GroLine

HI981420

GROLINE MONITOR

Measure
7.11 pH
1200 PPM
69.9 °F

GroLine Monitor

HANNA®
instruments

Dear Customer,

Thank you for choosing a Hanna Instruments product.

Please read this instruction manual carefully before using the instrument.

This manual will provide you with the necessary information for correct use of the instrument, as well as a precise idea of its versatility.

If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com or view our worldwide contact list at www.hannainst.com.

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1. PRELIMINARY EXAMINATION

This product is intended to monitor pH and conductivity levels in nutrient water. Remove the monitor and accessories from the packaging and verify that no damage has occurred during shipping. Remove the protective film from monitor. Contact your local Hanna Instruments Office if items are missing or damaged.

Each monitor is supplied with:

• HI1285-8 pH/EC/TDS probe with built-in temperature sensor, DIN connector and 2m (6.6') cable
• HI50036-0 Quick Calibration solution sachets (2)
• HI700661P Electrode cleaning solution sachets for agriculture (2)
• 12VDC adapter
• Instruction manual
• Monitor Quality Certificate
• Probe Quality Certificate

Note: Save all packing material until you are sure that the monitor works correctly. Any defective item must be returned in its original packing.

2. SAFETY MEASURES

Before using this product, make sure that it is entirely suitable for your specific application and for the environment in which it is used.

Operation of this instrument may cause interference to other electronic equipment, requiring the operator to take steps to correct interference. Any variation introduced by the user to the supplied equipment may degrade the monitor's EMC performance.

To avoid damage or burns, do not put the instrument in microwave ovens.
Do not use or store the monitor in hazardous environments.

3. SPECIFICATIONS

pH Specifications

Range	0.00 to 14.00 pH, 0.0 to 14.0 pH
Resolution	0.01 pH, 0.1 pH
Accuracy (@25 ºC/77 ºF)	±0.05 pH, ±0.1 pH
Calibration	one or two-point calibration (using pH 4.01,7.01, 10.01 buffers) using auto buffer recognition. one-point calibration using quick calibration solution
Temperature Compensation	Automatic: 0.0 to 60.0 ºC; 32.0 to 140.0 °F

EC Specifications

Range	0.00 to 10.00 mS/cm
Resolution	0.01 mS/cm
Accuracy (@25 ºC/77 ºF)	±0.1mS/cm (0.00 to 5.00mS/cm) ±0.2mS/cm (5.00 to 10.00mS/cm)
Calibration	one-point at 1.41 mS/cm or 5.00 mS/cm using auto standard recognition. one-point calibration using quick calibration solution
Temperature Compensation (not user selectable)	automatic, with $\beta = 1.9\%/°C$

TDS Specifications

Range	0 to 5000 ppm (0.5 TDS Factor)* 0 to 7000 ppm (0.7 TDS Factor)*
Resolution	10 ppm
Accuracy (@25 ºC/77 ºF)	$\pm2\%$FS
Calibration	through EC calibration
TDS Factor	0.5(500 ppm) or 0.7(700 ppm)

Note: 1000 μS/cm = 500 ppm with 0.5 TDS Factor
= 700 ppm with 0.7 TDS Factor

Temperature Specifications

Range	0.0 to 60.0 °C / 32.0 to 140.0 °F
Resolution	0.1 °C / 0.1 °F
Accuracy	±0.5 °C / ±1 °F

Additional Specifications

Probe	HI1285-8 pH/EC/TDS/temperature polypropylene body, pre-amplified multiparameter probe with internal temperature sensor DIN connector and 2 m (6.6') cable
	Max Pressure: 0.2 bar
	pH range: 0 to 13 pH
	IP68 (continous immersion up to 2 meters)
Automatic Logging	Measurements (pH, EC, TDS, Temperature) min/max/average/status logged continuously at 15 minutes interval
	Recall graphic modes
	Export on USB-C flash drive or PC
	Log files in CSV format
	30 days stored data at 15 minutes interval
Display	128 x 64 pixel B/W LCD with green backlight
	Automatic backlight dimming using ambient light sensor
GLP	Good Laboratory Practice with last 5 pH and EC calibration history.
Monitor Waterproof Protection	IP65 (dust and low pressure water jets)
Alarms	High and Low with enable/disable option for all parameters.

Additional Specifications

USB-C (Host/Device)	Export logged data on USB flash drive / PC
Power Supply	12VDC adapter (included)
Environment	0 to 50 °C (32 to 122 °F), RH max 95% non-condensing
Monitor Dimensions	125 x 185 x 38 mm (4.92 x 7.28 x 1.49")
Monitor Weight	333g (11.7oz.)
Probe Dimensions	187 x 25 x 25mm (7.36 x 0.98 x 0.98")
Probe Weight	191g (7.7oz.)
Ordering Information	HI981420 is supplied with: HI1285-8 multiparameter probe, HI50036-0 Quick Cal buffer solution sachet (2), HI700661 pH electrode cleaning solution sachet for agriculture (2), DC power adapter (1), and instruction manual
Warranty	2 years (probe 6 months)

4. DESCRIPTION

4.1. SIGNIFICANCE OF USE

pH in agriculture

pH affects the ability of plant roots to absorb nutrients. Calcium, phosphorus, potassium and magnesium are likely to be unavailable to plants in acidic soils. Plants have difficulty absorbing copper, zinc, boron, manganese and iron in basic soils. By managing pH, you can create an ideal environment for plants and often discourage plant pests at the same time.

pH is measured on a scale of 0-14. A pH reading below 7 is considered acidic, while a pH reading above 7 is basic. A pH reading of 7 is neutral, and is ideal for many plants and spray materials. The pH scale is logarithmic, which means that a pH reading of 6 is 10 times more acidic than a reading of 7.

You can measure the pH of your spray tank water, or your irrigation/fertigation water.
If spray tank water is too acidic (low pH) or too basic (high pH), the pesticides mixed in can be deactivated and may even burn the plants.

The pH of water applied to the plants should match desired soil pH. Otherwise it will gradually change the soil pH. Acidic fertilizers can be used to lower pH. Limestone is often used to raise pH. The type of limestone applied and your soil type can make a difference in how quickly and how much the pH will change. Most of the nitrogen and phosphorus fertilizers used today are acid forming. For example, about 1.5 pounds of lime is required to neutralize the effect of applying 1 pound of anhydrous ammonia to the soil.

Some irrigation water contains substantial quantities of calcium and magnesium bicarbonates (lime) which help neutralize the acidifying effects. Thus, soils (without free lime) under production become increasingly acidic unless lime is artificially applied or is present in the irrigation water. This means farmers need to frequently check soil pH to determine whether they are maintaining a proper soil acidity level.

EC in agriculture

EC stands for electrolytic conductivity, or the ability of a solution to conduct an electric current. Current travels efficiently through water with high levels of salt present (high EC), and less so through pure water (low EC). EC indicates how much dissolved salt is in a given sample. That's why EC is also referred to as TDS (total dissolved solids). All nutrients are salts, so EC is a measure of your total nutrients. Knowing your EC levels will help in plant production and monitoring of inputs. Monitoring the EC of aqueous solutions is fairly simple.

You calibrate the probe in a known standard, then submerse the sensor into the liquid. To use EC to check fertilizer levels, take an EC reading of a precise mixture of your fertilizer and irrigation water in the desired concentration. You can check your fertigation water at any point along the system. Its EC should match your sample. If it doesn't, check the injectors, valves and nozzles in the system for blockage or other problems.

Always check the EC of your water first, and subtract that number from the EC reading of your solution to determine your fertilizer concentration.

Another way to determine the output of your fertilizer injector is by measuring the electrical conductivity (EC) of the dilute fertilizer solution. You can get a good estimate of the fertilizer concentration by measuring the EC of the solution by using a EC meter.

Be sure to calibrate your monitor before use and be sure to subtract the EC of your clear water from the fertilizer reading. Compare the corrected value for the EC of your fertilizer solution to that listed on the fertilizer bag for the ppm N you intend to be apply.

During the crop cycle, especially for short-term crops like bedding plants, you should monitor the EC of your fertilizer solution to check that the injector is working properly. The fertilizer label may have the EC of several concentrations of the diluted fertilizer. For example, the EC of 100 ppm N, is 0.65 mS/cm.

4.2. GENERAL DESCRIPTION

GroLine Monitor is designed to offer you the combination of pH, conductivity, (or total dissolved solids), with temperature measurements. All operations and settings, including calibration buffers and temperature scale selection, are included in easy to use monitor setup.

The supplied HI1285-8 multiparameter probe measures pH, EC/TDS, and temperature in one convenient, rugged probe. A solid-state preamplifier is integrated into the probe to protect the pH measurement from transient electrical noise. Sources of electrical noise include ballasts used in lighting and pumps to circulate water and nutrient solutions. If pH reading in pH 7 buffer is around 4, the probe is broken.

Measurements are automatically logged in the internal memory of the GroLine Monitor every 15 minutes and can be viewed using the plot/record log feature or exported to a Flashdrive or by connecting to PC.

The main operating modes of this monitor are measurement, setup and logging. Follow this general outline of steps to get you started. The following topics are expanded in the sections of this manual.

Other features:

- Can be integrated into a fertilizer system
- pH/EC/TDS probe with built-in temperature sensor
- As a failsafe feature if the pH bulb breaks the pH will be around 4
- Multiple viewing options for on-screen data
- Quick calibration using Quick Cal solution simultaneously for pH and EC
- Calibration timeout reminder from 1-30 days for pH and EC
- Visual plot screens for real-time data and log history
- 24 hour summary screens (plot and details)
- Alarms feature for all parameters
- Automatic Continuous Logs, 15 minute intervals, 30 day storage
- Logged Data can be stored and later exported to a USB C drive or transferred to a PC using the USB C connection
- GLP feature calibration data for the pH and EC (up to 5 calibrations)
- Dedicated Help with contextual message
- Setup, Calibration and Operating parameters are stored in nonvolatile memory. All settings are retained if power is lost.

4.3. PRODUCT DIAGRAM

FRONT VIEW
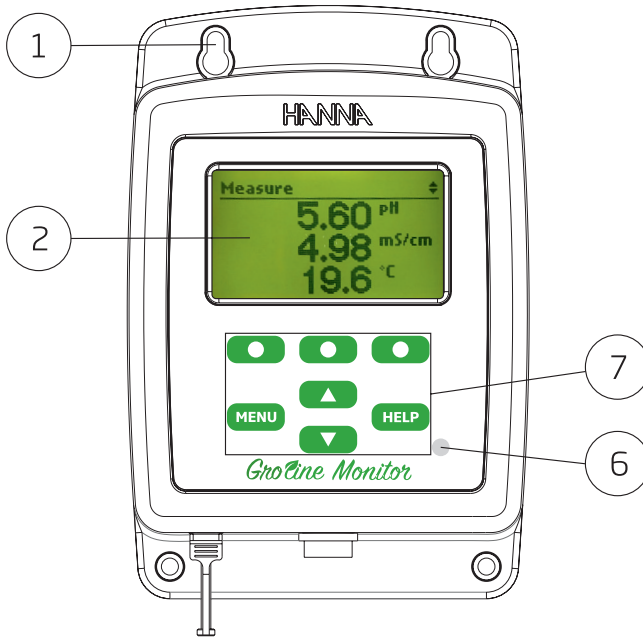
BOTTOM VIEW
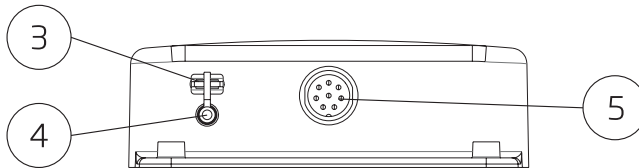
1. Mounting holes
2. Liquid Crystal Display (LCD)
3. USB-C port
4. Power cable
5. DIN Probe Connector
6. Ambient light sensor
7. Keypad Area

BACK VIEW

4.4. KEYPAD DESCRIPTION

MENU Access to Quick Calibration, History, pH/EC/Temperature options and General setup.

▲ In menu mode scroll the menu items /adjust the settings.
▼ In measurement mode changes the screen: three parameter screen (pH, EC and Temperature), single parameter screen and plot display.

HELP Enter/Exit Help Menu.

● Virtual Function Keys - Contextual functionality.

5. GENERAL OPERATION
5.1.START UP MONITOR
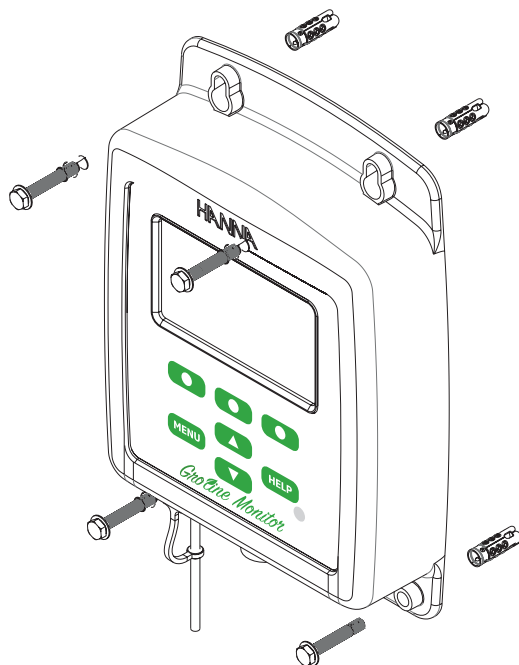
This is a general outline of the steps required to perform accurate measurements:

1. Mount the monitor on a stable support/wall.
2. Connect the HI1285-8 probe to the monitor.
3. Connect the power adapter to the monitor and power source.
4. Set up the monitor. See the "Monitor Menu" section for details.
5. Calibrate the probe.

Mounting the Monitor

The HI981420 is supplied with mounting holes in the enclosure. It should be wall mounted at eye-level on a vibration-free surface utilizing all the mounting holes. Consider power source, tank location (with regard to sensor cable length) and operating temperature (50 °C/122 °F max) when considering installation location.

The GroLine Monitor and probe can be used for fertilizer tank monitoring. The system continuously measures the EC and pH of the tank.

The probe (HI1285-8) should be placed in location representing the bulk properties of the tank.

5.2. PROBE CONNECTION

With the monitor turned off, connect the HI1285-8 probe to the DIN socket on the bottom of the monitor by aligning the pins and pushing in the plug. Tighten the nut to ensure a good connection. Remove the protective cap from the probe before taking any measurements.

DO NOT BE ALARMED IF ANY SALT DEPOSITS ARE PRESENT.

This is normal with electrodes and they will disappear when rinsed with water.

PROBE DESCRIPTION

2 m

1. DIN Connector
2. Polypropylene Body
3. pH Sensor
4. EC Sensor
5. Wick Reference Junction
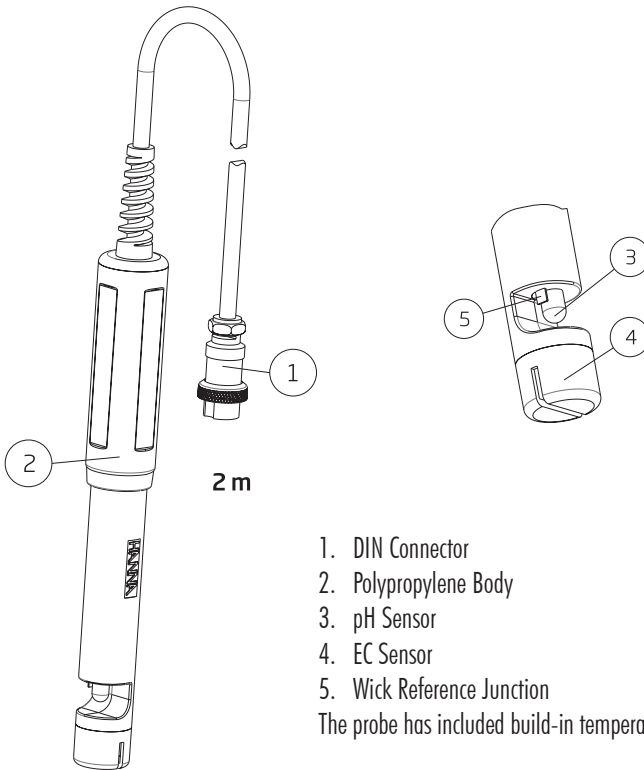
The probe has included build-in temperature sensor.

5.3. ELECTRODE CONDITIONING AND MAINTENANCE

During transport tiny bubbles of air may have formed inside the pH sensor bulb. The electrode cannot function properly under these conditions. These bubbles can be removed by "shaking down" the electrode as you would do with a glass thermometer. If the pH bulb and/or junction are dry, soak the probe in HI70300 Storage Solution for at least one hour.

To ensure a quick pH response, the glass bulb and the junction should be kept moist and not allowed to dry out. Install the probe so it is constantly immersed in the sample.
When not in use, keep the glass moist by moistening the small sponge with of HI70300 Storage Solution or, in its absence, HI7082 KCl 3.5M and replace the protective cap.

IMPORTANT: Rinse the entire probe with tap water and shake excess water from probe before calibrating or using. The Storage solution is extremely conductive and will contaminate standards if not removed thoroughly from the probe.

pH bulb cleaning and inspection

1. On a weekly basics, rinse the probe with tap water as preventative maintenance. Inspect probe to ensure solids have not caked around the bulb. Bi-monthly, a more thorough cleaning is advised. Clean the entire HI1285-8 probe in HI700661 Electrode Cleaning Solution for Agriculture.

2. Open the HI700661 sachet. Place opened sachet in a beaker to prevent tipping. Place the probe in the sachet and stir the solution gently. Allow the probe to soak in the sachet 5 to 15 minutes. Rinse the entire probe thoroughly with water.

3. Shake excess water from the probe.

4. Soak the probe for 1 hour in HI70300 storage solution. Rinse the entire probe thoroughly with water after this procedure, as it is extremely conductive.

5. Shake excess water from the probe.

6. Recalibrate: Place the probe tip into the pH calibration standard. Wait for the reading to stabilize as the probe equilibrates to the temperature of the solution.

7. If the probe response is slow or does not calibrate correctly, repeat the cleaning procedure.

EC Cell cleaning and Inspection

1. On a weekly basics, rinse the probe with tap water as preventative maintenance. Monthly, a more thorough cleaning is advised. Clean the EC sensor (slot in bottom of probe) with a non-abrasive detergent, or see #4 below.

2. Inspect the slot in the bottom of the HI1285-8. It should be free of foreign material.

3. If any solids are detected in the slot, use a soft material such us cardboard, to dislodge the material. Pass the material through the slot repeatedly.

4. A salt or mineral coating can be removed by rinsing it with a steam of running tap water and jetting the steam through the opening. During pH cleaning, the EC probe will also be exposed to pH cleaning solutions. This solution will also help dissolve coating on the EC sensors. Rinse the slot thoroughly with water after this procedure, as it is extremely conductive.

5. Shake excess water from the probe.

6. Recalibrate: Place the probe tip into the EC calibration standard. Wait for the reading to stabilize as the probe equilibrates to the temperature of the solution. Press GLP and note the Cell coefficient.

5.4. MONITOR MENU

5.4.1. MENU OPTIONS

Press **MENU** key to display a list of configurable options.
Highlight desired option using ▲ ▼ .

Quick Calibration

Press **Start** to enter the **Quick Calibration** screen.
pH and Conductivity are displayed and the quick
calibration procedure is initiated (see Operational Guide).

History

When **History** is selected, two options are available: **View** and
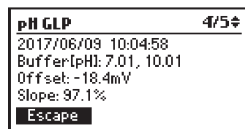**Options**. Using these, the user can view data, plot or can export
data (see Data Storage).

pH

Three **pH** options are available: **CAL**, **Setup**, and **GLP**.

1. Press **CAL** to start a standard pH calibration procedure
(see pH calibration).

2. Press **Setup** to enter in **Menu/pH** options.
A **High** and/or **Low pH Alarm** can be selected. A calibration
timeout feature can be configured. Also the
pH resolution can be changed from 0.01 to 0.1 pH.
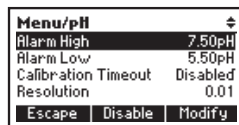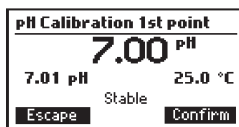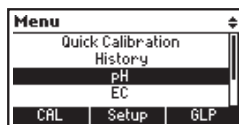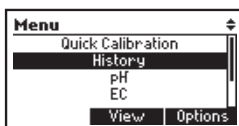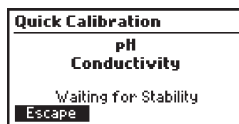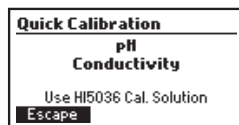
3. Press **GLP** to display the last pH calibration data and up to 4 previous ones. Use ▲ ▼ to display previous Calibration data. The newest data is in position 1.

```
pH GLP                    4/5♦
2017/06/09  10:04:58
Buffer[pH]: 7.01, 10.01
Offset: -18.4mV
Slope: 97.1%
  Escape
```

EC

Three options are available after pressing **EC**: **CAL**, **Setup** and **GLP**.

```
Menu                       ♦
         History
           pH
           EC
       Temperature
  CAL    |  Setup  |  GLP
```
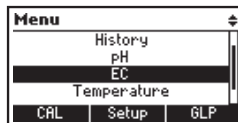
1. Press **CAL** to initiate a EC calibration with a conductivity standard (see EC calibration).

```
EC Calibration
            5.01    mS/cm
5.00 mS/cm          25.0 °C
       Waiting for Stability
  Escape
```

2. Press **Setup** to enter in a menu with parameters (see EC Setup) used to configure conductivity measurements. These include alarms, a calibration timeout feature, mode and TDS factor.

```
Menu/EC                    ♦
Alarm High          Disabled
Alarm Low            1.00mS
Calibration Timeout Disabled
Mode                    EC
  Escape  |  Enable
```
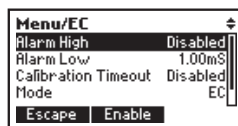
3. Press **GLP** to display the last EC calibration data and up to 4 previous calibration. Use ▲ ▼ arrow to display previous calibration data. The newest data is in position 1.

```
EC GLP                    1/2♦
2017/03/02  04:10:01
Standard[mS/cm]: 5.00
Cell coefficient: 107.3%

  Escape
```
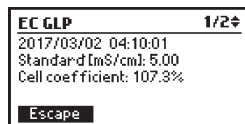
Temperature

Highlight **Temperature** and press **Setup** to display temperature options menu (see Temperature Setup).

```
Menu                       ♦
           pH
           EC
       Temperature
         General
         Setup
```
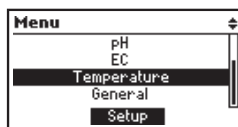
General

Highlight General and press **Setup** to enter General options menu (see General Setup).
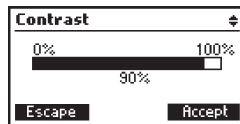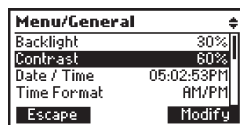
```
Menu                       ♦
           pH
           EC
       Temperature
         General
         Setup
```
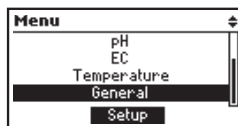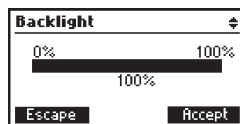
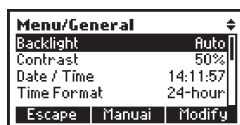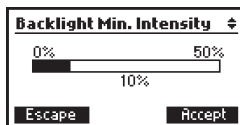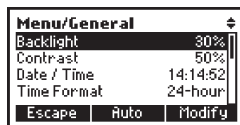### 5.4.2. GENERAL SETUP

Backlight

Default state is **Auto** (backlight level is automatically adjusted to dim in low light conditions). This function works together with the integrated ambient sensor on the keypad to automatically adjust the backlight of the LCD. Press **Auto** and then **Modify** to adjust the minimum backlight intensity level. If the minimum is changed then when the room is dark, the backlight remains on at a lower brightness.
The range is 0-50%.

```
Menu/General              ↕
Backlight              30%
Contrast               50%
Date / Time        14:14:52
Time Format        24-hour
  Escape  |  Auto  |  Modify
```

```
Backlight Min. Intensity  ↕

0%                     50%
▮▮▮▮▮
          10%

  Escape              Accept
```

Press **Manual** and then **Modify** to change backlight value from 0 to 100% using ▲ ▼ arrows.

```
Menu/General              ↕
Backlight             Auto
Contrast               50%
Date / Time        14:11:57
Time Format        24-hour
  Escape  | Manual |  Modify
```

Press the **Accept** key to confirm or **Escape** to return to the general menu without saving the new value.

```
Backlight                 ↕

0%                    100%
▮▮▮▮▮▮▮▮▮▮
          100%

  Escape              Accept
```

Contrast

Press **Modify** to change contrast value from 0 to 100% using ▲ ▼ arrows. Press the **Accept** key to confirm or **Escape** to return to the general menu without saving the new value.

```
Menu/General              ↕
Backlight              30%
Contrast               60%
Date / Time      05:02:53PM
Time Format         AM/PM
  Escape            |  Modify
```

```
Contrast                  ↕

0%                    100%
▮▮▮▮▮▮▮▮▮
          90%

  Escape              Accept
```

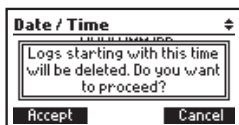### Date / Time

Press the **Modify** key to change the date/time.
Press the functional ► key to highlight the value to be
modified (year, month, day, hour, minute or second).
Use the ▲ ▼ keys to changes the value.
Press the **Accept** key to confirm changes or **Escape** to return to
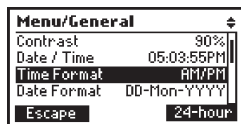general menu without saving the new date or time.

```
Menu/General          ↕
Backlight          Auto
Contrast            50%
Date / Time    12:18:11
Time Format    24-hour
 Escape           Modify
```

```
Date / Time           ↕
        DD-Mon-YYYY
   ↕   20-Apr-2017
        05:03:21PM
 Escape    →     Accept
```
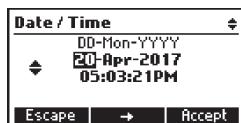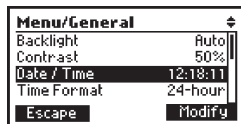
*Note: If time is changed to a value before the last log, a time conflict warning will be
displayed and logs will be erased.*

```
Date / Time           ↕
┌──────────────────────┐
│Logs starting with this time│
│will be deleted. Do you want│
│       to proceed?    │
└──────────────────────┘
 Accept           Cancel
```

Time Format

Option: AM/PM or 24-hour
Press the functional key to select the desired time format.

```
Menu/General          ↕
Contrast            90%
Date / Time    05:03:55PM
Time Format      AM/PM
Date Format  DD-Mon-YYYY
 Escape          24-hour
```

Date Format

Press the **Modify** key to change the Date Format.
Use the ▲ ▼ keys to select the desired format.
Press the **Accept** key to confirm or **Escape** to return to
general menu without saving the new format.

```
Menu/General          ↕
Date / Time    17:04:12
Time Format    24-hour
Date Format  DD-Mon-YYYY
Decimal Separator     .
 Escape           Modify
```

```
Date Format           ↕
YYYY-MM-DD
Mon DD, YYYY
DD-Mon-YYYY
YYYY-Mon-DD
 Escape           Accept
```
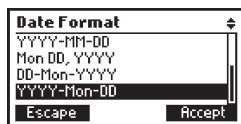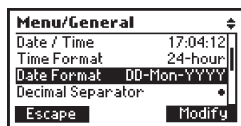
Decimal Separator

Option: Comma (,) or Period (.)

Press the functional key to select the desired decimal separator or press **Escape** to return to general menu without saving the new format. The decimal separator is used on the measurement screen and CSV files.

```
Menu/General          ↕
Time Format      24-hour
Date Format   DD/MM/YYYY
Decimal Separator       .
Language        English
 Escape             ,
```
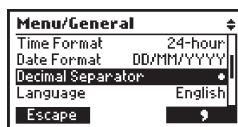
Language

Press the Modify key to change the Language. Use the ▲ ▼ keys to select the desired language. Press the **Accept** key to confirm or **Escape** to return to general menu. Press the functional key to select one of the languages installed.

```
Menu/General          ↕
Decimal Separator
Language        English
Beep On              □
Instrument ID     0002
 Escape         Modify
```
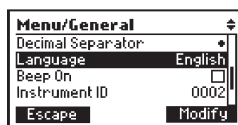
Beep On

Option: Enable or Disable

When enabled, a short beep is heard every time a key is pressed. A long beep alert sounds when the pressed key is not active or an error is detected. Press the functional key to enable/disable the beeper.

Press **Escape** to return to the general menu.

```
Menu/General          ↕
Decimal Separator       ,
Language        English
Beep On              □
Instrument ID     0000
 Escape         Enable
```
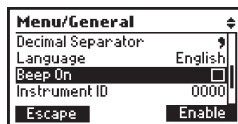
Instrument ID

Option: 0 to 9999

This option is used to set the instrument's ID (identification) Press the **Modify** key to access the instrument ID screen. Press the ▲▼ keys in order to set the desired value. Press the **Accept** key to confirm the value or **Escape** to return to the general menu without saving the new value.

```
Menu/General          ↕
Language        English
Beep On              ☑
Instrument ID     0000
Meter Information
 Escape         Modify
```

```
Instrument ID
      ↕0002

 Escape         Accept
```
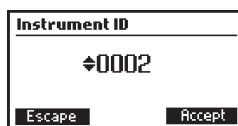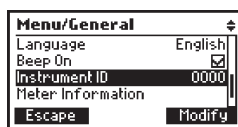
Note: This ID will be used in data files exported from the monitor.

Meter Information

Press the **Select** key to view the model, serial number, firmware version and selected language. Press **Escape** to return to the general menu.
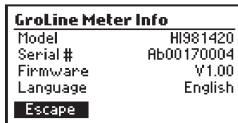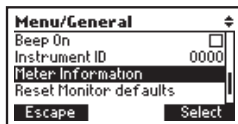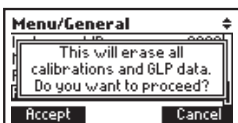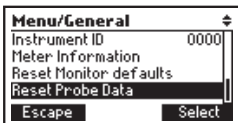
Reset Monitor defaults

Press the **Select** key to activate Reset Monitor defaults settings. Press **Accept** to initiate procedure or **Cancel** to return to the general menu without reset.
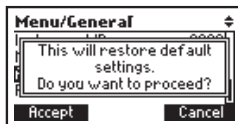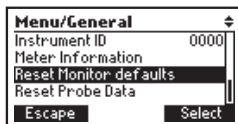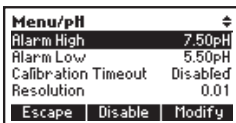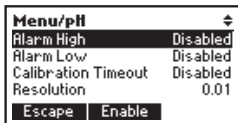
Reset Probe Data

Use this feature when replacing the probe. This function erases all of the previous probe's GLP history and calibration data.

5.4.3. pH SETUP

Alarm High and **Alarm Low** in the pH menu have two options **Enable or Disable**:

When alarms are set to **Enable** press **Modify** to adjust the pH alarm value.

Set the Alarm Low and Alarm High as boundaries of acceptable variation for pH. If these boundaries are exceeded, the display flashes as a visual indication that the desired solution pH has changed.

Menu/pH	≑
Alarm High	7.50pH
Alarm Low	5.50pH
Calibration Timeout	Disabled
Resolution	0.01
Escape	Disable	Modify

Menu/pH	≑
Alarm High	Disabled
Alarm Low	1.93pH
Calibration Timeout	Disabled
Resolution	0.01
Escape	Disable	Modify

Use ▲▼ keys to set pH alarm value.

Press the **Accept** key to confirm the value or **Escape** to return to the general menu without saving the new value.

Alarm Low   ≑1.61 pH | Escape | Accept |

Alarm High   ≑9.59 pH | Escape | Accept |

Note: The high alarm must be set to a value greater than the low alarm.

Calibration Timeout

Calibration Timeout feature is used to set a calibration or service reminder. This can be configured from 1-30 days or disabled. A message will be displayed with the measurement indicating it's time to service the probe.

Menu/pH	≑
Alarm High	Disabled
Alarm Low	Disabled
Calibration Timeout	7 days
Resolution	0.01
Escape	Disable	Modify

Calibration Timeout   ≑30 days | Escape | Accept |

pH Clean/Cal. Due ≑
7.08 pH
4.62 mS/cm
25.0 °C

Resolution

Press functional key to choose desired pH resolution (0.01 or 0.1).
Press **Escape** to return to the general menu.

Menu/pH	≑
Alarm High	Disabled
Alarm Low	Disabled
Calibration Timeout	Disabled
Resolution	0.01
Escape	0.1

5.4.4. EC SETUP

Note: Prior to setting EC alarm limits, select desired Mode of operation, TDS or EC.

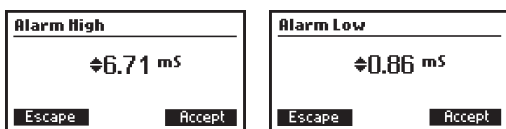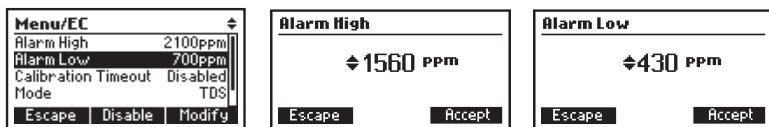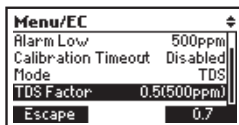**Alarm High** and **Alarm Low** in the EC menu have two options, **Enable or Disable**:

Menu/EC	⬍
Alarm High	Disabled
Alarm Low	Disabled
Calibration Timeout	Disabled
Mode	EC
Escape	Enable

Menu/EC	⬍
Alarm High	3.00mS
Alarm Low	1.00mS
Calibration Timeout	Disabled
Mode	EC
Escape	Disable	Modify
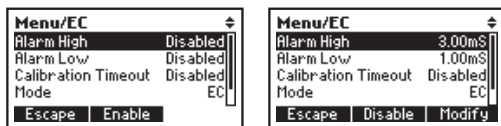
When alarms are set to **Enable** press **Modify** to adjust EC alarm value.

Menu/EC	⬍
Alarm High	Disabled
Alarm Low	1.00mS
Calibration Timeout	Disabled
Mode	EC
Escape	Enable

Menu/EC	⬍
Alarm High	Disabled
Alarm Low	1.00mS
Calibration Timeout	Disabled
Mode	EC
Escape	Disable	Modify

Menu/EC	⬍
Alarm High	3.00mS
Alarm Low	1.00mS
Calibration Timeout	Disabled
Mode	EC
Escape	Disable	Modify
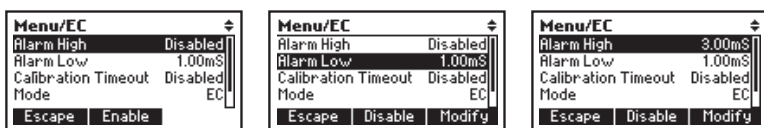
Use ▲▼ keys to set EC alarm value.

Press the **Accept** key to confirm the value or **Escape** to return to the general menu without saving the new value.

Note: The high alarm must be set to a value greater than the low alarm.

Alarm High
⬍6.71 mS
Escape	Accept

Alarm Low
⬍0.86 mS
Escape	Accept

When selected measurement mode is TDS, alarms values will be displayed in ppm units.

Menu/EC	⬍
Alarm High	2100ppm
Alarm Low	700ppm
Calibration Timeout	Disabled
Mode	TDS
Escape	Disable	Modify

Alarm High
⬍1560 PPm
Escape	Accept

Alarm Low
⬍430 PPm
Escape	Accept

Calibration Timeout

Calibration timeout feature is used to set a scheduled reminder for calibration or service. It can be configured 1-30 days or disabled (no message). A reminder message will be displayed with the measurement indicating it's time to service the probe.
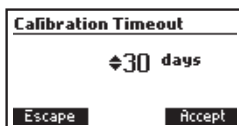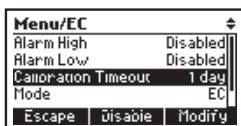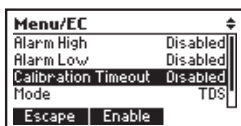
Mode

Press functional key to change EC with TDS mode.
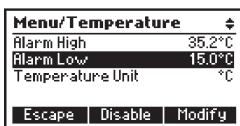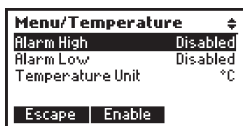Press **Escape** to return to the general menu.
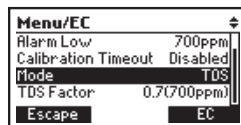
TDS Factor

Press functional key to choose desired TDS factor: 0.5 (500ppm)
 or 0.7 (700ppm). Press **Escape** to return to the general menu.

5.4.5. TEMPERATURE SETUP

Alarm High and **Alarm Low** in the Temperature menu have two options **Enable** or **Disable**:

When alarms are set to **Enable**, press **Modify** to adjust the Temperature alarm value.
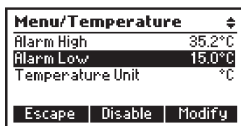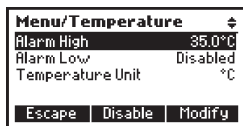
Use ▲▼keys to set Temperature alarm value.

Note: The high alarm must be set to a value greater than the low alarm value.

Press the **Accept** key to confirm the value or **Escape** to return to the general menu without saving the new value.

Alarm High	Alarm Low
‡35.3 ℃	‡13.3 ℃
Escape Accept	Escape Accept
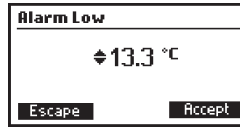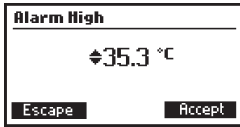
When selected temperature unit is °F, alarm values will be displayed in same unit.

Alarm Low	Alarm High
‡55.9 °F	‡95.4 °F
Escape Accept	Escape Accept
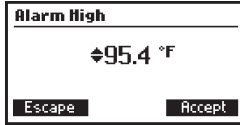
Temperature Unit

Option: °C or °F
Press the functional key to select the desired temperature unit
Celsius or Fahrenheit ;
Press **Escape** to return to the general menu.

Menu/Temperature	‡
Alarm High	Disabled
Alarm Low	Disabled
Temperature Unit	°F
Escape	°C
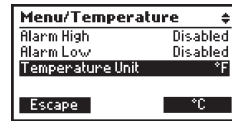
5.4.6. ALARMS

The alarm feature provides visual indication that a parameter has diverged from the preferred measurement readings.

Active Alarms: When an alarm is activated, the display will flash providing a visual indication from a distance that an alarm set-point has been triggered. If the measurement returns to the configured limits, the flashing will stop. In addition to the LCD flashing, the message bar will display alarm information and the affected parameter will also blink; pH, EC (TDS) or Temperature.

The table below tabulates the configurable alarm parameters and the Factory set defaults.

Parameter	Setup options	Default
pH	Enable Disable	Disable
	Alarm High	7.50 pH
	Alarm Low	5.50 pH
EC/TDS	Enable Disable	Disable
	Alarm High	3.00mS/cm (2100ppm for 0.7 CF)
	Alarm Low	1.00mS/cm (700ppm for 0.7 CF)
Temperature	Enable Disable	Disable
	Alarm High	35 °C (95 °F)
	Alarm Low	15 °C (59 °F)

6. OPERATIONAL GUIDE

6.1. PROBE CALIBRATION

The probe should be calibrated:

- Before installing the probe in the system.
- After probe replacement.
- Daily when greatest accuracy is required.
- Every 2 weeks along with routine maintenance.

Every time you calibrate the monitor use fresh buffer standards and perform electrode maintenance as required. It is advised to choose calibration buffers that bracket the sample pH.

Two calibration modes are available for pH and EC:

- Quick calibration: easily accessible from MENU, allows simultaneous single point calibrations for pH and EC using quick calibration solution.

- Standard calibration: accessible from pH or EC Menu; allows pH calibration with one or two buffers (from 3 eligible pH values: 4.01; 7.01; 10.01) and a single EC calibration point (with standards 1.41 mS/cm or 5.00 mS/cm).

Preparation

Pour small quantities of the buffer solutions into clean beakers. If possible, use plastic beakers to minimize any EMC interferences. For accurate calibration and to minimize cross-contamination, use two beakers for each buffer solution: one for rinsing the probe and one for calibration.

6.1.1 QUICK CALIBRATION

For quick calibration use HI5036 quick calibration solution (HI50036P sachets or HI5036-050 500 mL bottle).
Submerse the probe a minimum of 4 cm (1½") into the solution and stir gently.

Select **Quick Calibration** from **MENU**.

Press **Start** and monitor enters in **Quick Calibration** screen.
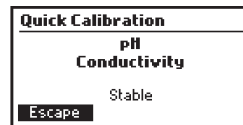
When the standard value is recognized and stability is reached the monitor automatically accepts the calibration.
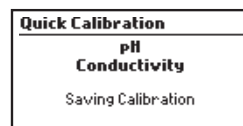
After saving the calibration the monitor returns to **MENU**.
Pressing **Escape** can exit the Quick calibration without saving data.

Quick Calibration
pH
Conductivity

Escaping
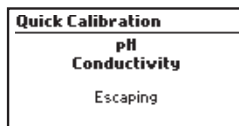
If the standard is not recognized or the offset is out of
accepted range "Wrong Standard" is displayed. Refresh
the calibration solution, clean and rinse the probe or press
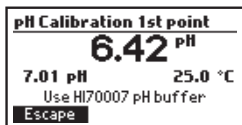**Escape** to exit calibration.

Quick Calibration
pH
Conductivity

Wrong Standard
Escape
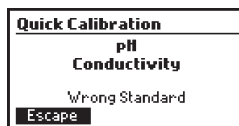
6.1.2. pH CALIBRATION

If you are measuring in the acidic range, use pH 7.01 as the first buffer and pH 4.01 as the second
buffer. If you are measuring in the alkaline range, use pH 7.01 as the first buffer and pH 10.01 as
the second buffer.

Select pH from **MENU** and press **CAL** to enter the pH calibration function.
While in pH Calibration Mode, the display will show the current pH reading, the current temperature
reading and the current buffer:

pH Calibration 1st point	pH Calibration 1st point	pH Calibration 1st point
6.42 pH	6.86 pH	7.00 pH
7.01 pH 25.0 °C	7.01 pH 25.0 °C	7.01 pH 25.0 °C
Use HI70007 pH buffer	Waiting for Stability	Waiting for Stability
Escape	Escape Clear	Escape

The following functions are available in pH Calibration Mode:

• **Clear**: Press to clear the last calibration from the monitor. After confirming, the "Calibration
cleared" message is displayed.

Note: The GLP history will show "Calibration cleared" message with the date.

• **Confirm**: Press to accept the current calibration point. Only available if the measurement is
stable and within the limits for the selected buffer.

• **Escape:** Press to exit calibration and return to **MENU**.

Procedure

Calibration can be performed using one or two calibration buffers. For more accurate
measurements, a two-point calibration is recommended.

Submerse the probe a minimum of 4 cm ($1\frac{1}{2}$") into a buffer solution and stir gently.

Two point calibration

From the **MENU** screen with pH highlighted, press the **CAL** key to begin the calibration process.

pH Calibration 1st point	pH Calibration 1st point
6.42 pH	7.00 pH
7.01 pH 25.0 °C	7.01 pH 25.0 °C
Use HI70007 pH buffer	Waiting for Stability
Escape	Escape
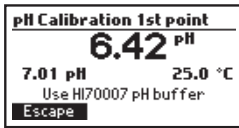
The monitor will suggest using the HI70007 pH 7.01 buffer, but it also automaticaly recognize the HI70004 pH 4.01 and HI70010 pH 10.01 buffers.
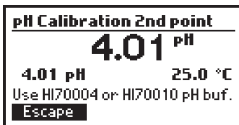
Note: For two point calibration the buffer 7.01 pH must be used for the first point.

When the reading is stable and close to the selected buffer, the **Confirm** key will become available. Press **Confirm** to accept and store the calibration point. The monitor will now prompt for the second buffer .

pH Calibration 1st point
7.00 pH
7.01 pH   25.0 °C
Stable
Escape   Confirm
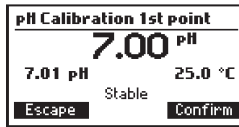
To continue calibrating with a second buffer, rinse and submerse the pH electrode 4 cm (1½") into the second buffer solution and stir gently.
Monitor will recognizes automatically second buffer 4.01 or 10.01pH.

pH Calibration 2nd point	pH Calibration 2nd point	pH Calibration 2nd point
4.01 pH	4.01 pH	10.00 pH
4.01 pH 25.0 °C	4.01 pH 25.0 °C	10.01 pH 25.0 °C
Use HI70004 or HI70010 pH buf.	Waiting for Stability	Waiting for Stability
Escape	Escape	Escape

If **Escape** is pressed during the second buffer the display will return in **MENU**. Only the first calibration point will be saved.

pH Calibration 2nd point
4.00 pH
4.01 pH   25.0 °C
Escaping
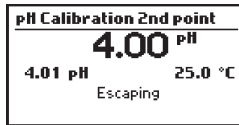
The monitor will store the two-point calibration information and returns to MENU mode.

When the reading is stable and close to the selected buffer, the **Confirm** key will become available. Press **Confirm** to accept and store the calibration point 4.01 or 10.01pH.
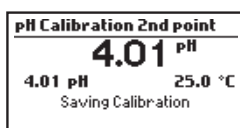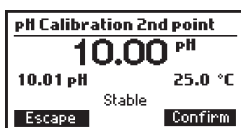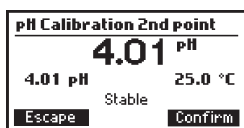
One point calibration

To perform only a one-point calibration, press **Escape** to calibrate in 7.01 pH, or will save automatically one calibration point for 4.01 and 10.01 pH. The monitor will store the calibration information and return to **MENU**.
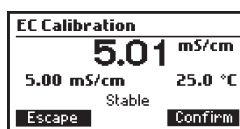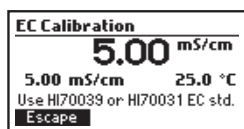
6.1.3. EC CALIBRATION

Select **EC** from **MENU** and press **CAL** to enter the EC calibration function.
The following functions are available in EC Calibration Mode:

- **Clear:** Press to clear the last calibration from the monitor. After confirming, the "Calibration cleared" message is displayed.
- **Confirm:** Press to accept the current calibration point. Only available if the measurement is stable and within the limits for the selected EC standard solution.
- **Escape:** Press to exit calibration and return to MENU.

While in **EC Calibration Mode**, the display will show the current EC reading, the current temperature reading and the current standard:

The calibration can be erased at any time by entering the calibration and pressing **Clear**. A warning message will appear and confirmation for deleting the calibration is requested. Press **Accept** to confirm or **Cancel** to exit and return in the calibration screen.

The calibration can be erased at any time by entering the calibration and pressing **Clear**. A warning message will appear and confirmation for deleting the calibration is requested. Press **Accept** to confirm or **Cancel** to exit and return in the calibration screen.
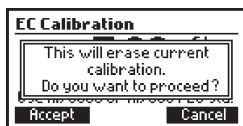
*Note: The GLP history will show "Calibration cleared"message with the date.*

Immerse the probe in 1.41 mS/cm or 5.00 mS/cm calibration solution.

From the MENU screen with **EC** highlighted, press the **CAL** key to begin the calibration process.
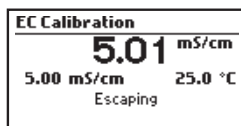EC standard value will be autorecognized by monitor.

When the reading is stable and close to the selected standard, the **Confirm** key will become available.
Press **Confirm** to accept and store the calibration point.
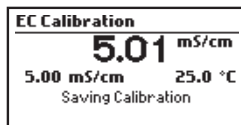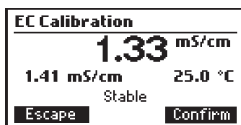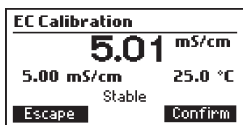
Press **Escape** to exit calibration without saving the calibration.

Calibration messages

Wrong Buffer:

If the buffer is not recognized or the offset is out of the
accepted range "Wrong Buffer" message is displayed.
Change the buffer, clean the electrode and repeat calibration.

```
pH Calibration 2nd point
         7.01 pH
4.01 pH          25.0 °C
       Wrong Buffer
Escape
```
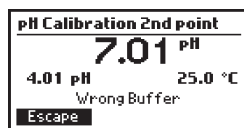
Wrong Standard:

If the EC standard is not recognized "Wrong Standard" message
is displayed.
Change the solution, clean the electrode and repeat calibration.

```
EC Calibration
         7.27 mS/cm
5.00 mS/cm       25.0 °C
       Wrong Standard
Escape
```

Wrong Temperature:

If the temperature sensor is reading an extreme value, the
Wrong Temperature message is displayed.
Replace probe.

```
pH Calibration 1st point
         7.00 pH
7.01 pH          60.0 °C
       Wrong Temperature
Escape
```

No buffer detected:

This message appears if the probe has detected no buffer.

```
pH Calibration 1st point
         14.00 pH
--- pH           25.0 °C
       No buffer detected
Escape
```
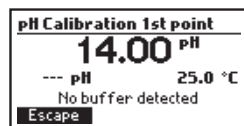
Invalid Slope:

This message appears when the calculated slope is not in the
acceptable range.

```
pH Calibration 2nd point
         3.03 pH
4.01 pH          25.0 °C
       Invalid Slope
Escape
```
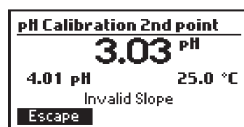
Clean Electrode:

This indicates poor pH electrode performance (offset out of
accepted window, or slope under the accepted lower limit).
Often, cleaning the probe will improve the pH electrode's
response.

```
pH Calibration 1st point
         7.21 pH
7.01 pH          25.0 °C
       Clean Electrode
Escape          Confirm
```
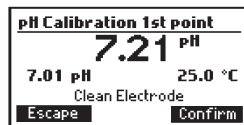
6.2. GLP INFORMATION

Good Laboratory Practice (GLP) refers to a quality control function used to ensure uniformity and consistency of sensor calibrations and measurements. Select **pH** or **EC** from MENU and press **GLP** to review the calibration information. The monitor can store calibration info from the last 5 pH and EC calibrations. The newest calibration is positioned at #1. Pressing ▲▼ keys in GLP can view the informations from last five calibrations.

GLP pH

Highlight **pH** from **MENU** and press **GLP**. Monitor will display date/time, buffer used, slope and offset from last 5 calibrations.

If a single point buffer calibration was made, the previous calibration slope will be used.
If all calibrations were cleared " No user calibration" message is displayed.

GLP EC

Highlight EC from **MENU** and press **GLP**. The monitor will display date/time, standard and cell coefficient from the last 5 calibrations. The cell coefficient can be used to determine when the probe requires cleaning. If this number decreases below 75% the probe requires cleaning.

If all calibrations were cleared " No user calibration" message is displayed

6.3. MEASUREMENT MODE

HANNA instruments
HI981420 v1.00

Turn On the monitor by connecting power adapter to power cable socket. After initialization has been completed, the controller displays the measurement screen.
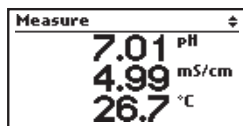
- Verify the probe is installed
- Verify the probe is calibrated
- Install probe in tank. The lower 4 cm of the probe must be submersed in the sample solution
- Upon powering monitor, the measurement screen displays all measured parameters. Using ▲▼ arrows can access 3 options of display:

All parameter screen

This screen is the default screen and displays all measured parameters.
Each time the monitor is started this screen will be displayed.
Depending on setup, monitor will display EC or TDS and temperature in ºC or ºF.

Measure ⬍	Measure ⬍	Measure ⬍
7.01 pH	7.01 pH	7.01 pH
4.99 mS/cm	2490 ppm	2500 ppm
26.7 ºC	26.8 ºC	80.1 ºF
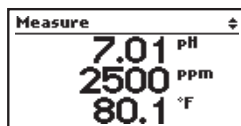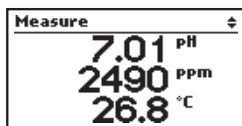
Single parameter screen

This screen permits better visualization from a distance.
In this screen the parameters (pH, EC/ TDS and temperature) are cycled automatically every 3 seconds.
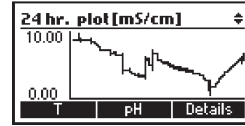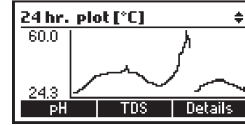
Measure ⬍	Measure ⬍	Measure ⬍
26.7 ºC	7.01 pH	4.99 mS/cm
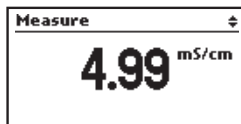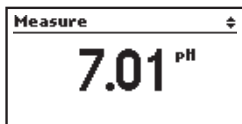
Real time plot screen

This screen is a plot representation of the last measurement of the selected parameters.

24 hr. plot [pH] ⬍
14.00
0.00
EC | T | Details
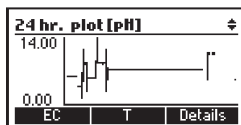
The first two functional buttons selects the parameter, while in the title bar, the current unit of the selected parameter is indicated.

Press **Details** button to access information regarding selected parameters: current reading, Max/Min reading and average.

Status Bar Messages
Whenever an event is triggered the status bar will show it in measure screen.

Possible events:
- "Logging disabled" - When Date and Time isn't set or the Real Time Clock is malfunctioning. The backlight will blink.

- "pH/EC/TDS/Temp. Out of Range" - measurements have exceeded the Monitor specifications. The backlight and the affected parameter will blink.

Note: For same parameter, alarms and other warnings will not be visible while "Out of Range" message presists. This has higher priority than alarms and warnings.

• "pH/EC/TDS/Temp. Alarm High/Low" - measurements have exceeded the specified High or Low limits. The backlight and the affected parameter will blink.

Alarm Low pH	Alarm High EC	Alarm Low Temp.
4.23 pH	7.57 pH	7.59 pH
5.00 mS/cm	5.00 mS/cm	0.00 mS/cm
25.0 °C	25.0 °C	14.0 °C

Note: For same parameter, warnings will not be visible while "Alarm High/Low" message persists. This has higher priority than warnings.

• "pH/EC/TDS Clean/Cal. Due" - last calibration exceeded the specified time interval or there is no calibration.

EC Clean/Cal. Due	pH Clean/Cal. Due
7.08 pH	7.08 pH
4.62 mS/cm	4.62 mS/cm
25.0 °C	25.0 °C

Note: To clear this message there are two ways: make a calibration or disable it from parameter setup.

7. DATA STORAGE

The GroLine Monitor logging system automatically saves measurement data. Stored data can be accessed two ways; from the measurement screen and from the History Menu.
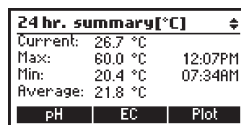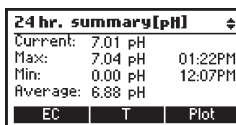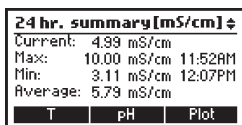
Data from last 24 hours of measurements can be accessed directly from the Measurement screen.

Using the arrows the screen will display a 24 hr. summary that includes:
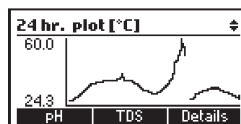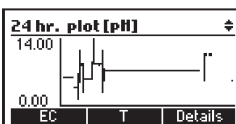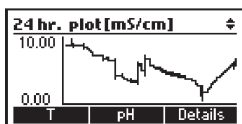
- The current value for the selected parameter
- Min/Max and Average values measured over a 15 minute
- A plot of the selected data.

7.1. 24 HR. DATA FROM MEASUREMENT SCREEN

To access the logged data press the ▲ ▼ keys from measurement to display the **24 hr. summary** screen. Press **Details** key to access **24hr. summary** and parameters key to select information for desired parameter:

24 hr. summary[mS/cm] ⬍		
Current:	4.99 mS/cm	
Max:	10.00 mS/cm	11:52AM
Min:	3.11 mS/cm	12:07PM
Average:	5.79 mS/cm	
T	pH	Plot

24 hr. summary[pH] ⬍		
Current:	7.01 pH	
Max:	7.04 pH	01:22PM
Min:	0.00 pH	12:07PM
Average:	6.88 pH	
EC	T	Plot

24 hr. summary[°C] ⬍		
Current:	26.7 °C	
Max:	60.0 °C	12:07PM
Min:	20.4 °C	07:34AM
Average:	21.8 °C	
pH	EC	Plot

Press **Plot** to display the data graphically.

24 hr. plot[mS/cm] ⬍
10.00
0.00
T pH Details

24 hr. plot[pH] ⬍
14.00
0.00
EC T Details

24 hr. plot[°C] ⬍
60.0
24.3
pH TDS Details

7.2. HISTORY

Data from the last 30 days of measurements can be viewed from History Menu.
The following presentations are possible:

- Thirty day plots for pH, EC and temperature using average values;
- Single day plots of pH, EC and temperature for the last 24 hours;
- Min/Max and Average values tabulated in 15 minutes interval for up to 30 days of data.

Note: Data is overwritten after 30 days so it should be backed up if needed.

When Date and Time isn't set or the Real Time Clock is malfunctioning "Logging disabled" appears in measure screen in the status bar and the backlight will blink.

To access, press MENU, highlight **History** and press **View**. The monitor will display a 30 day data plot. Change the parameter by pressing the second function key.
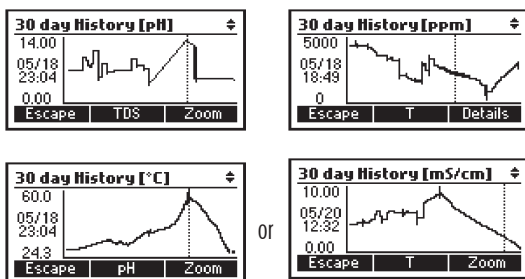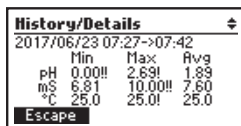

Press the ▲ ▼ keys to select day, then press Zoom to view the One day plot.
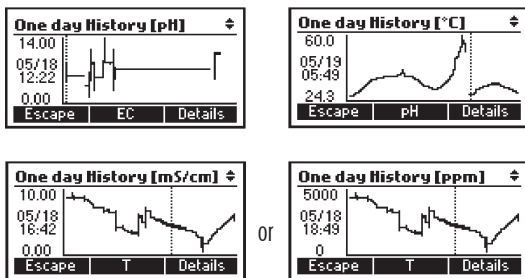
Press **Details** to view the tabulated data with date and time stamp.
Press the ▲ ▼ keys, to scroll through the daily records max/min and average readings:

Press **Escape** to return in plot mode.
Press **Escape** a second time to return to **Menu.**

Note: If "!" appears in log data (*.csv and History/Details screen), an alarm was triggered. The symbol for High/Low Alarm is added next to Max/Min column of the affected parameter.

Note: If "!!" appears in log data (*.csv and History/Details screen), the probe was used beyond monitor's specifications and the data is not considered reliable.

7.3. DATA EXPORT

There are three options, two are used to export data; the third option is used to clear the log and start a new log session.

Highlight **History** from Menu using ▲ ▼ and press **Options** to access History/ Export options.
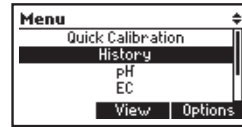
Note: Data will be exported in the EC/ TDS format the monitor is configured at the time of export. This includes temperature unit, TDS factor and mode.
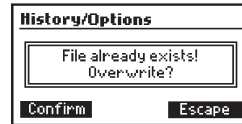
Export to flash drive
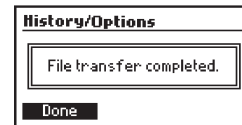
Connect USB C to the monitor.

Highlight **Export to flash drive** using ▲ ▼, then press **Select**. After connection file transfer will be started
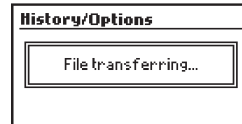
If the flash drive contains a previously saved file, it will ask about overwriting. If the monitor has an ID , the file name will reflect that identification and a letter. Exporting a second file from the same monitor will increment the letter by one. For exemple, if the ID is 123, the File names will be GLM0123 A through GIM0123 Z. If all letters are taken , an overwrite message appears.
After file transfer, the monitor displays "File transfer completed" message. Press **Done** to return to Export screen.

History/Options

No flash drive connected.

If the USB flash drive is missing or not detected, the monitor displays a warning message:

History/Options

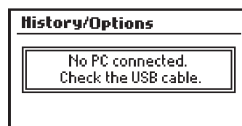File transfer timeout

Escape
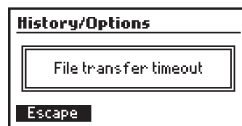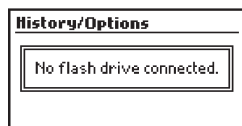
Export to PC

Highlight History from Menu and press **Options** function. Connect an USB cable between the PC and monitor. Highlight **Export to PC** using ▲ ▼, then press **Select**.

History/Options

Export to flash drive
Export to PC
Clear History

Escape | Select

After connection the file will be displayed from the GroLine Monitor. Open the file and save to PC in desired format, name and location.

History/Options

PC connected.
Use PC to transfer file.
Press 'Done' when finished.

Done
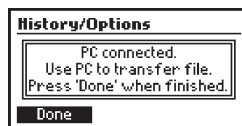
If the USB cable is missing or not detected the monitor displays a warning message:

History/Options

No PC connected.
Check the USB cable.

The transferred data is saved to the USB flash drive in a file named as "GLMxxxxy.csv", where "xxxx" represents the unit's ID and "y" represents a letter from A to Z. This file name format helps to avoid overwriting the same file. In case of all letters are used, the overwrite warning appears and the "GLMxxxA.csv" will be replaced. (See exemple in Export to Flash drive).
Logged data are formated as configured in the Decimal Separator parameter (*.csv) and can be opened with any text editor or spread sheet program.

Suggested settings for correct formating: use period field separator for Western Europe character set (ISO-88859-1). Adjust font or column width appropriately.

History/Options

Export to flash drive
Export to PC
Clear History

Escape | Select

Clear History

Highlight **History** from Menu and press **Options**. Highlight **Clear History** using ▲ ▼, then press **Select** to permanently delete the entire logged History. Press **Accept** to initiate procedure or **Cancel** to return to History Options without clear.

History/Options

This will permanently delete all logs. Do you want to proceed?

Accept | Cancel
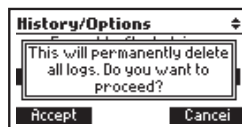
8. ACCESSORIES

HI1285-8	pH/conductivity probe with built-in temperature sensor, DIN connector and 2 m (6.6') cable
HI740036P	Plastic Beaker Set, 100 mL (10 pcs.)

ELECTRODE STORAGE SOLUTION

HI70300-050	Storage Solution, 500 mL
HI70300G	Storage Solution Sachets, 20 mL (25 pcs.)

ELECTRODE CLEANING SOLUTION

HI7061-050	general purpose cleaning solution for agriculture, 500 mL
HI70061G	Cleaning Solution Sachets, 20 mL (25 pcs.)

BUFFER SOLUTIONS

HI70004G	pH 4.01 Buffer Sachets, 20 mL (25 pcs.)
HI70007G	pH 7.01 Buffer Sachets, 20 mL (25 pcs.)
HI70010P	pH 10.01 Buffer Sachets, 20 mL (25 pcs.)
HI50036P	Quick Calibration Sachets, 20 mL (25 pcs.)
HI7004-050	pH 4.01 Buffer Solution, 500 mL
HI7007-050	pH 7.01 Buffer Solution, 500 mL
HI7010-050	pH 10.01 Buffer Solution, 500 mL
HI5036-050	Quick Calibration Solution, 500 mL

EC SOLUTIONS

HI70031G	1413 μS/cm (1.41 mS/cm) solution, 20 mL sachets (25)
HI70039G	5000 μS/cm (5.00 mS/cm) solution, 20 mL sachets (25)
HI50036P	Quick Calibration Sachets, 20 mL (25 pcs.)
HI7031-050	1413 μS/cm (1.41 mS/cm) solution, 500 mL
HI7039-050	5000 μS/cm (5.00 mS/cm) solution, 500 mL
HI5036-050	Quick calibration solution, 500 mL

Recommendations for Users

Before using this product make sure that they are entirely suitable for your specific application and for the environment in which they are used.

Operation of these instruments may cause unacceptable interferences to other electronic equipment. Take all necessary steps to correct such interferences. Any variation introduced by the user to the supplied equipment may degrade the instruments EMC performance.

To avoid damages or burns, do not put the instrument in a microwave oven. For yours and the instrument safety do not use or store the instrument in hazardous environments.

Warranty

The HI981420 is warranted for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. The probe is warranted for 6 months. Damage due to accidents, misuse, tampering or lack of prescribed maintenance is not covered.

If service is required, contact your local Hanna Instruments Office. If under warranty, report the model number, date of purchase, serial number and the nature of the problem. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization (RGA) number from the Technical Service department and then send it with shipping costs prepaid. When shipping any instrument, make sure it is properly packed for complete protection.

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