Back to MANUALS Menu

# OPERATING INSTRUCTION MANUAL

## Model P63
## pH Analyzer

***Worldwide Headquarters and Sales:***

**GLI International, Inc.**
9020 West Dean Road
Milwaukee, Wisconsin 53224
U.S.A.

*Phone:* [414] 355-3601
*Fax:* [414] 355-8346
*E-mail:* info@gliint.com
*Web:* www.gliint.com

***Represented By:***

This operating manual and other GLI operating manuals are available on GLI's web site at gliint.com when viewed using Adobe's free Acrobat reader. To get this reader, link to Adobe through GLI's web site or visit Adobe's web site at adobe.com.

**WARRANTY**

GLI International, Inc. warrants the Model P63 to be free from defects in material or workmanship for a period of 2 years (24 months) from the date of shipment of this product from our facility. A warranty claim will not be honored if defects are not reported within the warranty period, or if GLI International determines that defects or damages are due to normal wear, misapplication, lack of maintenance, abuse, improper installation, alteration, or abnormal conditions. GLI International's obligation under this warranty shall be limited to, at its option, replacement or repair of this product. The product must be returned to GLI International, freight prepaid, for examination. The product must be thoroughly cleaned and any process chemicals removed before it will be accepted for replacement or repair. GLI International's liability shall not exceed the cost of the product. Under no circumstances will GLI International be liable for any incidental or consequential damages, whether to person or property. GLI International will not be liable for any other loss, damage or expense of any kind, including loss of profits, resulting from the installation, use, or inability to use this product.

# IMPORTANT SAFETY INFORMATION

**This analyzer is compliant with safety standards as outlined in:**
European Community low voltage directive (EN 61010-1)

**Please read and observe the following:**

- Opening the analyzer door exposes you to line power voltage, if present, at terminals TB5 and TB6 in the base of the enclosure. This may be hazardous. Always remove line power before entering this area in the analyzer. However, the analyzer door assembly contains only low voltage and is completely safe to handle.
- Install this analyzer in accordance with relevant local codes and instructions contained in this operating manual. Also, note and comply with the analyzer's technical specifications and input ratings. If one line of the line power mains is not neutral, use a double-pole mains switch to disconnect the analyzer.
- Whenever it appears that analyzer safety is questionable, disconnect line power from the analyzer to ensure against any unintended operation. For example, an unsafe condition is likely when:
  1) The analyzer appears visibly damaged.
  2) The analyzer fails to operate properly or provide the intended measurements.
  3) The analyzer has been stored for long periods at temperatures above 140°F (60°C).
- Only qualified personnel should perform wiring or repairs, and only when the analyzer is not powered.

## HELPFUL IDENTIFIERS

In addition to information on installation and operation, this instruction manual may contain WARNINGS pertaining to user safety, CAUTIONS regarding possible instrument malfunction, and NOTES on important, useful operating guidelines.

**WARNING:**

**A WARNING LOOKS LIKE THIS. IT WARNS YOU OF THE POTENTIAL FOR PERSONAL INJURY.**

**CAUTION:**

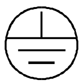
**A CAUTION LOOKS LIKE THIS. IT ALERTS YOU TO POSSIBLE INSTRUMENT MALFUNCTION OR DAMAGE.**

☞ ***NOTE:*** *A note looks like this. It alerts you to important, useful operating information.*

Back to MANUALS Menu

## Definition of Equipment Symbols

This symbol **means CAUTION** and alerts you to possible danger or instrument malfunction. Refer to this manual before proceeding.



This symbol, which appears on the analyzer enclosure at the green ground screw (shown in Figure 2-3), **means that this is a protective ground terminal** and alerts you to connect an earth ground to it.

This symbol on the equipment **means that there is alternating current present** and alerts the user to be careful.

Back to MANUALS Menu

# CONDENSED OPERATING INSTRUCTIONS

This manual contains details for all operating aspects of the instrument. The following condensed instructions are provided to assist you in getting the instrument started up and operating as quickly as possible. **These condensed instructions are only for basic operation.** To use specific features of the instrument, refer to the appropriate sections in this manual for instructions.

## A. CONNECTING SENSOR

1. After properly mounting the analyzer (PART TWO, Section 2), connect the GLI Differential Technique pH sensor to “SENSOR” terminals on TB1 (Figure 2-3), matching colors as indicated. When using a conventional combination pH electrode, follow the instructions in PART TWO, Section 3.2 to connect it.

   ***NOTE:*** *For GLI Differential sensors that have two shield wires, always connect its outer shield to the green ground screw (earth ground) and its inner shield to “SHLD” Terminal 6.*

2. Configure the analyzer for the type of sensor being used:

   A. Press the **CONFIG key** to display the “CONFIGURE” menu screen.

   B. Use the ⇩ **key** to select the “Main Parameter” line, and press **ENTER key** to display the “MAIN PARAMETER” submenu screen.

   C. With the “Sensor Type” line selected, press **ENTER key** to display the “SENSOR TYPE” submenu screen.

   D. Use ⇦ **or** ⇨ **key** to choose the appropriate selection:

      - **DIFF** for GLI Differential Technique Sensor
      - **COMB** for conventional combination pH electrode

      With the selection highlighted, press **ENTER key** to enter it.

## B. ADJUSTING DISPLAY CONTRAST

Ambient lighting conditions may make it necessary to adjust display contrast to improve visibility. With the MEASURE screen displayed, press and hold the **ENTER key** and simultaneously press the ⇧ **or** ⇩ **key** until attaining the desired contrast.

(continued on next page)

Back to MANUALS Menu

# CONDENSED OPERATING INSTRUCTIONS

## C. CALIBRATING THE ANALYZER

The analyzer must be calibrated so that measured values will correspond to actual process values. The analyzer provides different methods for calibration. **For the first-time calibration, however, it is highly recommended to use the two-point <u>arbitrary</u> <u>buffer</u> method described below:**

1. Press the **CAL key** to display the “CALIBRATION” menu.

2. With the “pH” line selected, press **ENTER key** to display the “pH CALIBRATION” submenu screen.

3. With the “Arbitrary Buffer” line selected, press **ENTER key** to start calibration using this method (analog output state selection screen appears).

4. With analog output selection screen displayed:

   A. Use ⇦ **and** ⇨ **keys** to select “HOLD” to hold the analog outputs at their present values during calibration. Outputs can also be transferred (XFER) to user-preset values or allowed to remain ACTIVE.

   B. Use ⇩ **key** to select “CONTINUE,” and press **ENTER key** to continue.

5. On subsequently appearing screens, follow the easy instructions and make the appropriate selections to complete the calibration.

## D. COMPLETING ANALYZER CONFIGURATION

The analyzer provides many useful features including analog and TTL outputs, relays, optional PID controller, and software alarms. To configure these analyzer features to your application requirements, use appropriate CONFIGURE submenus to make selections and “key in” values. Refer to PART THREE, Section 5 for complete configuration details.

# TABLE OF CONTENTS

## PART ONE - INTRODUCTION



## PART TWO - INSTALLATION

Back to MANUALS Menu

# TABLE OF CONTENTS (continued)

## PART THREE - OPERATION

# TABLE OF CONTENTS (continued)

Back to MANUALS Menu

# TABLE OF CONTENTS (continued)



## PART FOUR - SERVICE AND MAINTENANCE



## PART FIVE - SPARE PARTS AND ACCESSORIES

Back to MANUALS Menu

# TABLE OF CONTENTS (continued)

## ILLUSTRATIONS



## TABLES

Back to MANUALS Menu



# PART ONE - INTRODUCTION

## SECTION 1

## GENERAL INFORMATION

### 1.1 Capability Highlights

**Sensor Input**

The analyzer is equipped with one of two types of sensor input (scaling) printed circuit boards. One board enables any GLI Differential Technique pH sensor to be used with the analyzer. The other is provided when using a conventional combination electrode or electrode pair.

**Informative Display**

In addition to displaying pH, **you can scroll the lower line** on the MEASURE screen using the ⇧ **or** ⇩ **key** to show other important system information. See operational specifications in PART ONE, Section 2.1 for a complete listing.

**Advanced Diagnostics**

True predictive diagnostics can forecast the date for end-of-sensor life. Reactive diagnostics alerts you to changes in vital sensor data including impedance, zero, and slope for the measuring and reference electrodes. All diagnostics data are logged and can be set to drive alarms. Analyzer self-checks verify memory, keypad, and display status.

**Data Logbook**

The analyzer logbook records up to 100 system events including calibrations, warn and fail messages, power-up/ power-down, relay overfeed timer “time outs”, and configuration activity. Each event is logged with its date and time of occurrence.

**Passcode-protected Access**

For security, you can create a passcode to restrict access to configuration settings to only authorized personnel. See PART THREE, Section 5.13 for details.

**Calibration Methods**

Four methods are available to calibrate the analyzer for pH. See PART THREE, Section 4.4 for details. Temperature can also be calibrated. However, since the analyzer is factory-calibrated for high, temperature measurement accuracy, this feature is typically not needed.

**Dual Analog Outputs**

The analyzer provides two sets of analog outputs. Each set consists of one 4-20 mA and one 0-5 VDC/0-1 mA signal. Each output set can represent the measured pH or temperature. When the analyzer is equipped with the optional PID controller, Output 1 can be set to represent the controller output (0-100%). Output 2 can be selected to provide a dedicated non-variable alarm signal of only 4 mA or 20 mA instead of its normal proportional output. When the analyzer detects that one of the 4-20 mA loops is open, it displays a “Current Load High” diagnostic message.

Relays

The analyzer has three relays. They may be the standard electromechanical relays, or the optional solid state AC or solid state DC relays.

TTL Outputs

The analyzer has three TTL (NAMUR) outputs. They can be used to represent the established German NAMUR Committee standards for measurement and control:

- **TTL Output A:** Instrument is “off line” for calibration or maintenance.
- **TTL Output B:** One or more software or system alarms are in the “warn” state.
- **TTL Output C:** One or more software or system alarms are in the “fail” state.

Each enabled TTL output can be set to operate as “fail safe,” and assigned an “on delay” time.

Transfer Condition (for analog outputs, relays, and TTL outputs)

The states of the analog outputs, relays, and TTL outputs can be separately transferred to user-preset states. This is especially useful during calibration or when performing maintenance. See PART THREE, Section 5.9 for details.

Optional PID Controller

The optional PID controller has a selectable algorithm (ISA or velocity), all tuning functions including manual reset, and timers for 0% and 100% controller output. In addition to its normal automatic operation, the controller can be operated manually using screens in the MAINT menu.

## 1.2 Modular Construction

The modular construction of the analyzer simplifies field servicing and provides electrical safety. The front door/keypad assembly uses voltages no greater than 24 VDC, and is completely safe to handle.

Opening the analyzer door accesses terminals inside the enclosure for electrical connections. Line power must be connected to specifically designated terminals on TB5/TB6.

**WARNING:**

**REMOVE LINE POWER BEFORE NEARING THIS AREA TO AVOID ELECTRICAL SHOCK.**

Back to MANUALS Menu



### 1.3 Retained Configuration Values

All user-entered configuration values are retained indefinitely, even if power is lost or turned off. The non-volatile analyzer memory does not require battery backup.

### 1.4 Analyzer Serial Number

Labels with the analyzer serial number are located on the top of the enclosure and backside of the door assembly. You can display the serial number by pressing the **DIAG key**, selecting “Device Description,” and pressing **ENTER**.

### 1.5 EMI/RFI Immunity

The standard analyzer has an aluminum enclosure and filters for line power and low-level signals, all of which provide substantial protection from most normally encountered electromagnetic interference. Some applications, however, may require additional protection. In these cases, the analyzer may be equipped with the EMI-hardened option that includes extra shielding, special shielded glass for the display, and CE certification. (An EMI upgrade kit is available for on-site retrofitting.) This protection exceeds U.S. standards and meets European IEC 801-series testing for electromagnetic and radio frequency emissions and susceptibility. Refer to Figure 1-1 and the specifications in Section 2.1 for more information.

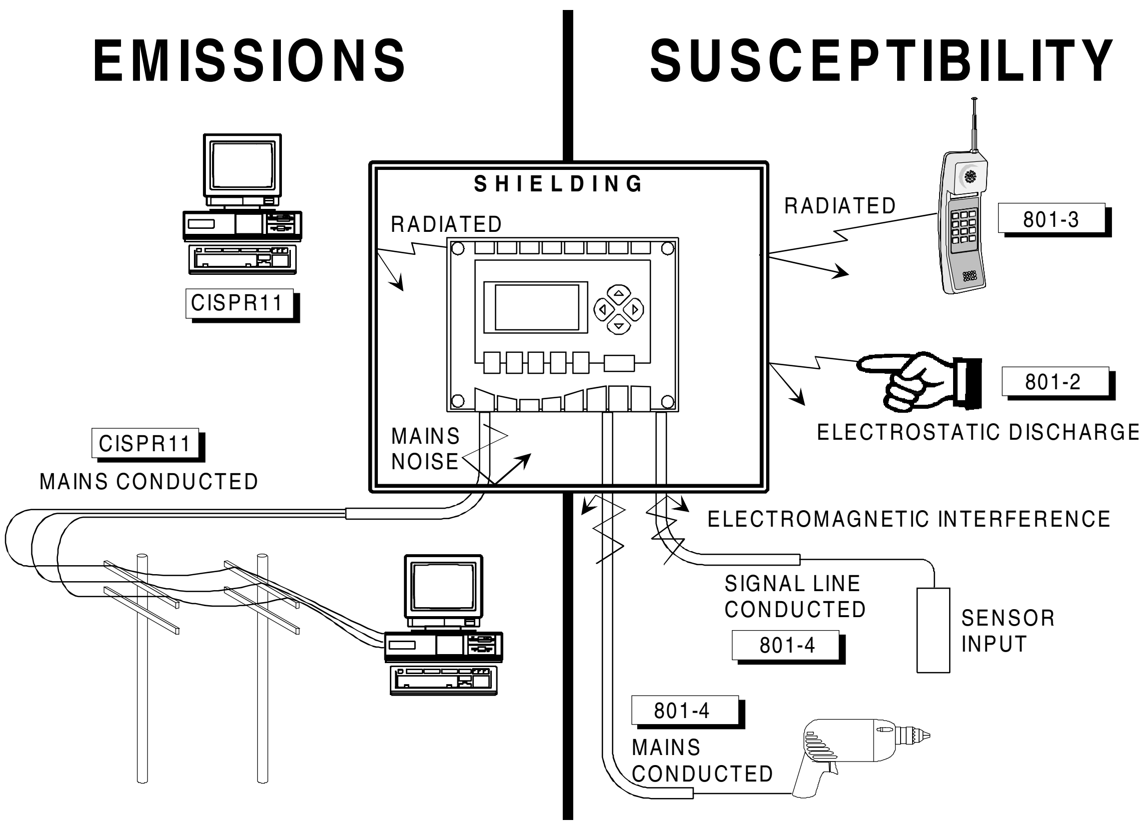



*FIGURE 1-1 EMI/RFI Immunity Diagram*

# SECTION 2
# SPECIFICATIONS

## 2.1 Operational

Display....................................... Graphic dot matrix LCD, 128 x 64 pixels with LED backlighting; 1/2 inch (13 mm) main display character height; 1/8 inch (3 mm) auxiliary information character height; menu screens contain up to six full lines of text

| Displayed Information | Ranges |
|---|---|
| Main Display | 0.0-14.0 pH or 0.00-14.00 pH, selectable |
| Auxiliary Display: | |
| Temperature | -10.0 to +110.0°C |
| Opt. PID Controller Output | 0.0-100.0% |
| Sensor Status | Displays predicted date for end-of-sensor life |
| Date | Month/day/year |
| Time | Hour/minutes |
| Calibration Status | Displays next scheduled date for calibration |
| mA Outputs (1 and 2) | 4.00-20.00 mA |
| Act. Electrode Impedance | 1-999 MΩ (Differential Technique sensor) |
| Std. Electrode Impedance | 1-999 MΩ (Differential Technique sensor) |
| Glass Elect. Impedance | 1-999 MΩ (conventional combination electrode) |
| Ref. Electrode Impedance | 1-250 KΩ (conventional combination electrode) |
| pH Sensor mV Output | -500 to +500 mV |
| Relay Status | On or off |
| Diagnostic Warnings | See Table A for details |
| Error Messages | See Table A for details |

Ambient Conditions .................... -22 to +140°F (-30 to +60°C); 0-95% relative humidity, non-condensing

Relays:

Types/Outputs: Standard ....... Three electromechanical relays (two SPDT and one SPST); UL-rated 5A 115/230 VAC, 5A @ 30 VDC resistive

Optional ..........Three solid state AC relays (all SPST); UL-rated 2A continuous; user must provide 24-250 VAC and 0.02 amps RMS minimum

or

Three solid state DC relays (all SPST); UL-rated 2A continuous; user must provide 3-60 VDC

Functional Modes ................... Each relay (A, B, and C) can be selected to be driven by the measured pH or temperature; or all relays operate as dedicated wash/cal cycle outputs for Cal-Clean™ System

Operating Modes: Control....... Settings for fail safe on/off, high/low phasing, setpoint, deadband, overfeed timer, on delay, and off delay

Alarm...........Settings for fail safe on/off, high alarm point, high alarm point deadband, low alarm point, low alarm point deadband, on delay, and off delay

Indicators................................ Relay A, B, and C annunciators indicate respective relay on/off status

Temperature Compensation ....... Automatic or manual, -10.0 to +110.0°C, with selection for temperature element (NTC 300 ohm thermistor, Pt 1000 ohm RTD or Pt 100 ohm RTD), or a manually entered value; 3-wire temp. sensor connection capability; auto temp. comp. for pure water (0.0-50.0°C)

Back to MANUALS Menu



Sensor-to-Analyzer Distance:
GLI Differential Tech. Sensor .. 3000 ft. (914 m) maximum (distances greater than 500 ft./152 m may degrade sensor impedance diagnostic readings)
Conventional Comb. Elect....... 100 ft. (30 m) maximum with electrode cable capacitance of less than 30 pF/foot

Power Requirements .................. 105-250 VAC, 50/60 Hz. (20 VA max.); no jumper or switch settings required

pH Calibration Methods:
Arbitrary (1 or 2-point) ............ Enter known value of buffer for each point
Pre-defined (1 or 2-point) ........ Automatic calibration and buffer recognition using buffers from one of these built-in buffer sets:

- GLI Buffers: 4.00, 7.00, and 10.00 pH
- NBS Buffers: 1.68, 4.01, 6.87, 9.18, and 12.45 pH
- DIN 19267 Buffers: 1.09, 4.65, 6.79, 9.23, and 12.75 pH
- Merck/Riedel de Haën Buffers: 2.00, 4.00, 7.00, 9.00, and 12.00 pH
- Ingold Buffers: 2.00, 4.01, 7.00, and 9.21 pH

Sample (1 or 2-point) .............. Enter known value of sample determined by laboratory analysis or comparison reading
Wash/Cal ............................... When used with a GLI Cal-Clean™ system or other appropriate hardware, initiates automatic wash/cal cycle operation using predefined buffer values from a selected built-in buffer set (see five buffer sets listed above)

TTL Auxiliary Inputs (two)........... Dedicated for use only with automatic GLI Cal-Clean™ System

Outputs: Analog* (standard)...... Two sets (1 and 2) each with 4 microampere (12-bit) resolution; each set consists of:

Isolated 4-20 mA (900 ohms max. load)
- and -
Isolated 0-5 VDC (1 megohm min. load)/
0-1 mA (100 ohms max. load)

*Each analog output set can be assigned to represent the measured pH or temperature. When the analyzer has the optional PID controller, Output 1 can be set to represent the controller output (0-100%). Output 2 can be selected to provide a special dedicated non-variable alarm signal (only 4 mA or 20 mA) instead of its normal proportional output. pH or temperature values can be entered to define the endpoints at which the minimum and maximum output values are desired (range expand). During calibration, both output sets can be selected to hold their present values, transfer to user-preset values to operate control elements by an amount corresponding to those values, or remain active to respond to the measurement. The display indicates an error message for each output current loop that is open.

TTL (standard)............ Three isolated auxiliary TTL-level outputs for:

A. Use with automatic Cal-Clean™ System
B. Use as NAMUR diagnostics:

TTL Output A: Instrument is “off line” for calibration or maintenance.

TTL Output B: One or more software or system alarms are in the “warn” state.

TTL Output C: One or more software or system alarms are in the “fail” state.

PID Controller (optional) ............. One isolated 4-20 mA (uses analog out 1); 900 ohms max. load

Memory Backup (non-volatile) .... All user settings are retained indefinitely in memory (EEPROM)

Logbook .................................... Non-volatile memory records up to 100 system events including calibrations, warning and failure messages, power-up/power-down, relay overfeed timer “time outs,” and configuration activity; each event is logged with its date and time of occurrence

Real-time Clock.......................... Operated by trickle-recharged lithium battery (10-year life) when power is interrupted

EMI/RFI Immunity:
Standard. .............................. Metal enclosure and filters for line power and low level signals provide substantial protection from electromagnetic and radio frequency interference
Certified CE Compliant (optional) ............ Extra shielding and special shielded glass for the graphic dot matrix display; exceeds U.S. and meets European standards for conducted and radiated emissions (CISPR11 Class A), protection from radiated EMI/RFI to a level of 10 volts/meter (IEC 801-3), electrostatic discharge (IEC 801-2), and conducted electromagnetic interference (IEC 801-4)

Electrical Certification (optional):
General Purpose .................. CSA and FM
Division 2 ............................. CSA: Class I and II, Groups A, B, C, and D
FM: Class I and II, Groups A, B, C, D, F, and G

## 2.2 Analyzer Performance (Electrical, Analog Outputs)

Accuracy ................................... 0.05% of span (±1 count)
Sensitivity ................................. 0.05% of span
Stability..................................... 0.05% of span per 24 hrs., non-cumulative
Non-linearity............................... 0.05% of span
Repeatability .............................. 0.1% of span or better
Temperature Drift ....................... Zero: 0.01% of span per °C;
Span: 0.01% of span per °C

## 2.3 Mechanical

Enclosure.................................. NEMA 4X; polycarbonate face panel, epoxy-coated high-quality cast aluminum door and case with four 1/2 inch (13 mm) conduit holes, nylon mounting bracket, and stainless steel hardware

Mounting Configurations............. Panel, surface, and pipe (horizontal and vertical) mounting

Net Weight ................................ 5.5 lbs. (2.5 kg) approximately

Back to MANUALS Menu



# PART TWO - INSTALLATION

## SECTION 1

## UNPACKING

After unpacking, it is recommended to save the shipping carton and packing materials in case the instrument must be stored or re-shipped. Inspect the equipment and packing materials for signs of shipping damage. If there is any evidence of damage, notify the transit carrier immediately.

## SECTION 2

## MECHANICAL REQUIREMENTS

### 2.1 Location

1. It is recommended to locate the analyzer as close as possible to the installed sensor:

   - **GLI Differential Technique Sensor:** The maximum allowable distance between this type of sensor and the analyzer is 3000 feet (914 m). However, distances greater than 500 feet (152 m) may degrade the electrode impedance diagnostics of the analyzer.

   - **Conventional Combination Electrode:** The maximum allowable distance between this type of electrode and the analyzer is 100 feet (30 m). A preamp may be used to extend this distance to 3000 feet (914 m), but the preamp must be within 100 feet (30 m) of the electrode. (**Important:** A preamp will eliminate the electrode impedance diagnostics capability of the analyzer.)

2. Mount the analyzer in a location that is:

   ➥ Clean and dry where there is little or no vibration.

   ➥ Protected from corrosive fluids.

   ➥ Within ambient temperature limits (-22 to +140°F; -30 to +60°C).

**CAUTION:**

**EXPOSING THE ANALYZER TO DIRECT SUNLIGHT MAY INCREASE THE OPERATING TEMPERATURE ABOVE ITS SPECIFIED LIMIT.**

Back to MANUALS Menu



## 2.2 Mounting

Figure 2-1 illustrates the various ways to mount the analyzer using the supplied bracket and hardware. Determine the mounting method and attach the hardware as shown in the respective illustration. Refer to Figure 2-2 for analyzer installation dimension details.

☞ ***NOTE:*** *Use the longest 6-inch (152 mm) bolts to panel mount the analyzer. To pipe mount the analyzer, use the 4-inch (102 mm) long bolts. Also, be sure that the ribbed side of the bracket faces <u>towards</u> the pipe. Use the short 3/4-inch (19 mm) long bolts to fasten the nylon bracket to the back of the analyzer case.*

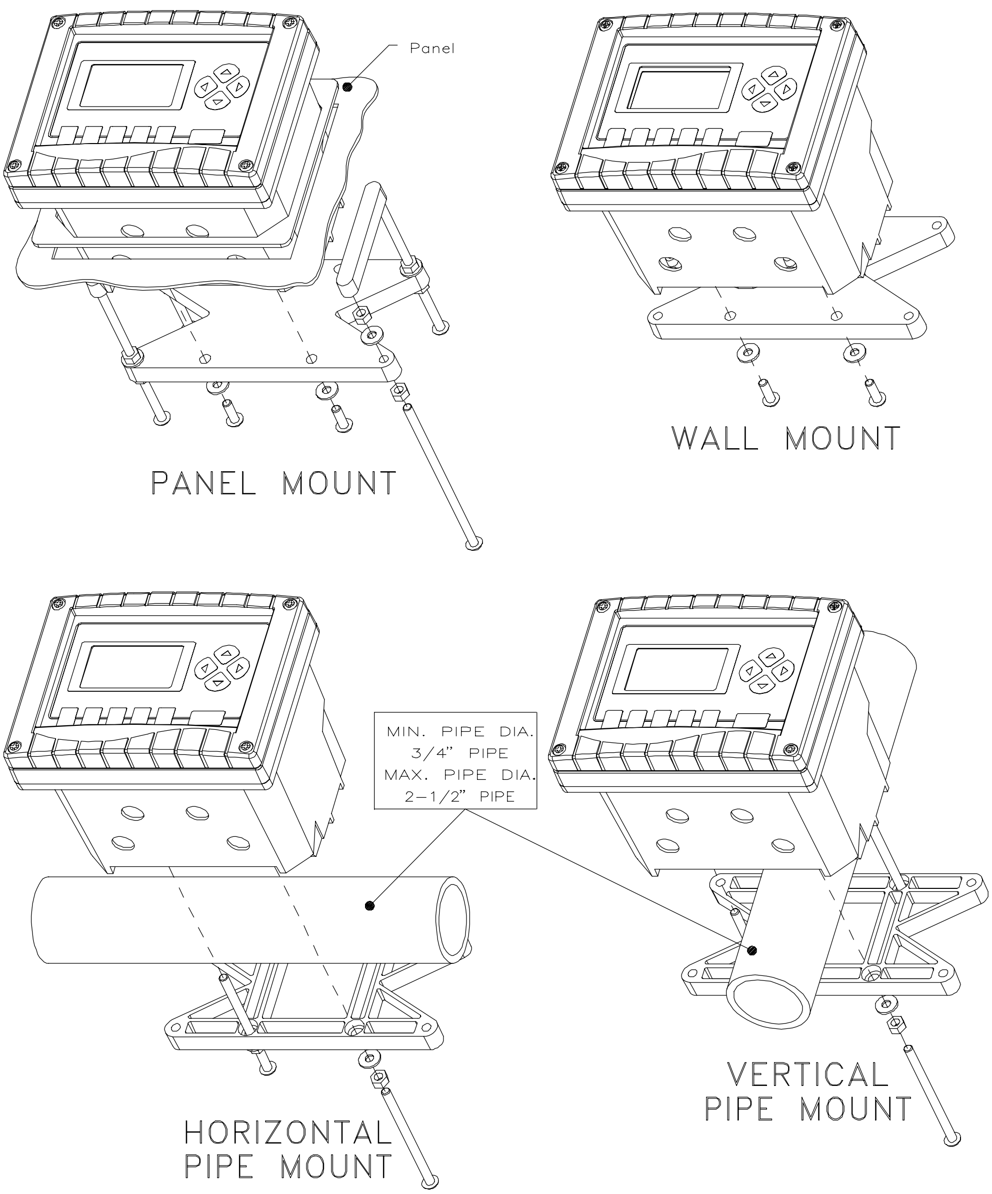



*FIGURE 2-1 Analyzer Mounting Arrangements*

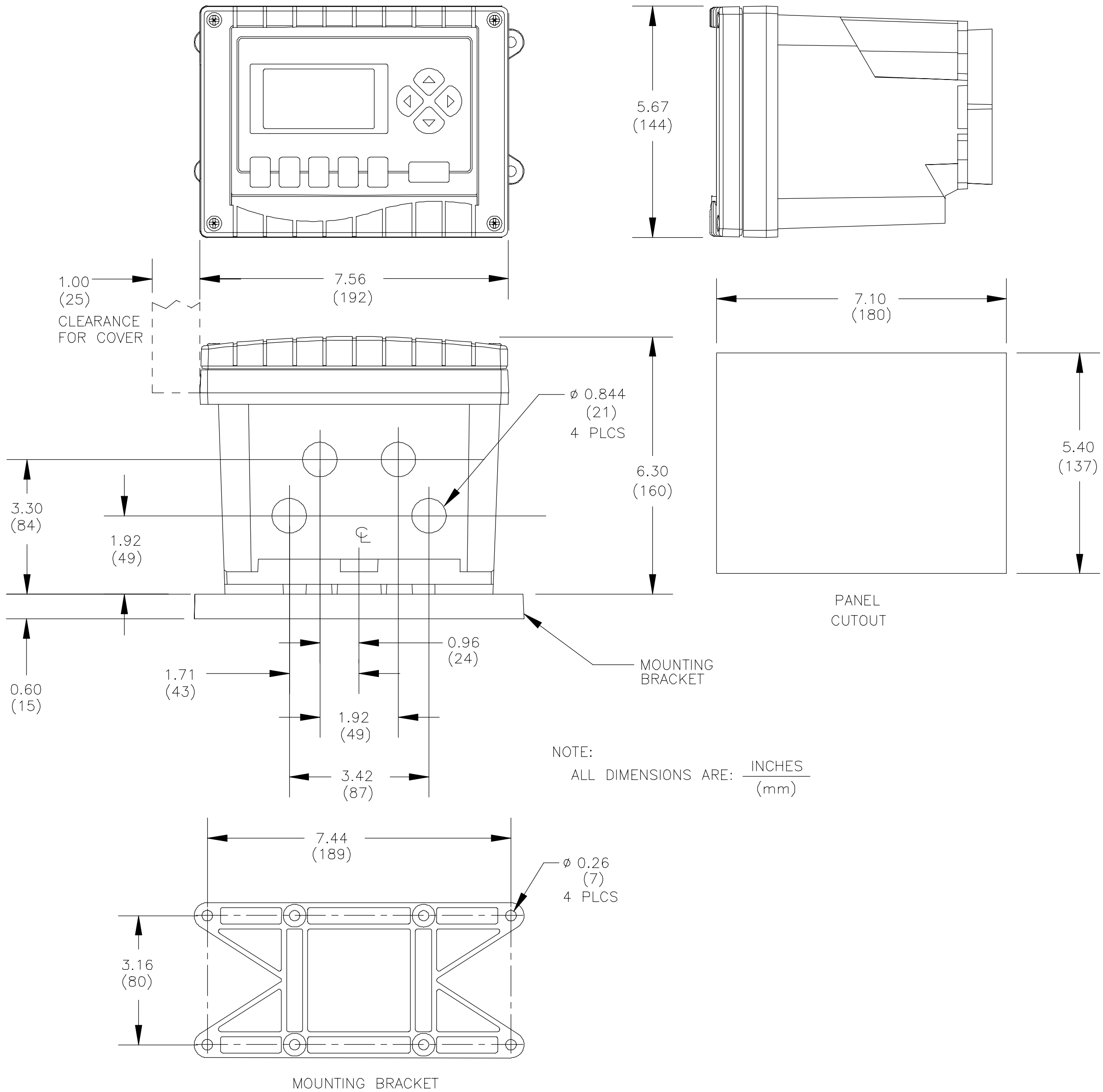



*FIGURE 2-2 Analyzer Installation Dimension Details*

## 2.3 Conduit Hole Requirements

**Recommendation:** Run all wiring to the analyzer in 1/2-inch, grounded metal conduits. If using only shielded cables, appropriate strain reliefs or cable grips are required. (GLI sells accessory cable grips, part number 3H1091, and watertight locknuts, part number 3H1230, for cable entries.) Seal unused cable entry holes with appropriate plugs.

☞ ***NOTE:*** *Use NEMA 4 rated fittings and plugs to maintain the watertight integrity of the NEMA 4X enclosure.*

Back to MANUALS Menu



# SECTION 3

## ELECTRICAL CONNECTIONS

To access terminal strips for electrical connections, open the left-hinged enclosure door by unscrewing the four fasteners. Figure 2-3 shows terminal strip designations and their arrangement on backside of door and inside analyzer.

***NOTE:*** *All terminals are suitable for single wires up to 14 AWG (2.5 mm$^2$). Depending on how the analyzer is equipped, alternate terminal designations shown in Figure 2-3 may apply.*

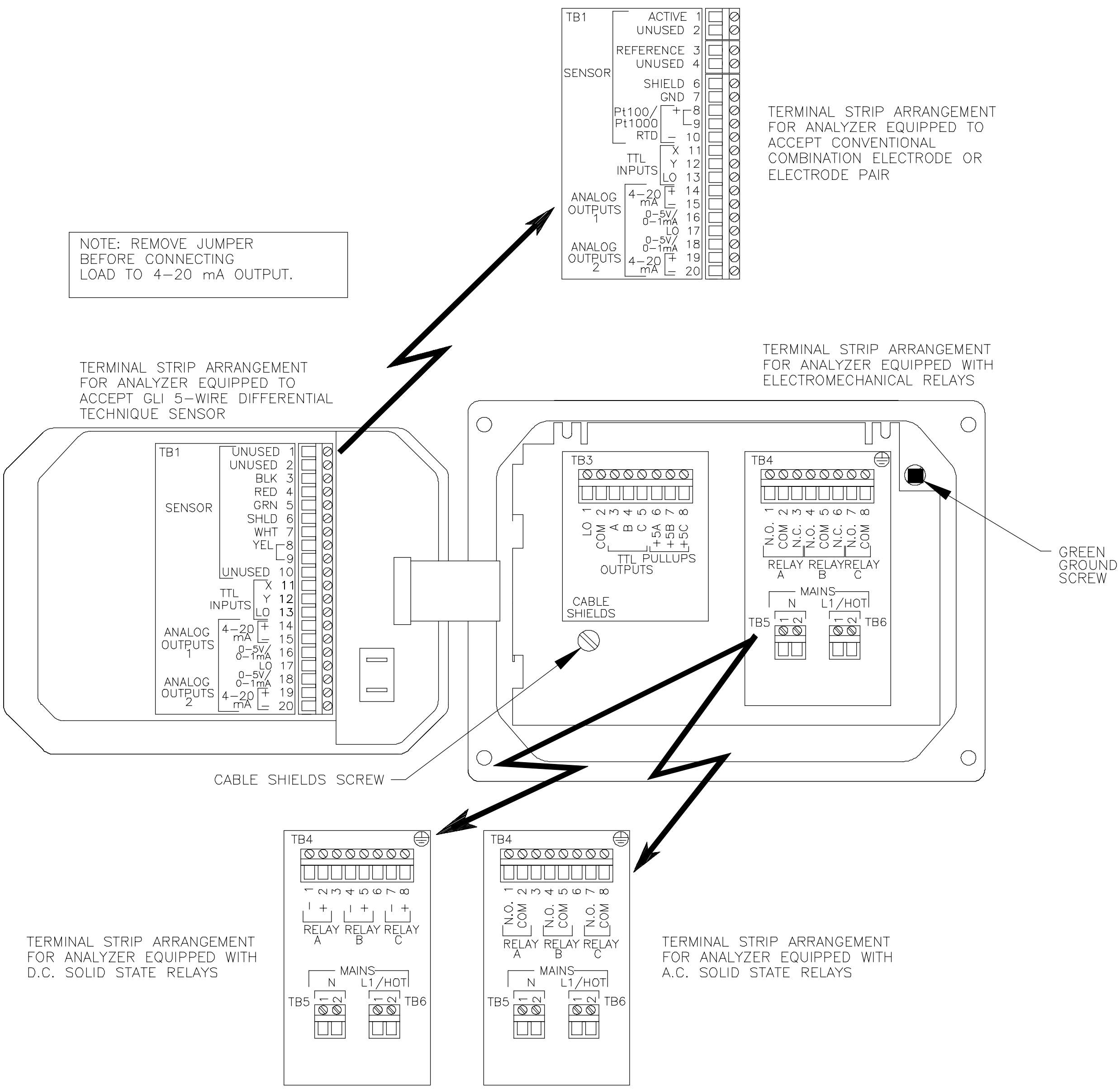



*FIGURE 2-3 Analyzer Terminal Strip Designations*

***NOTE:*** *For best EMI performance, terminate the shield wire of a GLI Differential Technique sensor as close as possible to the cable entry point instead of to the "SHLD" terminal 6 on TB1.*

***Recommended Termination:*** *Use the cord grip nut to capture the shield wire as shown in Figure 2-4.*

*When using a conventional combination electrode with a coaxial cable, the cable's shield must be connected to the "REFERENCE" terminal 3 on TB1.*

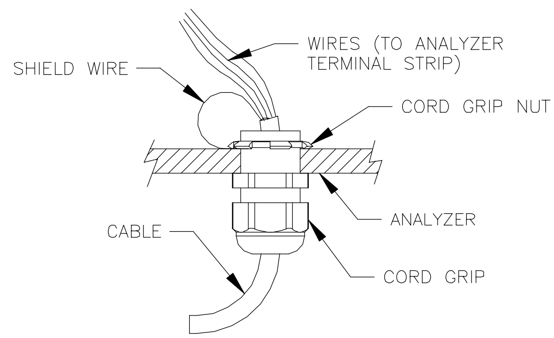



*FIGURE 2-4*
*Sensor Shield Wire Connection for Best EMI Performance*

## 3.1 GLI Differential Technique Sensor

All GLI Differential Technique sensors have a built-in temperature element for automatic temperature compensation and accurate process temperature measurement. In applications requiring extremely high accuracy for temperature measurement and compensation, or those in which the sensor cable run is more than 2000 ft./610 m, it may be best to use an external Pt 1000 ohm RTD temperature sensor.

**Installation Tip!** Route the sensor cable in 1/2-inch, grounded metal conduit to protect it from moisture, electrical noise, and mechanical damage.

For Installations where the distance between sensor and analyzer exceeds the sensor cable length, indirectly connect the sensor to the analyzer using a junction box and interconnect cable.

***NOTE:*** *Do not route the sensor cable in any conduit containing AC power wiring ("electrical noise" may interfere with the sensor signal).*

## Hookup Using Built-in Temperature Element

Refer to Figure 2-5 and connect the sensor (or interconnect) cable wires to TB1, matching colors as indicated.

☞ ***NOTE:*** *For GLI Differential sensors that have two shield wires, always connect its outer shield to the green ground screw (earth ground) and its inner shield to "SHLD" Terminal 6.*

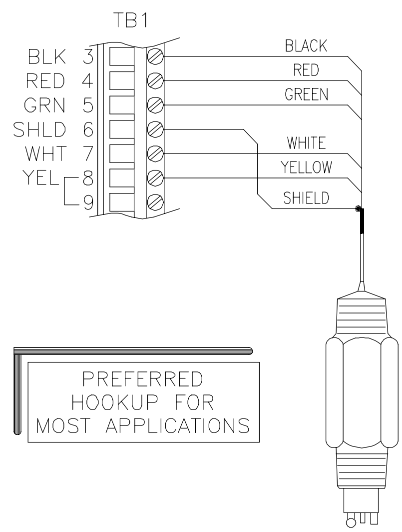



*FIGURE 2-5*
*Connecting GLI Differential Technique Sensor*
*(with built-in temperature element)*

## Hookup Using External Pt 1000 ohm RTD

1. Access the small white jumper on the circuit board mounted to the back of the analyzer door:

   a) Open the analyzer door and remove the ribbon cable connector from the back of the door.

   b) Unfasten the four screws and remove the plastic cover on the back of the door.

2. Cut or remove the small white jumper located to the left of Terminal 10 on TB1.

3. Refer to Figure 2-6 and connect the sensor (or interconnect) cable wires – except the yellow wire – to TB1, matching colors as indicated.

4. Tape the end of the unused yellow wire to prevent inadvertent contact. **Important: Do not cut off this wire**, which would permanently disable the GLI Differential sensor's built-in temperature element.

Back to MANUALS Menu



5. Wire the external Pt 1000 ohm RTD to the analyzer:

   a) Connect red wire to “YEL” Terminal 8 on TB1.

   b) Connect white wire to unmarked Terminal 9 (just below “YEL” Terminal 8) on TB1.

   c) Connect black wire to “N.C.” Terminal 10 on TB1.

   d) Connect cable shield to “SHLD” Terminal 6 on TB1.

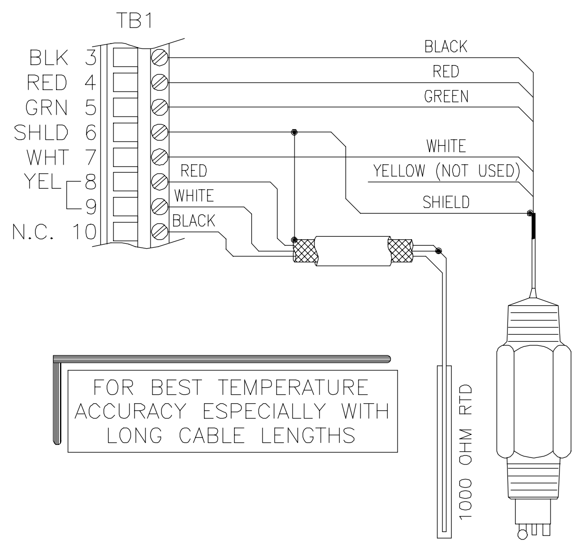



*FIGURE 2-6*
*Connecting GLI Differential Technique Sensor and External Pt 1000 ohm RTD*

## 3.2 Conventional Combination pH Electrode

The combination electrode must be within 100 feet (30 m) of the analyzer. Refer to Figure 2-7 and directly connect the electrode’s coaxial cable to the analyzer.

☞ ***NOTE:*** *Indirect hookup with a preamp wired between the electrode and analyzer is not recommended. This arrangement disables the analyzer’s important electrode diagnostics capability. Furthermore, the analyzer must be equipped with the Differential Technique sensor input board. Only the recommended direct hookup is described below.*

1. Connect the active electrode (center wire in coaxial cable) to “ACTIVE” Terminal 1 on TB1.

2. Connect the cable’s braided shield to “REFERENCE” Terminal 3 on TB1.

Back to MANUALS Menu



3. Connect a jumper between "REFERENCE" Terminal 3 and "GND" Terminal 7 on TB1.

4. Connect the electrode's integral temperature sensor (if equipped with one) or an external temperature sensor, to "Pt100/Pt1000 RTD" Terminals 8 and 10 on TB1.

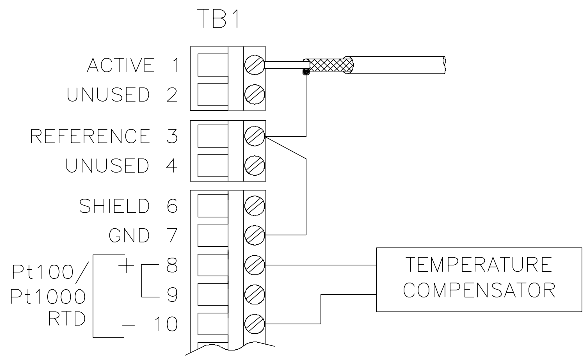



*FIGURE 2-7*
*Connecting Conventional Combination pH Electrode*

**Alternate 3-wire hookup:** For best temperature accuracy, especially with long cable lengths, connect the external temperature sensor to Terminals 8, 9, and 10 on TB1 as shown in Figure 2-6 and disregard the terminal designations.

## 3.3 Other Electrodes

Other types of pH electrodes, including electrodes with triaxial cable, electrode pairs, etc. can be used with this analyzer. To connect one of these types of pH electrodes, please contact the GLI Customer Service Department for wiring details.

## 3.4 TTL Inputs

The analyzer TTL inputs are dedicated for only operating a GLI Cal-Clean™ System or other automated wash/cal system. Refer to PART THREE, Section 5.4 for more details.

Back to MANUALS Menu



## 3.5 Analog Outputs

Two sets of isolated analog outputs (1 and 2) are provided. Each set consists of 4-20 mA and 0-5 VDC/0-1 mA signals. Each set can be assigned to represent the measured pH or temperature.

When the analyzer has the optional PID controller, Output 1 can be set to represent the controller output (0-100%). Output 2 can be selected to provide a special dedicated non-variable alarm signal (only 4 mA or 20 mA) instead of its normal proportional output. (This dedicated alarm signal can be used for the PID controller output timers or for wash/cal system operation.) To configure the outputs, refer to PART THREE, Sections 5.6 and 5.7. If you want an output to transfer to a preset value when calibrating or removing the sensor from the process, see PART THREE, Section 5.9 for details.

☞

**Installation Tip!** Use high quality, shielded instrumentation cable for connecting the analog outputs. To best protect the output signals from EMI/RFI, connect cable shields to the “CABLE SHIELDS SCREW” in Figure 2-3.

Isolated 0-5 VDC/0-1 mA

This is a dual-purpose output. The 0-5 VDC output requires a minimum load of 1 megohm. The 0-1 mA output can drive a load of up to 100 ohms.

- **Output 1 “0-5 V/0-1 mA” Signal:** Connect load (+) to Terminal 16 and load (-) to “LO” Terminal 17 on TB1.
- **Output 2 “0-5 V/0-1 mA” Signal:** Connect load (+) to Terminal 18 and load (-) to “LO” Terminal 17 on TB1.

Isolated 4-20 mA

This output can drive a load of up to 900 ohms.

☞

***NOTE:*** *Before connecting a load to a 4-20 mA output, remove the factory-installed jumper. When not using a 4-20 mA output, the jumper must be connected.*

- **Output 1 “4-20 mA” Signal:** Connect load to Terminals 14 and 15 on TB1, matching polarity as indicated.
- **Output 2 “4-20 mA” Signal:** Connect load to Terminals 19 and 20 on TB1, matching polarity as indicated.

## 3.6 Relay Outputs

The analyzer is equipped with three relays. They may be the standard electromechanical relays or the optional solid state AC or DC relays. For relay setup details, refer to PART THREE, Section 5.3.

> **CAUTION:**
>
> **DO NOT EXCEED THE CONTACT RATING FOR EACH RELAY (5A 115/230 VAC FOR ELECTROMECHANICAL RELAYS, OR 2A CONTINUOUS FOR SOLID STATE RELAYS). WHEN SWITCHING LARGER CURRENTS, USE AN AUXILIARY RELAY SWITCHED BY THE ANALYZER RELAY TO EXTEND ANALYZER RELAY LIFE. WHEN USING RELAY OUTPUTS, MAKE SURE THAT LINE POWER WIRING CAN ADEQUATELY CONDUCT THE CURRENT DRAW OF THE SWITCHED LOAD(S).**

### Electromechanical Relays (standard)

Two sets of SPDT relay outputs (Relays A and B) are provided at Terminals 1 through 6 on TB4. One SPST Relay C output is provided at Terminals 7 and 8 on TB4. **The relay outputs are not powered.** The line power used to power the analyzer may also be used to power the control or alarm devices with these relay contacts. Refer to Figure 2-8 for a general wiring arrangement. Always check control wiring to insure that line power will not be shorted by the relay switching action, and that wiring conforms to local codes.

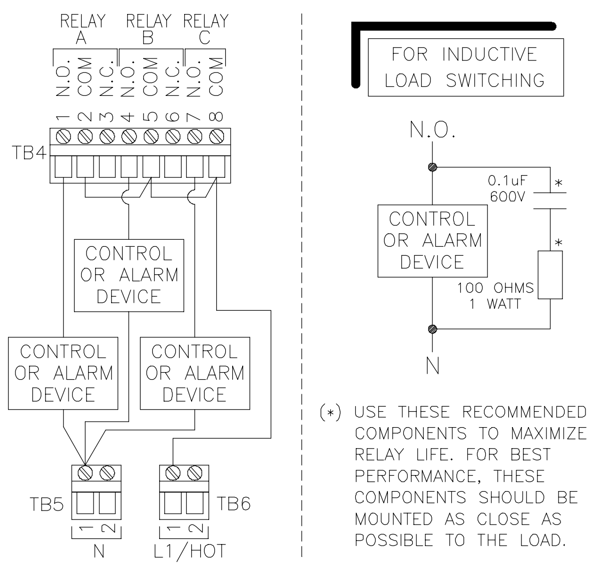



*FIGURE 2-8*
*Connecting Control/Alarm Device(s) to Electromechanical Relay(s)*

Back to MANUALS Menu



### Solid State AC Relays (optional)

Three sets of SPST solid state AC relay outputs (Relays A, B and C) are provided at Terminals 1 through 8 on TB4 -- except for unused Terminals 3 and 6. **The relay outputs are not powered.** The line power used to power the analyzer may also be used to power the control or alarm devices with these relay contacts. Refer to Figure 2-9 for a general wiring arrangement. Always check control wiring to insure that line power will not be shorted by the relay switching action, and that wiring conforms to local codes.

***NOTE:*** *These solid state AC relay outputs require 24-250 VAC power with at least 0.02 amps RMS.*

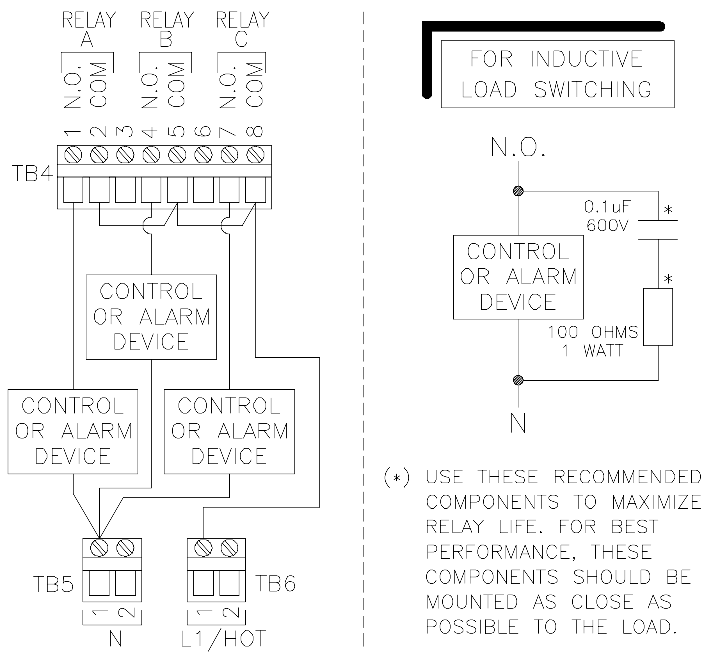



*FIGURE 2-9*
*Connecting Control/Alarm Device(s) to Solid State AC Relay(s)*

Back to MANUALS Menu



## Solid State DC Relays (optional)

Three sets of SPST solid state DC relay outputs (Relays A, B and C) are provided at Terminals 1 through 8 on TB4 -- except for unused Terminals 3 and 6. **The relay outputs are not powered.** You must supply DC power to the control or alarm devices with these relay contacts. Refer to Figure 2-10 for a general wiring arrangement. Always check control wiring to insure that the DC power source will not be shorted by the relay switching action, and that wiring conforms to local codes.

☞ ***NOTE:*** *These solid state DC relay outputs require 3-60 VDC power.*

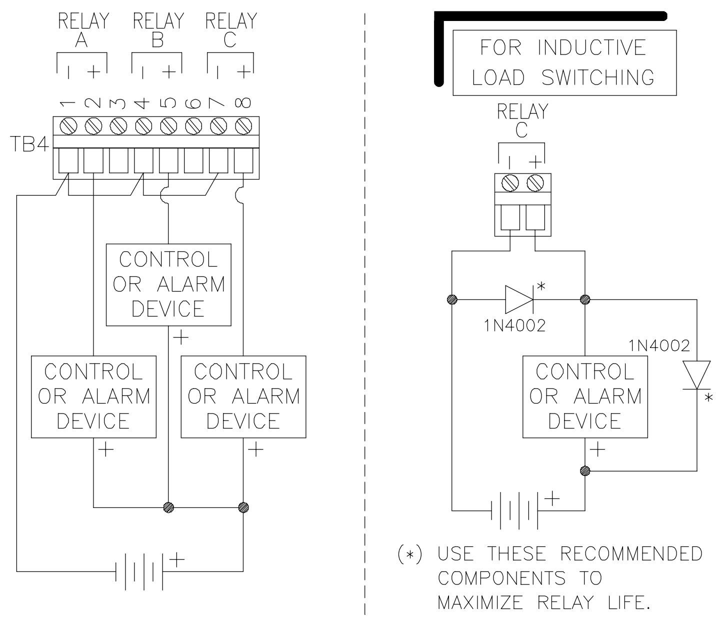



*FIGURE 2-10*
*Connecting Control/Alarm Device(s) to Solid State DC Relays*

Back to MANUALS Menu



## 3.7 TTL Outputs

Three sets of TTL outputs are provided at Terminals 1 through 8 on TB3. They can be selected to operate as:

- **NAMUR diagnostic outputs** by using the CONFIG menu and selecting “Relay/TTL Outputs,” and then enabling them for this purpose (PART THREE, Section 5.3).
- **Dedicated outputs for a wash/cal system** such as a GLI Cal-Clean™ System by using the CONFIG menu and selecting “Wash/Cal System,” and then enabling them for this purpose (PART THREE, Section 5.4).

> **Installation Tip!** Use high quality, shielded instrumentation cable for connecting the TTL outputs. To best protect the outputs from EMI/RFI, connect cable shields to the “CABLE SHIELDS SCREW” shown in Figure 2-3.

**The TTL outputs may be connected for internal or external power supply operation, or as a DC relay coil driver.**

Internal-supply Logic Operation

Refer to Figure 2-11 for the wiring arrangement to use TTL Output A for logic signal operation from the analyzer’s internal power supply. **This connection is for TTL Output A and provides +5 VDC for a logic “high” state and 0 VDC for a logic “low” state. Connect the other TTL outputs in the same way using their respective terminals.**

1. Jumper “LO” Terminal 1 to “COM” Terminal 2 on TB3.
2. Jumper “Pullups +5A” Terminal 6 to “TTL Outputs A” Terminal 3 on TB3.
3. Connect the external device to “TTL Outputs A” Terminal 3 with its low reference connected to “LO” Terminal 1 on TB3.

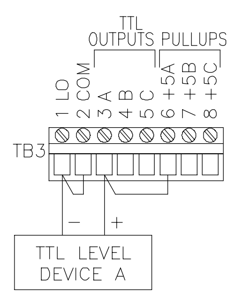



*FIGURE 2-11*
*TTL Output Connections for Internal-supply Logic Operation*

Back to MANUALS Menu


## External-supply Logic Operation

Refer to Figure 2-12 for the wiring arrangement to use TTL Output A for logic signal operation from an external power supply. This connection requires an external voltage supply and a “pullup resistor.”

**The following connection is for TTL Output A. Connect the other TTL outputs in the same way using their respective terminals.**

☞ ***NOTE:*** *Each TTL output can sink a maximum of 20 mA.*

1. Connect the external device’s low reference to TB3 “COM” terminal 2.

2. Connect the external device’s input to TB3 “TTL Outputs A” terminal 3.

3. Connect an appropriate “pullup” resistor from the external device’s input to the external device’s positive voltage supply (24 VDC maximum).

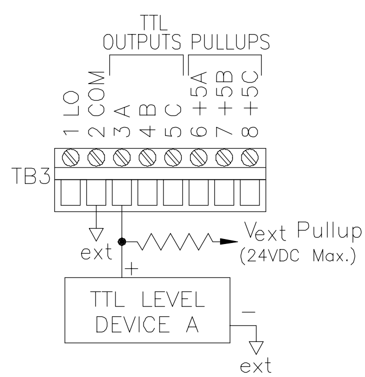



*FIGURE 2-12*
*TTL Output Connections for*
*External-supply Logic Operation*

## DC Relay Coil Driver Operation

Since the TTL outputs are open collector outputs, they may be used to switch current through a device such as a DC relay coil. Refer to Figure 2-13 for the wiring arrangement to use TTL Output A as a DC relay coil driver. This connection requires an external voltage supply and an appropriate diode.

**The following connection is for TTL Output A. Connect the other TTL outputs in the same way using their respective terminals.**

***NOTE:*** *Each TTL output can sink a maximum of 20 mA.*

1. Connect one side of the relay coil to TB3 “TTL Outputs A” terminal 3.

2. Connect the other side of the relay coil to an external positive voltage supply (+$V_{ext}$).

3. Connect a diode (1N4002 type), anode side towards TB3 terminal 3, across the relay coil.

4. Connect TB3 “COM” terminal 2 to an external ground.

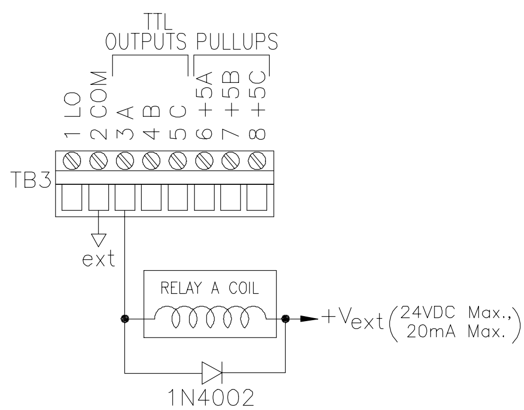



*FIGURE 2-13*
*TTL Output Connections for*
*DC Relay Coil Driver Operation*

### 3.8 Line Power

Connect line power to appropriate TB5 and TB6 terminals using the standard three-wire connection arrangement. **Use wiring practices which conform to local codes** (example: National Electric Code Handbook in the U.S.A.).

**WARNING:**

**REMOVE LINE POWER WHILE CONNECTING LINE POWER WIRES TO THE ANALYZER “MAINS” TERMINALS. ALSO, USE ONLY THE STANDARD THREE-WIRE GROUNDED WIRING ARRANGEMENT TO PREVENT AN UNSAFE CONDITION, AND TO ENSURE PROPER ANALYZER OPERATION.**

1. Connect the line power ground wire (usually green) to the “GREEN GROUND SCREW” located to the right of TB4 (Figure 2-3).

2. Connect the line power neutral wire (typically white) to one of the “N” terminals (1 or 2) on TB5. When the analyzer is equipped with the dual-fuse option, these terminals are fused with a 1/2 amp slow-blow fuse for protection.

3. Connect the line power hot wire (typically black) to one of the “L1/HOT” terminals (1 or 2) on TB6. These terminals <u>are always fused</u> with a 1/2 amp slow-blow fuse for protection, regardless of whether the analyzer is equipped with the single or dual-fuse option.

# PART THREE - OPERATION

## SECTION 1

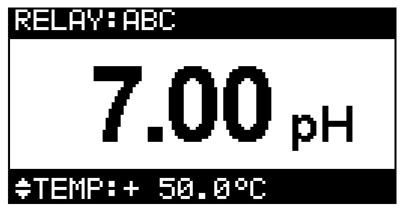
## USER INTERFACE

The user interface consists of an LCD display and keypad with **MEAS**, **CAL**, **CONFIG**, **MAINT**, **DIAG**, **ENTER**, ⇦, ⇨, ⇧, **and** ⇩ **keys**.

### 1.1 LCD Display

The display screens contain text, numeric information, and annunciators. Text is concise but conversational and easy to understand.

An example of a typical MEASURE screen is:




### 1.2 Keypad Keys

The **MEAS key** always displays the MEASURE screen. The **CAL**, **CONFIG**, **MAINT**, and **DIAG keys** display their respective highest level (main) menus from which you can select and display related submenus.

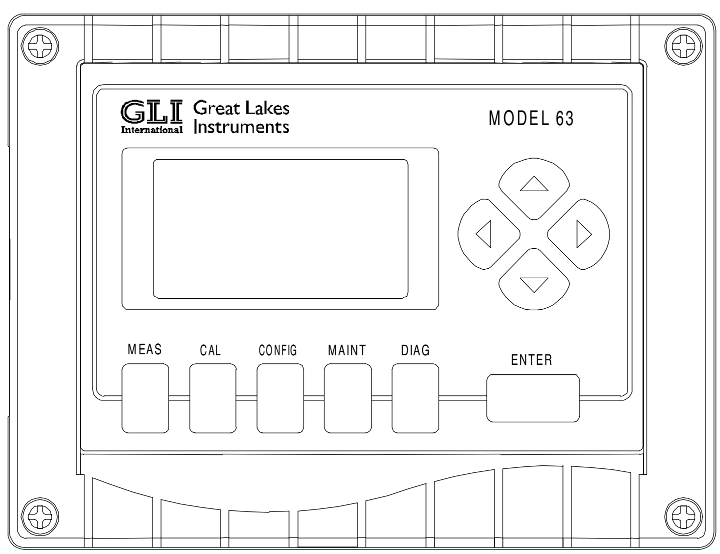
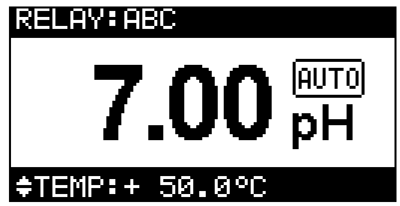


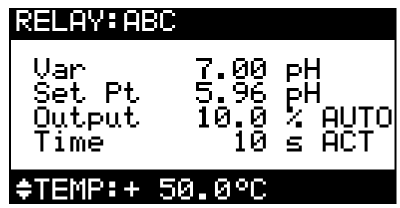

*FIGURE 3-1 Analyzer Keypad*

## Displaying MEASURE Screen (normal display mode)

The MEASURE screen is normally displayed. Pressing the **CAL**, **CONFIG**, **MAINT** or **DIAG key** temporarily replaces the MEASURE screen with their respective <u>main</u> menu screens. Pressing the **MEAS key** <u>always</u> displays the MEASURE screen. Pressing the ⇧ **or** ⇩ **key** scrolls the bottom line on the MEASURE screen (shown in reverse video) to show auxiliary information such as temperature, predicted date for end-of-sensor life, date and time, current outputs, next scheduled date for calibration, etc.

When the analyzer is equipped with the optional PID controller and it has been enabled, pressing the **MEAS key** toggles between the normal MEASURE screen and a PID controller summary screen as these examples show:

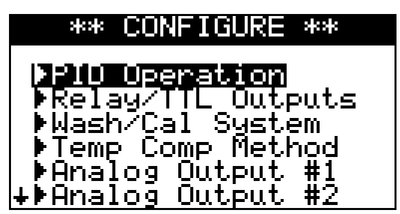



Note that the MEASURE screen shows the operating mode of the PID controller (AUTO or MANUAL). The PID controller summary screen shows important operating data.

## Displaying Main Menu Screens

With the MEASURE screen displayed, press the **CAL**, **CONFIG**, **MAINT** or **DIAG key** to display its corresponding <u>main</u> menu. For example, pressing the **CONFIG key** displays the CONFIGURE main menu screen:




Pressing the **CAL**, **CONFIG**, **MAINT** or **DIAG key** while any of the <u>main</u> menu screens is showing always returns the display back to the MEASURE screen. However, when any

Back to MANUALS Menu



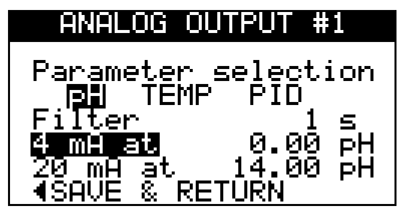
related lower level <u>submenu</u> screen is showing, pressing one of these same keys returns the display back one level to the <u>previous</u> screen. This enables you to conveniently abort configuring a screen you're in, or is a quick way to back out to a previous higher level screen.

**Moving Within a Screen**

Use the ⇦**,** ⇨**,** ⇧**, and** ⇩ **keys** to navigate within a screen. The ⇧ **and** ⇩ **keys** move the cursor up and down between lines and jog numeric values up and down (or toggle between + and - signs). The ⇦ **and** ⇨ **keys** move the cursor left and right within a line. The **ENTER key** confirms and enters data, selects submenus, and initiates displayed actions.

## 1.3 Entering Values

A line with an entry field usually has an identifying word or abbreviation before it. When scrolling to select a line, it becomes highlighted in reverse video. The ⇨ **key or ENTER key** advances the cursor to the entry field (number or word choice), which also becomes highlighted in reverse video as illustrated below:




**Viewing Selected Items**

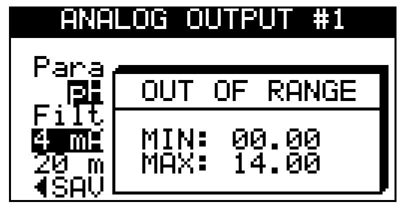
Stored menu screen selections are shown in reverse video, while those not selected appear in normal video (see example screen below). Non-highlighted numeric values are also shown in normal video.

Back to MANUALS Menu



### Confirming Entries

When a numeric value has been suitably adjusted, it can be confirmed by pressing the **ENTER key**. Each numeric entry is checked to insure it is within the analyzer's acceptable range. If not, an "OUT OF RANGE" data box appears, showing the acceptable range (see screen below). To delete the data box from the screen, press the **ENTER key**. Then readjust the numeric entry to be within the acceptable range.




### Storing Configuration Data

Screen choices for the CALIBRATE, MAINTENANCE, and DIAGNOSTIC menus are implemented immediately after pressing the **ENTER key**. Screen choices for the CONFIGURE menu are only confirmed after pressing the **ENTER key**, <u>but they do not overwrite pre-existing values</u>. This confirmation, however, may cause screen contents to change accordingly.

Relay, analog output, optional PID controller, and other analyzer configuration usually requires entering a group of related values. Rather than storing and overwriting old values one at a time, the analyzer accepts the entire group of entry values all at once. To store configuration data:

1. Adjust the value for the first selected field.
2. Press **ENTER key** to advance to the next field.
3. Repeat this sequence until the screen shows all desired values.
4. Press **ENTER key** again to simultaneously enter the entire group of values.

***NOTE:*** *As a precaution, old values are not overwritten until using the "SAVE AND RETURN" line to exit a configuration screen. Pressing the **MEAS key** or **CONFIG key** will exit a configuration screen, aborting the entry routine and retaining pre-existing values.*

# SECTION 2
## MENU STRUCTURE

The analyzer menu tree is divided into four main branches: CAL, CONFIG, MAINT, and DIAG. Each highest level main branch menu can be displayed by pressing its respectively named key. Each main menu is structured with related lower-level submenus and, in many cases, sub-submenus.

For details on CAL, CONFIG, MAINT, and DIAG main menus, see PART THREE, Sections 4, 5, 6, and 7 respectively.

**Menu Structure Tip!** The " ▶ " symbol pointing at each menu screen line indicates a related lower-level sub-menu can be displayed by selecting it and pressing the **ENTER key**. The " ◀ " symbol pointing away from a "RETURN" or "SAVE & RETURN" line at the bottom of a menu screen indicates you can backtrack to the previous related screen by pressing the ⇦ **key or ENTER key**.

Some lists are too long to completely fit on screen. A "🡇" symbol at the bottom left of the list indicates you can display hidden lines by pressing the ⇩ **key**. The "🡅" symbol at top left of list (see screen example below) indicates you can display hidden lines by pressing the ⇧ **key**.

```
** CONFIGURE **
↑▶Transfer Condition
 ▶Software Alarms
 ▶Meas Screen Setup
 ▶Set Time/Date
 ▶Set Passcodes
 ◀RETURN
```

# SECTION 3
## INSTRUMENT STARTUP

### 3.1 Adjusting Display Contrast

Ambient lighting conditions may make it necessary to adjust the analyzer display contrast to improve visibility. With the MEASURE screen displayed, press <u>and</u> <u>hold</u> the **ENTER key** and <u>simultaneously</u> press the ⇧ **or** ⇩ **key** until attaining the desired contrast.

### 3.2 Initial Calibration

Read Section 4 before initially calibrating to learn about the sensor's first-time calibration and all the different methods.

### 3.3 Initial Configuration

Read Section 5 before configuring the analyzer to familiarize yourself with all of the setup possibilities.

Back to MANUALS Menu



# SECTION 4
## CALIBRATE MENU

The CALIBRATE menu, displayed by pressing the **CAL** key, enables you to calibrate the analyzer for pH and temperature. Each type of calibration uses different submenus.

### 4.1 CALIBRATE Menu Structure

Refer to Figure 3-2 for the CALIBRATE menu structure.

☞ ***NOTE:*** *If a passcode has been assigned (Section 5.13), you must enter it to access the main CALIBRATE menu.*

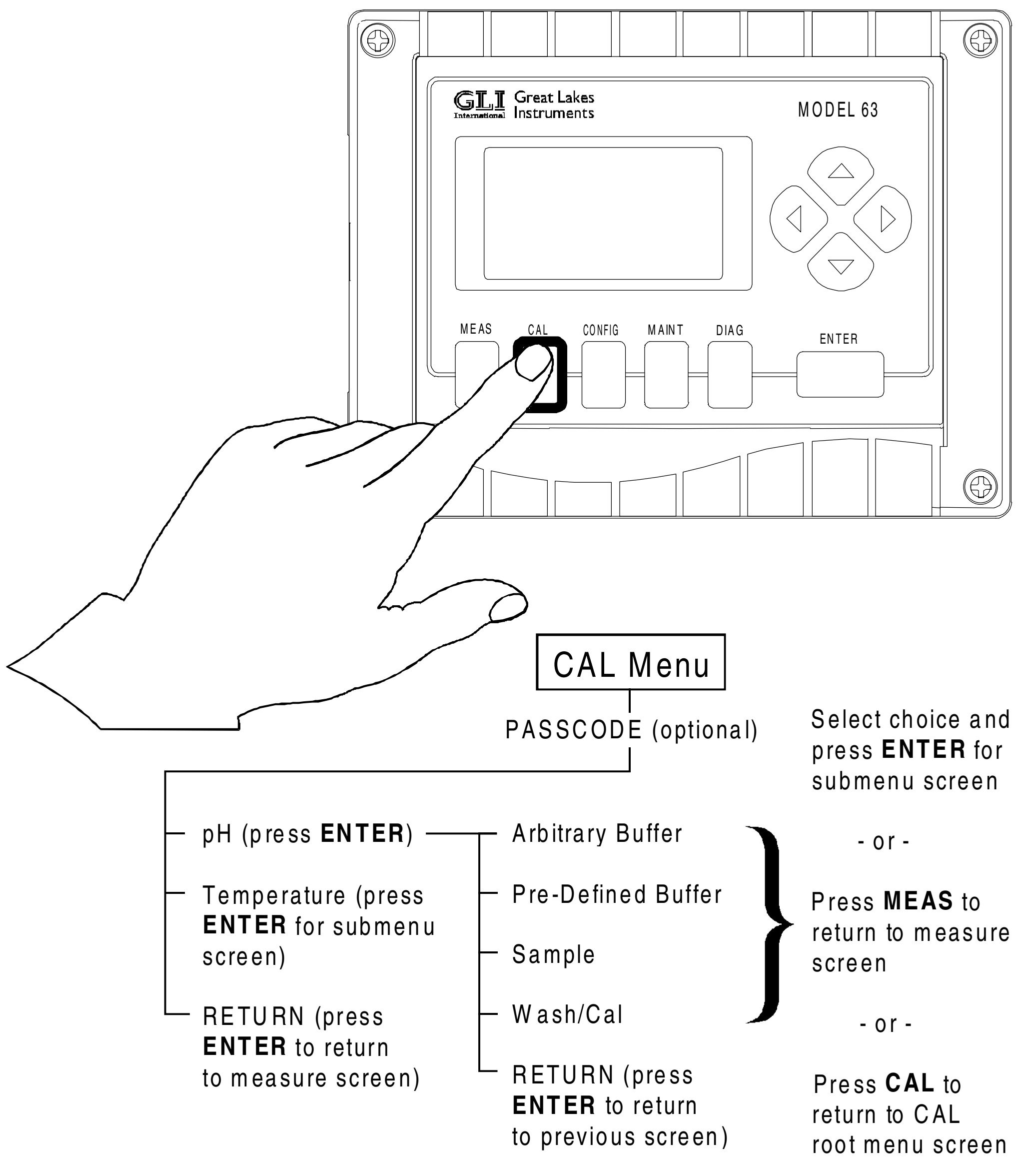



*FIGURE 3-2 CALIBRATE Menu Structure*

## 4.2 Things to Know About pH Calibration

Four methods are available to calibrate the analyzer for pH measurement (Section 4.4). The analyzer can also be calibrated for temperature measurement (Section 4.5).

**Calibrate at Regular Intervals**

To maintain best measurement accuracy, the analyzer must be periodically calibrated. Performance of the pH sensor slowly degrades over time, eventually causing inaccurate readings. The time period between calibrations, and the rate of system drift, can vary considerably with each application and its specific conditions.

> **Calibration Tip!** Establish a maintenance program to keep the sensor relatively clean and the analyzer calibrated. The daily, weekly or monthly intervals between performing maintenance will be influenced by the characteristics of the process solution, and can only be determined by operating experience.

**Temperature-corrected pH Measurement**

The analyzer will provide pH readings that are automatically corrected for temperature changes when the analyzer:

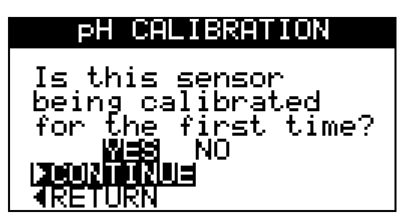
- Receives a temperature input signal from a pH sensor with a built-in temperature element (all GLI Differential sensors) or from an external temperature element.
- Has been correctly set for the type of temperature element being used for automatic compensation.

**Should You Temperature Calibrate?**

The analyzer is factory-calibrated for accurate temperature measurement, which is more than adequate for most applications. However, when extremely high accuracy is required, or when the sensor cable run is more than 2000 ft. (610 m), it may be best to use an external Pt 1000 ohm RTD and re-calibrate for temperature.

## 4.3 Sensor's First pH Calibration

When starting any calibration, the analyzer will ask you if the sensor you are using is being calibrated for the first time as shown by this screen:



By selecting yes, the analyzer establishes a “base line” of electrode statistics from which subsequent calibrations are compared. It takes several minutes longer than normal for a “first-time” sensor calibration to establish this base line. These statistics are stored in the “Calibration Record” sub-menu in the DIAGNOSTICS main menu.

***NOTE:*** *When calibrating a sensor for the first time, always perform a two-point calibration.* ***Important: During any calibration, always allow the temperatures of the sensor and buffers to equalize.***

## 4.4 pH Calibration Methods

Based on convenience and your application requirements, use one of four methods provided (see screen below) to calibrate the analyzer for pH measurement:

```
    pH CALIBRATION

▶Arbitrary Buffer
▶Pre-Defined Buffer
▶Sample
▶Wash/Cal

◀RETURN
```

- **Arbitrary Buffer Method:** With the sensor placed in any pH buffer, enter its known value. This method can be used for single or two-point calibrations.

- **Pre-Defined Buffer Method:** With the sensor placed in pH buffer whose value is contained in a buffer set that you pre-selected, the analyzer automatically calibrates that point without you having to enter its value. This method can be used for single or two-point calibrations.

- **Sample Method:** With the sensor remaining in the process, enter the known pH value of a grab sample whose value was determined by laboratory analysis or a comparison reading. This method is only for single-point calibrations.

- **Wash/Cal Method:** This method is dedicated for use only with a GLI Cal-Clean™ System or other appropriate automatic hardware that includes a positioner to retract/insert the sensor, solution dispensing equipment, and a solenoid control system.

After deciding which method to use, refer to the corresponding subsection for more details. When performing the calibration, refer to and follow the easy instructions shown on the analyzer display screens.

## Arbitrary Buffer Method

### Reasons to Use:

1. When you don't consistently use the same buffer(s).

2. When you don't want to configure the analyzer for calibration with pre-defined buffers.

3. When you don't have pH buffers with values contained in one of the analyzer's five buffer sets.

4. When you infrequently calibrate (not recommended).

### Advantages/Disadvantages:

This method is easy to perform but if you don't enter the exact buffer value shown on the buffer bottle chart corresponding to the buffer's actual temperature, measured pH readings will be slightly less accurate.

**General Procedure:**

You can perform a single or two-point calibration using the "Arbitrary Buffer" method. However, two-point calibration is strongly recommended. Any buffer(s) or solution(s) of <u>known</u> <u>pH</u> <u>value</u> can be used for calibration. Since pH buffers are most commonly used, they are referenced in the following procedure. Typically, pH 7 and pH 4 buffers are used. (pH 10 buffer is also readily available but is not as stable, particularly at extreme temperatures.)

☞ ***NOTE:*** *For best accuracy, use buffers with values approximately equal to the normal pH value of the process. <u>Example</u>: If the process is normally 3.5 pH, it is best to use pH 4 and pH 7 buffers rather than pH 7 and pH 10 buffers. Ideally, one of the calibration points should be 3.5 pH.*

1. Immerse the sensor in the buffer. **Important: Allow the sensor and buffer temperatures to equalize.** Depending on their temperature differences, this may take 30 minutes or more.

2. Determine the temperature of the buffer by using the analyzer's temperature measuring capability. (The pH value of a buffer changes slightly as its temperature changes.)

3. Using the table on the buffer bottle, find the exact pH value that corresponds with this temperature.

4. Key in the exact pH value when the analyzer asks you to do this.

☞ ***NOTE:*** *As you key in the value, the "pH" or "°C" annunciator may flash to indicate that the respective pH or temperature measurement signal is still too unstable for an accurate calibration. You can, however, enter the value while an annunciator flashes but the resultant calibration error will degrade measurement accuracy.* ***Recommendation:*** *For best calibration accuracy, wait until these annunciators stop flashing and then enter the value.*

*The signal stability at which the annunciators stop flashing is selectable. (Use "Stability Mode" screen in "Main Parameter" submenu of CONFIGURE main menu). A LOW stability mode enables the analyzer to accept a less stable measurement signal where pH or temperature is moderately changing. A HIGH stability mode requires the signal to be highly stable before flashing stops. A MED stability mode is midway between the other modes. The HIGH stability mode provides best calibration accuracy but takes longer. Also, in a noisy environment the measurement signal may never fully stabilize. The stability mode default is LOW.*

## Pre-Defined Buffer Method

**Reasons to Use:**

1. When you consistently use the same buffer(s).

2. When you plan to have a novice or unskilled operator calibrate (for example, someone who may confuse the two buffers being used for a two-point calibration).

3. When you plan to use a GLI Cal-Clean™ System.

**Advantages/Disadvantages:**

The "Pre-Defined Buffer" method takes time to initially set up but is very accurate and very convenient for novice operators because it eliminates the need to enter buffer values. Also, the person need not know which buffer the sensor is in while performing a two-point calibration.

Back to MANUALS Menu



**General Procedure:**

You can perform a single or two-point calibration using the “Pre-Defined Buffer” method. However, two-point calibration is strongly recommended. For best accuracy, select buffer values from an appropriate built-in buffer set that <u>surround</u> the normal pH value of the process.

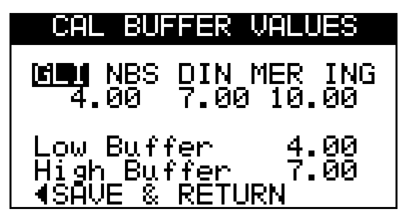
1. Before calibrating for the first time, you must enter a low and a high pre-defined buffer value from one of the five built-in buffer sets. (For a single-point calibration, only one pre-entered buffer value is required.) To select and enter pre-defined buffer values:

    A. Access the CONFIGURE main menu by pressing the **CONFIG key**.

    B. Use ⇩ **key** to select the “Main Parameter” sub-menu, and press **ENTER key**.

    C. Use ⇩ **key** to select the “Cal Buffer Values” sub-menu, and press **ENTER key**.

    D. Use ⇨ **key** to select the desired buffer set. As each buffer set is highlighted, only buffer values in that set are shown (see example of buffer setup screen below):




    E. Use ⇩ **key** to select the “Low Buffer” line. Use ⇧ **and** ⇩ **keys** to select the desired low buffer value.

    F. Press **ENTER key** to select the “High Buffer” line, and press ⇨ **key** to select its field. Use ⇧ **and** ⇩ **keys** to select the desired high buffer value.

    G. Press **ENTER key** to select the “SAVE & RETURN” line. Press **ENTER key** again to enter the displayed low and high buffer values into memory.

2. Immerse the sensor in a pre-defined buffer and allow their temperatures to equalize. **(For two-point calibrations you can put the sensor in either buffer.)** The analyzer recognizes each buffer and automatically initiates calibration of that point. If the analyzer cannot recognize the buffer, either the buffer is not one of the pre-selected buffers or the sensor may not be operating properly.

3. Continue calibration by following the simple instructions shown on the analyzer display screen. When you complete calibration of a point, the measured buffer value may be slightly different than the selected pre-defined buffer value. This is because the analyzer uses the exact value for that buffer at that temperature (obtained from its built-in buffer value-versus-temperature table), providing the highest possible measuring accuracy.

☞ ***NOTE:*** *The "pH" or "°C" annunciator may flash, indicating that the respective pH or temperature measurement signal is still too unstable for an accurate calibration. When the "Pre-defined Buffer" method is used, the analyzer automatically waits for the pH and temperature readings to stabilize, providing the highest possible calibration accuracy.*

*The signal stability at which the annunciators stop flashing is selectable. (Use "Stability Mode" screen in "Main Parameter" submenu of CONFIGURE main menu). A LOW stability mode enables the analyzer to accept a less stable measurement signal where pH or temperature is moderately changing. A HIGH stability mode requires the signal to be highly stable before flashing stops. A MED stability mode is midway between the other modes. The HIGH stability mode provides best calibration accuracy but takes longer. Also, in a noisy environment the measurement signal may never fully stabilize. The stability mode default is LOW.*

Sample Method

**Reasons to Use:**

1. When it is difficult or impractical to remove the sensor from the process, but it is easier to obtain a sample and determine its pH value.

2. When you do not want the inconvenience of using buffers.

3. When you prefer using readings from a calibrated, portable pH meter as the calibration reference.

**Advantages/Disadvantages:**

The “Sample” method is very convenient because buffers are not required and the sensor does not have to be removed from the process. Since it is a single-point calibration, however, it is less accurate than two-point calibration.

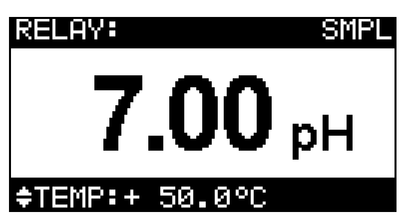
**General Procedure:**

***NOTE:*** *The “Sample” method cannot be used for the sensor’s first-time calibration. Initially, you must use the “Arbitrary Buffer” or “Pre-Defined Buffer” method to perform a two-point (not single-point) calibration. Anytime thereafter, the “Sample” method can be used to calibrate the sensor.*

1. After selecting the “Sample” method, the analyzer instructs you to “take” a sample and “continue” (by pressing **ENTER key**).

   ***NOTE:*** *“Take” means to actually obtain a grab sample in a container <u>while the analyzer is simultaneously recording</u> the measured process value during this time.*

2. While the analyzer is recording the process pH value, the display flashes “Wait.” When the MEASURE screen appears, a “SMPL” annunciator (see upper right corner of screen example below) indicates the process value has been recorded and you can continue calibration.



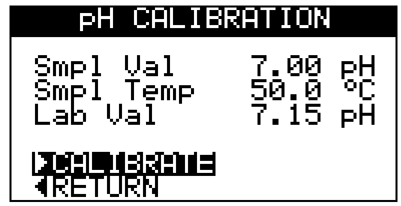
Back to MANUALS Menu



3. Determine the pH value of the sample using laboratory analysis or a calibrated portable pH meter.

4. Press the **CAL key** (display indicates that sample calibration is in progress).

5. Press the **ENTER key** to continue. The next screen (example shown below) prompts you to key in the known value of the sample (determined in step 3).




***NOTE:*** *There probably will be some difference between the "Smpl" (sample) value and the known "Lab Val." The entered lab value becomes the calibration value. Example: Suppose the analyzer recorded a sample value of 6.80 pH but the grab sample lab value was determined to be 6.92 pH. Also, the actual process value may have changed while determining the sample value. You enter 6.92 pH to complete calibration. The measured reading will change to reflect the new calibration.*

*If the process pH has a tendency to change rather quickly, it is very important that you take the sample and simultaneously initiate the analyzer to record the process pH value. Generally, the more time that elapses between doing these two things, the more calibration error there will be.*

6. After keying in the known value, press the **ENTER key** to store the value and select the "CALIBRATE" line. Press the **ENTER key** again to complete the calibration.

Back to MANUALS Menu



Wash/Cal Method
(only for use with
GLI Cal-Clean™ system)

**Reasons to Use:**

When you need frequent calibration and are using a GLI Cal-Clean™ system or other appropriate hardware to automate the calibration procedure. **This method <u>cannot</u> be used with a GLI Air/Water Blast Cleaning System, which is intended for automatic washing only -- not automatic calibration.**

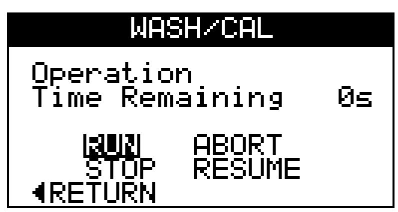
**Advantages/Disadvantages:**

Since the “Wash/Cal” method is a scheduled automatic method, it is the ultimate in convenience and eliminates the need for a person to calibrate. However, it does require a GLI Cal-Clean™ system or other appropriate hardware.

**General Procedure:**

***NOTE:*** *This method cannot be used unless a GLI Cal-Clean™ system or other appropriate hardware is installed. The analyzer software for the “Wash/Cal” method automatically controls this hardware. When calibration starts, the hardware isolates the sensor from the process, dispenses solutions to wash and rinse the sensor, and then delivers buffer to the sensor for calibration -- all automatically. The analyzer software enables you to schedule the automatic operation for washing and calibration. By design, this software is flexible enough to support various hardware implementations.*

When you select and enter “Wash/Cal” from the pH CALIBRATION submenu, the following screen appears:




You can initiate a wash/cal cycle manually by selecting “RUN” and pressing the **ENTER key**. This feature enables you to perform a wash/cal cycle at anytime without waiting for the scheduled time. In addition to opening and closing all valves and dispensing solutions at the appropriate times, the analyzer automatically calibrates using pre-defined buffer values from the pre-selected buffer set (five built-in buffer set choices are available). Consequently, when using the wash/cal method you must preset the analyzer with low and high buffer values before starting any calibration. (To select and enter buffer values, refer to the “Pre-Defined Buffer Method” subsection previously described in this section.) After a pre-defined buffer is dispensed to the sensor, calibration automatically starts. When a single-point calibration is required, only one of the pre-defined buffers is needed.

The length of time it takes for the analyzer to calibrate a point is determined by the selected signal stability mode. (Use “Stability Mode” screen in “Main Parameter” submenu of CONFIGURE main menu.) A LOW stability mode enables the analyzer to accept a less stable measurement signal where pH or temperature is moderately changing. A HIGH stability mode requires the signal to be highly stable before flashing stops. A MED stability mode is midway between the other modes. The HIGH stability mode provides best calibration accuracy but takes longer. Also, in a noisy environment the measurement signal may never fully stabilize. The stability mode default is LOW.

The analyzer uses the selected stability mode to determine when the pH and temperature measurement signals are acceptably stable to complete calibration of that point. The “Wash/Cal” method eliminates the requirement to watch for the “pH” and “°C” annunciators to stop flashing and then pressing the **ENTER key** to complete calibration of that point.

## 4.5 Temperature Calibration

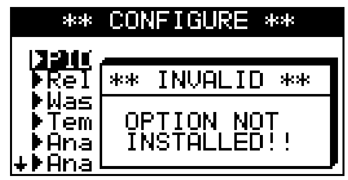
The analyzer is factory-calibrated for highly accurate temperature measurement. You only need to calibrate for temperature when the very highest accuracy is required. **However, do not attempt to temperature calibrate the analyzer unless you have accurate temperature standards (accurate to within ± 0.1°C), and are able to wait for the system to come to temperature equilibrium (approximately 30 minutes for each calibration point).** To calibrate for temperature, follow the simple instructions shown on the analyzer display screens.

Back to MANUALS Menu



# SECTION 5
## CONFIGURE MENU

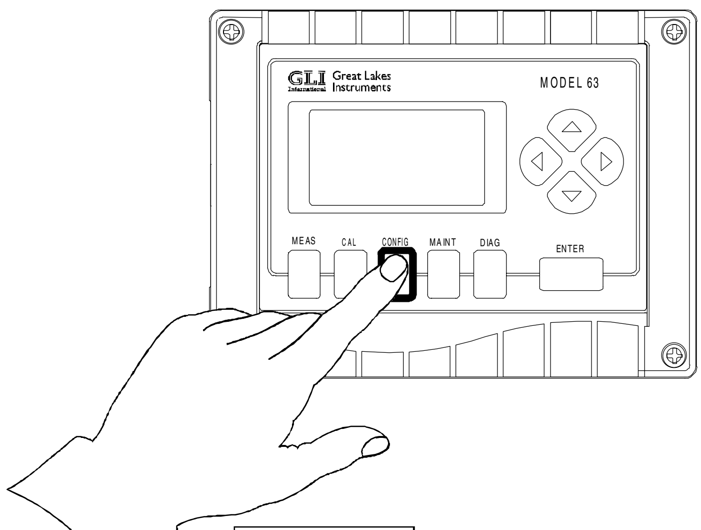
The CONFIGURE menu, displayed by pressing the **CONFIG key**, enables you to configure the analyzer to your application. When selecting a line for a non-equipped option, for example PID controller, an "Invalid" text box appears:




### 5.1 CONFIGURE Menu Structure

Refer to Figure 3-3 for the CONFIGURE menu structure.

***NOTE:*** *If a passcode has been assigned (Section 5.13), you must enter it to access the main CONFIGURE menu.*




CONFIG Menu

PASSCODE (optional)

- PID Operation
- Relay/TTL Outputs
- Wash/Cal System
- Temp Comp Method
- Analog Output #1
- Analog Output #2
- Main Parameter
- Transfer Condition
- Software Alarms
- Meas Screen Setup
- Set Time/Date
- Set Passcodes
- RETURN (press **ENTER** to return to measure screen)

Select choice and press **ENTER** for submenu screen

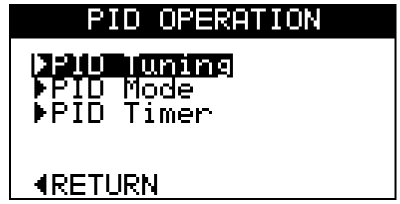
\- or -

Press **MEAS** or **CONFIG** to return to measure screen

*FIGURE 3-3 CONFIGURE Menu Structure*

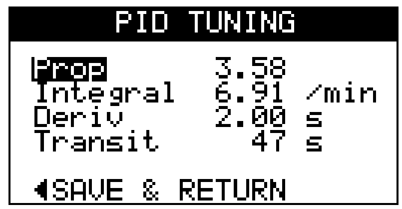
## 5.2 Operating PID Controller (optional feature)

To enable PID controller operation, choose “PID” for the analog Output 1 parameter selection (see Section 5.6). Then select “PID Operation” from the CONFIGURE main menu to display the following screen showing configuration functions for the PID controller:




### PID TUNING

Use this “PID TUNING” submenu screen to tune the controller to the dynamics of the pH process:



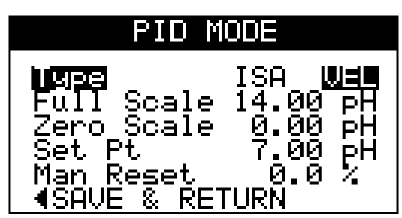

The screen settings are:

- Proportional gain (-99.99 to +99.99 with “ - “ for reverse action and “ + “ for direct action)
- Integral gain (0.00-50.00 repeats/minute)
- Derivative gain (0.00-10.00 seconds)
- Transit time setting (0-2000 seconds); displayed only when the type VEL (velocity algorithm) is selected for controller operation -- see PID MODE screen below

***NOTE:*** *Integral gain can be disabled by entering “0.00” to provide only PD controller action.*

### PID MODE

Use this “PID MODE” submenu screen to configure the controller to your application requirements:



Back to MANUALS Menu



The controller can be selected to use a velocity algorithm (VEL) or an Instrument Society of America algorithm (ISA). Each algorithm has anti-windup functionality. The velocity algorithm takes into account process deadtime (transit time), whereas the ISA algorithm does not (except by purposely de-tuning the controller).

When using the “Man Reset” setting, enter the controller output (0.0-100.0%) you want provided when the measured pH is at the controller set point value.

## PID TIMER

Use this “PID TIMER” submenu screen to independently set two controller output timer alarms (0.0% and 100.0%). This will provide alarm signals whenever the controller output remains at 0.0% or 100.0% for longer than the respectively entered times (see Section 5.7 for details).

```
      PID TIMER
100% Timer     ON  OFF
Time Out       10  min
0% Timer       ON  OFF
Time Out        7  min

◄SAVE & RETURN
```

The PID controller remains active while the analyzer is being configured or during normal measurement operation. Its output varies as needed, always striving to keep the process pH at the desired set point value. However, during calibration or by displaying the “HOLD/XFER OUTPUTS” submenu screen in the MAINTENANCE menu, you can select the controller output to:

- HOLD its present value.
- Transfer (XFER) to a preset value.
- Remain ACTIVE to respond to the measured value.

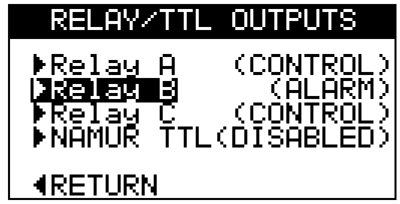
**Configuration Tip!** Before tuning the controller to the process dynamics, control the process manually (Section 6.3). This enables you to check the control element for proper sizing and to familiarize yourself with the capability of the control system.

After initially tuning the controller, readjustment (based on experimentation and observed response) is usually required until attaining desired control.

## 5.3 Setting Relays/TTL (NAMUR) Outputs

**Relays**

Use the "RELAY/TTL OUTPUTS" submenu screen in the CONFIGURE menu to display the operating mode (shown in parenthesis) for each relay and the NAMUR TTL outputs:




Select the relay (A, B or C) you want to configure, and press **ENTER key** to display its configuration screen showing all existing settings. An example setup screen for Relay A as a CONTROL relay is:


The screen settings are:

- **Parameter** (for CONTROL or ALARM relay)**:** Selecting "pH" assigns the relay to be driven by the measured pH; "TEMP" assigns the relay to be driven by the measured °C. The selected "Parameter" determines the measurement units shown for the relay setup fields.

- **Fail Safe** (for CONTROL or ALARM relay)**:** Selecting "OFF" disables fail safe operation so that when the relay is on, the relay annunciator is also on (normal operation). Conversely, selecting "ON" enables fail safe operation that turns the relay annunciator off when the relay is actually on. This reverses normal relay operation, allowing pumps, valves, etc. to be powered in a way that if power is interrupted, the relay (in its off state) puts the pump, valve, etc. in a "safe" condition. Example: Suppose Relay A operates a horn, which sounds to notify an alarm condition when the pH gets too high. But what if power is lost before the alarm could sound? The pH might continue to rise but without an alert (the analyzer has also lost power and is not operating). Using the fail safe feature would be a better approach for this application. Use a separate power source to wire the horn to the NC contact of Relay A, and select "Fail Safe ON." Now the horn will sound if the pH gets too high -- or if the analyzer power is interrupted (the relay will turn off, closing the NC contacts and powering the horn).

- **Type** (for CONTROL or ALARM relay)**:** This choice selects the relay operating mode.

| CONTROL Relay |
|---|

Selecting "CONTROL" operates the relay in a control mode. Setup entries specific to a CONTROL relay are:

Phase -- HIGH" sets the relay set point to respond to increasing measured value; "LOW" assigns the relay set point to respond to decreasing measured value.

Set Pt -- Sets the value at which the relay will turn on.

Dband -- Sets the range in which the relay remains on after the measured value decreases below the set point value (HIGH phase relay) or increases above the set point value (LOW phase relay).

Overfd Timer -- Sets the time (0-999.9 minutes) to limit how long the relay can remain "on." For complete details, see PART THREE, Section 8.

| ALARM Relay |
|---|

Selecting "ALARM" operates the relay in an alarm mode. Setup entries specific to an ALARM relay are:

High Alarm -- Sets the value at which the relay will turn on in response to increasing measured value.

High Dband -- Sets the range in which the relay remains on after the measured value decreases below the high alarm value.

Low Alarm -- Sets the value at which the relay will turn on in response to decreasing measured value.

Low Dband -- Sets the range in which the relay remains on after the measured value increases above the low alarm value.

Back to MANUALS Menu



- **"On Delay"** (for CONTROL or ALARM relay)**:** Sets a time (0-99 seconds) to delay the relay from normally turning on.

- **"Off Delay"** (for CONTROL or ALARM relay)**:** Sets a time (0-99 seconds) to delay the relay from normally turning off.

  These "On Delay" and "Off Delay" settings may be used to help eliminate process "overshoot" when there are long process pipe runs or delays in mixing.

**CAUTION:**

**WHEN ANALYZER WASH/CAL SYSTEM OPERATION IS ENABLED, ALL RELAYS BECOME DEDICATED WASH/CAL OUTPUTS AUTOMATICALLY OPERATED BY THE WASH/CAL FUNCTION. AS A RESULT, ALL EXISTING RELAY SETTINGS ARE TEMPORARILY DISREGARDED UNTIL WASH/CAL SYSTEM OPERATION IS DISABLED.**

TTL (NAMUR) Outputs

The German NAMUR Committee has established standards for measurement and control in the chemical process industry. The TTL (NAMUR) outputs provided by the analyzer conform to these standards and are intended to be used <u>as a set</u> for diagnostic signaling. Representation for each output signal is:

| | |
|---|---|
| TTL Output A: | Instrument is "off line" for calibration or maintenance. |
| TTL Output B: | One or more software or system alarms are in the "warn" state. |
| TTL Output C: | One or more software or system alarms are in the "fail" state. |

To use the TTL output set, select the "RELAY/TTL OUTPUTS" submenu screen in the CONFIGURE menu. Then select the "NAMUR TTL" line, press **ENTER key**, and select "ENABLED." All software alarm functions drive the TTL output set. For software alarm details, refer to PART THREE, Section 5.10. The TTL output set can be operated in a "fail safe" mode and/or assigned an "on delay" time.

## 5.4 Establishing Wash/Cal System Operation

☞ ***NOTE:*** *Depending on whether the analyzer is equipped for use with a conventional combination electrode or a GLI Differential Technique pH sensor, it has different software to operate the wash system:*

- ***Combination Electrode:*** *The analyzer software provides wash* *<u>and</u>* *calibration functions, specifically adapted for use with a GLI Cal-Clean™ System (or other appropriate hardware).*
- ***Differential Technique pH Sensors:*** *Different analyzer software provides a* *<u>wash</u>* *<u>only</u>* *function, specifically adapted for use with a GLI Air/Water Blast Cleaning System.*

*Refer to the appropriate subsection for software operating details.*

For GLI Cal-Clean™ System

The analyzer software provides wash <u>and</u> calibration functions that require a GLI Cal-Clean™ System (or equivalent engineered automatic system) to control appropriate hardware. The wash/cal functions can be used two basic ways:

1. For Continuous Measurement with Periodic Wash/Cal, enabling you to automatically:
   - Retract measuring electrode from the process
   - Dispense wash and/or rinse solutions to clean electrode
   - Dispense buffers for calibration
   - Calibrate (single or two-point calibration)
   - Insert cleaned and calibrated electrode into the process

2. For Continuous Retraction with Periodic Measurement, enabling you to automatically:
   - Insert measuring electrode into the process
   - Obtain measurements for a defined time period
   - Retract the measuring electrode from the process
   - Dispense wash and/or rinse solutions to clean electrode
   - Dispense buffers for calibration
   - Calibrate (single or two-point calibration)
   - Store cleaned and calibrated electrode in the positioner

The analyzer software enables you to create “Wash” and “Cal” cycles containing specific function steps to meet application requirements. The established cycles can then be scheduled for specific times and days, or set to occur at repetitive intervals. Wash and Cal cycles can also be started by a remote TTL input signal after enabling the remote system control feature.

## Dedicated Cal-Clean™ System Outputs and Required Inputs

When the wash/cal system feature is enabled, normal relay and TTL output operation is suspended and replaced by dedicated wash/cal operation. All of the analyzer outputs are used to control wash/cal functions:

| Analyzer Output | Wash/Cal Control Function |
|---|---|
| Relay A | Rinse |
| Relay B | Auxiliary Wash 1 and 2 |
| Relay C | Main Wash |
| TTL Output A | Sensor Retract |
| TTL Output B | Buffer 1 |
| TTL Output C | Buffer 2 |

Also, both analyzer TTL inputs are dedicated to monitoring the pH electrode position:

| TTL Input | Input Signal State |
|---|---|
| X | Low when electrode is inserted |
| Y | Low when electrode is retracted |

To enable the wash/cal system feature, press **CONFIG key** to display the CONFIGURE main menu, select the “Wash/Cal System” line, press **ENTER key** to display the following submenu screen, and select “YES.”

```
WASH/CAL SYSTEM
Enabled      YES   NO
▶Define Wash Cycle
▶Define Cal Cycle
▶Schedule Wash/Cal
▶Remote System Cntrl
◀RETURN
```

The “Define Wash Cycle” and “Define Cal Cycle” submenus are used to respectively configure “Wash” cycles and “Cal” cycles. Both submenus contain many of the same function steps but also have different steps for their specific purposes (see respective subsection for details). Although many wash and cal function steps have the same names and functions, they operate independently of each other and must be separately configured.

Back to MANUALS Menu



The “Schedule Wash/Cal” submenu is used to schedule “Wash” and “Cal” cycles on a time basis.

***NOTE:*** *Use the “Remote System Cntrl” (control) submenu only when you intend to use a TTL input signal to remote start a “Wash” or “Cal” cycle.*

## DEFINE WASH CYCLE Steps for GLI Cal-Clean™ System

Use the following submenu screen to define and enter a “Wash” cycle:

```
   DEFINE WASH CYCLE
 Abort Pos:  RETRACTED
 Hold Pos:   RETRACTED
 Cycle:             NO
 Hold Release      20s
 Aux Wash 1        60s
↓Aux Wash 1 Delay  30s
```

Each available “Wash” cycle function step is listed below in the sequence shown on the “DEFINE WASH CYCLE” submenu.

- **Abort Pos:** Sets the default position (RETRACTED or INSERTED) that you want the electrode to be in if a cycle is aborted. With “Abort Pos:” highlighted, use ⇧ **or** ⇩ **key** to select the choice.

- **Hold Pos:** Sets the position (RETRACTED or INSERTED) that you want the electrode to be held in during the “Hold Release:” function step. With “Hold Pos:” highlighted, use ⇧ **or** ⇩ **key** to select the choice.

- **Cycle:** Sets whether or not (YES or NO) you want the wash cycle to repeat itself at a preset time interval (see last function step “Cycle Interval”) instead of occurring by normal scheduling with the “SCHEDULE WASH/CAL” screen. With “Cycle:” highlighted, use ⇧ **or** ⇩ **key** to select the choice.

- **Hold Release:** Sets how long (0-999 seconds) you want analog Outputs 1 and 2 to remain “held” after the electrode is inserted back into the process. (A cycle begins with the analyzer automatically “holding” the analog outputs. The electrode then retracts. The monitored TTL inputs determine when the electrode is fully retracted. If retraction takes longer than 25 seconds, the cycle aborts and an error message screen appears. After the electrode is fully retracted, the cycle continues with the “Aux Wash 1” step.)

- **Aux Wash 1:** Sets how long (0-999 seconds) the “Aux Wash 1” step is to remain on. This is the first output (Relay B) to be activated after the electrode has been fully retracted. If “0” is entered, this step (and its related “Aux Wash 1 Delay” step, even if it has an entered time) will be bypassed in the cycle.

- **Aux Wash 1 Delay:** Sets the time period (0-999 seconds) between the “Aux Wash 1” and “Main Wash” steps. If a “0” is entered, this step will be bypassed and the cycle will proceed with the “Main Wash” step.

- **Main Wash:** Sets how long (0-999 seconds) the “Main Wash” step is to remain on. If “0” is entered, this step (and its related “Main Wash Delay” step, even if it has an entered time) will be bypassed in the cycle.

- **Main Wash Delay:** Sets the time period (0-999 seconds) between the “Main Wash” and “Rinse” steps. If a “0” is entered, this step will be bypassed and the cycle will proceed with the “Rinse” step.

- **Rinse:** Sets how long (0-999 seconds) the “Rinse” step is to remain on. If “0” is entered, this step (and its related “Rinse Delay” step, even if it has an entered time) will be bypassed in the cycle.

- **Rinse Delay:** Sets the time period (0-999 seconds) between the “Rinse” step and “Aux Wash 2” step. If a “0” is entered, this step will be bypassed and the cycle will proceed with the next function step.

- **Aux Wash 2:** Sets how long (0-999 seconds) the “Aux Wash 2” step is to remain on. If “0” is entered, this step (and its related “Aux Wash 2 Delay” step, even if it has an entered time) will be bypassed in the cycle.

☞ ***NOTE:*** *The “Aux Wash 1” step that occurs earlier in the cycle and this “Aux Wash 2” step both use the same analyzer output (Relay B) to provide the* <u>*same*</u> *auxiliary wash solution.*

- **Aux Wash 2 Delay:** Sets the time period (0-999 seconds) between the “Aux Wash 2” step and re-inserting the electrode. If “0” is entered, this step will be bypassed and the electrode will be immediately re-inserted. (The monitored TTL inputs determine when the electrode is fully inserted. If insertion takes longer than 25 seconds, the cycle aborts and an error message screen appears. After the electrode is inserted, the entered time for the “Hold Release” step counts down. When it expires, analog Outputs 1 and 2 return to their active states and the cycle ends.)

- **Cycle Interval: Only for use when “YES” is selected for the third function step “Cycle:” to enable repetitive cycling.** The “Cycle Interval:” function step sets the time period (0-999 seconds) between the end of one cycle and the beginning of the next cycle.

## DEFINE CAL CYCLE Steps for GLI Cal-Clean™ System

A “Cal” cycle is similar to a “Wash” cycle except that it also includes function steps pertaining to calibration. Use the following submenu screen to define and enter a “Cal” cycle:

```
   DEFINE CAL CYCLE

 Abort Pos: RETRACTED
 Cal Timeout      90s
 Hold Release     30s
 Aux Wash 1       60s
 Aux Wash 1 Delay 20s
↓Main Wash        60s
```

Many of the “Cal” steps have the same names and functions as the “Wash” cycle steps. However, they do operate independently of each other. This provides greater flexibility such as being able to wash the electrode anytime instead of only being able to wash it during a “Cal” cycle. Also, a stronger wash solution may be desired during a “Cal” cycle. Each available “Cal” cycle function step is listed below in the sequence shown on the “DEFINE CAL CYCLE” submenu.

- **Abort Pos:** See “Wash” cycle for description.

- **Cal Timeout:** Sets how long (0-999 seconds) you want the analyzer to wait for a successful calibration to be completed. If the entered time expires before completing a successful calibration, the “Cal” cycle will abort and a message screen will appear.

- **Hold Release:** See "Wash" cycle section for description.
- **Aux Wash 1:** See "Wash" cycle section for description.
- **Aux Wash 1 Delay:** See "Wash" cycle section for description.
- **Main Wash:** See "Wash" cycle section for description.
- **Main Wash Delay:** See "Wash" cycle section for description.
- **Rinse:** See "Wash" cycle section for description.
- **Rinse Delay:** See "Wash" cycle section for description.
- **Buffer 1:** Sets how long (0-999 seconds) the "Buffer 1" step is to remain on. If "0" is entered, this first calibration point step (and its related "Buffer 1 Delay" step, even if it has an entered time) will be bypassed in the "Cal" cycle.
- **Buffer 1 Delay:** Sets the time period (0-999 seconds) between the "Buffer 1" step and calibration of the first point. This entered time can be used to allow the pH reading to stabilize before attempting to calibrate this first point. If a "0" is entered, this step will be bypassed and the "Cal" cycle will proceed with the "Buffer 2" step.

  After Buffer 1 is delivered, the analyzer automatically initiates calibration of the first point. (The pre-defined buffer values used for calibration are selected with the "CAL BUFFER VALUES" sub-submenu in the "MAIN PARAMETER" submenu in the CONFIGURE menu.) If any errors occur during calibration, or the "Cal Timeout" time expires, the "Cal" cycle aborts and an error message screen appears.

☞ ***NOTE:*** *A "first-time" sensor calibration cannot be done using automatic wash/cal system operation. You must perform a "first-time" sensor calibration using the Pre-Defined Buffer Method described in PART THREE, Section 4.4. Failure to do this will result in incorrect measurement readings.*

After the first point has been successfully calibrated, the second "Rinse" and "Rinse Delay" steps will occur for their respectively entered times before the "Cal" cycle continues with the "Buffer 2" step.

- **Buffer 2:** Sets how long (0-999 seconds) the “Buffer 2” step is to remain on. If “0” is entered, this second calibration point step (and its related “Buffer 2 Delay” step, even if it has an entered time) will be bypassed in the cal cycle.

- **Buffer 2 Delay:** Sets the time period (0-999 seconds) between the “Buffer 2” step and calibration of the second point. This entered time can be used to allow the pH reading to stabilize before attempting to calibrate this second point. If a “0” is entered, this step will be bypassed and the “Cal” cycle will proceed with the <u>third</u> “Rinse” and “Rinse Delay” steps.

***NOTE:*** *If only a single-point calibration is desired, enter a time of “0” seconds for the “Buffer 1” or “Buffer 2” steps to bypass that respective calibration point.*

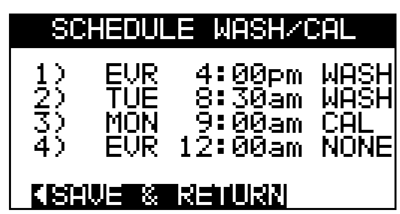
After Buffer 2 is delivered, the analyzer automatically initiates calibration of the second point. After the second point has been successfully calibrated, the <u>third</u> “Rinse” and “Rinse Delay” steps will occur for their respectively entered times before the “Cal” cycle continues with the “Aux Wash 2” step.

- **Aux Wash 2:** See “Wash” cycle section for description.

- **Aux Wash 2 Delay:** See “Wash” cycle section for description.

## SCHEDULE WASH/CAL Events for GLI Cal-Clean™ System

Use the “SCHEDULE WASH/CAL” submenu screen (example screen shown below) to schedule when you want “Wash” and “Cal” cycles to occur:




Up to 28 separate events (“Wash” or “Cal” cycles) can be scheduled. <u>Each line</u> on the “SCHEDULE WASH/CAL” submenu <u>represents one event</u>. To schedule an event, enter three items:

- **Day of week:** Selections are “SUN,” “MON,” “TUE,” “WED,” “THU,” “FRI,” “SAT,” or “EVR” for an event recurring every day.

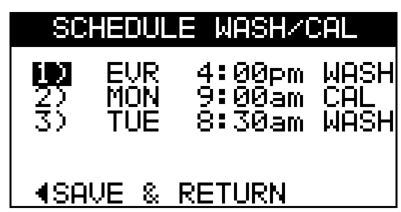
- **Time of day:** Enter scheduled time of day as either "am" or "pm."
- **Type of event:** Selections are "WASH" for a wash cycle, "CAL" for a cal cycle, or "NONE" for an unscheduled event or when you want to delete a previously scheduled event from the list.

When viewing the "SCHEDULE WASH/CAL" submenu screen <u>for</u> <u>the</u> <u>first</u> <u>time</u> <u>only</u>, it displays an unscheduled event as:

"1〉 EVR 12:00 am NONE"

You must edit this event line to establish when the event is to occur and what type of event it will be. Pressing the **ENTER key** enters the event and displays another unscheduled event line. Repeat this procedure until all desired scheduled events are entered. Then scroll down and select the "SAVE & RETURN" line, and press the **ENTER key** to enter <u>all</u> <u>events</u> <u>at</u> <u>once</u>.

***NOTE:*** *Events need not be entered in sequential order. When the "SCHEDULE WASH/CAL" submenu is displayed again, the analyzer automatically sorts and sequentially displays all scheduled events with "EVR" (everyday) events always <u>listed</u> <u>before</u> specific day events (see example screen below).*




*When events are inadvertently scheduled to occur at the same time, the analyzer automatically deletes any lower-listed event with the same scheduled time. Only the time -- not the type of event (WASH or CAL) -- determines the events being deleted.*

To delete a currently scheduled event, simply change event type to "NONE." When the "SCHEDULE WASH/CAL" submenu is displayed again, that event will be deleted.

***NOTE:*** *When an event is in progress, another event cannot begin. The other event will be skipped. Schedule events far enough apart to prevent them from conflicting with each other.*

## REMOTE SYSTEM CONTROL for GLI Cal-Clean™ System

A “Wash” cycle or “Cal” cycle can be remote started when a TTL input signal is applied to the “REMOTE INPUT” terminals in the Cal-Clean control box. Use the following submenu screen to enable remote operation and select the operating mode it triggers:

```
REMOTE SYSTEM CONTROL
 Enabled      YES   NO

 Mode   WASH CAL R&H

 ◄RETURN
```

Depending on the selected operating mode, an applied TTL input signal will do the following:

- **WASH:** Momentary* TTL signal starts preset “Wash” cycle.
- **CAL:** Momentary* TTL signal starts preset “Cal” cycle.
- **R & H:** Sustained TTL signal <u>retracts</u> electrode, rinses it for 5 seconds, and <u>holds</u> it in preset position (RETRACTED or INSERTED) until TTL signal is removed.

*TTL input signal need not be sustained to run cycle.

## GLI Cal-Clean™ Wash/Cal System Safeguards

Analog Output 2 can be configured to act as an alarm. Doing this will cause an alarm condition alert if any error occurs during wash/cal system operation. An error message screen informs you of the problem and enables you to clear the alarm. When the alarm occurs, the present “Wash” or “Cal” cycle aborts.

***NOTE:*** *To clear an aborted cycle, manually operate the system using the “Sensor Maintenance” submenu listed in the MAINTENANCE menu. Refer to PART THREE, Section 6.4 for details.*

Specific TTL inputs verify the position of the pH electrode at all times. When a “Wash” or “Cal” cycle is not occurring, it is assumed that the electrode is inserted into the process. When the analyzer determines that the electrode is not fully inserted, analog Outputs 1 and 2 are “held,” and an error message screen appears.

Back to MANUALS Menu



***NOTE:*** *You must clear the alarm, and use the "Manual Insert" function (in the "Sensor Maintenance" submenu listed in the MAINTENANCE menu) to insert the electrode into the process and clear the output hold.*

Similarly, if the electrode is not in the position that it is expected to be in during a "Wash" or "Cal" cycle, or when manually retracting the sensor, the cycle aborts and an error message screen appears.

For GLI Air/Water Blast Cleaning System

The analyzer software provides a wash-only function that controls an optional GLI Air/Water Blast Cleaning System to automatically wash a GLI Differential Technique pH sensor with user-supplied air or water. You can establish when the wash (air or water blast) occurs and the duration of the wash.

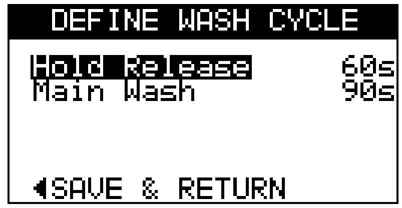
When you enable wash system operation, Relay C is used to control the GLI Air/Water Blast Cleaning System attached to the sensor. During the wash cycle, analog Outputs 1 and 2 and Relays A and B are automatically held at their present states to prevent upset of control or recording equipment that may be connected to them. After the completed wash cycle, the analog outputs and relays are released and returned to their configured "TRANSFER CONDITION" states unless you want to continue holding them for up to 999 seconds.

To enable the wash system feature, press **CONFIG key** to display the CONFIGURE main menu, select the "Wash System" line, press **ENTER key** to display the following submenu screen, and select "YES."

```
      WASH SYSTEM
Enabled     YES   NO

▶Define Wash Cycle
▶Schedule Wash

◀RETURN
```

## DEFINE WASH CYCLE for GLI Air/Water Blast Cleaning System

Use the following submenu screen to define and enter the wash cycle:

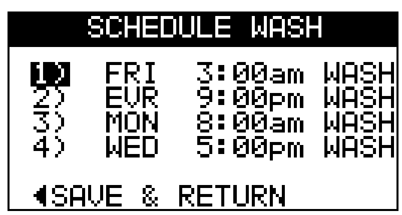



On this screen, the configuration choices are:

- **Hold Release:** Sets how long you want the analog Outputs 1 and 2 to remain "held" (0-999 seconds) after the wash cycle is completed.
- **Main Wash:** Sets how long the air blast wash is to remain on (0-300 seconds). If "0" is entered, the wash cycle will not occur.

## SCHEDULE WASH Events for GLI Air/Water Blast Cleaning System

The wash system operates on a timed basis. Use the "SCHEDULE WASH" submenu screen (example screen shown below) to schedule when you want defined wash cycle events to occur:




Up to 28 separate wash cycle events can be scheduled. To schedule a defined wash cycle event, enter a "day of week," "time of day," and "event type." Day of week selections include "SUN" through "SAT," or "EVR" for use when a wash cycle event is to recur every day. Event type selections are "WASH" or "NONE" for an unscheduled event or when you want to delete a previously scheduled event from the list.

When viewing the "SCHEDULE WASH" submenu screen for the first time only, it displays an unscheduled event as:

"1〉 EVR 12:00 am NONE"

You must edit this event line to establish when the defined wash cycle event is to occur. Pressing the **ENTER key** enters the event and displays another unscheduled event line. Repeat this procedure until all desired scheduled events are entered. Then scroll down and select the "SAVE & RETURN" line, and press the **ENTER key** to enter <u>all events at once</u>.

***NOTE:*** *Wash events need not be entered in sequential order. When the "SCHEDULE WASH" submenu is displayed again, the analyzer automatically sorts and sequentially displays all scheduled wash events with "EVR" (everyday) events always <u>listed before</u> specific day events (see example screen below).*

```
     SCHEDULE WASH
1)  EVR 12:00am WASH
2)  EVR  9:00pm WASH
3)  MON  8:00am WASH
4)  WED  5:00pm WASH

◄SAVE & RETURN
```

*When wash events are inadvertently scheduled to occur at the same time, the analyzer automatically deletes any lower-listed wash event with the same scheduled time. Only the time -- not the type of event (WASH or NONE) -- determines the events being deleted.*

To delete a currently scheduled wash event, simply change event type to "NONE." When the "SCHEDULE WASH" submenu is displayed again, that event will be deleted.

***NOTE:*** *When an event is in progress, another event cannot begin. The other event will be skipped. Schedule events far enough apart to prevent them from conflicting with each other.*

Back to MANUALS Menu



## 5.5 Selecting TEMP COMP METHOD

After selecting “Temp Comp Method” from the CONFIGURE menu, use the following submenu to configure the analyzer for the desired temperature compensation method:

```
    TEMP COMP METHOD
 Type  300ΩNTC Pt1000
 Meas       AUTO  MAN
 MAN Value     25.0°C
 Cal        AUTO  MAN
 MAN Value     25.0°C
↓Pure Water  OFF   ON
```

The screen settings are:

- **Type:** Selecting “300ΩNTC” sets the analyzer for use with a 300 ohm NTC temperature element (used in all GLI Differential Technique pH sensors -- except Model 6006P4-2000 pure water pH sensor systems which use a Pt1000 RTD). Selecting “Pt100” or “Pt1000” respectively sets the analyzer for use with a Pt1000 or Pt100 RTD temperature element (used in most conventional combination pH electrodes).

> *Special Case: Select “Pt1000” when using a GLI Differential Technique pH sensor and an external Pt1000 temperature sensor for applications requiring extremely high accuracy for temperature measurement and compensation, or those in which the sensor cable run is more than 2000 ft. (610 m).*

- **Meas:** This setting affects measured pH readings. Select “AUTO” when you want the measured temperature to automatically compensate the pH reading. Select “MAN” when you want to use a fixed temperature value to compensate the pH reading, and enter that value in the Meas “MAN Value” line. (This line is inaccessible if “AUTO” is selected.)

- **Cal:** This setting affects temperature compensation for calibration. Suppose you are using a GLI Differential sensor and an external Pt1000 temperature sensor. The sensor is placed in buffer for calibration. Now suppose the Pt1000 is still in the process and at a different temperature than the buffer, resulting in a poor calibration. In this case you should select “MAN”, measure the buffer temperature with a thermometer, and enter that value in the Cal “MAN Value” line. (This line is inaccessible if “AUTO” is selected.) Select “AUTO” when the temperature sensor can be in the buffer to sense its temperature. This applies

Back to MANUALS Menu

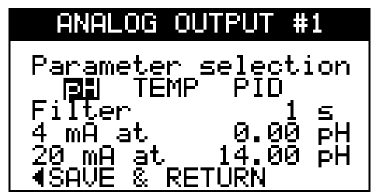


to GLI Differential pH sensors as well as combination pH electrodes, regardless of whether the temperature element is built-in or external.

- **Pure Water:** This setting is normally “OFF.” When measuring pH in solutions with the weakly dissociating electrolytes ammonia, morpholine, or hydrazine, select “ON” to provide a correction factor for pure water temperature compensation. This special compensation is specifically for use in power plant applications. It adds an associated temperature-dependent offset, from the selected built-in table, to the measured pH.

## 5.6 Setting ANALOG OUTPUT 1

After selecting “Analog Output 1” from the CONFIGURE menu, use the following submenu to configure this output:




The screen settings are:

- **Parameter selection:** Selecting “pH” assigns the output to represent the measured pH; “TEMP” assigns the output to represent the measured temperature; and “PID” assigns the output to represent the optional PID controller output. (The “PID” choice does not appear if the analyzer is not equipped with this option.) The selected “Parameter” determines the measurement unit shown for the “4 mA” and “20 mA” setup fields.

- **Filter:** If the output is selected to represent the measured pH or temperature, the “Filter” field can be set to provide a time constant (in seconds) to filter or “smooth out” the output signal. A minimum entry of “0 s” has no smoothing effect. A maximum entry of “999 s” provides maximum smoothing. Deciding what output filter time to enter is a compromise. The higher the filter time, the longer the output signal response time will be to a change in the measured value.

- **4 mA at:** This entry sets the low endpoint of the pH (or °C) measuring range at which 4 mA is desired.

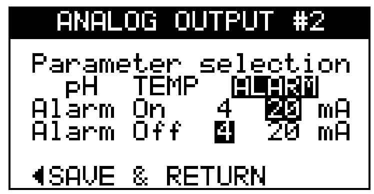
Back to MANUALS Menu



- **20 mA at:** This entry sets the high endpoint of the pH (or °C) measuring range at which 20 mA is desired.

## 5.7 Setting ANALOG OUTPUT 2

Set this output in the same way as Analog Output 1 except note that the “Parameter Selection” has a third “ALARM” choice. After selecting “ALARM,” the screen changes (see example below), and the normal proportional 4-20 mA output changes to a special dedicated non-variable alarm signal (selectable for only 4 mA or 20 mA).




You may want to select “ALARM” when using:

- **A relay overfeed timer** so that the alarm signal can represent an overfeed timer “time out” alarm condition.
- **The Wash/Cal method for calibration** so that the alarm signal can represent any error such as slope error, sensor in wrong position, etc. that may occur during wash/cal operation.
- **The optional PID controller** so that the alarm signal can represent a PID controller output timer “time out” alarm condition (0.0% or 100.0% controller output remained on longer than the preset time).

***NOTE:*** *Whenever “ALARM” is selected, the transfer condition for Output 2 automatically becomes “ACTIVE,” regardless of its preset mode. Also, the software alarms (Section 5.10) do not affect this output.*

Back to MANUALS Menu



## 5.8 Setting MAIN PARAMETER Functions

After selecting “Main Parameter” from the CONFIGURE menu, use these four listed submenus to configure the analyzer to your application:

```
     MAIN PARAMETER
 ▶Sensor Type
 ▶Pulse Suppression
 ▶Cal Buffer Values
 ▶Stability Mode

 ◀RETURN
```

SENSOR TYPE

Use the following “SENSOR TYPE” submenu to set the analyzer for the type of pH sensor being used:

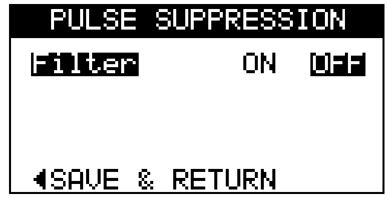
```
      SENSOR TYPE
    DIFF     COMB

 STD Cell     7.00 pH

 ◀SAVE & RETURN
```

Select the “DIFF” choice when using a GLI Differential Technique pH sensor. The “COMB” setting is for a conventional combination pH electrode. Additionally, each choice provides slightly different temperature compensation that will affect measured pH readings. When “DIFF” is selected, the analyzer uses the “STD Cell” value of 7.00 pH to further refine temperature compensation. If your GLI Differential sensor has a special standard cell value, adjust this value to match it for best measurement accuracy. (When “COMB” is selected, the “STD Cell” line does not appear.)

PULSE SUPPRESSION

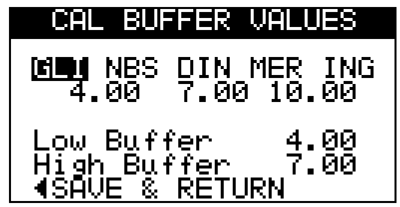
Sometimes an external interference may occasionally cause the measurement system to provide unstable readings. Common causes include entrained gas bubbles in the process, and electromagnetic interference (EMI or “electrical noise” pulses). The analyzer has a pulse suppression feature to counteract this condition and stabilize readings. Example: Suppose the analyzer reading is steadily showing 7.3 pH, then suddenly jumps to 9.8 pH for a few seconds, and returns to 7.3 pH. By using this feature, the analyzer will perceive this as a temporary upset, “suppressing” most of this pulse change and providing a smoother measurement reading.

Use the following “PULSE SUPPRESSION” submenu to turn this feature on or off:




## CAL BUFFER VALUES

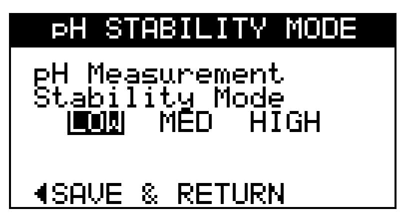
Only use the following “CAL BUFFER VALUES” submenu when you intend to use the “Pre-Defined Buffer Method” for pH calibration:




Choose the specific buffer set you want to use for pH calibration, and then select the desired low and high buffer values from that set. For calibration details using the “Pre-Defined Buffer Method,” refer to PART THREE, Section 4.4 under the respective subheading.

## pH STABILITY MODE

Use the following “pH STABILITY MODE” submenu to set the acceptable rate of stability for the measured pH and temperature signals during calibration:




- **LOW:** During calibration, the pH and °C annunciators stop flashing when these two measured signals are less stable (changing moderately).

- **MED:** During calibration, the pH and °C annunciators stop flashing when these two measured signals are more stable (less change per time period than “LOW” setting).

- **HIGH:** During calibration, the pH and °C annunciators stop flashing when these two measured signals are <u>most</u> stable (less change per time period than "MED" setting).

***NOTE:*** *When using the "HIGH" mode setting during calibration in an electrically noisy environment, the measured pH and temperature signals may never reach full stabilization.*

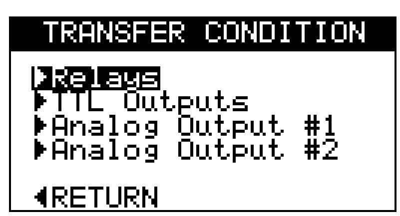
During calibration, the flashing pH and °C annunciators indicate a changing measured signal, alerting you to wait until they stop flashing before proceeding. Following this practice will provide the best accuracy. (To reduce calibration time, you can ignore the flashing annunciator recommendation and proceed, but measurement readings will be less accurate. For automated wash/cal system calibrations, both annunciators must stop flashing before automatic calibration can continue.)

## 5.9 Setting TRANSFER CONDITION

Use the "TRANSFER CONDITION" submenu (shown below) to transfer various outputs from their existing states to desired preset states. The preset transfer conditions are usually used during calibration or a maintenance procedure such as cleaning the sensor. The following example illustrates the usefulness of the transfer condition feature:

> TRANSFER MODE EXAMPLE
>
> Suppose during calibration you want:
> - Relays A and B to be off.
> - Relay C to be on.
> - TTL A output to be low.
> - TTL B and C outputs to be high.
> - Analog output #1 to be frozen at its present value.
> - Analog output #2 to change to 4.55 mA.

After selecting "Transfer Condition" from the CONFIGURE menu, use these four listed submenus to set up transfer conditions for the respective outputs to meet your specific application requirements:

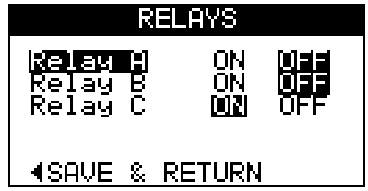


Back to MANUALS Menu



**RELAYS (A, B, and C)**

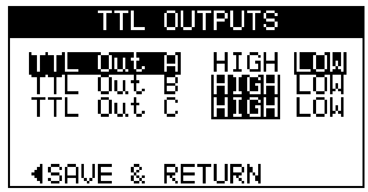
Use the following “RELAYS” submenu to set the transfer conditions for each relay:




Selecting “ON” sets the respective relay to be on during a transfer condition. Conversely, selecting “OFF” sets the relay to be off.

**TTL OUTPUTS (A, B, and C)**

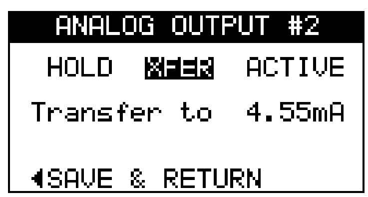
Use the following “TTL OUTPUTS” submenu to set the transfer conditions for each TTL output:




Selecting “HIGH” sets the respective TTL output to be high during a transfer condition. Conversely, selecting “LOW” sets the TTL output to be low.

**ANALOG OUTPUTS (1 and 2)**

Use the “ANALOG OUTPUT #1” and “ANALOG OUTPUT #2” submenus to set the transfer conditions for each respective output set:




The screen settings are:

- **HOLD:** Holds output values (4-20 mA and 0-5 VDC/0-1 mA) at their present values during a transfer condition.
- **XFER:** Transfers 4-20 mA output value to a desired mA value, shown on the next line, during a transfer condition. (The 0-5 VDC/0-1 mA values also transfer to values that correspond to the entered 4.00-20.00 mA value.)
- **ACTIVE:** Enables output values (4-20 mA and 0-5 VDC/0-1 mA) to continue tracking the measured value during a transfer condition.

Back to MANUALS Menu



## 5.10 Setting SOFTWARE ALARMS

After selecting “Software Alarms” from the CONFIGURE menu, use the seven listed submenus (last one hidden) to set alarm limits for the respective software alarm functions:

```
SOFTWARE ALARMS
 pH          (ENABLED)
 Temp        (ENABLED)
 Cal Timer   (ENABLED)
 Zero       (DISABLED)
 Slope       (ENABLED)
 Active Ω    (ENABLED)
```

All software alarm functions drive the TTL (NAMUR) Outputs A, B, and C.

The submenu screens for each of the software alarm functions -- except the “Cal Timer” -- contain the same selection and entry fields as shown on this example screen:

```
TEMPERATURE ALARM
Enabled        YES  NO
Fail High +100.0 °C
Warn High +  90.0 °C
Warn Low  +  70.0 °C
Fail Low  +  60.0 °C
SAVE & RETURN
```

Each software alarm function (except “Cal Timer”) has alarm limit values for “Fail High,” “Warn High,” “Warn Low,” and “Fail Low.” For example, suppose you set software alarms for the measured temperature because you want to be alerted when the process temperature is too far from its normal 80°C. In this example, select “YES” to enable the temperature software alarm function and enter appropriate values. Suppose these values are:

| | |
|---|---|
| Fail High: | +100.0°C |
| Warn High: | +90.0°C |
| Warn Low: | +70.0°C |
| Fail Low: | +60.0°C |

In this example, if temperature increased to +92.0°C, the display would indicate “WARN” and TTL (NAMUR) Output B, if enabled, would provide a warn signal. If temperature decreased to +52.0°C, the display would indicate “FAIL” and TTL (NAMUR) Output C, if enabled, would provide a fail signal.

Use the following “CAL TIMER” submenu to enter the number of days that you want to elapse before you perform the next calibration:

```
CAL TIMER ALARM
Enabled        YES  NO
Warn High       7 Days

◄SAVE & RETURN
```

After the set time elapses, the analyzer reminds you to calibrate by displaying a “WARN” alert, and creates diagnostic message # 80 (cal date reached). This message can be displayed by accessing the “Messages” submenu in the DIAGNOSTICS menu.

## 5.11 Setting MEASURE SCREEN Resolution

After selecting “Meas Screen Setup” from the CONFIGURE menu, use the following submenu to set display resolution (one or two places after decimal point) for the MEASURE screen:

```
MEAS SCREEN SETUP
Decimal Pt    .XX .X

◄SAVE & RETURN
```

Regardless of this setting, all setup screens always show values with a two-place display resolution (XX.XX).

## 5.12 Setting Analyzer Clock (SET TIME/DATE)

After selecting “Set Time/Date” from the CONFIGURE menu, use the following submenu to set the present time and date for the analyzer real-time clock (RTC):

```
SET TIME/DATE
Time    9:07am
Day    Friday
Date   03/24/95
Mode   12-Hour

◄RETURN
```

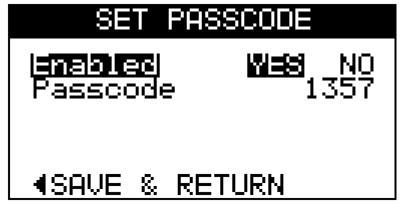
***NOTE:*** *The “12-Hour” selection in the “Mode” field provides an am/pm time format. The “24-Hour” selection provides a military time format.*

Back to MANUALS Menu



## 5.13 SET PASSCODE

After selecting ”Set Passcode” from the CONFIGURE menu, use the following submenu to set a passcode:




***NOTE:*** *The entered passcode must be a 4-digit number.*

**CAUTION:**

**WHEN ENABLED, THE SET PASSCODE MUST BE ENTERED TO ACCESS ANY MAIN ANALYZER MENU (CALIBRATE, CONFIGURE, MAINTENANCE, OR DIAGNOSTICS). BE SURE TO WRITE THE PASS-CODE DOWN AND STORE IT IN A SAFE PLACE. IF YOU ARE AN AUTHORIZED PERSON AND HAVE FORGOTTEN OR MISPLACED THE ASSIGNED PASSCODE, CONTACT THE GLI CUSTOMER SER-VICE DEPARTMENT FOR ASSISTANCE.**

Record your passcode here ➨ __ __ __ __

Back to MANUALS Menu



# SECTION 6

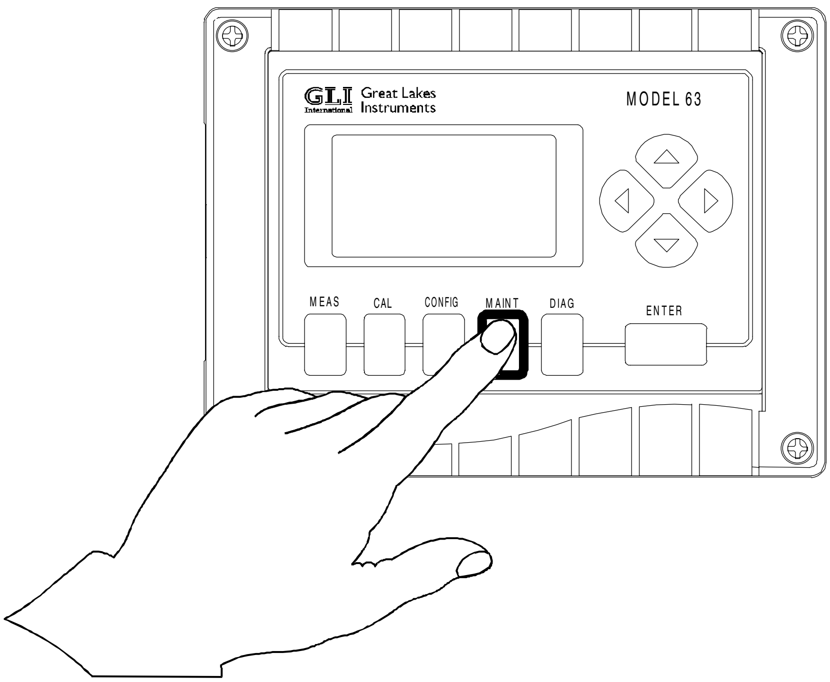
## MAINTENANCE MENU

The MAINTENANCE menu, displayed by pressing the **MAINT key**, enables you to manually control many analyzer functions during maintenance or when troubleshooting the system. This can also help you verify whether connected external devices are operating.

### 6.1 MAINTENANCE Menu Structure

Refer to Figure 3-4 for the MAINTENANCE menu structure.

**NOTE:** If a passcode has been assigned (Section 5.13), you must enter it to access the MAINTENANCE menu.




MAINT Menu

PASSCODE (optional)

- Hold/Xfer Outputs
- Manual PID
- Sensor Maintenance
- Manual Analog Out
- Manual Relay/TTL
- Simulate pH/Temp
- RETURN (press **ENTER** to return to measure screen)

Select choice and press **ENTER** for submenu screen

- or -

Press **MEAS** or **MAINT** to return to measure screen

*FIGURE 3-4 MAINTENANCE Menu Structure*

Back to MANUALS Menu



## 6.2 HOLD/XFER OUTPUTS

After selecting “Hold/Xfer Outputs” from the MAINTENANCE menu, use the following submenu to manually change the output modes:

```
HOLD/XFER OUTPUTS
Present output
state
 HOLD  XFER  ACTIVE
present values

◄RETURN
```

When cleaning the sensor or performing other maintenance tasks, you may want to hold the analog outputs and relays at their present states or transfer them to states that will not adversely affect the connected devices. By selecting “HOLD” or “XFER,” the output states respond accordingly <u>even after exiting this submenu screen</u>. The HOLD or XFER annunciator will appear on the MEASURE screen to remind you that this condition exists. To cancel the manual hold or transfer, use this same submenu screen and then select “ACTIVE.”

***NOTE:*** *Using this screen to manually hold or transfer relays may interact with relay overfeed timer operation (if counting). Refer to PART THREE, Section 8.5 for complete details.*

## 6.3 MANUAL PID (manually operate PID controller)

After selecting “Manual PID” from the MAINTENANCE menu, use this submenu to manually operate the PID controller:

```
MANUAL PID
Var          4.00 pH
Set Point    7.00 pH

AUTO  MAN     0.0 %

◄RETURN
```

By manually operating the PID controller, you can check the control elements for proper sizing, and get a “feel” for the capability of the control system.

Back to MANUALS Menu



## 6.4 SENSOR MAINTENANCE (manually operate wash system)

**This section is only pertinent when using a GLI Cal-Clean™ automatic wash/cal system or a GLI Air/Water wash-only system.**

***NOTE:*** *Depending on whether the analyzer is equipped for use with a conventional combination electrode or a GLI Differential Technique pH sensor, it has different sensor maintenance software:*

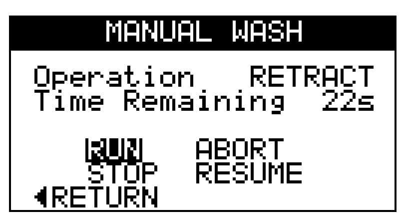
- ***Combination Electrode:*** *The analyzer software provides sensor maintenance functions specifically adapted for use with a GLI Cal-Clean™ System (or other appropriate hardware).*
- ***Differential Technique pH Sensors:*** *Different sensor maintenance software provides functions specifically adapted for use with a GLI Air/Water Blast Cleaning System.*

*Refer to the appropriate subsection for sensor maintenance software operating details.*

For GLI Cal-Clean™ System

After selecting “Sensor Maintenance” from the MAINTENANCE menu, use these three listed submenus to manually wash, manually retract, or manually insert the sensor:


All three “Sensor Maintenance” submenus contain the <u>same selection and entry fields</u> as shown on this “MANUAL WASH” submenu screen:




On the “MANUAL RETRACT” screen, selecting “RUN” holds

Back to MANUALS Menu

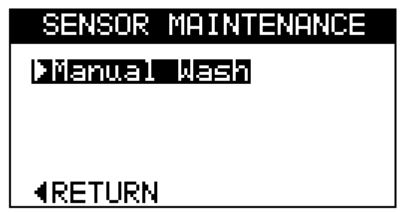


the analog outputs at their present values, retracts the sensor, and rinses it (Relay A output) for the longer of either "Rinse" time entered for a "Wash" or "Cal" cycle. When the rinse is finished, the sensor remains in the retracted position until you insert it by using the "MANUAL INSERT" submenu screen.

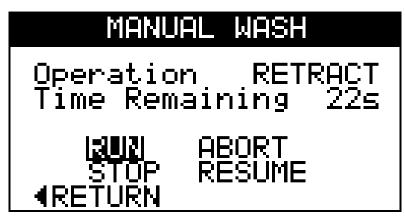
On the "MANUAL INSERT" screen, selecting "RUN" holds the analog outputs at their present values, turns off the retract output (TTL A), and begins sensor insertion. When TTL inputs confirm that the sensor is fully inserted, the analog outputs remain held until the longer of either "Hold Release" time entered for a "Wash" or "Cal" cycle expires.

### For GLI Air/Water Blast Cleaning System

After selecting "Sensor Maintenance" from the MAINTENANCE main menu, press **ENTER key** to display the following screen:




With the "Manual Wash" line selected, press the **ENTER key** to access the following submenu screen:




Use this "MANUAL WASH" submenu screen to manually control the defined wash cycle previously established (PART THREE, Section 5.4 under "For GLI Air/Water Blast Cleaning System" subheading in "DEFINE WASH CYCLE" section).

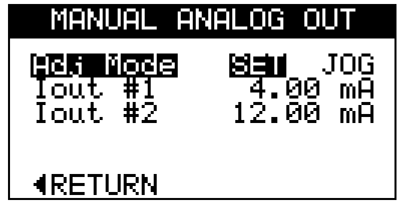
Select "RUN" and press the **ENTER key** to hold the analog outputs at their present values and to start the defined wash cycle (Relay C output). The "Operation Time Remaining" field counts down the time entered for the defined wash cycle. The analog outputs remain "held" until the hold release time, entered for the defined wash cycle, expires.

Back to MANUALS Menu



## 6.5 MANUAL ANALOG OUT (set/jog analog output mA values)

After selecting "Manual Analog Out" from the MAINTENANCE menu, use the following submenu screen to manually set/jog both analog output mA values:




You can "SET" or "JOG" the analog output values.

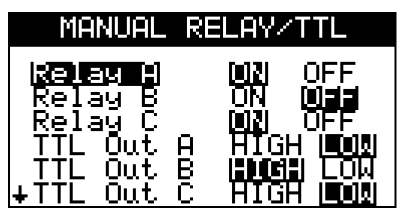
- **SET:** Enables you to adjust the 4.00-20.00 mA value for each output set. (0-5 VDC/0-1 mA values are also automatically adjusted to values corresponding to the entered 4.00-20.00 mA value.)

- **JOG:** Enables you to jog the 4.00-20.00 mA value for each output set up or down by respectively holding down the ⇧ **key or** ⇩ **key**. (0-5 VDC/0-1 mA values are also automatically adjusted to values corresponding to the adjusted 4.00-20.00 mA value.)

***NOTE:*** *Using this screen to set or jog the outputs* <u>*overrides*</u> <u>*and*</u> <u>*clears*</u> *any "HOLD" or "XFER" setting. When exiting this screen, both analog Outputs 1 and 2 automatically return to "ACTIVE" operation.*

## 6.6 MANUAL RELAY/TTL (manually activate relays/TTL outputs)

After selecting "Manual Relay/TTL" from the MAINTENANCE menu, use the following submenu screen to manually operate the relays and TTL outputs:




By manually operating the relays and TTL outputs, you can activate the devices connected to them.

***NOTE:*** *Using this screen to select states for the relay and TTL outputs* <u>*temporarily*</u> <u>*overrides*</u> *any "XFER" state setting. This also will interact with relay overfeed timer operation (if counting). Refer to PART THREE, Section 8.5 for complete details. When exiting*

Back to MANUALS Menu



*this screen, the relays and TTL outputs automatically return to their previous states.*

## 6.7 RESET OVERFD TIMER (reset relay overfeed timers)

1. After selecting "Reset Overfd Timer" from the MAINTENANCE menu, use the following submenu screen to manually reset <u>all</u> "timed out" relay overfeed timers at once:

```
  RESET OVERFD TIMER
Relay A   DISABLED
Relay B   999.9 min
Relay C   TIMED OUT

RESET ALL TIMEOUTS
◄RETURN
```

   This screen shows the present status for each relay. The status possibilities are:

   - **DISABLED:** Indicates relay overfeed timer has a preset configuration value of "0.0" minutes, or the relay has been set to function as an ALARM relay.
   - **XXX.X min:** Indicates the in-progress "count down" (in minutes) of an active relay overfeed timer from its preset setting to zero.
   - **TIMED OUT:** Indicates overfeed timer has completed counting down and needs to be reset after investigating the cause for this "timed out" condition.

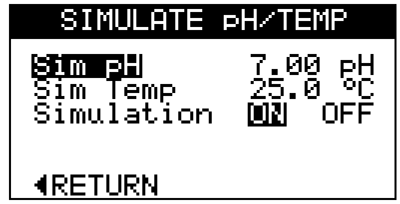
2. With the "RESET ALL TIMEOUTS" line highlighted, press **ENTER key** to simultaneously reset all relay overfeed timers with a "TIMED OUT" status. Resetting the relay overfeed timers:

   - Returns relay to its normal operation.
   - Clears "Overfeed (A, B, C) Timeout" Fail message from message list, and NAMUR TTL Output C (if used) responds to this condition by turning off unless other fail or warn conditions are pending.
   - Adds an "All Timeouts Reset" entry to the logbook.
   - Changes Analog Output 2 (only when set to represent a dedicated alarm signal) to the selected non-alarm state value (4 mA or 20 mA).

***NOTE:*** *See PART THREE, Section 8 for more operating details for overfeed timers.*

## 6.8 SIMULATE pH/TEMP Values

After selecting “Simulate pH/Temp” from the MAINTENANCE menu, use the following submenu screen to simulate pH and temperature values:




Simulating pH and °C values is useful when setting up and verifying control or alarm schemes. Example: Suppose you’ve set an alarm relay to sound a horn when the measured pH exceeds 12 pH. By using a simulated pH value, you can verify this condition without actually upsetting the process value. A “SIM” annunciator appears on the MEASURE screen to remind you of a simulated condition.

***NOTE:*** *Using this screen to manually simulate values may interact with relay overfeed timer operation (if counting). Refer to PART THREE, Section 8.5 for complete details.*

# SECTION 7

## DIAGNOSTICS MENU

### 7.1 Predictive pH Sensor Diagnostics

The analyzer can predict the date (month/year) for the end of the pH sensor's operating life. This predictive diagnostic feature operates automatically and continuously. You need not enable or configure this feature.

End-of-Sensor Life

The analyzer forecasts the predictive diagnostic end-of-sensor life date based on information contained in the "Calibration Record." The analyzer monitors the degradation of the sensor's slope, offset, electrode impedance, and other parameters over time.

☞ ***NOTE:*** *The "Calibration Record" is only updated during a calibration. Consequently, for the predictive diagnostics to be useful and important the sensor must be routinely cleaned, maintained, and calibrated. Failure to do this may prematurely update the end-of-sensor life date, providing a false indication to replace the sensor, when all it may really need is cleaning and/or routine maintenance. (See sensor operating manual for cleaning and maintenance information.)*

You can scroll to the "PREDICT: month/year" date (shown on bottom line of MEASURE screen) using ⇧ **or** ⇩ **key**. Until a "first-time" sensor calibration is performed, the display indicates "PREDICT: 0/00." After the first calibration, the display indicates the month in which calibration was performed, and the five-year maximum prediction. As more calibrations are performed, the end-of-sensor life date is updated based on the rate of degrading sensor performance (active or glass electrode impedance, slope, and offset). Example: Suppose a new sensor is installed and calibrated every month based on process conditions. When originally installed, the sensor had a slope of 60 mV/pH. After the first and two subsequent monthly calibrations, the analyzer diagnosed that the sensor slope is degrading at a rate of 2 mV/pH per month. Based on this rate, the analyzer predicts the date that the sensor will no longer be useable. When the "predict" date actually occurs, the analyzer displays a "WARN" alert, and creates diagnostic message # 34 (predicted probe date) which can be displayed by accessing the "Messages" submenu in the DIAGNOSTICS menu.

## Electrode Impedance Readings

The analyzer also displays electrode impedance readings to assist you in diagnosing problems. When using a GLI Differential Technique sensor, the displayed impedance readings are of its active and standard electrodes. When using a conventional combination pH electrode, the displayed impedance readings are of its glass and reference electrodes. The type of glass used for each electrode will affect the actual measured values. In any case, all impedance readings are temperature compensated.

☞

**Maintenance Tip!** To take advantage of this useful analyzer feature, upon startup note the impedance readings for each electrode to establish a statistical "baseline." Thereafter, occasionally monitor these readings for steep increases or decreases. Abnormally high or low readings can indicate:

- Electrode degradation due to aging.
- A disconnected sensor.
- A sensor that is out of the process.
- A dehydrated, cracked or broken electrode.

Back to MANUALS Menu

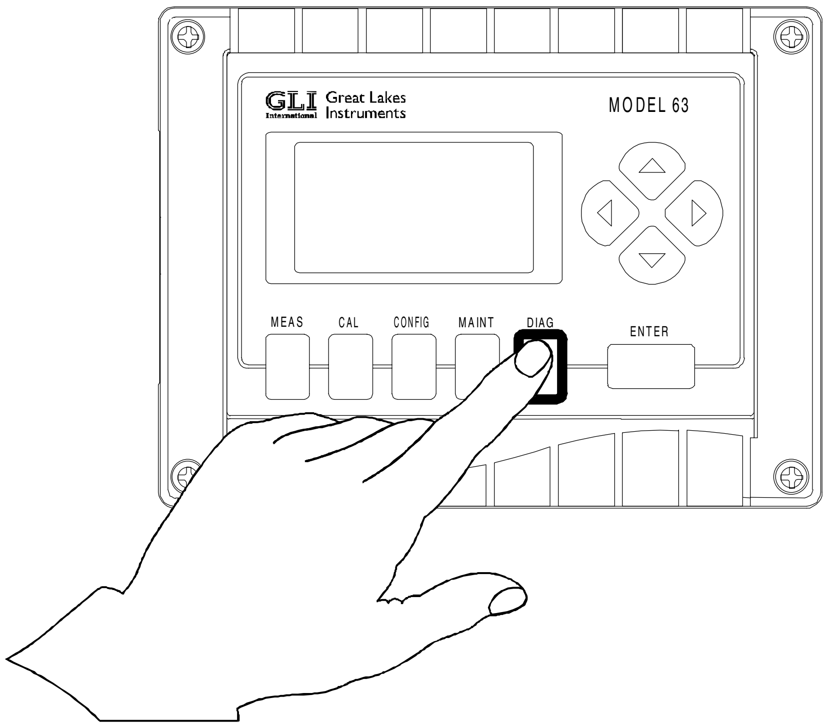


## 7.2 DIAGNOSTICS Menu Structure

The DIAGNOSTICS menu, displayed by pressing the **DIAG key**, enables you to diagnose problems with the analyzer or measurement system.

Refer to Figure 3-5 for the DIAGNOSTICS menu structure.

***NOTE:*** *If a passcode has been assigned (Section 5.13), you must enter it to access the DIAGNOSTICS menu.*




DIAG Menu

PASSCODE (optional)

- Messages
- Calibration Record
- Sensor Statistics
- Logbook
- Hardware Test
- Device Description
- Factory Assistance
- RETURN (press **ENTER** to return to measure screen)

Select choice and press **ENTER** for submenu screen

\- or -

Press **MEAS** or **DIAG** to return to measure screen

*FIGURE 3-5 DIAGNOSTICS Menu Structure*

Back to MANUALS Menu



## 7.3 MESSAGES (diagnostics message list)

When an analyzer or system problem occurs, the analyzer alerts you by displaying "WARN" or "FAIL" on the MEASURE screen. To understand what these alerts mean, access the "Messages" submenu from the DIAGNOSTICS menu:

```
** DIAGNOSTICS **
▶Messages:     6F  1W
▶Calibration Record
▶Sensor Statistics
▶Logbook
▶Hardware Test
↓▶Device Description
```

On the example screen shown above, the "6F  1W" to the right of the "Messages" line indicates there are six Fail messages and one Warn message in the list. Analyzer software alarms and diagnostics generate the messages.

Accessing the "Messages" submenu displays a message list similar to this example screen:

```
MESSAGES
•FAIL#   3
 pH > FAIL LEVEL
•FAIL#  17
 Rge < FAIL LEVEL
•FAIL#  21
↓ Rref < FAIL LEVEL
```

All messages in the list are also stored in the logbook (Section 7.6). All messages have an identification number and concise text describing the problem. (A " > " symbol in a message means greater than and " < " means less than.) The following list shows, in numerical order, all possible messages and their causes/remedies.

***NOTE:*** *Messages with identification numbers higher than #128 are "logbook-only" messages pertaining to system events. To view logbook-only messages, you must access the "Logbook" submenu.*

**TABLE A -- DIAGNOSTICS Message List**

| Message # | Displayed Message | Cause/Remedy |
|---|---|---|
| # 2 | pH > WARN LEVEL | Measured pH exceeded software alarm's preset warn high level. |
| # 3 | pH > FAIL LEVEL | Measured pH exceeded software alarm's preset fail high level. |
| # 4 | pH < WARN LEVEL | Measured pH exceeded software alarm's preset warn low level. |
| # 5 | pH < FAIL LEVEL | Measured pH exceeded software alarm's preset fail low level. |
| # 6 | ZERO > WARN LEVEL | Measured zero exceeded software alarm's preset warn high level. |
| # 7 | ZERO > FAIL LEVEL | Measured zero exceeded software alarm's preset fail high level. |
| # 8 | ZERO < WARN LEVEL | Measured zero exceeded software alarm's preset warn low level. |

Continued on next page.

**TABLE A -- DIAGNOSTICS Message List (continued)**

| Message # | Displayed Message | Cause/Remedy |
|---|---|---|
| # 9 | ZERO < FAIL LEVEL | Measured zero exceeded software alarm’s preset fail low level. |
| # 10 | SLOPE > WARN LEVEL | Measured slope exceeded software alarm’s preset warn high level. |
| # 11 | SLOPE > FAIL LEVEL | Measured slope exceeded software alarm’s preset fail high level. |
| # 12 | SLOPE < WARN LEVEL | Measured slope exceeded software alarm’s preset warn low level. |
| # 13 | SLOPE < FAIL LEVEL | Measured slope exceeded software alarm’s preset fail low level. |
| # 14 | Rge > WARN LEVEL | Measured impedance of active (or glass) electrode exceeded software alarm’s preset warn high level. |
| # 15 | Rge > FAIL LEVEL | Measured impedance of active (or glass) electrode exceeded software alarm’s preset fail high level. |
| # 16 | Rge < WARN LEVEL | Measured impedance of active (or glass) electrode exceeded software alarm’s preset warn low level. |
| # 17 | Rge < FAIL LEVEL | Measured impedance of active (or glass) electrode exceeded software alarm’s preset fail low level. |
| # 18 | Rref > WARN LEVEL | Measured impedance of standard (or reference) electrode exceeded software alarm’s preset warn high level. |
| # 19 | Rref > FAIL LEVEL | Measured impedance of standard (or reference) electrode exceeded software alarm’s preset fail high level. |
| # 20 | Rref < WARN LEVEL | Measured impedance of standard (or reference) electrode exceeded software alarm’s preset warn low level. |
| # 21 | Rref < FAIL LEVEL | Measured impedance of standard (or reference) electrode exceeded software alarm’s preset fail low level. |
| # 26 | PREAMP CURRENT HIGH | Bias current to GLI Differential sensor is too high. Sensor may be faulty, incorrectly connected, or have a shorted cable. Check wiring. |
| # 29 | PREAMP CURRENT LOW | Bias current to GLI Differential sensor is too low. Sensor may be faulty, incorrectly connected, or have a shorted cable. Check wiring. |
| # 32 | 0C > Tcal > 100C | Calibration was performed at an extreme temperature (less than 0°C or more than 100°C). To clear the message, recalibrate at a temperature between 0°C and 100°C. |
| # 34 | PREDICTED PROBE DATE | Sensor has reached the end of its predicted life based on changes in slope, offset, electrode impedance, and other parameters. See Section 7.1 “Predictive pH Sensor Diagnostics” for more information. To clear the message, clean the sensor and recalibrate up to four times. If message still has not cleared, perform a “first-time” calibration with the existing sensor or a new sensor. |
| # 37 | pH OVER RANGE | Sensor’s pH signal value is too large. Sensor may be faulty, incorrectly connected, or have a shorted cable, or analyzer may have a faulty scaling card. Check wiring. |
| # 39 | pH UNDER RANGE | Sensor’s pH signal value is too small. Sensor may be faulty, incorrectly connected, or have a shorted cable, or analyzer may have a faulty scaling card. Check wiring. |
| # 40 | PURE WATER TC ERROR | Sensor is in a process with a temperature too extreme for the pure water temperature compensation to perform accurately. Temperature must be between 0°C and 50°C to prevent pure water temp. compensation errors. |
| # 42 | FEED TIMEOUT | Time has exceeded PID controller timer’s (0% or 100%) preset time. |
| # 45 | SENSOR DISCONNECTED | This condition is determined indirectly. If the sensor current is too low, if the temperature compensator is open, and if electrode impedances are zero, it is likely that the sensor is disconnected. Check wiring and interconnect cable, if used. |
| # 65 | TEMP COMP SHORTED | Temperature compensator is shorted. Sensor may be faulty, incorrectly connected, or have a shorted cable. Check wiring. Replace sensor if necessary. |

Continued on next page.

Back to MANUALS Menu



**TABLE A -- DIAGNOSTICS Message List (continued)**

| Message # | Displayed Message | Cause/Remedy |
|---|---|---|
| # 67 | TEMP COMP OPEN | Temperature compensator is open. Sensor may be faulty, incorrectly connected, or have an open cable. Check wiring. Replace sensor if necessary. |
| # 68 | TEMP > WARN LEVEL | Measured temperature exceeded software alarm's preset warn high level. |
| # 69 | TEMP > FAIL LEVEL | Measured temperature exceeded software alarm's preset fail high level. |
| # 70 | TEMP < WARN LEVEL | Measured temperature exceeded software alarm's preset warn low level. |
| # 71 | TEMP < FAIL LEVEL | Measured temperature exceeded software alarm's preset fail low level. |
| # 80 | CAL DATE REACHED | Time has exceeded cal timer alarm's preset time. Calibrate now. |
| # 83 | CURRENT 1 LOAD HIGH | Load in analog Output 1 current loop is too high or loop is open. Check 4-20 mA loop wiring. If not used, short output to clear the message. |
| # 85 | CURRENT 2 LOAD HIGH | Load in analog Output 2 current loop is too high or loop is open. Check 4-20 mA loop wiring. If not used, short output to clear the message. |
| # 91 | OVERFEED A TIMEOUT | Preset time for Relay A overfeed timer has "timed out". Examine the cause for this condition and correct it. Then manually reset the timer using the MAINTENANCE menu. |
| # 93 | OVERFEED B TIMEOUT | Preset time for Relay B overfeed timer has "timed out". Examine the cause for this condition and correct it. Then manually reset the timer using the MAINTENANCE menu. |
| # 95 | OVERFEED C TIMEOUT | Preset time for Relay C overfeed timer has "timed out". Examine the cause for this condition and correct it. Then manually reset the timer using the MAINTENANCE menu. |
| # 100 | TIME/DATE RESET | Real-time clock has reset. If internal battery is discharged (from analyzer not being powered for many months) and the analyzer is then powered, the clock will reset. Clear the message by setting the time/date in the CONFIGURE menu. |
| # 102 | BATTERY LOW | Internal battery powering the real-time clock is not properly charged. If the analyzer has been powered for several days and the message remains, the battery may be faulty. Return the analyzer to GLI for repair. |
| # 113 | SCAL EE ERROR | The analyzer's scaling card is faulty. Return the analyzer to GLI for repair. |
| # 115 | SCAL EE QUEUE FULL | The analyzer's scaling card is faulty. Return the analyzer to GLI for repair. |
| # 117 | SYS EE ERROR | The analyzer's µP board is faulty. Return the analyzer to GLI for repair. |
| # 119 | SYS EE QUEUE FULL | The analyzer's µP board is faulty. Return the analyzer to GLI for repair. |
| # 121 | LGBK EE ERROR | The analyzer's µP board is faulty. Return the analyzer to GLI for repair. |
| # 123 | LGBK EE QUEUE FULL | The analyzer's µP board is faulty. Return the analyzer to GLI for repair. |
| **"LOGBOOK-ONLY" Messages (event occurrences from this point forward)** | | |
| # 128 | Power Down | Line power to analyzer was removed on the indicated date and time. |
| # 130 | Power Up | Line power to analyzer was restored on the indicated date and time. |
| # 132 | Dead-Man Timeout | Analyzer displayed a screen, other than the MEASURE screen, for more than 30 minutes, and then returned to the MEASURE screen on the indicated date and time. |
| # 134 | MEAS Menu Active | MEAS key was used to exit a screen, or auxiliary information line on MEASURE screen was changed on the indicated date and time. |
| # 136 | CAL Menu Active | Activity in CALIBRATE menu occurred on the indicated date and time. |
| # 138 | MAINT Menu Active | Activity in MAINTENANCE menu occurred on the indicated date and time. |
| # 140 | CONFIG Menu Active | Activity in CONFIGURE menu occurred on the indicated date and time. |
| # 142 | DIAG Menu Active | Activity in DIAGNOSTICS menu occurred on the indicated date and time. |
| # 145 | HIDDEN Menu Active | Activity in HIDDEN menu occurred on the indicated date and time. |
| # 150 | PID Tuning Changed | PID configuration changed on the indicated date and time. |
| # 152 | PID Mode Changed | PID mode changed on the indicated date and time. |
| # 154 | PID Timer Changed | PID timer setting changed on the indicated date and time. |

Continued on next page.

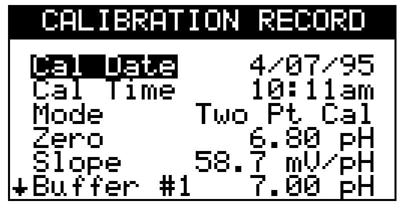
| TABLE A -- DIAGNOSTICS Message List (continued) | | |
|---|---|---|
| **"LOGBOOK-ONLY" Messages (continued)** | | |
| Message # | Displayed Message | Cause/Remedy |
| # 156 | Relay A Changed | Relay A configuration changed on the indicated date and time. |
| # 158 | Relay B Changed | Relay B configuration changed on the indicated date and time. |
| # 160 | Relay C Changed | Relay C configuration changed on the indicated date and time. |
| # 162 | NAMUR Changed | NAMUR configuration changed on the indicated date and time. |
| # 164 | Temp Comp Changed | Temperature compensation changed on the indicated date and time. |
| # 166 | Iout #1 Changed | Analog Output 1 configuration changed on the indicated date and time. |
| # 168 | Iout #2 Changed | Analog Output 2 configuration changed on the indicated date and time. |
| # 170 | Relay Xfer Changed | Relay transfer condition configuration changed on indicated date/time. |
| # 172 | TTL Xfer Changed | TTL transfer condition configuration changed on indicated date/time. |
| # 174 | Iout #1 Xfer Changed | Analog Output 1 transfer condition value changed on indicated date/time. |
| # 176 | Iout #2 Xfer Changed | Analog Output 2 transfer condition value changed on indicated date/time. |
| # 178 | Temp Alarm Changed | Temperature software alarm values changed on the indicated date/time. |
| # 180 | Meas Screen Changed | MEASURE screen changed on the indicated date and time. |
| # 182 | Time Changed | Analyzer clock was adjusted on the indicated date and time. |
| # 184 | Date Changed | Analyzer calendar was changed on the indicated date and time. |
| # 186 | All Timeouts Reset | Relay A, B, and/or C overfeed timers were reset on indicated date/time. |
| # 200 | Temp Cal OK | Successful temperature calibration occurred on the indicated date/time. |
| # 202 | Bad Temp Cal | Unsuccessful temperature calibration was attempted on the indicated date/time. |
| # 204 | pH Cal OK | Successful pH calibration occurred on the indicated date/time. |
| # 206 | Bad pH Cal | Unsuccessful pH calibration was attempted on the indicated date/time. |
| # 208 | pH Sensor First Cal | Sensor was calibrated for the first time on the indicated date/time. |
| # 216 | Wash Cycle Changed | Wash cycle changed on the indicated date and time. |
| # 218 | Cal Cycle Changed | Cal cycle changed on the indicated date and time. |
| # 220 | Wash/Cal Sched Changed | Wash/Cal schedule changed on the indicated date and time. |
| # 222 | Sensor Type Changed | The pH sensor type configuration changed on the indicated date/time. |
| # 224 | Pulse Supp Changed | The pulse suppression mode changed on the indicated date/time. |
| # 226 | Buffer Vals Changed | The buffer value configuration changed on the indicated date/time. |
| # 228 | Stability Mode Changed | Measurement signal threshold for calibration changed on the indicated date/time. |
| # 230 | pH Alarm Changed | pH software alarm values changed on the indicated date and time. |
| # 232 | Cal Timer Alarm Changed | Cal timer software alarm value changed on the indicated date/time. |
| # 234 | Zero Alarm Changed | Zero software alarm values changed on the indicated date and time. |
| # 236 | Slope Alarm Changed | Slope software alarm values changed on the indicated date/time. |
| # 238▲ | Glass Ω Alarm Changed | Glass electrode impedance software alarm values changed on the indicated date/time. |
| # 240▲ | Ref Ω Alarm Changed | Reference electrode impedance software alarm values changed on the indicated date/time. |
| # 242✧ | Active Ω Alarm Changed | Active electrode impedance software alarm values changed on the indicated date/time. |
| # 244✧ | Std Ω Alarm Changed | Standard electrode impedance software alarm values changed on the indicated date/time. |
| # 246 | Passcode Changed | Passcode changed on the indicated date and time. |
| # 248 | Incorrect Passcode | An incorrect passcode entry was attempted on the indicated date/time. |

▲ These messages are only provided and displayed when using a conventional combination pH electrode.
✧ These messages are only provided and displayed when using a GLI Differential Technique pH sensor.

## 7.4 CALIBRATION RECORD (last calibration only)

The analyzer creates a record containing information about the last calibration. This includes the calibration date and time, the calibration mode (single or two-point), the sensor's zero and slope, the buffer values used, the sensor's mV output, and the temperature during calibration.

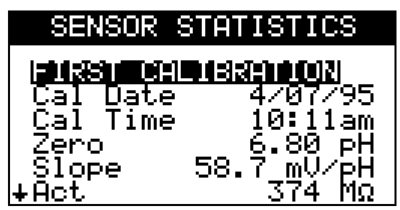
After selecting "Calibration Record" from the DIAGNOSTICS menu, a screen similar to this example screen appears:




## 7.5 SENSOR STATISTICS (1st and last 3 calibrations)

The analyzer creates sensor statistics records for the first calibration and the last three (most recent) calibrations. The data contained in these records is similar to the data in the calibration record.

After selecting "Sensor Statistics" from the DIAGNOSTICS menu, a screen similar to this example screen appears:




Items in the "FIRST CALIBRATION" record include the calibration date and time, the sensor's zero and slope, and impedance of the measuring and reference electrode. The other calibration records (LAST CALIBRATION, 2 CALIBRATIONS AGO, and 3 CALIBRATIONS AGO) contain the same information, but it is displayed as the difference between that respective calibration and the first calibration. For example, suppose the FIRST CALIBRATION slope was 59.6 mV/pH and the slope for the last calibration was 57.3 mV/pH. The displayed slope for the LAST CALIBRATION would then be "-2.3 mV/pH" (the negative difference between the first and last calibrations).

Back to MANUALS Menu



## 7.6 LOGBOOK

The analyzer logbook creates a “log” of up to 100 events. An event is generally defined as “something that happened involving the analyzer.” Any diagnostic message shown in Table A (Diagnostics Message List in Section 7.3) can be contained in the logbook. When the logbook’s 100-event capacity is exceeded, the analyzer automatically deletes the oldest event while adding the newest event.

After selecting “Logbook” from the DIAGNOSTICS menu, a screen similar to this example screen appears:

```
      LOGBOOK
 •4/07/95 10:15am
  FAIL#  37 CLEARED
  pH OVER-RANGE
 •4/07/95 10:15am
  FAIL#  37 ACTIVE
↓ pH OVER-RANGE
```

## 7.7 HARDWARE TESTS (for analyzer main components)

After selecting “Hardware Test” from the DIAGNOSTICS menu, use the following submenu screen to manually test the analyzer operating hardware, memory, display, keypad, and real-time clock (RTC):

```
   HARDWARE TEST
 ▶RAM Test
 ▶ROM Test
 ▶EEPROM Test
 ▶Display Test
 ▶Keypad Test
↓▶RTC Test
```

If any test fails, return the analyzer to GLI for repair.

***NOTE:*** *During hardware tests, the analyzer continues to measure and control normally without interruption.*

## 7.8 DEVICE DESCRIPTION

To find the analyzer’s complete model number, serial number, software version, and other related information, select “Device Description” from the DIAGNOSTICS menu. A screen similar to this example screen appears:

```
 DEVICE DESCRIPTION
 Model# P63A1N-A-B1-
 Serial#  00-00-0000
 Version        V1.00
 Special        K0000
 Setup Date 00/00/00
↓Repair File C000000
```

## 7.9 FACTORY ASSISTANCE

After selecting “Factory Assistance” from the DIAGNOSTICS menu, this screen appears for convenient referral:

```
 FACTORY ASSISTANCE
GLI International
9020 W. Dean Rd.
Milwaukee, WI 53224
phone: 800-543-8907
fax:   414-355-7797
◄RETURN
```

**Diagnostics Tip!** For additional information on trouble-shooting, contacting our Customer Service Department, or instructions to return an analyzer for repair, refer to PART FOUR, Section 3.

# SECTION 8

# RELAY OVERFEED TIMER FEATURE

The useful relay overfeed timer feature, **only available to a CONTROL relay**, is described in detail in this section.

## 8.1 Why Use an Overfeed Timer

Suppose that you configure a CONTROL relay with a high phase to operate in response to increasing measured value. The CONTROL relay will then turn on whenever the measured value exceeds its preset setpoint. When the measured value decreases below the setpoint by an amount you preset (the deadband setting), the relay will turn off. But what if a damaged sensor or a process upset condition keeps the measured value above the setpoint or deadband setting? The control element (valve, pump, etc.) switched by that relay would then continue to operate. Depending on the application control scheme, this may excessively dispense costly chemical additives or overly drain or divert the process. Also, the control element itself could be damaged due to excessive continuous or unusual operation such as a pump that is running dry. The useful overfeed timer prevents undesirable conditions like these from happening. It restricts how long the relay and its connected control element will remain on regardless of conditions.

## 8.2 Configuring Relay Overfeed Timers

To set a relay overfeed timer, refer to PART THREE, Section 5.3 in the “Relay Setup” subsection. The time you set to restrict how long the relay stays on (0-999.9 minutes) should be just enough to provide acceptable results. An excessive setting may waste chemicals or the process itself. Initially, set this time as an estimate. Then, by experimenting and observing the response, periodically “fine tune” to optimize the setting.

## 8.3 Overfeed Timer “Timeout” Operation

When a relay overfeed timer “times out,” it:

- Turns relay off until overfeed timer is reset.
- Adds “Overfeed (A, B, C) Timeout” Fail message (#91, #93 and #95 respectively) to message list and logbook, and TTL NAMUR Output C (if used) responds to this condition by turning on.
- Changes Analog Output 2 (only when set to represent a dedicated non-variable alarm signal) to the selected alarm state value (4 mA or 20 mA).

Back to MANUALS Menu



## 8.4 Resetting Overfeed Timer

To manually reset <u>all</u> "timed out" relay overfeed timers at once, please refer to PART THREE, Section 6.7.

## 8.5 Interactions with Other Analyzer Functions

A relay overfeed timer can, and often will, interact with other analyzer functions while those functions are in use. TABLE B below explains common overfeed timer interactions.

<table>
<tr><th colspan="3">TABLE B -- Relay Overfeed Timer Interactions With Other Analyzer Functions</th></tr>
<tr><th colspan="2">Function Conditions</th><th>Resulting Action of Overfeed Timer</th></tr>
<tr><th colspan="3">Manually Holding a Relay</th></tr>
<tr><td>Off relay held in "off"</td><td>Overfeed timer was off</td><td>Overfeed timer remains off. After you change back to ACTIVE from the HOLD mode, the overfeed timer will remain off until the measured value (or a value you simulate) causes the relay to turn on.</td></tr>
<tr><td>On relay held in "on"</td><td>Overfeed timer was counting</td><td>Overfeed timer continues its "count down" until it turns the relay off. If you release HOLD <u>before</u> the timer "times out," the timer continues its "count down" until it turns the relay off or the timer automatically resets when the measured value (or a value you simulate) causes the relay to turn off. If you release HOLD <u>after</u> the timer has "timed out", the timer automatically resets.</td></tr>
<tr><td>On relay held in "on"</td><td>Overfeed timer was timed out</td><td>Overfeed timer remains off which keeps the relay turned off. You must manually reset the timer (PART THREE, Section 6.7).</td></tr>
<tr><th colspan="3">Manually Transferring a Relay</th></tr>
<tr><td>Off relay is transferred to "on"</td><td>Overfeed timer was off</td><td>Overfeed timer starts its "count down" until it turns the relay off. After you change the "on" relay back to "off," the overfeed timer automatically resets.</td></tr>
<tr><td>On relay is transferred to "off"</td><td>Overfeed timer was counting</td><td rowspan="2">Overfeed timer automatically resets. After you change the "off" relay back to "on", the overfeed timer starts its "count down" until it turns the relay off, or the timer automatically resets again when the measured value (or a value you simulate) causes the relay to turn off.</td></tr>
<tr><td>On relay is transferred to "off"</td><td>Overfeed timer was timed out</td></tr>
<tr><th colspan="3">Manually Operating a Relay</th></tr>
<tr><td>Off relay is changed to "on"</td><td>Overfeed timer was off</td><td>Overfeed timer starts its "count down" until it turns the relay off. After you change the "on" relay back to "off," the overfeed timer automatically resets.</td></tr>
<tr><td>On relay is changed to "off"</td><td>Overfeed timer was counting</td><td rowspan="2">Overfeed timer automatically resets. After you change the "off" relay back to "on", the overfeed timer starts its "count down" until it turns the relay off, or the timer automatically resets again when the measured value (or a value you simulate) causes the relay to turn off.</td></tr>
<tr><td>On relay is changed to "off"</td><td>Overfeed timer was timed out</td></tr>
<tr><th colspan="3">Manually Simulating Values</th></tr>
<tr><td>Off relay is turned "on" by simulated value</td><td>Overfeed timer was off</td><td>Overfeed timer starts its "count down" until it turns the relay off. After you change the "on" relay back to "off," the overfeed timer automatically resets.</td></tr>
<tr><td>On relay is turned "off" by simulated value</td><td>Overfeed timer was counting</td><td rowspan="2">Overfeed timer automatically resets. After you change the "off" relay back to "on", the overfeed timer starts its "count down" until it turns the relay off, or the timer automatically resets again when the measured value (or a value you simulate) causes the relay to turn off.</td></tr>
<tr><td>On relay is turned "off" by simulation value</td><td>Overfeed timer was timed out</td></tr>
<tr><th colspan="3">TTL (NAMUR) Outputs</th></tr>
<tr><td colspan="3">The TTL NAMUR outputs, if enabled, are driven by the analyzer software warn/fail alarms. Whenever an overfeed timer "times out," it is considered a fail condition which will turn on TTL output C.</td></tr>
<tr><th colspan="3">Wash/Cal Feature (all relay and TTL outputs)</th></tr>
<tr><td colspan="3">When the wash/cal feature is enabled, the analyzer dedicates all relay and TTL outputs for this purpose. Consequently, the overfeed timers for Relays A, B, and C become non-functional. Furthermore, Relays A, B, and C will not appear on the screen showing relay overfeed timer status.</td></tr>
</table>

Back to MANUALS Menu



# PART FOUR - SERVICE AND MAINTENANCE

## SECTION 1

## GENERAL INFORMATION

### 1.1 Inspecting Sensor Cable

If a measurement problem exists and you suspect the sensor cable, inspect it for physical damage. If an interconnect cable is used, disconnect the cable at both ends (junction box and analyzer) and, using an ohmmeter, check its wires for continuity and internal shorts.

### 1.2 Removing/Attaching Analyzer Door

**To Remove Analyzer Door:**

1. Loosen the four screws on the analyzer's front bezel and swing open the door.
2. Disconnect the ribbon cable connector from the backside of the door.
3. While holding the door, slide the door release lever (Figure 4-1) upward to release the door from the hinge.

**To Attach Analyzer Door (Figure 4-1):**

1. With the door open, hold the spring-loaded door release lever upward, carefully position the hinge slots onto the hinge until the hinge is fully seated, and release the lever.
2. After the door is attached, connect the ribbon cable connector to the backside of the door. To prevent accidentally crimping the cable, push any excess cable into the opening by the connector.
3. Close the door and tighten the four screws on the analyzer's front bezel.

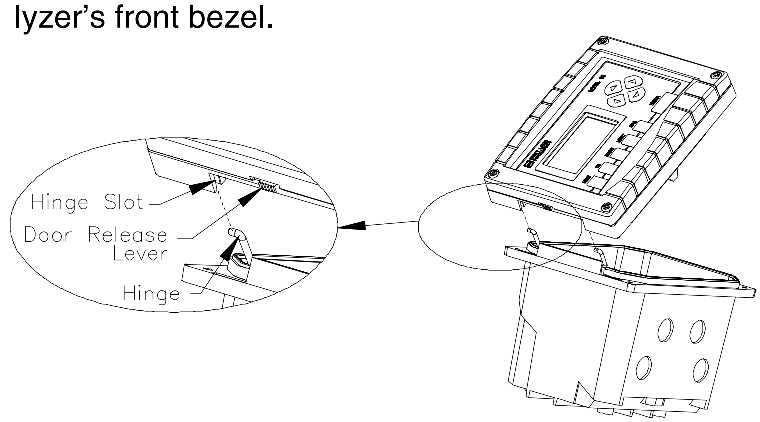



*FIGURE 4-1 Analyzer Door Attachment Details*

## 1.3 Replacing Relays

**WARNING:**

**DISCONNECT LINE POWER TO AVOID THE POSSIBILITY OF ELECTRICAL SHOCK.**

1. After disconnecting line power, loosen the four screws on the analyzer front door, and swing the door open. Disconnect the ribbon cable connector.

2. If analyzer is not equipped with EMI-hardened option, disregard this step, and proceed with step 3.

   If analyzer has EMI-hardened option:

   A. Remove the screw holding the thin metal divider between TB3 and TB4, and remove the divider.

   B. Loosen (but do not remove) the two screws securing the thin metal bracket that shields the ribbon cable connector. Remove the bracket by sliding it to the right from under the screws and pulling it outward.

3. Remove the two screws above the terminal strips and carefully extract the power supply board assembly.

4. On the outer perimeter of the component side of the board, unsolder the four tabs holding the metal cover (on terminal strip side) to access the relay pins.

5. Unsolder the defective relay. Replace it with an equivalent relay (see PART FIVE for relay part number).

6. Reinstall the power supply board assembly following the previous steps in reverse order.

Back to MANUALS Menu



## 1.4 Replacing Fuse(s)

The analyzer will have one or two 1/2 amp fuses (250 VAC; type M or T slow-blow; 5 mm x 20 mm size) depending on whether it is equipped with the single or dual fusing option.

**WARNING:**

**DISCONNECT LINE POWER TO AVOID THE POSSIBILITY OF ELECTRICAL SHOCK.**

1. After disconnecting line power, remove the power supply board assembly by performing steps 1 through 3 in the previous "Replacing Relays" Section 1.3.

2. Remove the blown fuse and replace it with a GLI fuse or an equivalent (see PART FIVE for fuse part number).

3. Reinstall the power supply board assembly following steps 1 through 3 in the previous Section 1.3 in reverse order.

Back to MANUALS Menu



# SECTION 2
## PRESERVING MEASUREMENT ACCURACY

### 2.1 Keeping Sensor Clean

To maintain measurement accuracy, periodically clean the sensor. Operating experience will help you determine the intervals between cleanings (days, weeks, or months). Use the recommended cleaning procedure described in the GLI sensor operating manual.

### 2.2 Keeping Analyzer Calibrated

Depending on application circumstances, periodically re-calibrate the analyzer to maintain measurement accuracy.

☞ **Maintenance Tip!** Upon startup, frequently check the system until operating experience can determine the optimum time between calibrations that provides acceptable measurement results.

Calibrate using one of the methods described in PART THREE, Section 4.4. Calibrating with old, contaminated, or diluted pH buffers may cause measurement errors. **Do not reuse buffers.** Never pour the portion of buffer used for calibration back into the buffer bottle -- always discard it. Note that the pH value of a buffer changes slightly as its temperature changes. (Always refer to the pH value-versus-temperature table on the buffer bottle.) Therefore, always allow the temperatures of the sensor and buffer to equalize while calibrating (verified when analyzer's "°C" annunciator stops flashing).

### 2.3 Avoiding Electrical Interference

**Recommendation:** Do not run the sensor cable (and interconnect cable, if used) in the same conduit with AC or DC power wiring. Also, connect cable shielding as recommended (PART TWO, Section 3.1 or 3.2).

☞ **Maintenance Tip!** Excess cable should not be coiled near motors or other equipment that may generate electrical or magnetic fields. Cut cables to proper length during installation to avoid unnecessary inductive pickup ("electrical noise" may interfere with sensor signal).

# SECTION 3

# TROUBLESHOOTING

## 3.1 Ground Loops

The analyzer may be affected by a “ground loop” problem (two or more electrically grounded points at different potentials).

**Symptoms Indicating A Possible Ground Loop**

- Analyzer reading is offset from the actual value by a consistent amount, or ....
- Analyzer reading is frozen on one value, or ....
- Analyzer reading is “off scale” (upscale or downscale).

Although the source of a ground loop may be difficult to determine, there are several common causes.

**Common Causes of Ground Loops**

- Components, such as recorders or computers, are connected to non-isolated analog outputs.
- Not using shielded cabling or failure to properly connect all cable shields.
- Moisture or corrosion in a junction box.

### Determining if Ground Loop Exists

The following simple test can help to determine if there is a ground loop:

1. With the pH measurement displayed, put the sensor in a non-conductive container (plastic or glass) filled with a known value pH buffer. Note the analyzer reading for this solution.

2. Connect one end of a wire to a known earth ground, such as the analyzer green ground screw or a metal water pipe. Place the other end of this wire into the buffer next to the sensor.

3. Note the analyzer reading now and compare it with the the reading taken in step 1. If the reading changed, a ground loop exists.

Finding Source of Ground Loop

Sometimes the source of a ground loop is easy to find, but it usually takes an organized approach to isolate the problem.

☞ **Troubleshooting Tip!** Use a systematic troubleshooting method. If possible, start by grounding all shields and electrical grounds at one stable point. One at a time, turn off all pumps, motors and switches that are in contact with the process. Each time you do this, check if the ground loop still exists. Since the process media being measured is electrically conductive, the source of the ground loop may not be readily apparent.

## 3.2 Isolating Measuring System Problem

When experiencing problems, try to determine the primary measurement system component causing the problem (sensor, analyzer, or interconnect cable if used). Use the analyzer's system diagnostic capabilities to help you isolate the problem (see PART THREE, Section 7). Additionally, perform these simple checks:

Checking Electrical Connections

1. Verify that line power exists at the analyzer's MAINS terminals (TB5 and TB6).

2. Check the analyzer's ribbon cable and make sure its mating connectors are properly connected.

Verifying Sensor Operation

To verify sensor operation, refer to the procedure in the troubleshooting section of the sensor operating manual.

Verifying Analyzer Operation

**WARNING:**

**DISCONNECT LINE POWER TO AVOID THE POSSIBILITY OF ELECTRICAL SHOCK.**

1. After disconnecting line power from the analyzer, disconnect the pH sensor.

2. Depending on the type of pH sensor, refer to the appropriate category below and follow the steps to simulate the pH and temperature input signals:

Back to MANUALS Menu



**For GLI Differential Technique Sensor**

A. Connect a millivolt generator (or a jumper, if generator is not available) between Terminal 4 (red) and Terminal 5 (green) on TB1, with the (+) lead on Terminal 4.

B. Connect a 1%, 301 ohm resistor between Terminal 5 (green) and Terminal 8 (yellow) on TB1.

C. Connect a jumper between Terminal 3 (black) and Terminal 5 (green) on TB1.

D. Make sure the analyzer is configured for a 300 ohm NTC temperature element (see PART THREE, Section 5.5 for details).

**For Conventional Combination Electrode**

A. Connect a millivolt generator (or a jumper, if generator is not available) between Terminal 1 (active) and Terminal 7 (ground) on TB1, with the (+) lead on Terminal 1.

B. Connect a 1%, 1K ohm resistor between Terminal 8 and Terminal 10 on TB1.

C. Connect a jumper between Terminal 3 (reference) and Terminal 7 (ground) on TB1.

D. Make sure the analyzer is configured for a Pt 1000 temperature element (see PART THREE, Section 5.5 for details).

3. Reconnect line power to the analyzer.

**WARNING:**

**LINE POWER IS PRESENT. BE CAREFUL TO AVOID ELECTRICAL SHOCK.**

4. Set the millivolt generator to provide each of the following outputs, checking the analyzer MEASURE screen each time for these corresponding pH readings:

| Generator Output | Corresponding Analyzer pH Reading |
|---|---|
| Zero mV | 7 pH (approximately |
| (-) 175 mV | 10 pH (approximately |
| (+) 175 mV | 4 pH (approximately |

When Using Jumper Only (not generator)

| | |
|---|---|
| - - - - | 7 pH (approximately |

5. Scroll MEASURE screen bottom line to show temperature:
   - For GLI Differential Technique sensor, the temperature value should be approximately “25°C.”
   - For a conventional combination electrode, the temperature value should be approximately “0°C.”

   If these readings are achieved, the analyzer is operating properly, but the sensor or interconnect cable (if used) may be inoperative. Proceed with step 6. If you cannot get these readings, the analyzer is probably inoperative.

**WARNING:**

**DISCONNECT LINE POWER TO AVOID THE POSSIBILITY OF ELECTRICAL SHOCK.**

6. After disconnecting line power from the analyzer, remove the millivolt generator, temperature simulation resistor, and the jumper from the analyzer’s TB1 terminals. Reconnect the sensor directly to the analyzer (purposely excluding the interconnect cable, if used).

7. Reconnect line power to the analyzer.

**WARNING:**

**LINE POWER IS PRESENT. BE CAREFUL TO AVOID ELECTRICAL SHOCK.**

8. Using the “Arbitrary Buffer Method,” perform a two-point calibration. If calibration is accomplished, the analyzer and sensor are operating properly. If the system cannot be calibrated, the sensor is probably inoperative.

9. If the interconnect cable was excluded in step 6, and it was determined that the analyzer and sensor are operating properly, the interconnect cable is probably defective.

## 3.3 Customer Assistance

If you need assistance in troubleshooting or repair service, please contact your local GLI representative, or the GLI Customer Service Department at:

GLI International, Inc.
9020 West Dean Road
Milwaukee, WI 53224

Phone: [800] 543-8907
Fax: [414] 355-8346
E-mail: info@gliint.com

— GLI CUSTOMER SERVICE DEPARTMENT HOURS —

| | Eastern Std. Time | Central Std. Time | Mountain Std. Time | Pacific Std. Time |
|---|---|---|---|---|
| Monday through Thursday | 8:30 a.m. to 5:30 p.m. | 7:30 a.m. to 4:30 p.m. | 6:30 a.m. to 3:30 p.m. | 5:30 a.m. to 2:30 p.m. |
| Friday | 8:30 a.m. to 4:00 p.m. | 7:30 a.m. to 3:00 p.m. | 6:30 a.m. to 2:00 p.m. | 5:30 a.m. to 1:00 p.m. |

Call the GLI Customer Service Dept. before returning an analyzer for repair. Many problems can be diagnosed and resolved over the telephone. GLI will issue a Return Material Authorization (RMA) number if it is necessary that the analyzer be returned for repair. **All returned analyzers must be freight prepaid and include:**

1. A clearly written description of the malfunction.
2. Name of person to contact and the phone number where they can be reached.
3. Proper return address to ship analyzer back. Include preferred shipping method (UPS, Federal Express, etc.) if applicable.
4. A purchase order if analyzer is out of warranty to cover costs of repair.

☞ ***NOTE:*** *If the analyzer is damaged during return shipment because of inadequate packaging, the customer is responsible for any resulting repair costs. (**Recommendation:** Use the original GLI shipping carton or an equivalent.)*

*Also, GLI will not accept analyzers returned for repair or replacement unless they are thoroughly cleaned and all process material is removed.*

# PART FIVE - SPARE PARTS AND ACCESSORIES

| Description | Part Number |
|---|---|
| Relay (one each): | |
| Electromechanical | 2T1035 |
| Solid state AC | 2T1036 |
| Solid state DC | 3T1004 |
| Fuse (1/2 amp, 250 VAC, 5 mm x 20 mm) | 7F1048 |
| EMI Hardening Upgrade Kit (includes extra shielding and special glass for LCD readout) | G63G1110 |
| Mounting Hardware Kit (includes nylon mounting bracket, gasket for panel mounting and all required hardware) | 1000G3228 |
| Ribbon Cable Assembly | 1000A4A3235 |
| Liquid Crystal Display | G63G1060 |
| Door Hinge Replacement Kit (includes hinge pin, spring and door release lever) | G63G1090 |
| Replacement Screws Kit (includes the nut, washer and all screws used for analyzer assembly) | G63G1120 |

**Complete Door Assemblies:**

- For P63A Analyzers (accepts only GLI Differential Technique Sensor):

| Description | Part Number |
|---|---|
| Without PID or EMI hardening options | G63G1030-101 |
| With PID, but without EMI hardening option | G63G1030-102 |
| Without PID, but with EMI hardening option | G63G1030-103 |
| With PID and EMI hardening options | G63G1030-104 |

- For P63B Analyzers (accepts only Conventional Combination Electrode or Electrode Pair):

| Description | Part Number |
|---|---|
| Without PID or EMI hardening options | G63G1040-101 |
| With PID, but without EMI hardening option | G63G1040-102 |
| Without PID, but with EMI hardening option | G63G1040-103 |
| With PID and EMI hardening options | G63G1040-104 |

Back to MANUALS Menu



| Description | Part Number |
|---|---|
| **Scaling Board Assemblies:** | |
| • For P63A Analyzers (accepts only GLI Differential Technique Sensor) | G63G1080 |
| • For P63B Analyzers (accepts only Conventional Combination Electrode or Electrode Pair) | G63G1130 |
| **Complete Power Supply Board Assemblies:** | |
| • For Single-fused P63A or P63B Analyzers: | |
| Includes 3 electromechanical relays | G63G1050-101 |
| Includes 3 solid state AC relays | G63G1050-102 |
| Includes 3 solid state DC relays | G63G1050-103 |
| • For Dual-fused P63A or P63B Analyzers: | |
| Includes 3 electromechanical relays | G63G1050-104 |
| Includes 3 solid state AC relays | G63G1050-105 |
| Includes 3 solid state DC relays | G63G1050-106 |
| **Complete CPU Board Assemblies (including software):** | |
| • For P63A Analyzers (accepts only GLI Differential Technique Sensor): | |
| Without PID option | G63G1070-101 |
| With PID option | G63G1070-102 |
| • For P63B Analyzers (accepts only Conventional Combination Electrode or Electrode Pair): | |
| Without PID option | G63G1070-103 |
| With PID option | G63G1070-104 |
| **Software Only (set of two EPROM's):** | |
| • For P63A Analyzers (accepts only GLI Differential Technique Sensor): | |
| Without PID option | P63AXXXXXA1N |
| With PID option | P63AXXXXXB1N |
| • For P63B Analyzers (accepts only Conventional Combination Electrode or Electrode Pair): | |
| Without PID option | P63BXXXXXA1N |
| With PID option | P63BXXXXXB1N |