*Technology For Solutions*

GLI International

Data Sheet PRO-E3/1101
Supersedes PRO-E3/501

# PRO-series Electrodeless Conductivity Transmitter

**(Model PRO-E3 measures Conductivity, % Concentration, and Total Dissolved Solids)**


CE

Certified Compliant to
European Community Standards

■ **Multiple Measurements.**
The PRO-E3 transmitter can be selected to measure conductivity, % concentration or total dissolved solids (ppm). Measured parameter and temperature values can be displayed separately or together. The corresponding 4-20 mA analog output value can also be shown. (The PRO-E3 also provides an uncompensated conductivity readout for concentration measurement.)

■ **Built-in Concentration Tables.**
Built-in chemical tables represent the most commonly measured solutions in various concentration ranges. Simply select the table matching your solution type and range. For other solutions, you can create a custom concentration table of up to ten data points to define it.

■ **Versatile Hookup Capability.**
PRO-series transmitters can be wired in a two, three or four-wire hookup arrangement to meet your application requirement.

■ **Compact Size and NEMA 4X Universal Mounting.**
The compact PRO-series transmitter can be panel, wall, pipe or integral sensor mounted.

■ **Multiple Language Capability.**
All screens can be selected for display in English or Spanish. (Different languages such as French or German may also be substituted.)

■ **"Menu-guided" Operation.**
The simple keypad and logical menu structure make this transmitter easy to use. Menu screens guide you through setup, calibration, operation, and test/maintenance functions.

■ **Four Temperature Compensation Methods.**
Select from linear slope (% per °C), built-in natural water temperature properties table or, for special solution compensation requirements, create a custom temperature table of up to ten data points for accurate temperature-compensated measurements. A "no compensation" mode is also available.

■ **Electromagnetic Conformance.**
All PRO-series transmitters exceed U.S. and meet European standards for EMI and RFI emissions and immunity.

■ **Simple Interactive Diagnostics.**
Built-in diagnostics continuously test transmitter and sensor operation.

■ **Multiple Calibration Methods.**
Two "wet" calibration methods are available for sensor offset of conductivity measurement. For % concentration, choose between methods to enter a concentration or conductivity value. TDS calibration requires entering a known reference solution or sample ppm value. Sensor zeroing (first time only) is available for all measurements.

■ **Isolated 4-20 mA Analog Output.**
The isolated 4-20 mA analog output can represent the selected measurement (conductivity, % concentration or TDS) or the measured temperature. During calibration, the analog output is automatically held at the last measured value and, upon completion, returned to its active state.

■ **Passcode-protected Access.**
For security, use the passcode feature to restrict configuration and calibration settings to only authorized personnel.

■ **OEM Versions Available.**
PRO-series transmitters can be packaged or configured to accommodate OEM-specific needs.

**ELECTRODELESS CONDUCTIVITY**

# Specifications

**Operational:**

Display..... Two-line by 16 character LCD

***NOTE:*** *The measured value (conductivity, % concentration or TDS) and temperature can be displayed separately or shown together on a single screen. The corresponding 4-20 mA analog output value can also be shown. When measuring concentration, a readout of uncompensated conductivity is also provided.*

| Measurement | Range(s) |
|---|---|
| Conductivity..... | µS/cm: 0-200.0 or 0-2000<br>mS/cm: 0-2.000, 0-20.00, 0-200.0 or 0-2000<br>S/cm: 0-2.000 |
| % Concentration..... | 0-99.99% or 0-200.0% |
| TDS..... | 0-9999 ppm |
| Temperature..... | -20.0 to +200.0°C or -4.0 to 392.0°F |
| Analog Output ..... | 4.00-20.00 mA |

Ambient Conditions..... Operation: -4 to +140°F (-20 to +60°C); 0 to 95% relative humidity, non-condensing
Storage: -22 to +158°F (-30 to +70°C); 0 to 95% relative humidity, non-condensing

Temperature Compensation ..... Automatic from 14.0 to 392.0°F (-10.0 to +200.0°C) with selection for Pt 1000 ohm RTD temperature element, or manually fixed at a user-entered temperature

***NOTE:*** *The selected measurement (conductivity, % concentration or TDS) determines which of the following temperature compensation methods are available:*

- *Linear % per °C slope*
- *Built-in natural water temperature properties table*
- *User-entered temperature table*
- *No compensation*

Sensor-to-Transmitter Distance..... Maximum cable length is a function of the measuring range and allowable non-linearity. The following schedule is recommended:

| Full-scale Range | Maximum Length |
|---|---|
| 200 to 2000 µS/cm ..... | 200 ft. (61 m) |
| 2000 to 2,000,000 µS/cm ..... | 300 ft. (91 m) |

***NOTE:*** *When measuring % concentration, convert the transmitter full-scale value to conductivity to determine the maximum distance.*

Power Requirements ..... Two-wire Hookup: 16-30 VDC; Three-wire Hookup: 14-30 VDC*; Four-wire Hookup: 12-30 VDC*
(Class 2 Power Supply) *16 VDC minimum with RS-485 serial communication.

Calibration Methods:

Sensor Zero (all measurements)..... With the dry sensor in air, press keys to initiate automatic system zeroing

Sensor Offset: Conductivity..... Cond Cal: Enter compensation reference temp., linear % per °C slope, and one reference solution value
Sample Cal: Enter one sample value (determined by laboratory analysis or comparison reading)

Concentration ..... Conc Cal: Enter one sample value (determined by laboratory analysis or comparison reading)
Cond Cal: Enter compensation reference temp., linear % per °C slope, and one reference solution value

TDS ..... TDS Cal: Enter one sample value (determined by laboratory analysis or comparison reading)

Analog Output..... Isolated 4-20 mA output with 0.004 mA (12-bit) resolution

***NOTE:*** *Output can represent the selected measurement (conductivity, % concentration or TDS) or measured temperature. Parameter values can be entered to define the endpoints at which the 4 mA and 20 mA analog output values are desired (range expand). During calibration, the analog output is automatically held at the last measured value and, upon completion, returned to its active state.*

Maximum Loop Load..... Dependent on power supply voltage, transmitter hookup arrangement, and wire resistance:

| Maximum Permissible Loads | | | | | | | |
|---|---|---|---|---|---|---|---|
| Transmitter Hookup Arrangement | Power Supply Voltage | | | | | | |
| | 12 VDC | 14 VDC | 16 VDC | 20 VDC | 24 VDC | 28 VDC | 30 VDC |
| Two-wire Hookup | - - - - | - - - - | 100 ohms | 300 ohms | 500 ohms | 700 ohms | 800 ohms |
| Three-wire Hookup | - - - - | 500 ohms | 600 ohms | 800 ohms | 1000 ohms | 1200 ohms | 1300 ohms |
| Four-wire Hookup | 400 ohms | 500 ohms | 600 ohms | 800 ohms | 1000 ohms | 1200 ohms | 1300 ohms |

Memory (non-volatile)..... All user settings are retained indefinitely without battery backup

EMI/RFI Conformance..... Exceeds US and meets European standards for conducted and radiated emissions and immunity; certified CE compliant for applications as specified by EN 50081-2 for emissions and EN 50082-2 for immunity

Electrical Certifications:

General Purpose (pending)..... UL, C-UL, FM, and CENELEC

Class 1, Division 2 (pending)..... UL, C-UL and FM: Groups A, B, C, D, F, and G

**Transmitter Performance (Electrical, Analog Output):**

Accuracy**..... ± 0.1% of span
Sensitivity**..... ± 0.05% of span
Repeatability**..... ± 0.05% of span
Temperature Drift**..... Zero and Span: ± 0.02% of span per °C
Response Time..... 1-60 seconds to 90% of value upon step change (with output filter setting of zero)

***These typical performance specifications are:*

1. *Based on 25°C with conductivity of 500 µS/cm and higher. Consult GLI for applications in which conductivity is less than 500 µS/cm.*
2. *De-rated above 100°C to the maximum displayed temperature of 200°C. Consult GLI for details.*

# Specifications (continued)

**Mechanical:**

| | |
|---|---|
| Enclosure | Polycarbonate; NEMA 4X general purpose; choice of included mounting hardware |
| Mounting Configurations | Panel, wall, pipe or integral sensor mounting |
| Dimensions | With Back Cover: 3.75 in. W x 3.75 in. H x 2.32 in. D (95 mm W x 95 mm H x 60 mm D)<br>Without Back Cover for Panel Mount: 3.75 in. W x 3.75 in. H x 0.75 in. D (95 mm W x 95 mm H x 19 mm D) |
| Net Weight | 10 oz. (280 g) approximately |

# Ordering Information

**MODEL NUMBER** (see Notes 1 and 3)

- **PRO-E3A** Electrodeless conductivity transmitter with wall/pipe/integral sensor mount kit (see Note 2)
- **PRO-E3B** Electrodeless conductivity transmitter with panel mount kit (includes gasket, retainer plate, and four screws)
- **PRO-E3C** Basic electrodeless conductivity transmitter (without mounting hardware -- electronics only)

**RESERVED CATEGORY**

**EQUIPMENT TAGGING** (specify tag data)

- **N** None
- **P** Paper
- **S** Stainless steel

**1** **Product Number**

**Choose item from each category.**

### Ordering Notes:

1. The standard on-screen languages for PRO-series transmitter operation are English and Spanish. A different language (French, German, etc.) may be substituted for Spanish. Please specify the desired language.
2. This mounting kit includes all hardware needed to wall, pipe or integral sensor mount the transmitter. When integrally mounting the transmitter onto a GLI convertible style electrodeless conductivity sensor, please specify the sensor part number with a "PRO2" suffix to ensure a correct sensor cable length. When integrally mounting the transmitter onto a GLI sanitary style sensor, please specify the sensor part number with a "PRO1" suffix to also include a coupling. When the coupling is not required for a replacement sanitary style sensor, please specify the sensor part number with a "PRO2" suffix.
3. Each transmitter is supplied with a CD-ROM containing operating manuals (in PDF-file format) for all of the PRO-series transmitters. Paper manuals are also available (see Accessories below).

### Accessories (order separately):

- **Retrofit Wall/Pipe/Integral Sensor Mount Kit 1000A3457-001**

  This hardware kit enables an existing panel-mounted PRO-series transmitter to be wall, pipe or integral sensor mounted.

- **Retrofit Panel Mount Kit 1000A3455-001**

  This hardware kit enables an existing wall, pipe or integral sensor-mounted PRO-series transmitter to be panel mounted.

- **Couplings to Retrofit Transmitter onto Sensor**

| Installed 3700E-series Sensor | Required Coupling | |
|---|---|---|
| | Part Number | Size |
| Convertible | None required | - - - - |
| Sanitary | 1000F3465-001 | 5/8-11 UNC x 1/2-inch |

- **Operating Manual No. PRO-E3**

  A paper booklet operating manual for the PRO-E3 electrodeless conductivity transmitter.

### Electrodeless Conductivity Sensors

Refer to Data Sheet 3700E for sensor details.

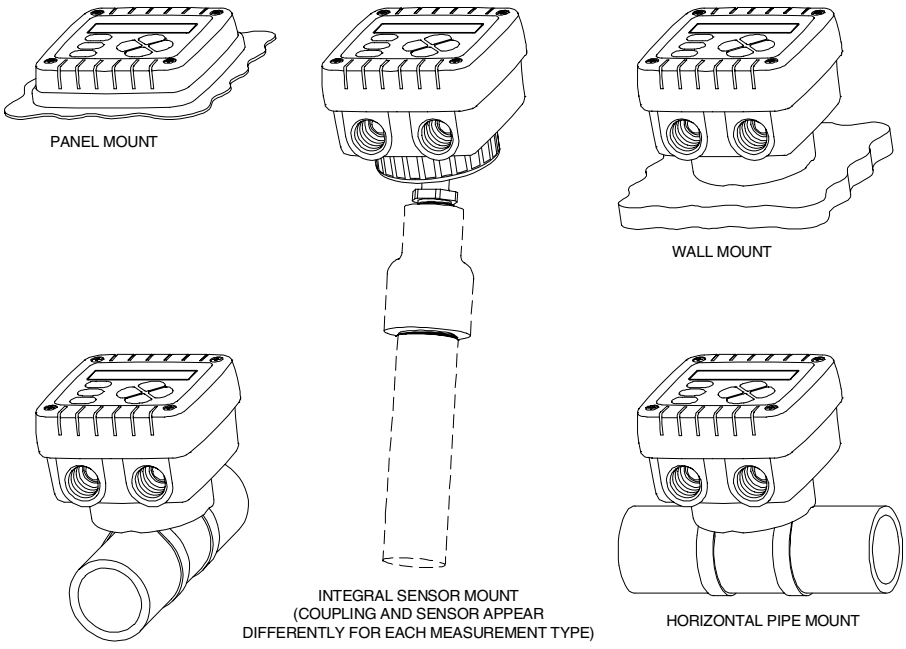
# Engineering Specification

1. The microprocessor-based transmitter shall accept any GLI Model 3700E-series electrodeless conductivity sensor.
2. The transmitter shall measure the selected parameter (conductivity, % concentration or TDS) and process temperature.
3. The transmitter shall be operable in multiple languages.
4. The transmitter shall have a two-line by 16 character LCD. It shall display the measured value and temperature separately or together on a single screen. The corresponding 4-20 mA analog output value shall also be shown. When measuring concentration, a readout of uncompensated conductivity shall also be provided.
5. The transmitter shall have these calibration methods:
   a) Sensor Zero: With the dry sensor in air, press keys to initiate automatic system zeroing.
   b) Cond Cal: Enter compensation reference temperature, linear % per °C slope, and one conductivity reference solution value.
   c) Sample Cal: Enter one conductivity sample value (determined by laboratory analysis or comparison reading).
   d) Conc Cal: Enter one concentration sample value (determined by laboratory analysis or comparison reading).
   e) TDS Cal: Enter one TDS sample value (determined by laboratory analysis or comparison reading).
6. The transmitter shall have a passcode to restrict configuration and calibration settings to only authorized personnel.
7. The transmitter shall have built-in chemical tables representing the most commonly measured solutions in various concentration ranges. For other solutions, the transmitter shall enable the user to create a custom concentration table of up to ten data points to define the solution.
8. Depending on the selected parameter (conductivity, % concentration or TDS), the transmitter shall provide one or more of the following temperature compensation methods:
   a) Linear slope (% per °C).
   b) Built-in natural water properties table.
   c) User-defined temperature table of up to ten data points for special solution compensation requirements.
   d) No compensation.

# Engineering Specification (continued)

9. The transmitter shall have user-test diagnostics for transmitter and sensor operation without requiring special test equipment.
10. The transmitter shall have an isolated 4-20 mA analog output that can be assigned to represent the selected parameter (conductivity, % concentration, or TDS) or measured temperature. Parameter values can be entered to define the endpoints at which the 4 mA and 20 mA analog output values are desired (range expand). During calibration, the analog output is automatically held at the last measured value and, upon completion, returned to its active state.
11. The transmitter shall be GLI International, Inc. Model PRO-E3.

# Mounting Configurations




**Model 3700E-series Electrodeless Conductivity Sensors**

(for use with PRO-E3 Transmitter)

For complete details and specifications, refer to Data Sheet 3700E.