperature value and turning off the compensation.

Dissolved oxygen temperature compensation shall include compensation for both the oxygen permeation rate of the sensor membrane and for the solubility of oxygen in water.

The indicating transmitter shall operate from 90-130 or 180-250 VAC or nominal 24 VDC 4-wire power, as specified. It shall provide an illuminated display, readable in direct sunlight or darkness. It shall be provided with hardware for sealed panel mounting or with optional kit for wall or pipe mounting with NEMA 4X, IP65 rating, as specified. Connection to sensors shall be via supplied cables with connector near the sensors for convenient installation, cleaning and replacement of the sensor and calibration of the transmitter. The transmitter shall have plug-in connectors and allow overall sensor-to-transmitter wiring distances up to 200 feet (61 m) for most sensors.

The indicating transmitter shall be provided with four alarm setpoints, assignable to two SPDT mechanical relays. Setpoints may also be assigned to two additional solid state AC relays, if specified. Analog output signals shall include two isolated, powered 4-20 mA signals, assignable to any measurement such as conductivity, dissolved oxygen, comparison, temperature, etc. Output scaling shall be selectable as linear or bi-linear (to provide high resolution at the low end of range yet keep high measurements on-scale during upset or startup). Selectable RS232 or RS422 shall also be provided.

The instrument shall be ISO9001 factory calibrated to NIST-traceable standards and be provided with a certificate of calibration. Accessory NIST-traceable resistance calibration modules, interchangeable with conductivity sensors, shall be available to permit full field calibration of conductivity/resistivity and temperature measurements, including leadwire effects.

pH/ORP and dissolved oxygen sensors shall include a local preamplifier to assure signal integrity. Conductivity cell constants shall be individually ISO9001 factory calibrated to ASTM-traceable standards, with final verification in 18+ Megohm-cm pure water for 0.1 cm<sup>-1</sup> sensors. They shall be provided with certificates of calibration.

The indicating transmitter and sensor(s) shall be Mettler-Toledo Thornton model 2000 Instrument, 363- or MT-series pH/ORP sensor, 367-series dissolved oxygen sensor and/or 24X-series conductivity sensor.

For the most current product information visit:

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ML0064 Rev C. 1/04