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**Specifications for the Hydro Instruments**  
**Model RPH-260 Residual Analyzer**  
**Specification RPH-260**

Probe Type Residual Chlorine Analyzer

**1.01 GENERAL**

**1.01.1 Completeness**

The system shall be complete with all components, equipment, and appurtenances.

**1.01.2 Quality Assurance**

All materials and components shall be new and unused of first quality by well-known manufacturers. Inferior materials or components shall not be allowed.

**1.02 MANUFACTURER**

The manufacturer shall be Hydro Instruments, Telford, PA, USA or approved equal. The residual analyzer shall be Hydro Instruments Model RPH-260 Residual Analyzer with one or two disinfectant probes. The version RPH-261 shall be set up for one probe and the version RPH-262 shall be set up for two probes.

**1.03 RESIDUAL ANALYZER**

**1.03.1 General**

1. The residual analyzer shall be capable of incorporating one or two of the below listed disinfectant probes without the need for any reagent chemicals.
2. The residual analyzer shall be capable of being provided with one or two temperature sensors and zero, one or two pH probes.
3. The residual analyzer shall offer the option of adding a flow stop switch alarm for each disinfectant probe sample water flow stream.
4. The residual analyzer shall be capable of software compensation for temperature and pH variations for free chlorine measurement.
5. Shall include Modbus RS-485 two-way communication.
6. The residual analyzer shall be provided with a universal power supply accepting 100 to 250 VAC (50-60 Hz) or direct 24 VDC powered.
7. An optional data logger shall be available for automatically recording the analyzer output data (residual, temperature and pH/ORP when applicable) at a selectable frequency.
8. The analyzer shall allow the user to hold (freeze) the readings/outputs, for a selectable period of time, to prevent false alarms during cleaning and calibrations.

### 1.03.2 Monitor/Controller Electronics

1. Shall include a 320 x 240 pixel graphical color display and four push button interface and shall be housed in a NEMA4X (IP66) rated enclosure.
2. The display shall include three (3) graphs (residual, pH, and Temperature) to display these values graphically over the preceding period of time.
3. Shall include the following input/output communication features:
  - a. Four (4) optically isolated 4-20mA output channels, each field-selectable for indication of residual reading, pH/ORP, temperature, or control signal output.
  - b. Four (4) adjustable relay outputs for alarm indications.
  - c. Modbus RS-485 two-way communication.
4. An optional data logger with real time clock shall be available for automatically recording the analyzer output data (residual, temperature and pH/ORP when applicable) at a selectable frequency.
5. Shall accept input signals from the chlorine residual probes, pH sensors or ORP probes, and thermistors, (dip switch selectable between pH and ORP), and a 4-20mA input channel for proportional process variable (water flow meter).
6. Shall be capable of software compensation for temperature fluctuations and also for temperature and pH effects on disinfectant probe measurements.
7. Shall be capable of zero and span calibrations for each probe input signal through software.
8. Shall provide for pH calibration by sample point or two pH buffer solutions of 4 and 7, 7 and 10, or 4 and 10.
9. Shall allow for sample point calibration of the thermistor.
10. The residual analyzer shall offer the option of adding a flow stop switch alarm for each disinfectant probe sample water flow stream.

### 1.03.3 Optional pH Probes

1. The residual analyzer shall be capable of optionally incorporating an optional pH probe for each disinfectant probe to measure the pH of the sample water at each probe.
2. The pH reading can be used by the monitor/controller to allow software compensation for the effects of pH and Temperature changes on disinfectant probe measurements.

### 1.03.4 Bubble Trap Flow Cell (for probe options listed in section 1.03.4)

1. The analyzer shall include a bubble trap flow cell for mounting of certain disinfectant probes listed below in section 1.03.4, pH and temperature sensors.
2. This flow cell shall include a bubble trap design with open weir and gravity flow to control water flow rate, maintain no pressure condition, and avoid bubbles reaching and effecting the pH and Temperature sensors.
3. The flow cell shall be constructed of clear acrylic material for easy monitoring of flow cell condition.
4. The flow cell shall include a clean out port below the chlorine residual probe.

#### 1.03.4.1 Model F1 Measurement Probe for Bubble Trap Flow Cell

1. The probe shall use the Amperometric method to continually monitor free chlorine residual. The signal generated by this probe shall be read by the residual analyzer monitor/controller.
2. The probe measurement ranges available are zero to 0.50, 2.00, 5.00, 10.0 and 20.0 PPM.
3. The residual analyzer shall employ an Amperometric probe using a semi-permeable membrane and electrodes immersed in an electrolyte solution to continually monitor the target species.
4. The measurement cell shall have a 10 second speed of initial response and a T<sub>90</sub> response of approximately 30 seconds.
5. The probe shall be suitable for pressures less than or equal to 0.5 bar (7 PSI), temperature range of 0 - 45 C (32 - 113 F), and a pH range of 6 to 8.
6. The probe response shall have natural pH dependence and automatic compensation for changes in pH and Temperature shall be available in the RPH-260 controller.
7. No ice crystals shall be present in the measuring water.
8. Surfactants in measuring water are NOT tolerated.
9. Sea water is not tolerated.

#### 1.03.4.2 Model F2 Measurement Probe for Bubble Trap Flow Cell

1. The probe shall use the Amperometric method to continually monitor free chlorine residual. The signal generated by this probe shall be read by the residual analyzer monitor/controller.
2. The probe measurement range shall be from 0 to 200 PPM.
3. The electrodes shall be immersed in an electrolyte behind a semi-permeable membrane.
4. The measurement cell shall have a 10 second speed of initial response and a T<sub>90</sub> response of approximately 2 minutes.
5. The probe shall be suitable for pressures less than or equal to 0.5 bar (7 PSI), temperature range of 0 - 45 C (32 - 113 F), and a pH range of 4 to 9.
6. The probe response shall have reduced pH dependence and automatic compensation for changes in pH and Temperature shall be available in the RPH-260 controller.
7. Surfactants in measuring water are tolerated.
8. No ice crystals shall be present in the measuring water.
9. Sea water is tolerated with a conductivity range of 10 µS/cm – 50 mS/cm.

#### 1.03.4.3 Model T1 Measurement Probe for Bubble Trap Flow Cell

1. The probe shall use the Amperometric Potentiostatic method to continually monitor total chlorine residual. The signal generated by this probe shall be read by the residual analyzer monitor/controller.
2. The probe measurement ranges available are zero to 0.50, 2.00, 5.00, 10.0 and 20.0 PPM.
3. The electrodes shall be immersed in an electrolyte behind a semi-permeable membrane.
4. The measurement cell shall have a 10 second speed of initial response and a T<sub>90</sub> response of approximately 2 minutes.
5. The probe shall be suitable for pressures less than or equal to 0.5 bar (7 PSI), temperature range of 0 - 45 C (32 - 113 F), and a pH range of 4 to 12.

6. The probe response shall have greatly reduced pH dependence and automatic compensation for changes in pH and Temperature shall be available in the RPH-260 controller.
7. Surfactants in measuring water are tolerated.
8. No ice crystals shall be present in the measuring water.
9. Sea water is not tolerated with the standard MCH-T1 membrane cap, but sea water is tolerated with the MCH-F2 membrane cap.

#### 1.03.5 Pressurized Closed Flow Cell (for probe options listed in section 1.03.5)

1. The analyzer shall include a closed flow cell for mounting of certain disinfectant probes listed below in section 1.03.5, pH and temperature sensors.
2. This flow cell includes a rotameter and rate control valve to allow visual monitoring and manual control of the water flow rate.
3. The flow cell shall be constructed of clear acrylic material for easy monitoring of flow cell condition.
4. The flow cell shall include a clean out port below the chlorine residual probe

#### 1.03.5.1 Model F3 Measurement Probe for Pressurized Closed Flow Cell

1. The probe shall use a 3-electrode Potentiostatic method to continually monitor free chlorine residual. The current signal generated by this probe shall be read by the residual analyzer monitor/controller.
2. The probe measurement ranges available are zero to 1.00, 2.00, 5.00, 10.0 and 20.0 PPM.
3. The two of the electrodes shall be directly immersed in the water and the third electrode shall be immersed in electrolyte. The probe shall not use any membrane.
4. The probe head shall include a passive cleaning head with three free moving balls that serve to continually clean the two exposed electrodes.
5. The measurement cell shall have a 10 second speed of initial response and a T<sub>90</sub> response of approximately 30 seconds.
6. The probe shall be suitable for pressures less than or equal to 8 bar (116 PSI), temperature range of 0 - 50 C (32 - 122 F), and a pH range of 5 to 9.
7. The probe response shall have natural pH dependence and automatic compensation for changes in pH and Temperature shall be available in the RPH-260 controller.
8. Surfactants in measuring water are tolerated.
9. No ice crystals shall be present in the measuring water.
10. Sea water is not tolerated.