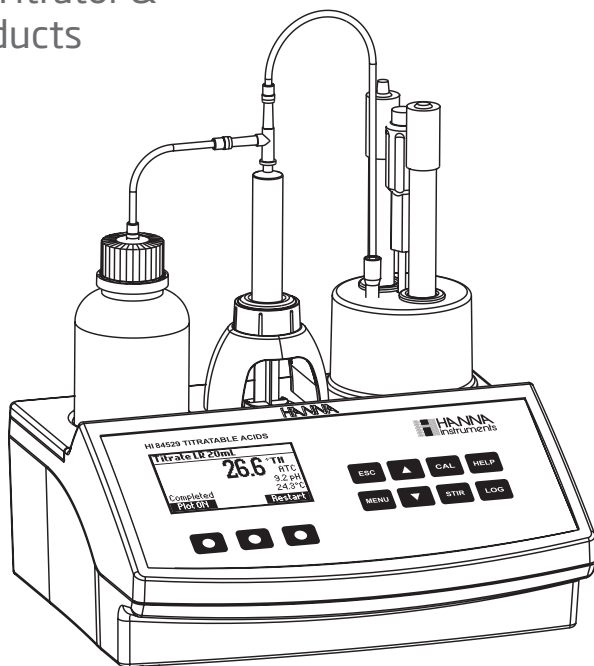


# Instruction Manual

# HI 84529

Titrateable Acidity Mini Titrator &  
pH Meter for Dairy Products



Dear  
Customer

Thank you for choosing a Hanna Instrument product.  
Please read this instruction manual carefully before using this instrument.  
This manual will provide you with the necessary information for correct use of this 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](mailto:tech@hannainst.com) or view our worldwide contact list for a Hanna representative near you at [www.hannainst.com](http://www.hannainst.com).

All rights are reserved. Reproduction in whole or in part is prohibited without the written consent of the copyright owner, Hanna Instruments Inc., Woonsocket, Rhode Island, 02895, USA

## Table of Contents

Included .....	4
Safety Measures .....	5
Description .....	6-8
Significance of Use .....	6-7
Principle of Operation .....	7-8
Diagram .....	9-12
Product Diagram .....	9-10
Keypad Function .....	11
Guide to Indicators .....	12
Setup/ Installation .....	13-24
Dosing Pump .....	13
Titrator Startup .....	13
Startup Menu .....	14-18
Guide to Display Codes .....	18-20
Pump Calibration Messages .....	20-21
pH Calibration Messages .....	21-22
Titration Messages .....	22-23
Electrode Preparation Procedure .....	23-24
Operational Guide .....	25-44
Electrode Calibration Procedure .....	25-28
pH Buffer Temperature Dependence .....	29
Dosing Pump Installation .....	30
Dosing Pump Prime Procedure .....	31-32
Pump Calibration Procedure .....	32-34
Titration Procedure .....	35-38
Tips for an Accurate Measurement .....	38-39
Titrator GLP Information .....	40
pH Measurement .....	40-43
pH Meter GLP Information .....	43
PC Interface and Data Transfer .....	44
Maintenance .....	45-47
Electrode Conditioning and Maintenance .....	45
Troubleshooting Guide .....	46-47
Specifications .....	48-49
Accessories .....	50-51
Warranty .....	52

## Included

Please examine this product carefully. Make sure that the instrument is not damaged. If any damage occurred during shipment, please notify your local Hanna Representative.

Each **HI 84529** mini titrator is supplied complete with:

HI 84529-70 Reagent kit for titratable acidity in dairy products

FC 260B pH electrode

HI 5315 Reference electrode

HI 7662-M Temperature probe

HI 7072 Fill solution (30 mL)

HI 700640 Cleaning solution for milk deposits (2 x 20 mL)

One capillary dropper pipette

Two 100 mL beakers

Tube set (aspiration tube with titrant bottle cap and dispensing tube with tip)

Dosing Pump Valve

5 mL Syringe

1 mL Plastic pipette

Stir bar

Power adapter

Instruction manual

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

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 unacceptable interferences to other electronic equipment, thus requiring the operator to take all necessary steps to correct interferences. Any variation introduced by the user to the supplied equipment may degrade the instrument's EMC performance.

To avoid damages or burns, do not put the instrument in microwave ovens. For your and the instrument's safety, do not use or store the instrument in hazardous environments.

## Description

The **HI 84529** is a low-cost easy to use, microprocessor-based automatic minititrator and pH meter designed for the rapid and accurate analysis of Total Titratable Acidity in Dairy Products. The **HI 84529** will quickly become a valuable tool by eliminating subjective factors including color indicators, errors in calculations or erratic titrant additions.

The instrument benefits from Hanna's many years of experience as a manufacturer of quality analytical instrumentation. A clear and well-designed user interface makes the instrument intuitive and simple to use.

By pressing the Start key in Titrator mode, the instrument will automatically titrate the sample to the set end point, perform all necessary calculations and display the results in the selected unit. At the end of the titration, another titration can be started by pressing the Restart key. A dedicated HELP keys aids in setup, calibration and troubleshooting.

Other features:

pH meter / mV meter

Stir speed control

Graphic mode to display the titration data

Data can be stored using the log feature and then exported to a USB stick or transferred to a PC using the USB connection

Log on demand for up to 400 samples (200 pH/mV measurements; 200 for titration results)

GLP feature, to view calibration data for the pH electrode and pump

## Significance of Use

Titrateable acidity can be expressed in several units; % lactic acid (% l.a.), degree Soxhlet Henkel (°SH), degree Dornic (°D) or degree Thörner (°TH). Each of these units corresponds to a specific procedure used to titrate dairy products.

**Soxhlet Henkel degrees (°SH)** - mostly used in Central Europe. This value is obtained by titrating 100 mL of milk with 0.25N NaOH, using phenolphthalein as indicator.

**Thorner degrees (°Th)** - mostly used in Sweden and the CIS. This value is obtained by titrating 100 mL of milk, diluted with 2 parts of distilled water, with 0.1N NaOH, using phenolphthalein as indicator.

**Dornic degrees (°D)** - mostly used in Netherlands and France. This value is obtained by titrating 100 mL of milk, diluted with 2 parts of distilled water, with N/9 NaOH, using phenolphthalein as indicator.

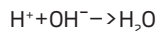
**Percent lactic acid (%l.a.)** - frequently used in the UK, USA, Canada, Australia and New Zealand. This value is obtained in the same way as °D, dividing the result by 100.

The titratable acidity values will vary depending on the method used. Select Low 50 to titrate a non diluted sample, or select Low 20 / High 20 to titrate 20 mL or 20 g samples that are diluted with twice its volume of deionized a distilled water. The **HI 84529** uses methods based on AOAC International and Standard Methods for the Examination of Dairy Products. Both of these method report titratable acidity as % lactic acid, a rough conversion factor can be used to convert the results to the other available units:

From:	To:	Divide By:
%l.a.	°SH	0.0225
%l.a.	°D	0.0100
%l.a.	°TH	0.0090

The **HI 84529** can be customized to meet the needs of any dairy analysis lab. Samples can be titrated by weight or volume, diluted or nondiluted (low range only) and titrated to a fixed pH end point that can be adjusted by the user.

The methodology for titratable acidity in dairy products is based on neutralization reaction where the acids in the sample (i.e. lactic acid) reacts with a base (i.e. sodium hydroxide) to produce water:



## Principle of Operation

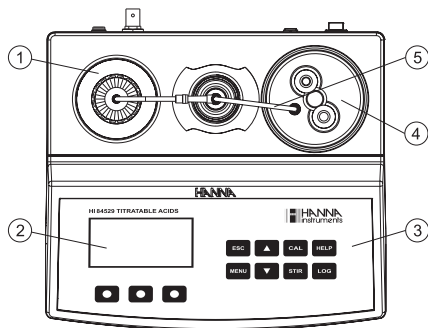
In an ideal solution, the endpoint of an acid titration corresponds stoichiometrically to the complete neutralization of the acids present.

This endpoint for this reaction can be determined visually using a color indicator (i.e. phenolphthalein), however this endpoint becomes very objective in opaque and colored samples. The **HI 84529** removes this issue by titrating to a fixed pH endpoint that can be set by the user. The **HI 84529** can be customized to meet individual needs with samples titrated by mass or by volume, in two different ranges, with diluted and non diluted (low range only). For precise analysis the sample size, volume of titrant added and titrant concentration must be known.

The **HI 84529** Titratable Acid in Dairy Products Minititrator utilizes a simple sample preparation, a high quality dosing pump for titrant additions, potentiometric endpoint determination and instantaneous computations. To maintain the high accuracy of the minititrator a simple pump calibration is required. The pump calibration uses a known quantity of a known solution to compensate for changes in the dosing system, this procedure should be performed regularly.

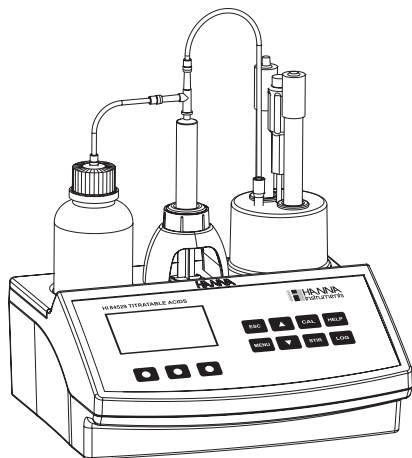


## Product Diagram



1. Titrant bottle
2. Liquid Crystal Display (LCD)
3. Keypad
4. Electrode holder
5. Dispensing tube

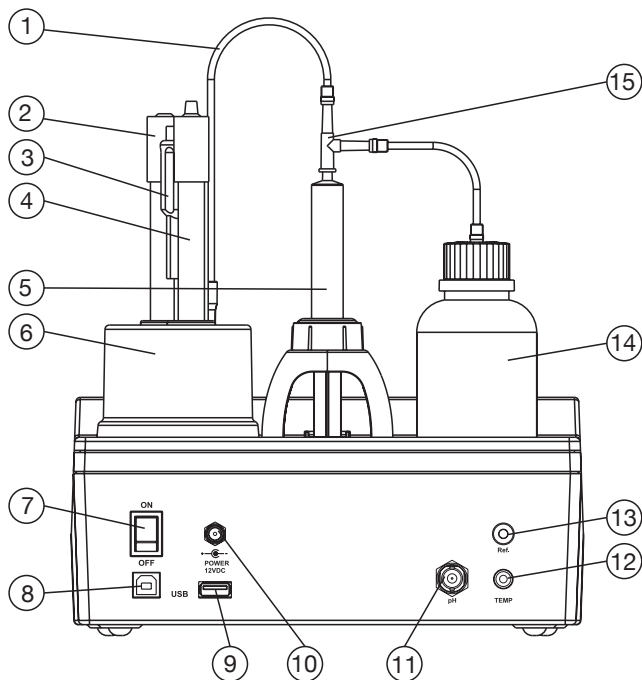
Overhead View



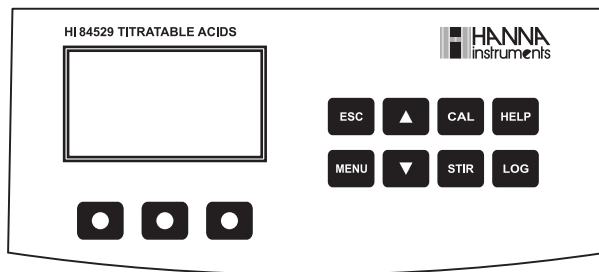
Front View

## Product Diagram

Rear View



- |                                 |                                      |
|---------------------------------|--------------------------------------|
| 1. Dispensing tube              | 9. USB connector (Storage interface) |
| 2. pH Electrode                 | 10. Power adapter                    |
| 3. Temperature probe            | 11. BNC electrode connector          |
| 4. Reference electrode          | 12. Temperature connector            |
| 5. Syringe                      | 13. Reference connector              |
| 6. Electrode holder             | 14. Titrant bottle                   |
| 7. Power switch                 | 15. Dosing Pump Valve                |
| 8. USB connector (PC interface) |                                      |



**ESC** - used to leave the current screen and to return either to the previous screen or to the main screen. In Setup, exits a parameter without changing the value

**▼▲** - used to modify the parameters' values, to scroll the information displayed while viewing a help screen or to move between the options from the instrument's Setup

**CAL** - used to access the Electrode and Pump calibration options

**HELP** - used to access/exit the instrument's contextual help

**LOG** - used to save the current pH/ mV reading in pH meter mode and the titration result

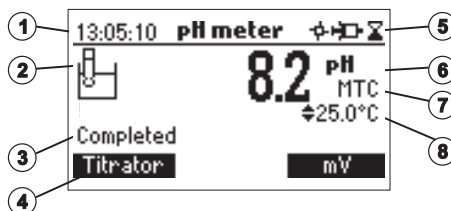
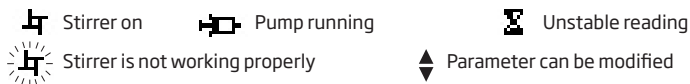
**MENU** - used to enter Setup, Recall or GLP selection menu, while instrument is in pH or titration mode

**STIR** - used to start/stop the stirrer

**Note:** The stirrer starts automatically during pump calibration and titration, it cannot be stopped by pressing STIR key.

## Guide to Indicators

During the instrument's operation a set of information are displayed on the LCD. Displayed icons:



1. Current time and instrument mode information (pH meter or Titrator)
2. Procedural Indicators
3. Instrument status
4. Virtual option keys
5. Stirrer and reading status
6. Main reading information
7. pH temperature compensation mode (Manual or Automatic)
8. Temperature reading

**Note:** If temperature probe is not connected, Manual Temperature Compensation is used and MTC appears on the right side of the screen. If Automatic Temperature Compensation is in use the ATC appears on the right side of the screen.

## Dosing Pump

## Titration Startup

The dosing pump is based on a valve that automatically moves the titrant between the titrant bottle and syringe when filling the syringe and between the syringe and sample when dispensing. A replaceable 5 mL plastic syringe is used to limit the amount of titrant used per test to ensure the highest possible accuracy. Before a set of titrations, it is necessary to prime the dosing system.

**Note:** Once titrations have been completed, the dosing system should be cleaned with deionized water using the prime feature.

This is a general outline of the steps required to perform a titration. The following topics are expanded upon in each section that follows.

1. Place the instrument on a flat table. Do not place the instrument in direct sunlight.
2. Connect the power adapter to the instrument.
3. Turn the instrument ON using the power switch on the rear panel of the instrument.
4. Set up the instrument. See the "Setup Menu" section for details.
5. Connect the pH electrode to the instrument.
6. Connect the reference electrode to the instrument. Connect the temperature probe to the instrument.
7. Calibrate the pH electrode.
8. Connect the tubes and the valve. See the "Dosing Pump Installation" section for the procedure.
9. Remove the titrant bottle cap and replace it with the bottle cap with tubes. Place the titrant bottle in the appropriate place on the titrator top.  
**Note:** Different titrants are required based on the concentration. See "Pump Calibration Procedure" for details.
10. Prime the syringe. To assure high accuracy, verify there are no air bubbles in the syringe or tubing. Calibrate the pump.  
**Note:** Different volumes of standards are required based on the concentration. See "Pump Calibration Procedure" for details.
11. Prepare the sample.
12. Run a titration and log sample results.

## Startup Menu

The titrator's setup menu may be accessed from the main screen or titration screens (meter or titrator) by pressing the MENU key, then SETUP. A list of setup parameters will be displayed with currently configured settings. While in the setup menu, it is possible to modify the instrument's operation parameters. The ARROW keys permit the user to scroll the setup parameters. Press HELP to view the contextual help. Press ESC to return to the main screen.

Meter setup		
Conc. unit	°TH	
Acidity Titration	Low 20	
Sample Type	Mass	
Calib. Timeout	Disable	
%I.a.	°D	°SH

### Concentration Unit

% I.a., °SH, °D, °TH

Press the corresponding virtual option key to change the option.

% I.a. - % lactic acid; °SH - °Soxhlet Henkel; °D - °Dornic; °TH - °Thörner

Meter setup	
Conc. unit	%I.a.
Acidity Titration	Low 20
Sample Type	Mass
Calib. Timeout	Disable
Low 50   High 20	

### Acid Titration

Low 20, Low 50 or High 20

Press the corresponding virtual option key to select the desired range.

**Note:** Different titrants are required for each range.

Meter setup	
Acidity Titration	Low 20
Sample Type	Mass
Calib. Timeout	Disable
pH Resolution	0.1
Volume	

### Sample Type

Mass or Volume.

Samples can be added by volume or by mass. For improved accuracy all samples should be added by mass.

Meter setup	
Acidity Titration	Low 20
Sample Type	Mass
Calib. Timeout	Disable
pH Resolution	0.1
Modify	

### Calibration Timeout

Disabled or 1 to 7 days. This option is used to set the number of days before the pH calibration expired warning message is displayed. Press MODIFY to access the calibration timeout screen.

Use the ARROW keys to select the value. Press Accept to confirm or ESC to return to the setup menu without saving the changes.

<b>Calib. Timeout</b>	
Disable	
1 Day	
<b>2 Days</b>	
3 Days	
<b>Select</b>	

### pH Resolution

0.1 or 0.01.

Press the displayed virtual option key to change the option.

<b>Meter setup</b>	
Sample Type	Mass
Calib. Timeout	Disable
<b>pH Resolution</b>	<b>0.1</b>
Temperature unit	°C
<b>0.01</b>	

### Temperature Unit

°C, °F or K.

Press the virtual option key to change the option.

<b>Meter setup</b>	
Calib. Timeout	Disable
pH Resolution	0.1
<b>Temperature unit</b>	<b>°C</b>
Time	15:43:13
<b>K</b>   <b>°F</b>	

### Time

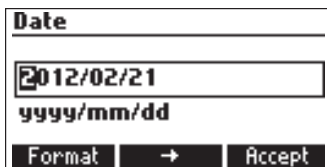
Press the Modify key to change the time and time format

<b>Meter setup</b>	
Temperature unit	°C
<b>Time</b>	<b>15:43:13</b>
Date	2012/01/16
Key Beep	<input type="checkbox"/>
<b>Modify</b>	

Press Format to switch between 12 hour (am/pm) and 24 hour mode. Press the arrow to highlight the value to be modified. Use the ARROW keys to change the value. Press Accept to confirm the new value or ESC to return to the setup.

<b>Time</b>	
15:33:13	
<b>hh:mm:ss 24 Hours</b>	
<b>Format</b>	<b>→</b> <b>Accept</b>

## Startup Menu



**Date**

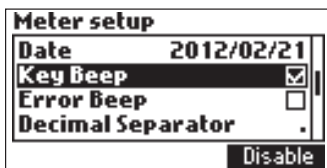
2012/02/21

yyyy/mm/dd

Format → Accept

### Date

Press the MODIFY key to change the date and date format.



**Meter setup**

Date 2012/02/21

Key Beep ☒

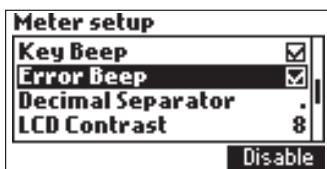
Error Beep ☐

Decimal Separator .

Disable

### Key Beep

Select ENABLE to activate or DISABLE to deactivate the Key Beep function. If enabled, a short beep will be heard every time a key is pressed.



**Meter setup**

Key Beep ☒

Error Beep ☒

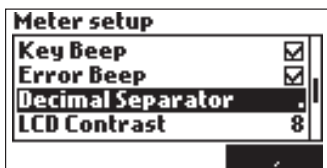
Decimal Separator .

LCD Contrast 8

Disable

### Error Beep

Select ENABLE to activate or DISABLE to deactivate the Error Beep function. If enabled, a beep will be heard when an error condition occurs.



**Meter setup**

Key Beep ☒

Error Beep ☒

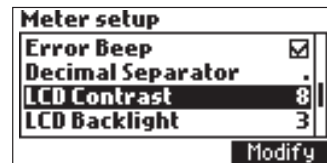
Decimal Separator .

LCD Contrast 8

Disable

### Decimal Separator

Select the symbol used for a decimal separator. You can choose either period or a comma.



**Meter setup**

Error Beep ☒

Decimal Separator .

LCD Contrast 8

LCD Backlight 3

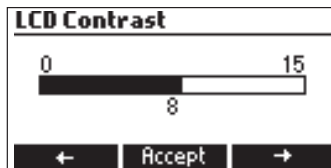
Modify

### LCD Contrast

This option is used to set the display's contrast. Press MODIFY to change the display's contrast. The default value is 8.

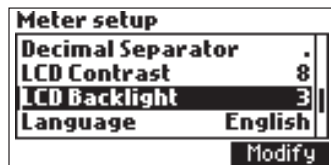


Use the ARROW keys or ← / → to increase/decrease the value. Press ACCEPT to confirm the value or ESC to return to the setup menu.



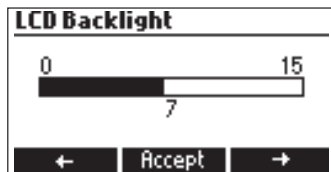
### LCD Backlight

Press Modify to change the backlight level. The default value is 3.



Use the ARROW keys or ← / → to increase/decrease the backlight level.

Press ACCEPT to confirm or ESC to return to the setup menu.



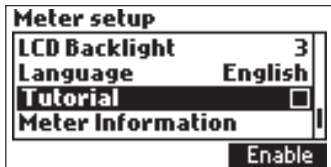
### Language

Press the corresponding virtual option key to change the language. If the selected language cannot be loaded, the previously selected language will be reloaded. If no language can be loaded at startup, the instrument will work in "safe mode". In "safe mode" all messages are displayed in English.

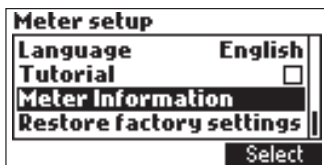


### Tutorial

ENABLE or DISABLE the Tutorial. This helpful tool offers additional information that guides the user step by step during calibration and titration.

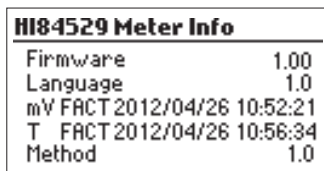


## Startup Menu

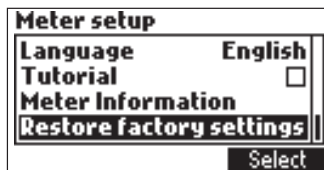


### Meter Information

Press SELECT to view the firmware version, language version, mV factory calibration date and time and temperature factory calibration date and time.

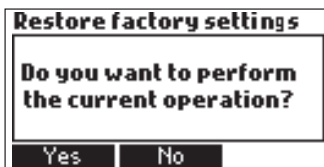


Press ESC to return to the Setup mode.



### Restore Factory Settings

Press SELECT to restore factory settings



Press YES to confirm the restore process or NO to return without restoring.

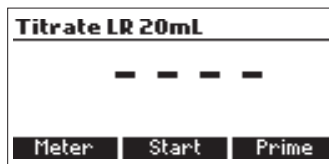
Press ESC to return to the Setup mode.

## Guide to Display Codes

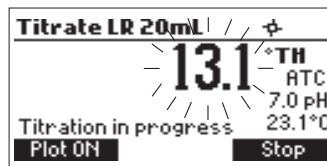


This screen appears when the instrument is turned on during the initialization process.

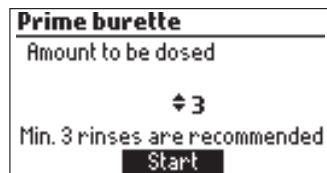
Titration screen display.



Titration screen when a titration is in progress.



Prime burette screen.



Prime burette screen when the dosing system is running.

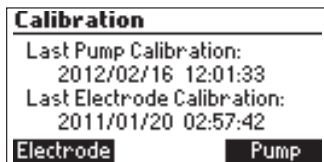


This error message appears when the pump is not working properly. Check the tubing, valve and syringe. Press RESTART to try again

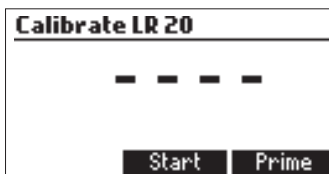


## Guide to Display Codes

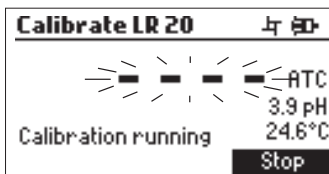
## Pump Calibration Messages



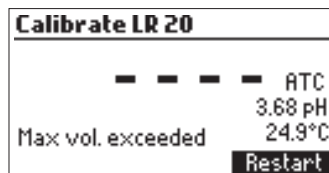
This screen appears when the titrator is in calibration mode. Press PUMP to calibrate Pump. Press ELECTRODE to calibrate pH electrode.



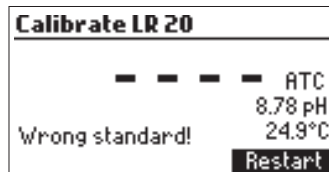
Pump calibration is initiated by pressing the START key.



This screen appears while pump calibration is in progress. Press ESC or STOP key to return to the Pump Calibration screen.

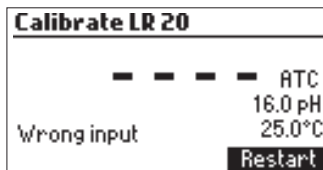


This error message appears during pump calibration when the endpoint cannot be reached and the maximum amount of titrant is exceeded. Check standard, electrode and/or dosing system and try again

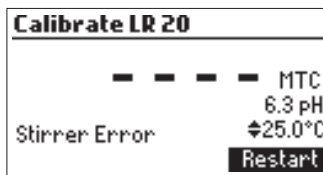


The calibration was outside the acceptable limits. Prepare a new standard and try again.

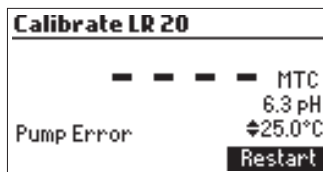
This error message appears when the pH reading exceeds the acceptable input limits (pH < -2.00 or pH > 16.00).



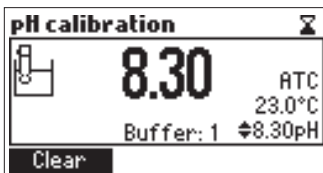
This screen appears when the stirrer is not working properly. Check the stir bar and beaker content. Press RESTART to try again.



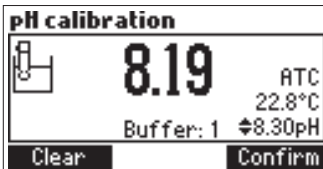
This error message appears when the pump is not working properly. Check the tubing, valve and syringe. Press RESTART to try again.



pH calibration mode.



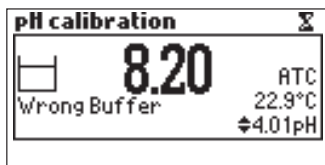
When the reading has stabilized, press CONFIRM to accept the calibration or CLEAR to restore the default calibration.



## Pump Calibration Messages

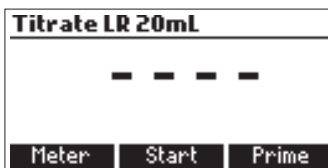
## pH Calibration Messages

## pH Calibration Messages

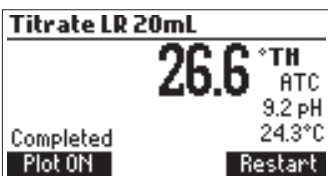


The “Wrong Buffer” message is displayed when the pH value is outside of the acceptable range. Clean the electrode by following the cleaning procedure and/or check the buffer value before continuing the pH calibration. Press the ESC key to exit pH calibration mode.

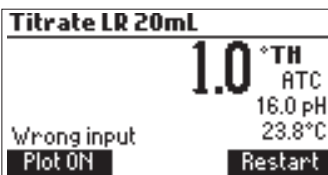
## Titration Messages



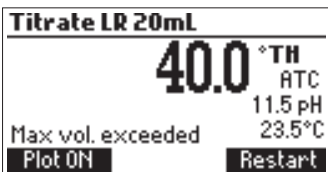
This screen is displayed when the instrument is in titration mode. Press START to begin a titration, METER to enter pH meter mode or PRIME to enter into the prime function.



The titration result, expressed as concentration in selected unit, is displayed automatically at the end of the titration. Press RESTART to start another titration or ESC to return to the main screen.

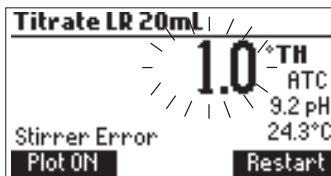


This error message appears when the input reading (pH or temperature) exceeds the specified limits. The pH or temperature value and concentration will blink indicating an error.

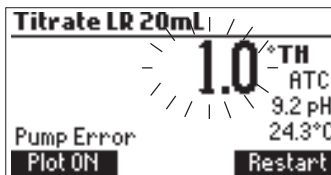


This screen appears when the sample concentration is out of range.

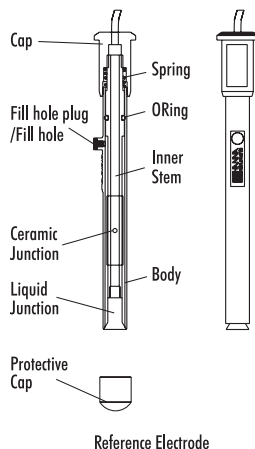
This screen appears when the stirrer is not working properly. Check the stir bar and beaker content. Press RESTART to try again.



This error message appears when the pump is not working properly. Check the tubing, valve and syringe. Press RESTART to try again.



1. Remove the electrode protective cap.
2. If the bulb is dry, soak the electrode in HI 70300 Storage Solution for at least one hour.
3. Preparation of reference electrode:
4. Unwrap Parafilm™ seal found over ceramic junction on inner stern of the reference electrode and discard. This is only used for shipping.
5. Rinse inner stern with deionized water, making certain to wet o-ring found on the inner stern.
6. Reassemble reference electrode by gently pushing the inner assembly into the outer body (from the bottom), slide spring and cap down the cable and over the top of the inner stern. Screw the cap into place.
7. Unscrew and remove the fill hole



## Titration Messages

## Electrode Preparation Procedure

## Electrode Preparation Procedure

- plug and o-ring on fill hole spout.
- Using the dropper pipette provided, add a few drops of HI 7072 fill solution to the electrode. Invert electrode to wet the o-ring and rinse the electrolyte chamber.
  - Holding the body of the electrode gently press the cap with your thumb. This permits the fill solution to drain out of the body. Release your thumb and verify electrode returns to its original position (you may need to gently assist for this to occur).
  - Fill electrode body with HI 7072 fill solution until solution volume is just below fill hole.

**Note:** During measurement always operate reference electrode with the fill hole open.

### Measurement

Place pH electrode and reference electrode into electrode holder and connect the electrodes to the instrument.

Rinse the pH and reference electrodes with distilled or deionized water. Immerse the pH and reference electrodes 1.5 cm (0.6") in the sample and stir gently for a few seconds.

For a faster response and to avoid cross-contamination of the samples, rinse the electrodes with a few drops of the solution to be tested, before taking measurements.

## Electrode Calibration Procedure

It is recommended to calibrate the instrument frequently, especially if high accuracy is required. The pH electrode should be recalibrated:

- Whenever the pH electrode is replaced
- At least once a week, but daily is advised
- After testing aggressive chemicals and after the electrode is cleaned
- When high accuracy is required
- If the pH calibration expired warning is displayed during measurement

Every time you calibrate the instrument use fresh buffers and clean the electrode.



## Electrode Calibration Procedure

### Procedure

A single one, two or three-point calibration can be performed, using the four predefined buffers 4.01, 6.00, 8.30 and 10.01 pH. For a single point calibration any of the four buffers may be used, 8.30 pH is recommended.



**Note:** The HI 84529 will not accept other pH buffers for calibration.

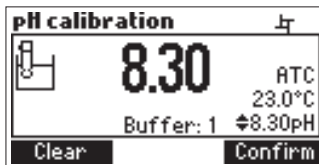
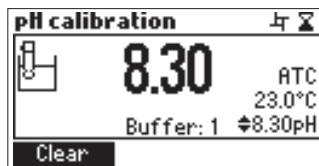
1. Pour small quantities of selected buffer solutions into clean beakers. For accurate calibration used two beakers for each buffer solution, the first one for rinsing the electrode and the second one for calibration.
2. Put a magnetic stir bar in the beaker that will be used for calibration.
3. Remove the protective cap and rinse the electrode with some of the buffer solution to be use for the first calibration point.
4. Put the first beaker with calibration buffer in the beaker holder.
5. Place the electrode holder on the top of the beaker and secure it by turning clockwise and press STIR.
6. Immerse the pH electrode and the temperature probe approximately 2 cm (0.8") into the buffer, paying attention not to touch the stir bar.

To enter Electrode Calibration follow the next steps:

1. Press CAL function key then ELECTRODE.
2. The electrode calibration screen will be displayed.
3. Press CLEAR to delete the previous calibration.

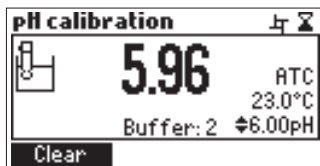
### 1 Point Calibration

1. The 8.30 buffer will be selected by default. If necessary, press the ARROW keys in order to select a different buffer value.
2. The  (unstable measurement) symbol will be shown on the display until the reading becomes stable.
3. When the reading is stable and close to the selected buffer, the  (unstable measurement) symbol will disappear and the CONFIRM key will become active.
4. Press CONFIRM to confirm the




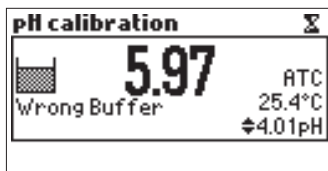
## Electrode Calibration Procedure

- calibration or ESC to exit calibration.
- After the calibration point has been confirmed, press ESC to exit without performing the second calibration point.



### 2 Point Calibration

- After pressing CONFIRM in step 4 of 1 point calibration procedure of the calibrated value will be shown on the display and the second expected buffer value will be displayed.
  - Remove the electrode holder with electrodes from the top of the beaker.
- Place the second beaker with calibration buffer in the beaker holder. Rinse the electrodes in a beaker containing the second buffer rinsing solution.
  - Place the electrode holder (with electrodes) on the top of the beaker and secure it by turning clockwise and press STIR.
  - If necessary, press the ARROW keys in order to select a different buffer value. The  (unstable measurement) symbol will be shown on the display until the reading becomes stable.
  - When the reading is stable and close to the selected buffer, the (unstable measurement) symbol will disappear and the Confirm key will become active.
  - Press CONFIRM to confirm the calibration.
  - The calibrated value will be shown on the display and the third expected buffer value will be automatically selected.
  - After the second calibration point has been confirmed, press ESC to exit without performing the third calibration point.



### 3 Point Calibration

- Remove the electrode holder with electrode from the top of the beaker.
- Place the third beaker with calibration buffer in the beaker holder. Rinse the electrodes in a beaker containing the third buffer rinsing solution.
- Place the electrode holder (with electrodes) on the top of the beaker and secure it by turning clockwise



## Electrode Calibration Procedure

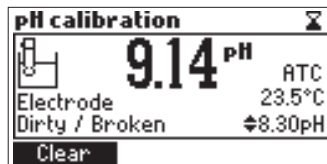
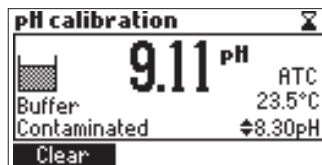
and press STIR. If necessary press the ARROW keys in order to select a different buffer value.

4. The (unstable measurement) symbol will be shown on the display until the reading becomes stable.
5. When the reading is stable and close to the selected buffer, the (unstable measurement) symbol will disappear and the CONFIRM key will become active.
6. Press CONFIRM to confirm the calibration. The instrument stores the calibration value and returns to calibration menu, where the date and time for the pH calibration will be updated.

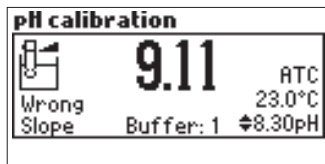
**Note:** A buffer confirmed during the calibration process is removed from the list of available buffers. If the value measured by the instrument is not close to the selected buffer, a "Wrong Buffer" error message will be shown on the display. Check if the correct buffer has been used or regenerate the pH electrodes by following the Cleaning Procedure. If necessary change the buffer or the electrode.

If the measured offset isn't within the preset limits ( $\pm 45$  mV), the meter will display the message "Buffer Contaminated" alternatively with "Electrode Dirty/Broken".

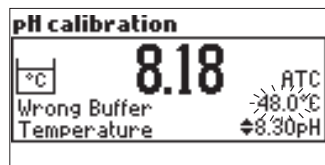
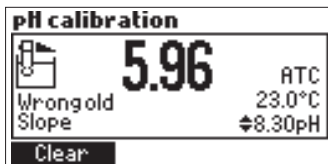
If the computed slope isn't within the preset limits, the meter will display the message "Wrong Slope". If the slope is too high the  symbol will be displayed. If the slope is too low the  symbol will be displayed.



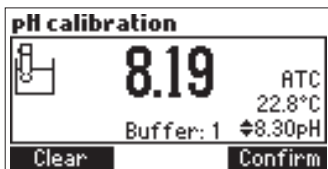
## Electrode Calibration Procedure



If the "Wrong Old Slope" error message is displayed, an inconsistency exists between the current and the previous (old) calibration. Clear the previous calibration by pressing CLEAR and proceed with calibration from the current calibration point. The instrument will keep all the confirmed values during the current calibration.



If the temperature reading is out of the defined temperature range of the buffer (0 to 45 °C), the "Wrong Buffer Temperature" error message will be displayed, and the temperature symbol will blink on the display. Calibration cannot be confirmed in this situation.



**Note:** To clear a previous calibration and to return to the default value, press CLEAR at any time after entering calibration mode. If CLEAR is invoked during the first calibration, point the instrument returns to the measurement mode. The CLEAR key is displayed only if a previous calibration exists.

## pH Buffer Temperature Dependence

Temperature has an effect on pH. The calibration buffer solutions are affected by temperature changes to a lesser degree than normal solutions. During calibration, the instrument will automatically calibrate to the pH value corresponding to the measured or set temperature.

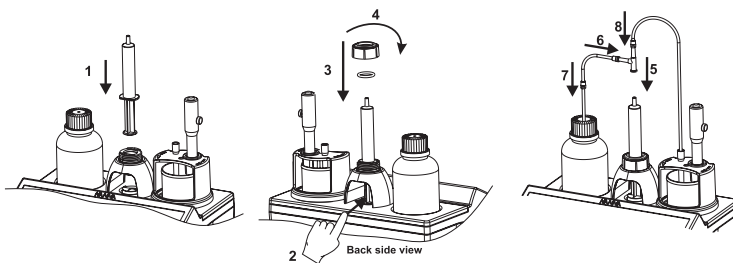
During calibration the instrument will display the pH buffer value at 25 °C.

Temp		pH Buffers			
°C	°F	4.01	7.01	8.20	10.01
0	32	4.01	7.13	8.38	10.32
5	41	4.00	7.10	8.34	10.24
10	50	4.00	7.07	8.31	10.18
15	59	4.00	7.04	8.27	10.12
20	68	4.00	7.03	8.23	10.06
<b>25</b>	<b>77</b>	<b>4.01</b>	<b>7.01</b>	<b>8.30</b>	<b>10.01</b>
30	86	4.02	7.00	8.17	9.96
35	95	4.03	6.99	8.14	9.92
40	104	4.04	6.98	8.11	9.88
45	113	4.05	6.98	8.08	9.85

## Dosing Pump Installation

To install the dosing pump follow the procedure below:

1. Extend the plunger on the 5 mL syringe to its maximum volume.
2. Place the syringe in the dedicated spot on the top of the meter (1).
3. Arrange the bottom of the syringe into the holder on the pump (2). Once the syringe is in place lower the barrel until it sits flush on the holder.
4. Put the o-ring and syringe-fixing nut over the syringe (3) and turn clockwise to secure it in place (4).
5. Place the valve on the top of the syringe (5). Ensure it fits securely.
6. Insert the aspiration tube into the left side of the valve (6) and replace the titrant bottle cap with the attached cap (7).
7. Insert the dispensing tube into the top of the valve (8).



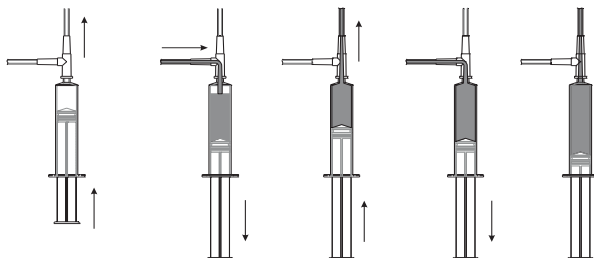
## Dosing Pump Prime Procedure

Prime cycle should be performed:

1. If you notice there is no titrant in the tip
2. Whenever the dosing system tubes are replaced
3. Whenever a new bottle of titrant is used
4. Before starting a pump calibration
5. Before starting a series of titrations

The prime cycle is used to fill the syringe before starting a set of titrations. Two rinse cycles of the syringe are shown in the figure below. The dispensing tube is connected to the top of the valve and the aspiration tube on the left side.

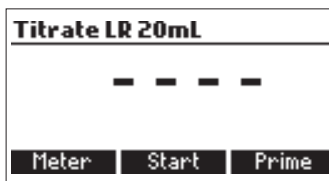
## Dosing Pump Prime Procedure



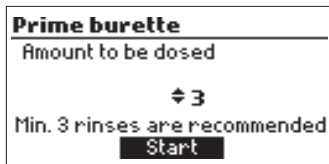
**Note:** The aspiration tube must be inserted in the titrant bottle. The dosing tip must be placed over a rinse beaker. Before starting the prime procedure, make sure you are using the appropriate titrant solution for the selected range.

To prime the burette, select PRIME option from TITRATION mode.

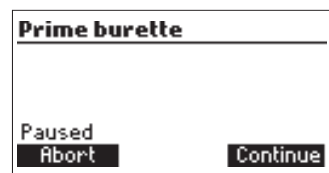
Adjust the rinses number by pressing the ▼ and ▲ keys and press START.



The number of syringe rinses can be set between 1 and 5 (at least three rinses are recommended to ensure that the air bubbles are completely removed).



To pause the prime process press the PAUSE key; to continue press the CONTINUE key. To stop the prime process press the STOP key.



## Dosing Pump Prime Procedure



**NOTE:** This error message appears when the pump is not working properly. Check the tubing, valve and syringe. Press RESTART to try again.

## Pump Calibration Procedure

The calibration of the pump must be performed every time the syringe, pump tube, the titrant bottle or the pH electrode is changed. It is recommended to perform the pump calibration before each set of titrations, after the titrator is left idle for several hours, or once daily.

Press MENU, select SETUP and select the corresponding measurement range according to the table below:

Unit	Low Range 20 or 50	High Range 20
%I.a	0.01 to 0.20	0.1 to 2.0
°SH	0.4 to 8.9	4.4 to 88.9
°D	1.0 to 20.0	10 to 200
°TH	1.1 to 22.2	11.1 to 222.2

Verify the electrode has been calibrated in 8.30 pH buffer.

Ensure the pump is primed with the correct titrant for the selected range (HI 84529-50 Low Range 20 Titrant or HI 84529-52 Low Range 50 Titrant, HI 84529-51 High Range 20 Titrant).

Sample preparation: Use a clean pipette add a precisely measured amount of HI 84529-55 Calibration Standard to a clean beaker as indicated below:

Low Range 20 - 1 mL

Low Range 50 - 2 mL

High Range 20 - 10 mL



**Note:** Failure to use a clean pipette will result in erroneous readings.

Fill the beaker up to the 50 mL mark with the distilled or deionized water.

Press CAL key. The instrument displays the date and time of the last electrode calibration, and the last pump calibration. Press Pump key.



**NOTE:** DO NOT PLACE THE DISPENSING TIP INTO THE CALIBRATION BEAKER, PLACE THE TIP OVER A WASTE BEAKER. A SMALL AMOUNT OF TITRANT IS DISPENSED WHEN THE PUMP RESETS.

### Calibration LR 20

Last Pump Calibration:  
2012/02/23 14:08:09  
Last Electrode Calibration:  
2012/01/17 14:38:03

Electrode

Pump

## Pump Calibration Procedure

Press START, wait for the syringe to refill. Place the stir bar in the beaker and put the beaker in the minititrator top.

Place the probe holder on the top of the beaker and secure it by turning clockwise. Rinse the pH electrode, reference electrode and temperature probe with deionized water and immerse them roughly 1.5 cm (0.6") into the sample. Be sure that the tip of the electrode is not hitting the stir bar. If necessary, additional distilled or deionized water can be added.

Insert the dosing tip into the titrant tube sleeve. IT IS CRITICAL THAT THE TIP BE IMMERSSED APPROXIMATELY 0.25 CM (0.1") INTO THE SOLUTION BEING TITRATED.

Press CONTINUE to begin the calibration and STOP to abort it. At the end of the calibration, "Calibration Completed" appears on display. To repeat the calibration press Restart or ESC to return to the main screen.

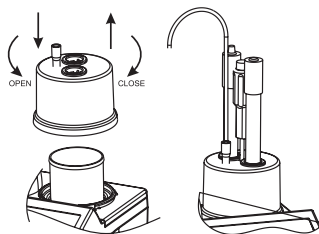
**Note:** If temperature probe is not connected, Manual Temperature Compensation is used and MTC appears on the right side of the screen. If Automatic Temperature Compensation is in use the ATC appears on the right side of the screen.

### Calibrate LR 20

— — — —

Start

Prime



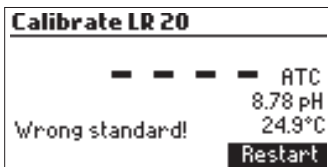
### Calibrate LR 20

Prepare the standard. Add stir bar to beaker. Attach the electrode holder. Insert electrodes and dosing tip.

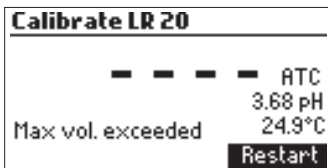
Continue

Stop

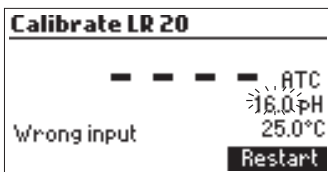
## Pump Calibration Procedure



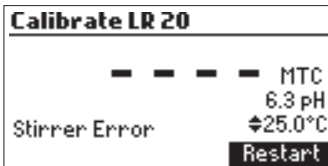
If an erroneous situation is encountered during the calibration, an error message is displayed and the calibration can be restarted by pressing RESTART. Prepare a new standard, rinse the electrode, temperature probe and dosing tip and try again.



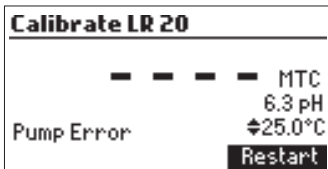
If the calibration doesn't complete and the max titrant volume of titrant is reached, an error message will be displayed. The calibration can be restarted by pressing RESTART. Prepare a new standard, rinse electrode, temperature probe and dosing tip and try again.



This error message appears when the pH reading exceeds the acceptable input limits ( $\text{pH} > -2.00$  or  $\text{pH} > 16.00$ ).



This screen appears when the stirrer is not working properly. Check the stir bar and beaker content. Press RESTART to try again.



This error message appears when the pump is not working properly. Check the tubing, valve and syringe. Press RESTART to try again.

## Titration Procedure

For best accuracy, before taking any measurement, ensure that the pump is calibrated on the selected range following the “Pump Calibration Procedure”.

**Note:** Verify that the instrument has been calibrated (pH and pump) before performing any titrations.

Refer to “Setup Menu” to set up the instrument for your measurement. Select the corresponding measurement range.

Unit	Low Range 20 and 50	High Range 50
%I.a	0.01 to 0.20	0.1 to 2.0
°SH	0.4 to 8.9	4.4 to 88.9
°D	1.0 to 20.0	10 to 200
°TH	1.1 to 22.2	11.1 to 222.2

### By Mass:

Place a clean 100 mL plastic beaker on an analytical balance. Zero the balance.

Add  $20 \pm 1$  g (Low 20, High 20) or  $50 \pm 1$  g (Low 50) to the beaker.

Record the reading once it has stabilized.

Remove the beaker from the balance.

### By Volume:

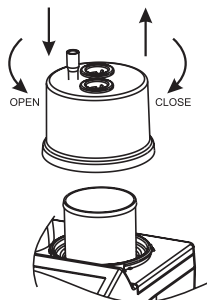
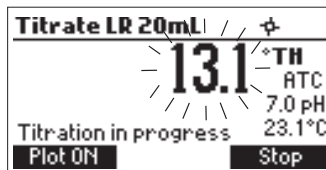
Volumetrically add 20 mL (Low 20, High 20) or 50 mL (Low 50) to a clean 100mL plastic beaker.

**Note:** Failure to use a clean pipette will result in erroneous readings.

**Note:** DO NOT PLACE THE TIP INTO THE SAMPLE BEAKER. PLACE THE TIP OVER A WASTE BEAKER. A SMALL AMOUNT OF TITRANT IS DISPENSED WHEN THE PUMP RESETS.

Press START to begin a titration.

For samples by mass the “Edit Sample Mass” screen will be displayed. Use the ARROW keys to enter the exact sample mass then press ACCEPT.



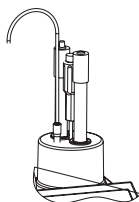
## Titration Procedure

**Edit sample Mass**

Enter the sample mass

↕ 20.01g

**Accept**



**Titrate LR 20mL**

Prepare the sample. Add stir bar to beaker. Attach the electrode holder. Insert electrodes and dosing tip.

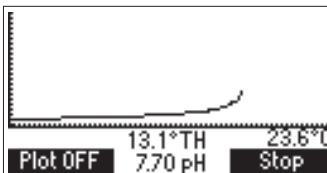
**Continue** **Stop**

**Titrate LR 20mL** ⚡

--- ATC 3.0 pH 23.1°C

Titration in progress

**Plot ON** **Stop**



For 20 g and 20 mL samples add deionized or distilled water to the 60 mL mark. Place the stir bar in the beaker and put the beaker in the mini titrator top.

Place the probe holder on the top of the beaker and secure it by turning clockwise. Rinse the pH electrode, reference electrode and temperature probe with deionized water and immerse it roughly 1.5 cm (0.6") into the sample. Be sure that the tip of the electrode is not hitting the stir bar. Insert the dosing tip into the titrant tube sleeve. **IT IS CRITICAL THAT THE TIP BE IMMERSSED APPROXIMATELY 0.25 CM (0.1") INTO THE SOLUTION BEING TITRATED.**

Press CONTINUE to begin the titration and STOP to abort it.

The instrument will continuously update the concentration on the display. The value will be displayed blinking. When the reading is under range "----" symbol appears blinking.

The titration curve can be visualized during a titration by pressing Plot ON. Press Plot OFF or ESC to exit this mode.

## Titration Procedure

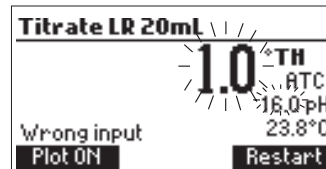
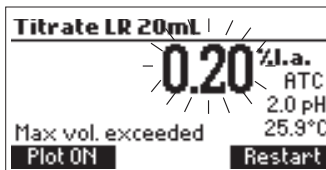
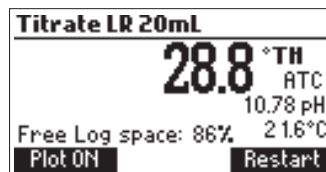
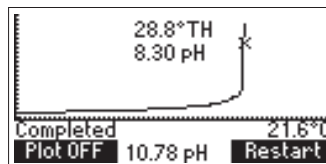
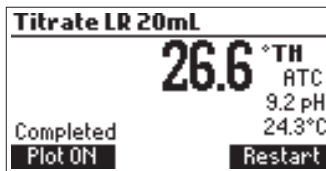
At the end of the titration, the concentration is displayed in the selected unit. The titration curve can be viewed by pressing Plot ON. Press Plot OFF or ESC to exit this mode.

Press LOG to record the concentration value and the titration curve into the instrument's memory. A message will be displayed for a few seconds indicating the amount of free log space. Up to 200 log samples can be recorded in the instrument's memory.

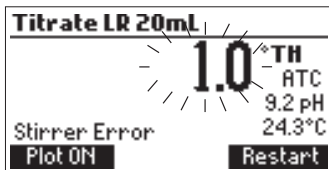
Press RESTART to begin a new titration or ESC to return to the titration menu.

If the concentration exceeds the range limits ( $>0.01$  %l.a. for Low Range,  $>2.0$  %l.a. for High Range), the exceeded range limit will be displayed blinking. Another titration can be started by pressing Restart.

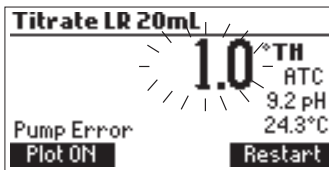
"Wrong input" error message appears when the input reading (pH, temperature) exceeds the specified limits. The pH or temperature value and the concentration will blink indicating an error.



## Titration Procedure



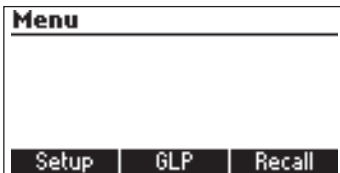
This screen appears when the stirrer is not working properly. Check the stir bar and beaker content. Press RESTART to try again.



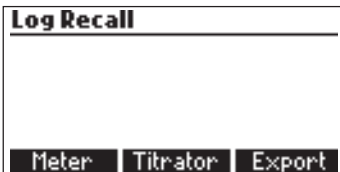
This error message appears when the pump is not working properly. Check the tubing, valve and syringe. Press Restart to try again.

## Tips for an Accurate Measurement

The instructions listed below should be followed carefully to ensure measurements are conducted with the highest possible accuracy and precision. IT IS CRITICAL THAT THE TIP BE IMMERSSED IN THE SOLUTION BEING TITRATED (APPROXIMATELY 0.25 CM).



- Calibrate the pump prior to each series of titrations.
- Calibrate the pump if the meter is left idle for several hours.
- Analyze the sample immediately after it is obtained.
- Clean the electrode with HI 70640 cleaning solutions specially designed for milk industry.



### View/Delete Titrator Recorded Data

Press MENU key then Recall to access the titrator logs.

When an external USB storage device is connected, the Export key is displayed. It saves the meter and titrator logs in two

text format files on the storage device.  
Press METER or TITRATOR to view the respective logs.

The instrument will display a list of all the records stored in the log.

Use the ARROW keys to scroll the list of records.

If the saved concentration was out of range, the "<" or ">" symbols are displayed in front of the reading.

Press DELETE to delete the selected log from the memory.

Press DEL.ALL to delete all records.

Press INFO to see detailed information about the highlighted record.

The selected record data and the titration curve data file name are displayed.

Press ESC to return to the previous screen.

Press PLOT to visualize the titration curve or ESC to return to the previous screen. On the titration curve, the endpoint volume and pH are displayed.

The titration data (Total Titrant Volume on the x-axis and pH on the y-axis) can be scanned through with the dotted line by using the ARROW keys.

To zoom on the titration curve press ZOOM.

If DELETE or DEL.ALL is pressed the instrument will ask for confirmation.

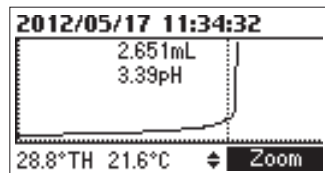
Press YES to delete the record or NO to return to the previous screen.

Deleting a single record will renumber the list of records.

If the titrator log is empty, the message "No records available!" will be displayed.

	*TH	Date
1	< 1.0	2012/05/22
2	9.8	2012/05/22
3	> 222.2	2012/05/22
4	46.7	2012/05/22
Delete Del.All Info		

<b>Record number: 2</b>	
2012/05/22	03:36:31 PM
9.8*TH	25.0°C
6839859.txt file	
Plot	Export

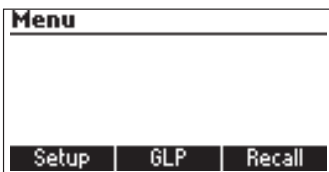


<b>Delete Titrator log</b>	
<b>Do you want to perform the current operation?</b>	
Yes	No

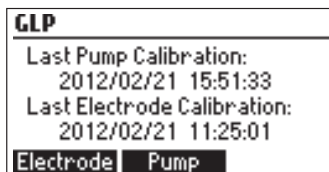
<b>Titrator</b>
<b>No records available!</b>

## Tips for an Accurate Measurement

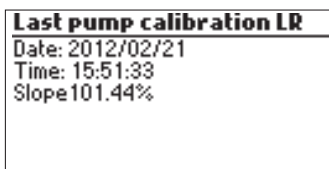
## Titration GLP Information



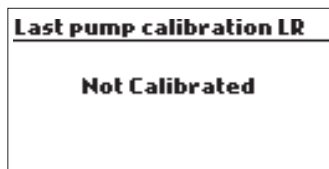
Press MENU then GLP (Good laboratory Practice).



From this screen it is possible to select ELECTRODE or the PUMP GLP.



Press PUMP to view the pump's last calibration date, time, and slope.



If a calibration hasn't been performed, the message "Not Calibrated" will be displayed.

## pH Measurement

The **HI 84529** can be used as a pH meter for direct measurements. Verify that the instrument has been calibrated before taking pH measurements. Set the instrument to pH meter. From titration mode press Meter until pH units are displayed. If an electrode calibration hasn't been performed, or the number of days exceeds the calibration time out value set, the message "CAL DUE" will blink on the left side of the display (see Calibration timeout option in Setup for details).



## pH Measurement

If CAL DUE is displayed perform an electrode calibration.

### Options:

Press MENU to access the instrument's menu.


Press HELP to view the contextual help whenever time you need additional information.

Press STIR to start/stop the stirrer.

Press TITRATOR to enter titration mode.

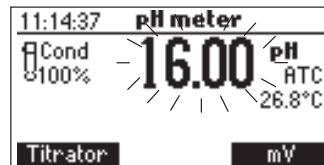
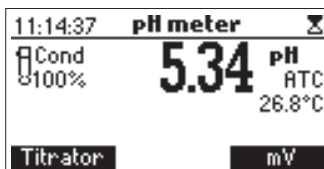
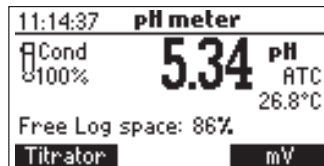
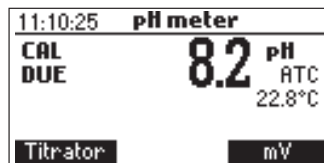
Press CAL to access the calibration menu.

Press LOG to save the current reading. A message indicating the free log space will be displayed for a few seconds.

In order to take pH measurements, follow the next steps: Submerge the pH electrode 2 cm (0.8") and the temperature probe into the sample to be tested and stir gently. Allow time for the electrode to stabilize. When the reading becomes stable, the  (unstable measurement) symbol will disappear.

If the pH reading is less than -2.00 pH or greater than 16.00 pH, the closest full-scale value will be displayed blinking.

If measurements are taken successively in different samples, it is recommended to rinse the electrodes thoroughly with deionized or distilled water and then with some of the next sample to prevent cross-contamination.

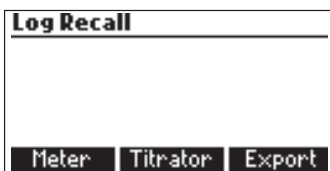


The pH measurements are affected by temperature. In order to have accurate pH measurements, the temperature effect must be compensated for. To use the Automatic Temperature Compensation (ATC) feature, connect and submerge the HI 7662-T temperature probe into the sample as close as possible to the electrode and wait for a few seconds. The "ATC" message will be shown on the

## pH Measurement

display. Automatic Temperature Compensation will provide pH corrected values for the measured temperature. If Manual Temperature Compensation (MTC) is desired, the temperature probe must be disconnected from the instrument. The default temperature of 25 °C (77 °F) or the last temperature reading will

be displayed, preceded by the symbol  $\blacktriangledown$  and the "MTC" message. The temperature can be adjusted with the ARROW keys (from -20.0 to 120.0 °C).



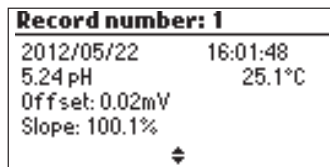
### View/Delete Titrator Recorded pH Data

To view or delete previously logged pH records press MENU key while in pH meter screen then RECALL to access the meter logs.

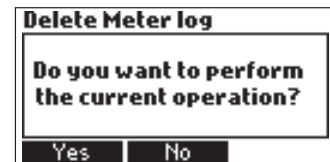
	mV/pH	Date
1	5.24pH	2012/05/22
2	> 16.00pH	2012/05/22
3	< -2000.0mV	2012/05/22
4	-100.0mV	2012/05/22

At the bottom of the screen are three buttons: **Delete**, **Del.All**, and **Info**.

A list of records is stored in the pH log. When an external USB storage device is connected, the Export key is displayed. It saves the meter and titrator logs in two text format files on the storage device.



If the saved mV/pH measurements are out of range, the "<" or ">" symbols are displayed in front of the reading. Press ESC to return to the previous screen



If DELETE or DEL.ALL is pressed the instrument will ask for confirmation. Press YES to delete the record or NO to return to the previous screen without deleting. Deleting a single record will renumber the list of records.

If the pH log is empty, the message “No records available!” will be displayed.

### **Measure**

**No records available!**

pH  
Measurement

The pH meter GLP screens displays the last pH calibration data.

To view this information press MENU key then GLP.

Press ELECTRODE to view information regarding electrode calibration.

### **Last Electrode Calibration**

Date: 2012/05/22	8.30
Time: 16:15:03	6.00
Cal Expire: Disabled	4.01
Offset: -0.9mV	
Slope: 100.0%	
Electrode Condition: 100%	

pH Meter  
GLP  
Information

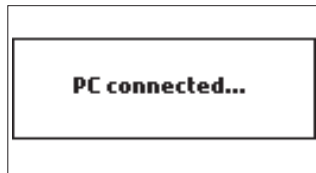
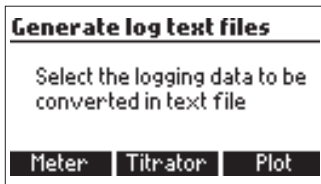
The following items are included in electrode GLP: the time and date of the last calibration,

offset, slope, electrode condition, calibration timeout and the calibration buffers. The buffers highlighted are from the previous calibration. If a calibration hasn't been performed, the message “Not Calibrated” will be displayed.

### **Last Electrode Calibration**

**Not Calibrated**

## PC Interface and Data Transfer



Titration Plots.

The generated files are now visible and can be used for further analysis. If the instrument has no logged Meter or Titrator records, the PC connected screen is displayed.

Data stored on the meter with the LOG function during mV measurement and titrations can be transferred from the meter to a USB stick using the Export function from the log recall menu. Two text files are transferred on the USB stick. These files can be used for further analysis on a PC. The logged data can also be transferred from the instrument to the PC using a USB cable. Connect the USB cable and the following screen will be displayed.

Press METER to generate the text file with Meter log data.

Press TITRATOR to generate the text file with Titrator log data.

Press PLOT to generate the text files with

### Storage Procedure

To assure a quick response time, the glass bulb should be kept moist and not allowed to dry out. Replace the solution in the protective cap with a few drops of HI 70300 or HI 80300 Storage Solution. The HI 5315 Reference may be stored with its black cap and Fill hole covered. Rinse and refill before using. Follow the Preparation Procedure on page 20 before taking measurements.

### Periodic Maintenance

Inspect the electrodes and the cables. The cable used for connection to the instrument must be intact and there must be no points of broken insulation on the cable or cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with distilled/deionized water.

### pH Cleaning Procedure

General	Soak in Hanna HI 7061 or HI 8061 General Cleaning Solution for approximately ½ hour.
Milk deposits	Soak in Hanna HI 70640 Cleaning Solution for milk deposits for approximately ½ hour (pH half cell only).
Protein	Soak in Hanna HI 7073 or HI 8073 Protein Cleaning Solution for 15 minutes.

**IMPORTANT:** After performing any of the cleaning procedures, rinse the electrode thoroughly with distilled or deionized water and soak the electrode in HI 70300 or HI 80300 Storage Solution for at least 1 hour before taking measurements.

### Reference Electrode Cleaning

Drain the old fill solution, rinse with a few drops of HI 7072 solution, drain, then refill with HI 7072 solution. Do not use an electrode if crystallized salts are visible inside the electrode. Drain electrode, disassemble and rinse internal body with deionized water. Reassemble and refill with fresh fill solution. The internal chamber of this electrode is gell filled. If the electrode has been left dry for long periods of time the gel may be dehydrated and stable measurements may not be obtainable. Disassemble electrode and soak internal assembly in HI 7072 fill solution. Verify the ceramic is wetted by the fill solution. Warming the solution slightly (50°C) before soaking will hasten this process. Permit the electrode to cool completely while immersed in this solution.

## Troubleshooting Guide

Symptoms	Problem	Solution
Slow response/excessive drift.	Dirty pH or reference electrode.	Soak the electrode tip HI 70640 solution for 30 minutes and follow the cleaning procedure. Refill reference electrode with new fill solution.
Reading fluctuates up and down (noise).	Clogged/dirty junction. Low electrolyte level (reference electrode). Cable connection.	Clean the pH electrode. Refill reference electrode with fresh fill solution. Check cable connection to meter and verify protective cap is off.
While in pH reading mode, -2.00 or 16.00 pH is displayed blinking.	Reading out of range.	Check cable connection to meter and verify protective cap is off. Check the quality of the sample. Clean the electrodes. Refill with fresh fill solution.
The meter does not accept the pH buffer solution for calibration.	Broken pH or reference electrode.	Follow the electrode cleaning procedure. If the error persists replace the electrode or contact your local Hanna Representative.
The pump calibration can't be performed.	Broken pump tubing. Wrong or contaminated pump calibration solution. Broken pH electrodes.	Verify tubing, valve, syringe are intact and solution passes when pump is primed and no air bubbles are present. Check the pump calibration solution. Verify electrodes are calibrated. Prepare another standard, prime the pump and restart the calibration.
The temperature probe is connected, but the meter displays "MTC".	Broken temperature probe.	Replace temperature probe.

## Troubleshooting Guide

Symptoms	Problem	Solution
After a titration the following is displayed blinking: Low Range: 0.20 %I.a., 8.9 °SH, 20.0 °D or 22.2 °TH. High Range: 0.1 %I.a., 4.4 °SH, 10 °D or 11.1 °TH.	Broken electrode. Instrument not calibrated. Wrong sample. Concentration out of range.	Check/clean the electrodes. Recalibrate the instrument (pump and pH). Use care during sample preparation. Check sample size and permitted range.
At startup, the meter displays the Hanna logo permanently.	One of the keys is stuck.	Check the keyboard or contact your local Hanna Representative.
"Error x" message is displayed.	Internal error.	Power off the meter and then power it on again. If the error persists, contact your local Hanna Representative.
"Stirrer error" message is displayed at the end of pump calibration or titration.	Check the stir bar and beaker content.	If the error persists, contact your local Hanna Representative.
Non-spinning stirrer icon blinking in pH calibration and meter mode.	Check the stir bar and beaker content.	If the error persists, contact your local Hanna Representative.
"Pump error" message is displayed.	Check the tubing, valve and syringe.	If the error persists, contact your local Hanna Representative.
At startup the meter displays "Methods corrupted".	The method file was corrupted.	Contact your local Hanna Representative.

# Specifications

## Titration

Range	(Low Range): %l.a.: 0.01 to 0.20; °SH: 0.4 to 8.9; °D: 1.0 to 20.0; °TH: 1.1 to 22.2 (High Range): %l.a.: 0.1 to 2.0; °SH: 4.4 to 88.9; °D: 10 to 200; °TH: 11.1 to 222.2
Resolution	(Low Range): %l.a.: 0.01; °SH: 0.1; °D: 0.1; °TH: 0.1 (High Range): %l.a.: 0.1; °SH: 0.1; °D: 1; °TH: 0.1
Accuracy (@25°C/77°F)	(Low Range): ± 0.01 %l.a. (High Range): ± 0.1 %l.a.
Method	Acid-base titration
Principle	Endpoint titration, 8.30 pH adjustable pH 8.1 - 8.4
Sample Size LR 20	20 mL or 20 g
Sample Size LR 50	50 mL or 50 g
Sample Size HR 20	20 mL or 20 g
Pump speed	10 mL/min
Stirring Speed	800 (Low Range) / 1000 (High Range)
Logging Data	up to 200 samples (pH or mV)

## pH Meter

Range	-2.0 to 16.0 pH / -2.00 to 16.00 pH
Resolution	0.1 pH / 0.01 pH
Accuracy (@25°C/77°F)	±0.01 pH
Calibration	one, two or three-point calibration (pH 4.01, 6.00, 8.30, 10.01)
Temperature Compensation	manual or automatic from -20 to 120°C (-4 to 248°F)
Logging Data	up to 50 samples

## mV Meter

Range	-2000.0 to 2000.0 mV
Resolution	0.1 mV
Accuracy	± 1.0 mV



## Temperature

Range	-20.0 to 120.0°C (-4.0 to 248.0°F)
Resolution	0.1°C
Accuracy	±0.4°C without probe error

## Additional Specifications

pH Electrode	FC 260B pH electrode with 1 m (3.3') cable (included),
Reference Electrode	HI 5315 reference probe with 1 m (3.3') cable (included)
Temperature Probe	HI 7662-M stainless steel temperature probe with 1 m (3.3') cable (included)
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Power Supply	12 VDC adapter (included)
Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
Weight	1.9 kg (67.0 oz.)

### Reagents

---

<b>HI 84529-50</b>	Titration solution for Low Range 20 (120 ml)
--------------------	--

---

<b>HI 84529-51</b>	Titration solution for High Range 20 (120 ml)
--------------------	---

---

<b>HI 84529-52</b>	Titration solution for Low Range 50 (120 ml)
--------------------	--

---

<b>HI 84529-55</b>	Pump Calibration Standard (230 mL)
--------------------	------------------------------------

---

### pH Calibration Solutions

---

<b>HI 7004M</b>	Buffer solution pH 4.01 (230 mL)
-----------------	----------------------------------

---

<b>HI 70060M</b>	Buffer solution pH 6.00 (230 mL)
------------------	----------------------------------

---

<b>HI 70083M</b>	Buffer solution pH 8.30 (230 mL)
------------------	----------------------------------

---

<b>HI 7010M</b>	Buffer solution pH 10.01 (230 mL)
-----------------	-----------------------------------

---

### Electrode Fill and Storage Solutions

---

<b>HI 7072</b>	Reference electrode fill solution (4 x 30 mL)
----------------	---

---

<b>HI 70300L</b>	Electrode storage solution (500 mL)
------------------	-------------------------------------

---

### Cleaning Solution

---

<b>HI 70640L</b>	Cleaning solution for remaining milk deposits (500 mL)
------------------	--

---

<b>HI 70641L</b>	Cleaning and disinfecting for dairy products (500 mL)
------------------	---

---

<b>HI 70642L</b>	Cleaning solution for remaining cheese deposits (500 mL)
------------------	--

---

<b>HI 7077L</b>	Electrode cleaning solution for oils (500 mL)
-----------------	---

---

**Electrodes**

<b>FC 260B</b>	pH electrode
<b>HI 5315</b>	Reference electrode
<b>HI 7662-M</b>	Temperature probe

**Other Accessories**

<b>HI 70500</b>	Tube set with cap for titrant bottle, tip and valve
<b>HI 71005/8</b>	115 Vac to 12 Vdc, 800 mA
<b>HI 71006/8</b>	230 Vac to 12 Vdc, 800 mA
<b>HI 731319</b>	Stir bar, 25 x 7 mm (10 pcs.)
<b>HI 740036P</b>	100 mL Beaker (10 pcs.)
<b>HI 740037P</b>	20 mL Beaker (10 pcs.)
<b>HI 740236</b>	5 mL syringe for minititrator
<b>HI 920013</b>	PC Connection Cable

## Warranty

**HI 84529** is guaranteed for two years against defects in workmanship and materials when used for its intended purpose and maintained according to instructions. Electrodes and probes are guaranteed for six months. This warranty is limited to repair or replacement free of charge. Damage due to accidents, misuse, tampering or lack of prescribed maintenance is not covered. If service is required, contact your local Hanna Representative from whom you purchased the instrument. 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 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. To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.

Hanna Instruments reserves the right to modify the design, construction or appearance of its products without advance notice.

## Notes

# contacts

## World Headquarters

Hanna Instruments Inc.  
Highland Industrial Park  
584 Park East Drive  
Woonsocket, RI 02895  
[www.Hannainst.com](http://www.Hannainst.com)

## Local Office

Hanna Instruments USA  
270 George Washington Highway  
Smithfield, RI 02917  
Phone: 800.426.6287  
Fax: 401.765.7575  
e-mail: [tech@Hannainst.com](mailto:tech@Hannainst.com)

