

Multiple Probe 215 Liquid Handler User's Guide

Multiple Probe 215 Liquid Handler User's Guide

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Safety

Read this section before installing and operating the Multiple Probe 215 Liquid Handler.

The Multiple Probe 215 Liquid Handler is intended to be used in a laboratory environment by trained technical personnel.







For safe and correct use of this instrument, it is recommended that both operating and service personnel follow the instructions contained in this guide when installing, cleaning, and maintaining the liquid handler.

The following safety precautions must be observed during all phases of operation, service, and repair of the instrument. Failure to comply with these precautions or with specific warnings elsewhere in this user's guide violates safety standards of design, manufacture, and intended use of the liquid handler. Gilson assumes no liability for the customer's failure to comply with these requirements.

The Multiple Probe 215 Liquid Handler has been certified to UL, CSA, and CE Safety standards.



Safety

The following electronic and hazard symbols may appear on the instrument:

Symbol	Explanation
~	Alternating current Courant alternatif Wechselstrom
≡	Direct current Courant continu Gleichstrom
	Protective conductor terminal Borne de terre de protection Schutzleiteranschluss
	Electrical power ON Sous tension Netzschalter ein
O	Electrical power OFF Hors tension Netzschalter aus
	Caution Attention Vorsicht
	Caution, risk of electric shock Attention, risque de choc électrique Vorsicht, Elektroschockgefahr
	Caution, hot surface Attention, surface chaude Vorsicht, heiße Oberfläche
	Fuse Fusible Sicherung
 KEEP HANDS CLEAR OF PROBE!	Keep hands clear of probe Garder les mains éloignées de l'aiguille Halten Sie Hände fern von der Nadel

Safety

The following safety notices may appear in this document:

 WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, may result in serious injury
 CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury
NOTICE	NOTICE indicates a potentially hazardous situation which, if not avoided, may result in equipment damage

Voltage

Access to the rear panel is necessary. The liquid handler must be detached from all voltage sources before service, repair, or exchange of parts.

For normal operation, the liquid handler is to be grounded through the AC line cord provided. Failure to do so can result in a potential shock hazard that could result in serious personal injury.

Use only fuses with the rated current and of the specified type as listed on the rear panel of the instrument.

The instrument must only be operated with the voltage specified on the rear panel label of the instrument using a grounded AC line cord.

Probes

While operating the liquid handler, keep hands clear of probe to avoid risk of personal injury by piercing.

Because the probe installed on the Z-arm may contain a dangerous substance, do not interfere in the work area of the instrument until the liquid handler has completed its procedures.

Solvents

Observe safe laboratory practices when handling solvents. If dangerous liquids are used, adequate protection such as proper ventilation, safety glasses, etc., should be used.

Refer to the Material Safety Data Sheets for the solvents before use.

Replacement Parts

Be sure to use only original replacement parts, mentioned in **Chapter 4, Maintenance** and **Appendix A, Replacement Parts and Accessories**. Do not repair or change parts which are not listed in this user's guide. If it is necessary to change parts not listed, please contact your Gilson-authorized representative.

This chapter provides information on the following topics:

- **Description**
- **Unpacking**
- **Customer Service**
- **Technical Specifications**

Description

The Multiple Probe 215 Liquid Handler is a high-throughput automated liquid handler capable of tasks such as sample transfers, dilutions, mixing, reagent addition, and microplate reformatting. It features patented Dual Rail™ syringe drive technology, accurate use of four or eight syringes, and accommodates probes that fit all application requirements. The Multiple Probe 215 Liquid Handler is intended to be used in a laboratory environment by trained technical personnel.



Unpacking

The liquid handler is delivered with all major components already assembled except for auxiliary parts such as the Z-arm, syringes, probes, racks, tubing, etc.

The liquid handler and its components are shipped in two containers:

- One container holds the liquid handler. Keep this container and packing assembly in case the liquid handler must be returned to the factory.
- The other container holds the auxiliary parts and any additional accessories that you ordered for the liquid handler.

To remove the liquid handler from its container:

- 1 Grasp the free end of the strapping around the box. Pull away from the box. Be alert when it releases as the strapping is very taut. Repeat for the second piece of strapping.
- 2 Lift the outer box off and away from the liquid handler.
- 3 Lift the inner box off and away from the liquid handler.
- 4 Lift the unit off its base platform and place it on a lab bench or cart.

CAUTION Gilson recommends that two people lift the liquid handler off the base of the packing container.

NOTICE Do not attempt to lift the instrument from the Y-arm (the horizontal arm). Always lift the instrument from its base.

- a) Using the two cutouts for hand holds, place a hand at the base of the packing container.
- b) Grip the liquid handler under the base plate.
- c) Lift the unit up and out of the foam packing material. The side containing the electronics cabinet is the heavier side.

Standard Equipment

After the liquid handler and accessories have been unpacked from their containers, you should have the following:

Multiple Probe 215 Liquid Handler (part number 25101311)

Z-arm (125 or 175 mm) and control cable with retaining clip

Locator plate with one drain base (includes 4 mounting screws)

Accessories which include:

- Rinse drain package which includes: 8-liter waste bottle, rinse station with fittings, and 5 feet of Tygon waste tubing with quick-connect fitting
- 8 PTFE inlet tubings (650 x 3 x 2 mm) with 20 µm stainless steel filter
- Cable support rod with bracket and 2 Phillips-head attachment screws
- Tubing support rod
- Fuse drawers, fuses, and power cords
- 10-pin terminal block
- 8-pin terminal block
- 10 plastic locking twist ties
- 9/64" ball driver for removal of armlock
- Spiral Wrap

215 Utility Programs CD

Documentation

The following documents are included with the Multiple Probe 215 Liquid Handler.

- Multiple Probe 215 Liquid Handler Documentation CD
- Declaration of Conformity
- Installation Qualification/Operational Qualification Procedures

Accessories

Based upon your configuration, you also ordered and received additional accessories, such as probes, syringes, transfer tubing, racks, and so on. If necessary, refer to [Appendix A, Replacement Parts and Accessories](#) for part numbers.

Customer Service

Gilson, Inc. and its worldwide network of authorized representatives provide customers with the following types of assistance: sales, technical support, applications, and instrument repair.

If you need assistance, please contact your Gilson-authorized representative. Specific contact information can be found at www.gilson.com. To help us serve you quickly and efficiently, please refer to **Before Calling Us** on page 5-9.

Technical Specifications

Please be aware of the following before operating the liquid handler.

NOTICE Changes or modifications to the liquid handler not expressly approved by Gilson could void the warranty.

This instrument complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this instrument may not cause harmful interference, and (2) this instrument must accept any interference received, including interference that may cause undesired operation.

Shielded cables must be used with the liquid handler to ensure compliance with the FCC Class A limits.

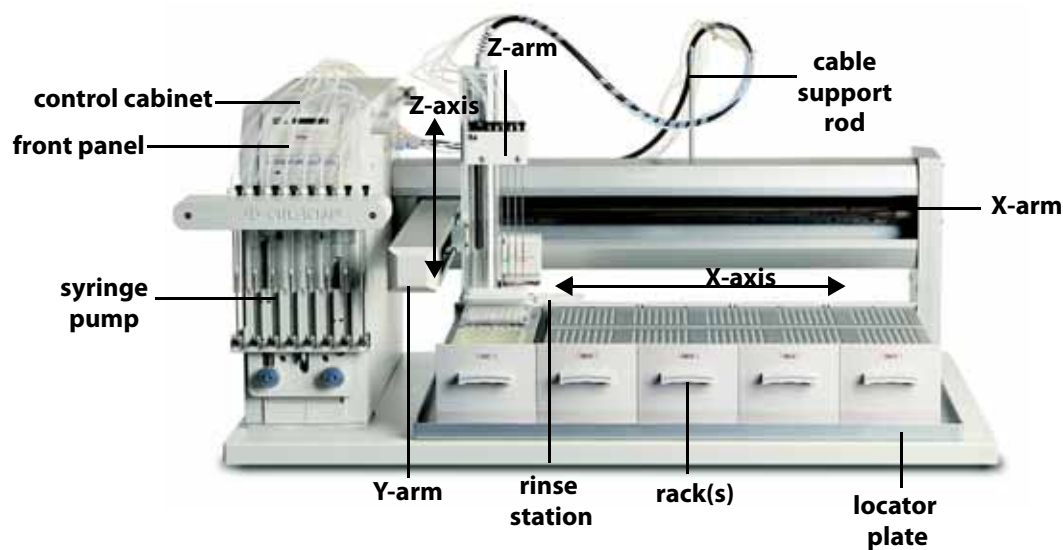
<i>Technical Specification</i>	<i>Definition</i>
Arm Speed	>45.7 cm/sec (>18 in/sec) in X dimension >40.6 cm/sec (>16 in/sec) in Y dimension
Communication Interface	RS-232 or GSIOC; Four inputs (contact closure, TTL, or open-collector), four relay outputs, and one switched +24V DC 1A output
Dimensions (W x D x H)	98 x 61 x 56 cm (39 x 24 x 22 in)* *Maximum height. Z-arm height is adjustable to accommodate vessel heights between 1 and 150 mm (dependent on installed Z-arm)
Environmental Conditions	Indoor use Altitude: up to 2000 m Temperature range: 5–40°C Air pressure: 75–105 kPa Humidity: Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
Front Panel	8-character display, START soft key and emergency STOP soft key
Horizontal Motion Strength	X: 5 kg (11 lbs) Y: 7 kg (15 lbs)

<i>Technical Specification</i>	<i>Definition</i>	
Injection Carryover	<0.05% Contact Gilson Customer Service to learn what methods and conditions were used to obtain this value	
Locator Plate Capacity	Up to five Code 200-series racks or One Code 505 or 505H rack plus one Code 200-series rack	
Power Requirements	Frequency: 50/60 HZ Voltage: 100–120 V or 220–240V, mains voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage Current rating: 2.0A for 100–120V or 1.0A for 220–240V	
Probe Positioning Performance	Accuracy: +/- 0.5 mm in X/Y dimensions +/- 1 mm in Z dimension Repeatability: +/- 0.25 mm in X/Y/Z dimension	
Probe Rinse	Probe rinsing occurs through a dedicated rinse station for rinsing the inside and outside of the probes	
Reproducibility	Liquid Handling	0.57% CV with 500 μ L of water
	Injection	<2.0% CV with 500 μ L syringe and partial loop filling method <5.0% CV with 500 μ L syringe and total loop filling method
	Contact Gilson Customer Service to learn what methods and conditions were used to obtain the values	
Sampler Type	X/Y/Z with stationary rack design	
Software	Gilson TRILUTION® LH Software	

Technical Specification		Definition
Syringe Capacity/ Flow Rates	Syringe Size	Maximum Flow Rate for Water
	100 µL	3.3 mL/min
	250 µL	8.4 mL/min
	500 µL	16 mL/min
	1000 µL	25 mL/min
	2500 µL	25 mL/min
	5000 µL	25 mL/min
Syringe Pump	Internal integral high-precision eight-piston syringe pump	
Vertical Punch Strength	0.6 kg/probe (1.4 lbs/probe)	
Volumetric Accuracy	Liquid Handling: 99.2% with 500 µL of water Contact Gilson Customer Service to learn what methods and conditions were used to obtain this value	
Weight	42 kg (93 lbs)	

This chapter takes you through the steps for setting up your Multiple Probe 215 Liquid Handler, which includes:

- **Locator Plate Installation**
- **Armlock Removal**
- **Z-Arm Installation**
- **Probe Installation**
- **Syringe Installation**
- **Plumbing Connections**
- **Rack Setup**
- **Final Z-Arm Adjustment**
- **Rear Panel Connections**



Locator Plate Installation

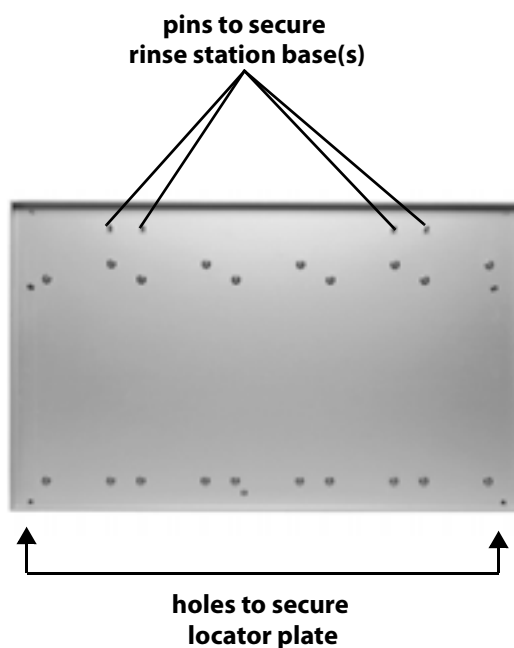
The locator plate serves two functions:

- Positions the racks and accessories that fit onto the bed of the liquid handler.
- Contains liquid spills, such as those caused by overflowing vessels.

The locator plate and its four mounting screws are shipped in a separate box with the liquid handler's accessories.

To install the locator plate onto the instrument bed:

- 1 Make sure the locator plate's rinse station base is at the rear of the instrument. (The locator plate will only install in this orientation.)
- 2 Align the four corner holes of the locator plate with the four holes on the instrument bed and lower the plate onto the bed.
- 3 Using a Phillips screwdriver, secure the locator plate using the four mounting screws.



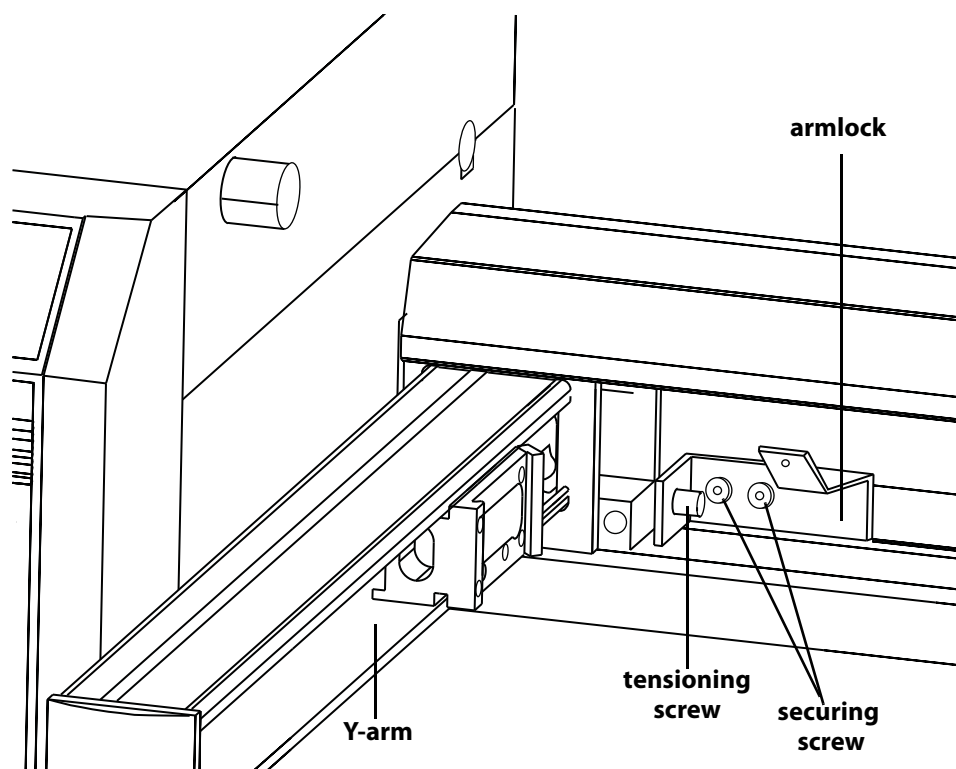
Armlock Removal

The armlock on the liquid handler secures the Y-arm during shipment. You must remove the armlock prior to installing the Z-arm and operating the instrument. If the armlock is not removed, the arm cannot move in the X direction. This results in an error state during operation.

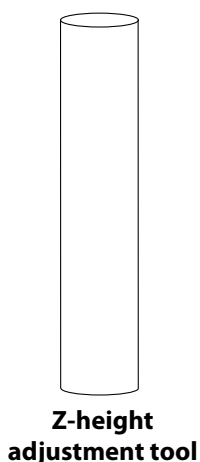
NOTICE If you need to move the liquid handler, always reinstall the armlock. This safeguards against mechanical damage.

To remove the armlock:

- 1 Remove the cardboard label in front of the armlock.
- 2 Using the 9/64" ball driver, loosen the tensioning screw that immobilizes the Y-arm.
- 3 Using the 9/64" ball driver, remove the two remaining screws that hold the armlock in place.
- 4 Remove the armlock and store it and ball driver for future use.



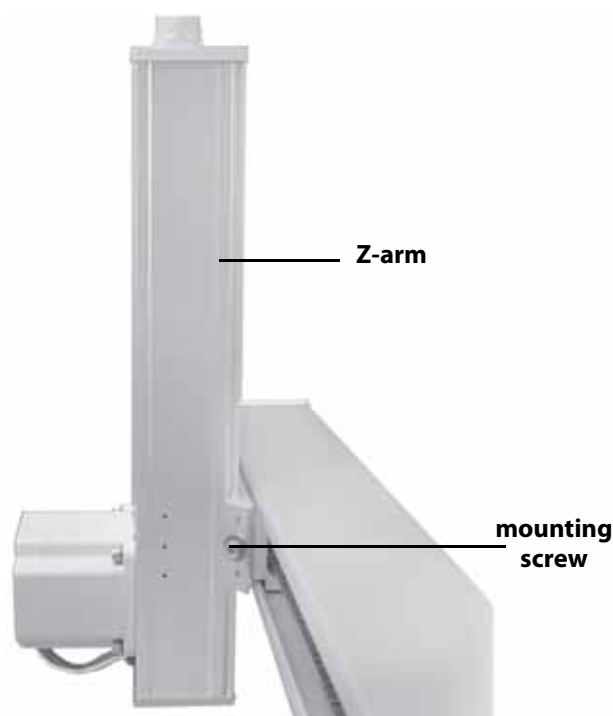
Z-Arm Installation



Z-Arm Installation

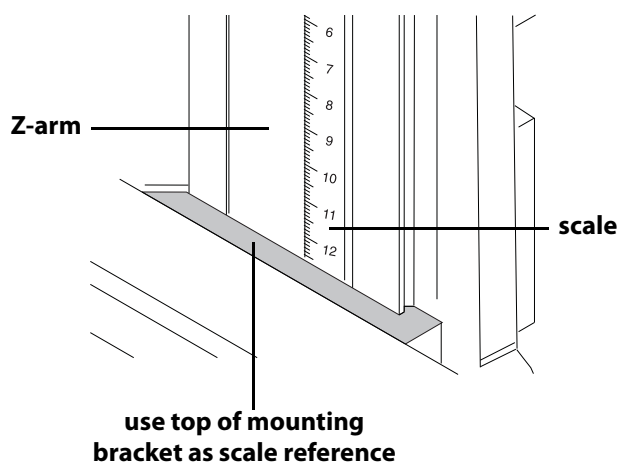
Follow these steps to install the Z-arm:

- 1 Locate the Z-arm and the Z-height adjustment tool that was shipped with the Z-arm.
- 2 Locate the Z-arm mounting bracket on the Y-arm and then slide it forward for easier access to the mounting screw.
- 3 Using a Phillips screwdriver, loosen the mounting screw. (Turn counterclockwise to loosen.)



- 4 Partially pull out the bracket. Do not remove completely.
- 5 Place the Z-arm into the mounting bracket. Insert one side of the Z-arm into place at a time.
- 6 Tighten the mounting screw on the Z-arm mounting bracket, but leave it loose enough so that the Z-arm can slide up and down.
- 7 Place the Z-height adjustment tool on one of its ends near the center of the locator plate (if necessary, remove any racks or accessories before doing this).
- 8 Manually move the arm so the Z-arm is centered over the Z-height adjustment tool.
- 9 While holding Z-height adjustment tool flat against the locator plate, use the other hand to lower the Z-arm until it lightly rests on the adjustment tool.

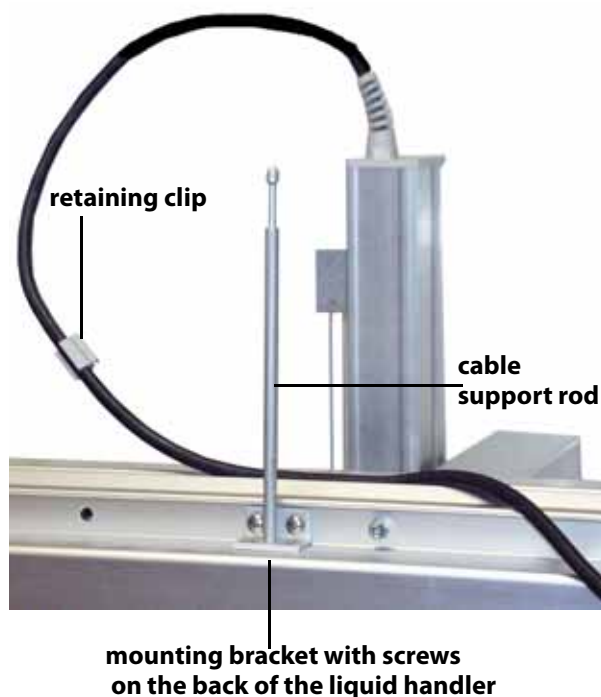
- 10 Tighten the screw on the mounting bracket until the Z-arm is secure.
- 11 While holding the adjustment tool in place, slide the Z-arm off the tool. Ensure that the bottom of the Z-arm lightly rubs against the adjustment tool as it moves.
- 12 Note the installed height of the Z-arm using the graduated scale located on one side of the arm and note it on this page. This clamp height is required when setting up parameters for the Z Height in the 215 Setup Utility as described on [page 3-13](#).



- 13 Store the Z-height adjustment tool.

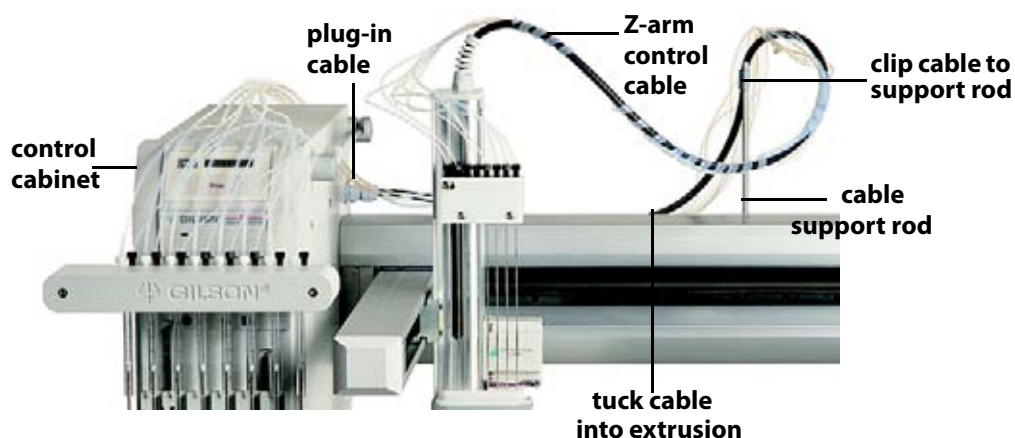
Install the Z-Arm Cable Support Rod

Use the two Phillips screws to attach the mounting bracket and cable support rod to the rear of the X-arm extrusion.



Z-Arm Connection

Plug the Z-arm control cable into the back topside of the control cabinet. The control cable should be tucked into the groove located in the top of the X-arm extrusion. The retaining clip that is already on the control cable should be snapped onto the top of the cable support rod. The control cable is correctly installed when the arm is extended to the extreme X and Y direction and the cable has enough slack. Refer to the diagram below.



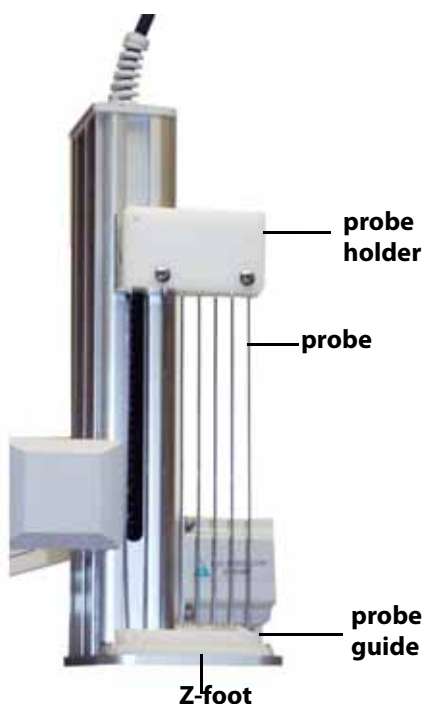
Probe Installation

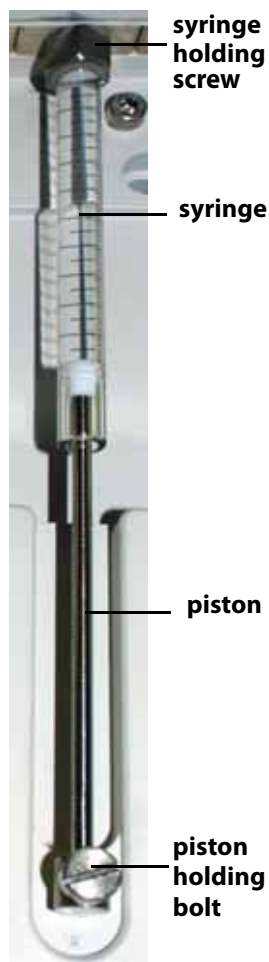
There are different probes available for use with the liquid handler. Depending on your application, you have purchased the appropriate probes and probe holder/guide kit. When installing the probes refer to the diagram that shows where they are installed on the liquid handler.

To install the probes:

- 1 Insert each probe into the top of the probe holder.
- 2 Pull the probe through the holder until the tip of the probe is in the probe guide.

Note: When installing only four probes for use with an 849 Multiple Injection Module, install the probes in positions 1, 3, 5, and 7.





Syringe Installation

The pistons on the syringe pump are shipped in the down position. If the pistons are not in the down position, refer to the instructions for changing a syringe in [Chapter 4, Maintenance](#). Those instructions detail how to lower the pistons.

NOTICE

The following procedure is important for correct syringe piston alignment. Improper alignment may cause premature piston seal failure.

When installing syringes, install the middle two syringes first and work outward. Only install syringes that will be used (i.e., four syringes for four probes). Or, disable the syringes that will not be used by removing the piston holding bolt.

To install each syringe refer to the diagram and instructions:

- 1 Remove a syringe from its package.
- 2 Lubricate the syringe's piston with reservoir solvent in order to reduce piston seal friction during installation. Push the piston into the syringe to make installation easier.
- 3 Remove the fourth piston holding bolt (counting from the left) from the syringe slide.
- 4 Finger tighten the syringe holding fitting into the fourth position in the solenoid valve retainer. Then pull the syringe's piston until it is aligned with the hole in the syringe slide.
- 5 Insert and finger tighten the piston holding bolt. Then using a screwdriver, tighten until snug.
- 6 To prevent pulling the syringe out of alignment when tightening the syringe holding fitting, use the bottom of the syringe retainer as a guide for the wrench. Then using a wrench, being careful not to hit the other syringes, tighten until snug.
- 7 Refer to the above steps to install the remaining syringes. Installing the syringes in the following order: 4, 5, 3, 6, 2, 7, 1, and 8 will maximize your work area when using the wrench.

Note: Remember the size of the syringes for later software configuration. (You can write the size in the margin here for reference.) See [Syringe Options](#) on page 3-10.

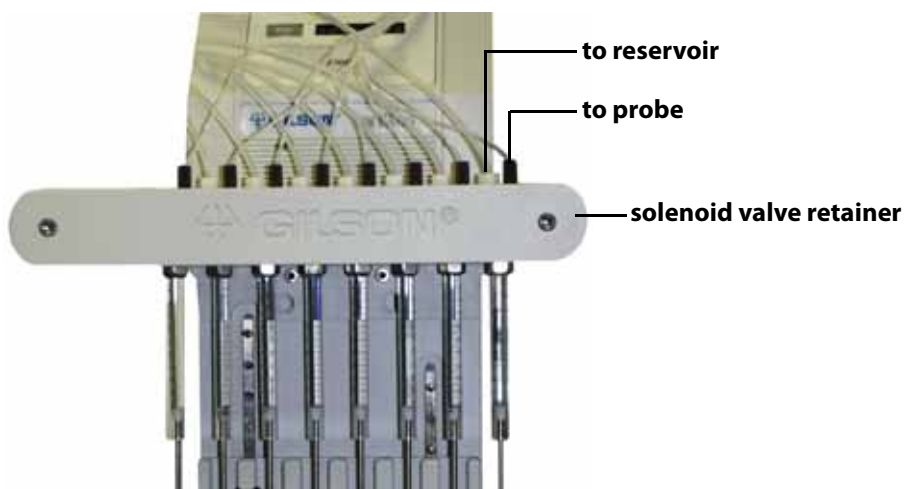
Plumbing Connections

Inlet Tubing Installation

You received eight lengths of inlet tubing (part number 3645357) with your liquid handler.

- 1 For each piece of inlet tubing, install its 1/4"-28 fitting into an "R" (reservoir) labeled hole located on top of the solenoid valve retainer.
- 2 Place the filtered end of the tubing into the bottle containing your diluent or probe rinse solution.

Note: If you need to lengthen the inlet tubing, order additional tubing (part number 49948392) and couplings (part number F1410153).



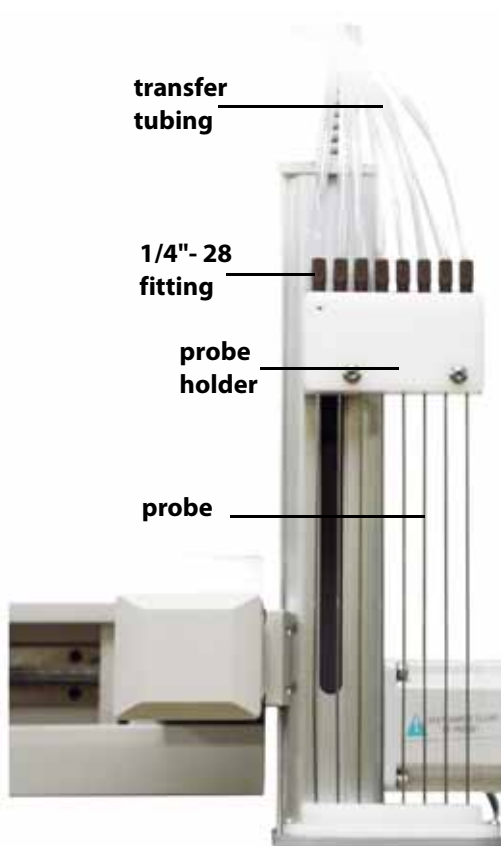
Transfer Tubing Installation

After installing the inlet tubing, install the transfer tubing.

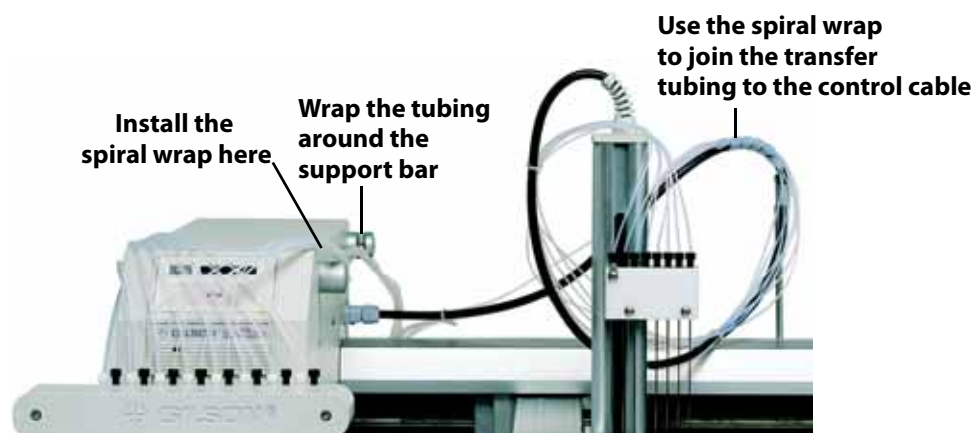
- 1 Install the tubing support rod in its brackets on the side of the control cabinet. Insert the front end of the rod into the hole before placing the back end of the rod in its cradle.
- 2 Starting with transfer tubing 1 and proceeding from left to right, connect one end of each tubing into a "P" (probe) labeled hole in the solenoid valve retainer. Finger tighten and then turn the fitting 1/4 turn with a wrench.

Note: If you're installing 5.5 mL tubing, connect the wider-head fitting to the solenoid valve retainer. The narrower-head (or headless) fitting attaches to the probe holder.

- 3 Lift the back end of the tubing support rod from its cradle. Then wrap the transfer tubing around the rod; wrap the tubing three or four times around the rod. Replace the tubing support rod.
- 4 Connect the other end of each transfer tubing to the corresponding position in the probe holder. Firmly tighten this fitting.



- 5 Locate the spiral wrap and cut two 4" lengths:
 - a) Install one piece of spiral wrap around the transfer tubing between the solenoid valve retainer and support rod.
 - b) Lower the Z-arm and then use the other piece of spiral wrap to join the transfer tubing to the control cable.



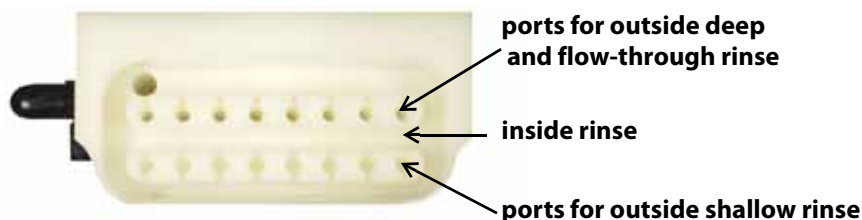
- 6 Gather any excess tubing into a coil to minimize the length of tubing and secure the coil using a twist tie. Position the excess tubing in a convenient location behind the liquid handler.
- 7 Move the Z-arm to the farthest location in the X and Y directions to ensure that the Z-arm can move freely. Reposition the spiral wrap if necessary, or cut and install additional lengths if necessary.

Rinse Station and Drain Waste Tubing Installation

Clean the probes using the rinse station. To eliminate liquid cross contamination, a rinsing procedure should pump an excess volume of reservoir solvent or probe washing solution through the probes and out into the rinse station. The small diameter of the rinse station ports allow the outsides of the probes to be washed along with the insides.

The rinse station's design accommodates three kinds of rinses:

- Inside Rinse (center trough) - Used for rinsing the inside of the probes and as a drain. Liquid is purged out of the probes to the drain.
- Outside Deep/Flow-Through Rinse (back row of rinse wells) - This type of rinse allows for a deeper insertion of the probe into the rinse wells resulting in a greater area of the outside of the probes to be rinsed. The flow-through rinse is used in applications where a rigorous wash of the probes' exterior is required. A second source of liquid is pumped to the rinse station to perform this type of rinse.
- Outside Shallow Rinse (front row of rinse wells) - Used for rinses after the probes have only been immersed in a few millimeters of sample.

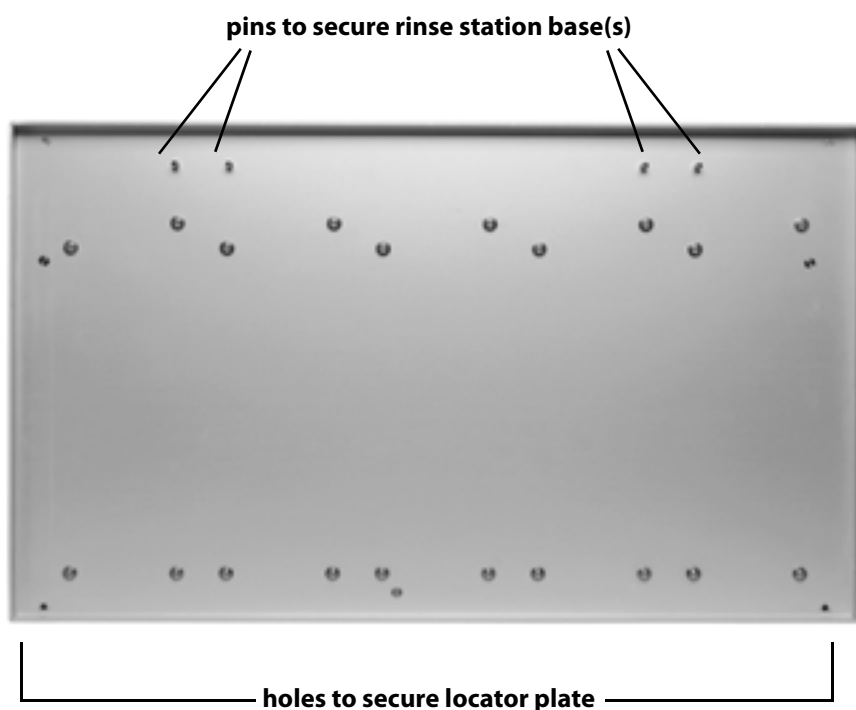


It may be necessary to vary the types and volumes of probe wash solutions to most efficiently eliminate carryover of particular compounds. Generally, the smaller the volume of probe wash solution used, the faster your automated liquid handling protocol.

Install the Rinse Station

The base of one rinse station is shipped already secured to the locator plate and is located at the left-rear of the locator plate. The locator plate can hold an optional second rinse station or you can move the rinse station base to an alternate location.

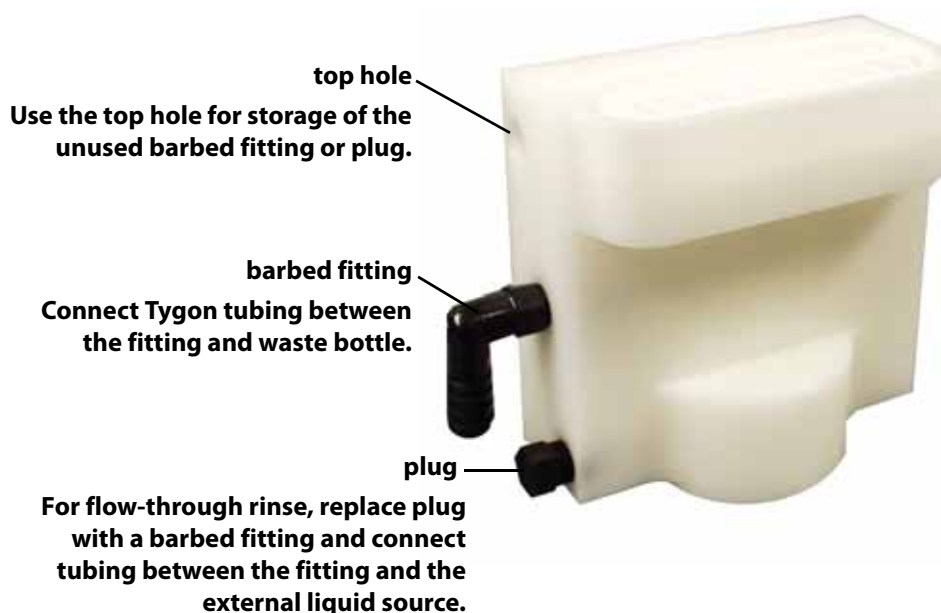
Before installing the rinse station, make sure the locator plate has been properly installed with the installed rinse station base located at the rear of the instrument bed.



To install the rinse station onto the base, follow these steps:

- 1 Align the triangle on the bottom of the rinse station with the base.
- 2 With the rinse station's fittings facing you, insert the rinse station into the base.
- 3 Press down and turn the rinse station clockwise. The rinse station is secure when you feel the rinse station snap into place. When installed correctly, the fittings point toward the control cabinet.
- 4 Connect waste tubing to the barbed fitting installed on the rinse station.

If you will be doing flow-through rinses, remove the plug installed on the rinse station and replace it with a barbed fitting. Connect tubing between the barbed fitting and the external liquid source.



Rack Setup

The Multiple Probe 215 Liquid Handler is equipped to locate Code 200- and 500-series racks. For a list of racks available for the liquid handler see [Appendix B, Racks](#).

Place the Code 200- or 500-series racks directly onto the locator plate:

- 1 Orient the rack so that the code number (for example, 200) is facing forward.
- 2 Fit the rack on the locator plate so that the slots and holes on the underside of the rack align with the pins on the locator plate.

Note: Although the Multiple Probe 215 Liquid Handler is equipped to locate all Code 200- and Code 500-series racks, not all vessel patterns are compatible with a four or eight probe configuration. For a list of racks available for use with multiple probes on the liquid handler see [Appendix B, Racks](#).

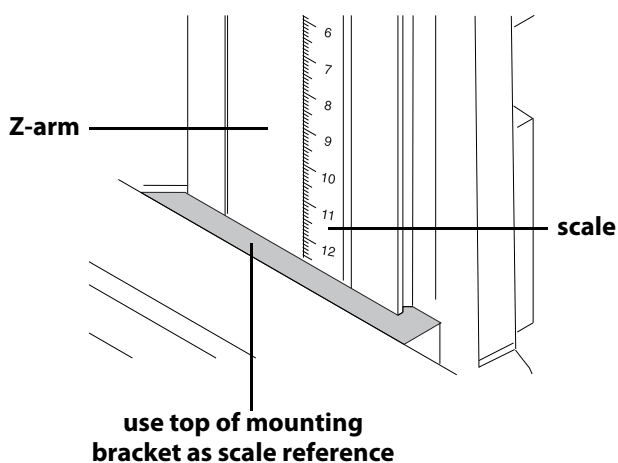
Final Z-Arm Adjustment

Follow these steps to verify that the Z-arm has been clamped high enough for the configuration:

- 1 Manually move the arm within the working area of the locator plate.
- 2 Verify that the arm passes approximately 5 mm above the top of the tallest vessel in a rack and above the rinse station.
- 3 If the arm passes freely and is not obstructed, continue the installation by making rear panel connections as described in the next section.

If the arm does not clear vessels or the rinse station:

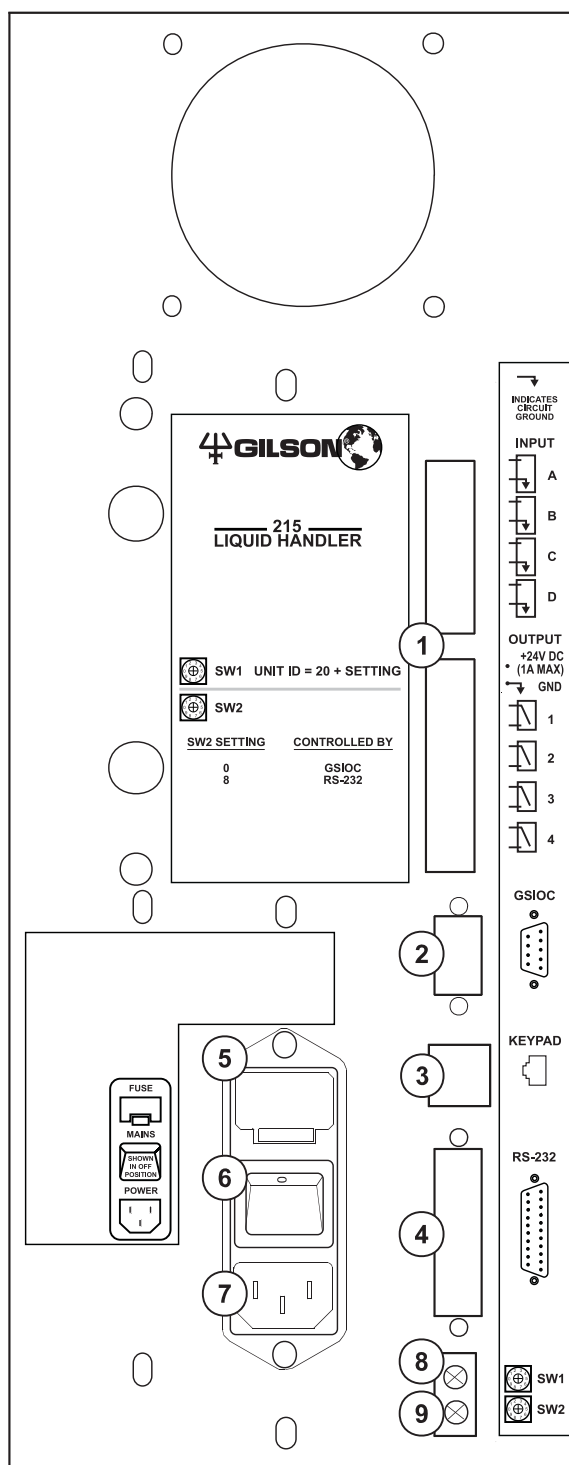
- a) Loosen the mounting screw so that the Z-arm can move up and down.
 - b) Raise the Z- arm up to clear the vessels and rinse station by a minimum of 5 mm.
 - c) Tighten the screw on the mounting bracket until the Z-arm is secure.
- 4 Note the installed height of the Z-arm using the graduated scale located on one side of the arm and note it on this page. Be sure to enter this new clamp height when setting up parameters for the Z Height in the 215 Setup Utility as described on [page 3-13](#).



Rear Panel Connections

Rear Panel Diagram


- 1 Input/Output ports
- 2 Gilson Serial Input/Output Channel (GSIOC) port
- 3 Keypad port (not used)
- 4 RS-232 port
- 5 Fuse drawer
- 6 Power switch
- 7 Power receptacle
- 8 SW1 (unit ID) selector
- 9 SW2 (control) selector



Input/Output Ports

You can use the input and output contacts found on the rear panel of the liquid handler to control peripheral devices. Refer to the [Rear Panel Diagram](#) on page 2-17 for the location of the input/output ports.

Inputs

The input terminal block of the liquid handler has four contacts. All of the inputs are paired, and each pair includes a GROUND reference ().

The contact input pairs are labeled A–D.

A contact is connected if it has a short across the input or is held low by a TTL output or other device.

Never connect voltages higher than 5V DC to an input. When using TTL signals, be sure to match GROUND connections.

Outputs

The output terminal block has five contacts. All of the outputs are paired.

Pins 1 and 2 supply ground and a +24V DC output. Do not use this output unless the receiving device can accept 24V power.

Outputs labeled 1–4 are paired, isolated-relay contact closures.

Make Connections

The following are needed to make connections:

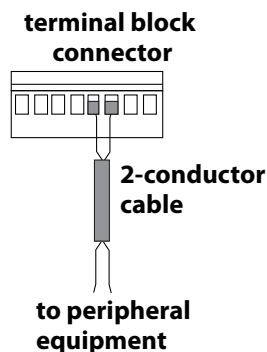
- terminal block connectors
- 2-conductor cable (22–30 gauge for each wire)

You can purchase a 6-foot piece of suitable cable (part number 709910206) or a package of 5 cables with identification markers (part number 36078155) from Gilson.

- wire insulation stripper
- small-blade screwdriver

To make connections using the 2-conductor cable:

- 1 Cut the cable into pieces of appropriate length.
- 2 Strip about 0.25 cm of insulation from each end of the cable.
- 3 Locate the appropriate green terminal block connector in the accessory package. The connector for inputs has eight terminals while the one for outputs has ten.
- 4 Insert each wire into the appropriate terminal on the terminal block connector. Push the wire all the way in and then tighten its corresponding pin screw.



Note: When making connections, be sure to maintain the correct orientation of the connector relative to the port. This is especially important if making connections to the +24V DC output.

- 5 Connect the terminal block connector to the liquid handler. The wires will be facing left and the pin screws will be facing you as you look at the rear of the instrument. Push the connector in as far as it will go. It is designed to fit snugly into its receptacle.
- 6 Connect the opposite ends of the wires to the other device(s). Be sure to match GROUND connections.
- 7 Label each cable to identify the purpose of the connection.

RS-232 Port

The RS-232 port is used to transfer information between the liquid handler and a computer. For the location of the RS-232 port, refer to the [Rear Panel Diagram](#) on page 2-17.

To connect your computer to the liquid handler, you need an RS-232 cable.

Connect the RS-232 Cable

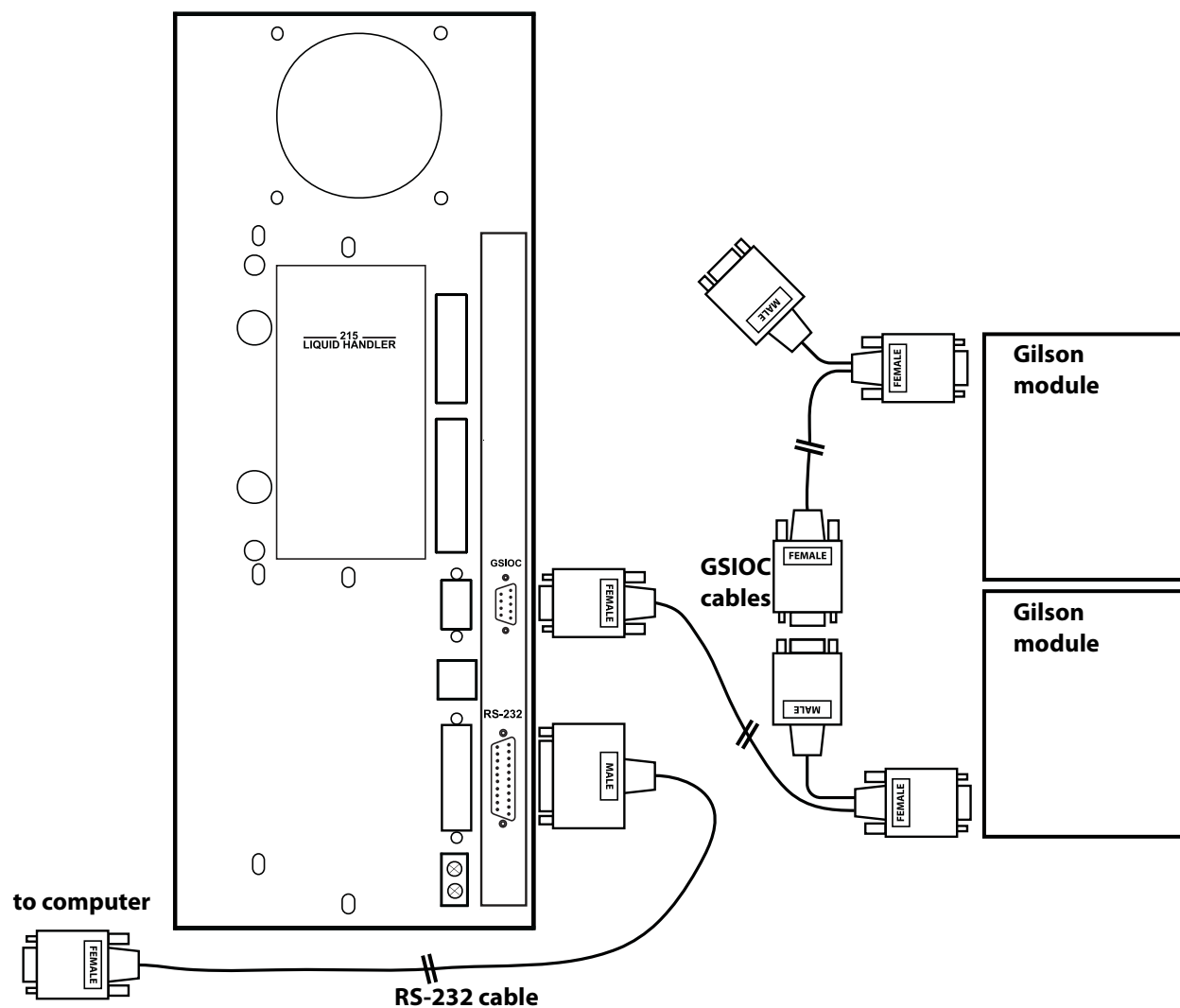
Attach the 25-pin, male end of the RS-232 cable to the RS-232 port located on rear panel of the liquid handler. Tighten the retaining screws.

Attach the female end of the RS-232 cable to the computer's RS-232 serial communications port. Tighten the retaining screws.

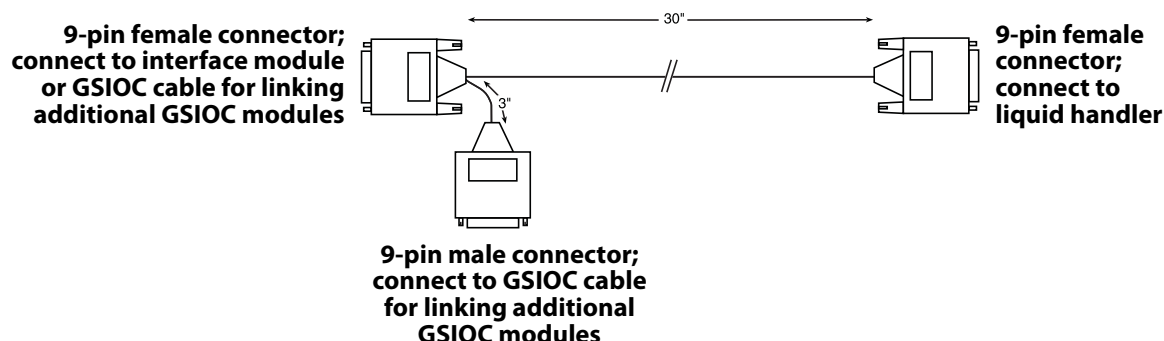
GSIOC Port

Use the GSIOC cable to link other instruments to the liquid handler and control all from one computer. A GSIOC cable has two 9-pin female connectors and one 9-pin male connector.

The following diagram shows the cabling connections between a computer, liquid handler, and GSIOC module.



Connect the female connector, located individually at one end of the cable, into the GSIOC port of the liquid handler. Tighten the retaining screws. (Refer to diagram below.)



Connect the other female connector, located on the same end as the male connector, to the Gilson module. Tighten the retaining screws.

If you are connecting more than one Gilson module, use the male connector to attach an additional GSIOC cable. Use the female connectors to connect each Gilson module.

Cables should be arranged in a linear fashion. Any “Y-branching” from the main GSIOC cable may increase noise.

SW1 (Unit ID) Selector

Use the SW1 selector to choose a different unit ID. Refer to the [Rear Panel Diagram](#) on page 2-17 for the location of the selector.

The unit ID identifies the liquid handler to Gilson software packages that can issue GSIOC commands to the liquid handler.

The unit ID is set to 22. There is no need to change this number unless it is the same as that assigned to another Gilson instrument that’s also connected along the GSIOC.

To change the unit ID:

- 1 Gently insert a small flat blade screwdriver into the SW1 selector on the rear panel and turn it.
- 2 Align the white dot with one of the indicated numbers. The unit ID is 20 plus the selected number.

SW2 (Control) Selector

Use the SW2 selector to set the liquid handler for GSIOC control. For the location of the selector, refer to the diagram on [page 2-17](#).

The SW2 selector is set to 8, indicating that the liquid handler is set for RS-232 control.

Change the setting to 0 (zero) if the liquid handler is connected via the GSIOC to a Gilson system and is being controlled by Gilson control software.

To change the control setting:

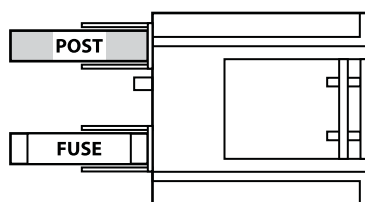
- 1 Gently insert a small flat blade screwdriver into the SW2 selector on the rear panel and turn it.
- 2 Align the white dot with one of the indicated numbers.

Fuse Installation

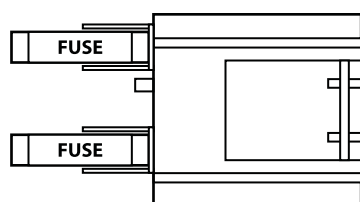
You received the liquid handler without any fuses installed.

To install the fuses:

- 1 Locate the accessory package containing the fuse drawer appropriate for your line voltage.
- 2 Locate the accessory package containing the 2.5A "T" Slo-Blo (5 x 20 mm size) fuses.
- 3 Install the fuse(s) into the fuse drawer. The fuse drawer for 100/120V accepts one fuse. The fuse drawer for 220/240V accepts two fuses.



**Fuse Installation for
100/200 voltage**



**Fuse Installation for
220/240 voltage**

- 4 Insert the fuse drawer into its receptacle in the liquid handler. For the location of the receptacle, refer to the [Rear Panel Diagram](#) on page 2-17.

Power Cord Connection

Locate the appropriate power cord for your line voltage.

Use the power cord to connect the liquid handler to a power source.

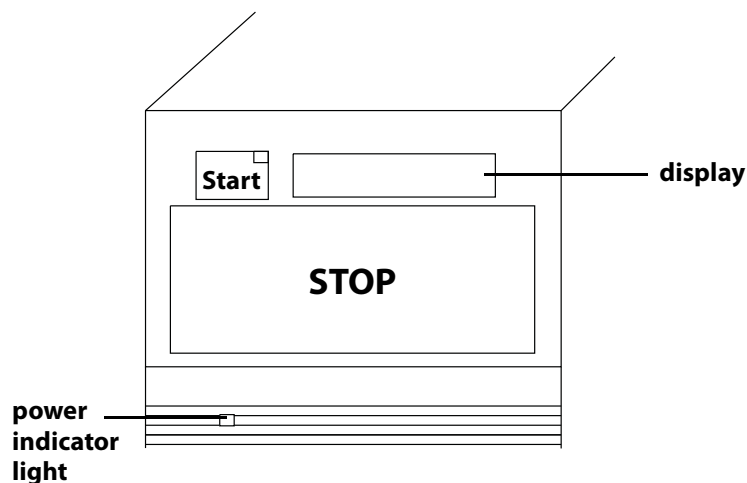
TRILUTION® LH Software provides programmed control of the Multiple Probe 215 Liquid Handler.

This chapter provides the following information:

- A description of the **Front Panel** of the liquid handler
- How to **Start Up** the liquid handler
- How to use the **215 Setup Utility**
- Instructions for using the **215 Priming Utility**
- How to **Test the Liquid Handler's Contacts**

Front Panel

The front panel of the liquid handler contains a Start button, Stop button, display, and power indicator light.



Start Button

The Start button can be used to home the XYZ-arm when the liquid handler is first powered up or when the motors for the XYZ-arm have been relaxed. When pressed, the yellow display light is turned on.

Stop Button

The Stop button is a large touch-sensitive pad that can be used to stop the liquid handler and also relax the motors for the XYZ-arm so that you can easily lift the probes and move the arm. When pressed, the yellow display light is turned off.

In a situation where an emergency stop is required, pressing the Stop button immediately stops the liquid handler. The stop button is designed to be sensitive enough that if you just brush it with your hand, it activates.

Display

The 8-character display shows the current status of the liquid handler and any error codes as they are encountered. Your program can also contain instructions for showing 8-character messages on the display when the program is run.

Refer to [Chapter 5, Troubleshooting](#) for a list of current error codes and required actions.

Power Indicator Light

This indicator becomes lit when you turn on power to the liquid handler using the power switch located on the rear panel. Refer to the [Rear Panel Diagram](#) on page 2-17, if necessary.

Start Up

To start the liquid handler:

- 1 Make sure that the armlock has been removed.
- 2 Make sure that the liquid handler is connected to a power source.
- 3 Turn on the liquid handler using the power switch located on the rear panel. Refer to the **Rear Panel Diagram** on page 2-17, if necessary. The power indicator light on the front panel illuminates.

When power is turned on, the liquid handler beeps and displays the current version of its installed firmware. This message appears for about one second before the display returns to a blank state.

In order to determine what PROM version is installed in your liquid handler, you may need to turn the unit off then on again and watch the display for the version number to appear.

- 4 After the liquid handler powers up, press the Start button. This initiates the homing sequence that allows the liquid handler to determine its mechanical reference positions. The sequence takes approximately one minute to complete.

While the homing sequence progresses, the display shows *Homing*. When the sequence completes, the display is blank.

215 Utility Programs

The 215 Utility Programs CD-ROM, provided with your liquid handler, supplies the following utility programs:

215 Setup Utility - Specifies configuration parameters for the liquid handler.

215 Priming Utility - Primes the transfer tubing.

215 Contact Test Utility - Enables you to test contact connections.

215 Injection Z-Height Utility - This utility is not applicable for the Multiple Probe 215 Liquid Handler.

Install 215 Utility Programs

Follow the on-screen instructions.

When prompted, restart the computer.

1



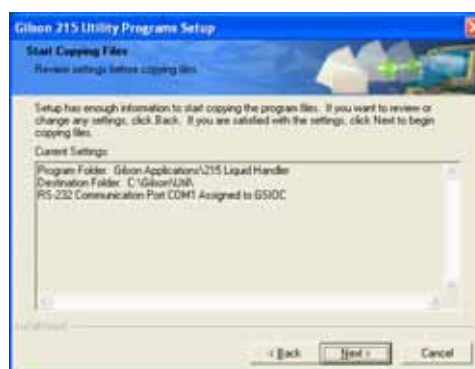
2



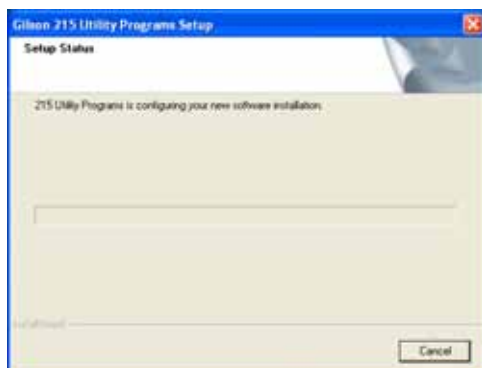
3



4



5



6



Start 215 Utility Programs


Windows® 2000/XP

For communication to occur, the Multiple Probe 215 Liquid Handler must be connected via an RS-232 or GSIOC to RS-232 connection to the computer. For information about making these connections, see [Chapter 2, Installation](#).

To start a utility program, click **START | ALL PROGRAMS | GILSON APPLICATIONS | 215 Liquid Handler** and then select a utility program from the list.

Help

On-line help is included for the 215 Utility Programs. The on-line help describes commands and dialogs displayed in the software and the procedures needed to perform tasks.

Click  to display help about the dialog box.

215 Setup Utility

The liquid handler comes with its configuration set by Gilson. Configuration information is stored in the non-volatile memory of the liquid handler. Prior to using the liquid handler for the first time, it is important to review and adjust the default configuration to make sure it is correct for your application.

The following pages describe how to configure a liquid handler using the 215 Setup Utility. Refer to the online help for assistance.

The 215 Setup Utility allows you to review and if necessary change the configuration options set for the liquid handler.

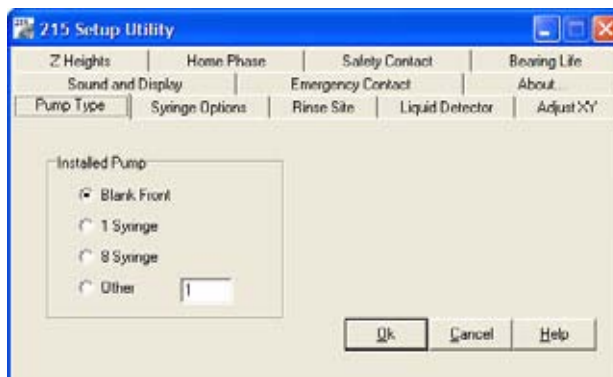
When you execute the utility program from your computer, the following screen with menu tabs appears:



Section	Described on
About...	page 3-17
Adjust XY	page 3-12
Bearing Life	page 3-15
Emergency Contact	page 3-16
Home Phase	page 3-14
Liquid Detector	page 3-11
Pump Type	page 3-9
Rinse Site	page 3-11
Safety Contact	page 3-15
Sound and Display	page 3-16
Syringe Options	page 3-10
Z Heights	page 3-13

Pump Type

Use the Pump Type tab to set the type of syringe pump installed in the instrument. If the pump type actually installed does not match the setting indicated here, an error will occur during operation.



Pump type selections are:

- Blank Front (no syringe pump is installed)
- 1 Syringe (not used for the Multiple Probe 215 Liquid Handler)
- 8 Syringe
- Other (for future use)

To store the pump type to memory, click **OK**.

To display the pump type currently set in the memory, click **Cancel**.

Syringe Options

Under the Syringe Options tab, you indicate the size of the installed syringes or click the Lower Syringe button so you can install new syringes.

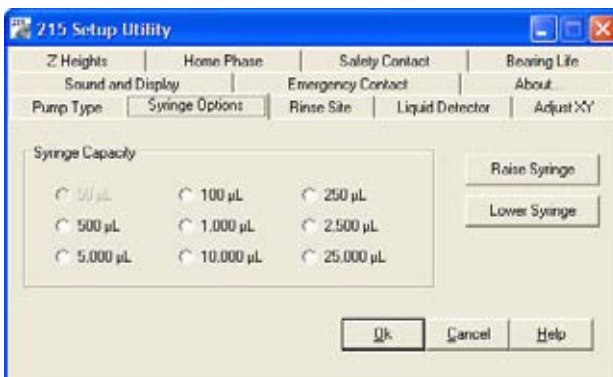
Use the option buttons to select the correct syringe size in microliters. If you do not know the size of the syringes installed, check the containers in which the syringes were shipped for size information. An incorrect setting can cause improper volumes to be aspirated or dispensed during liquid handler operation or can cause an error to occur.

To store the syringe capacity to memory, click **OK**.

To display the syringe capacity currently set in the memory, click **Cancel**.

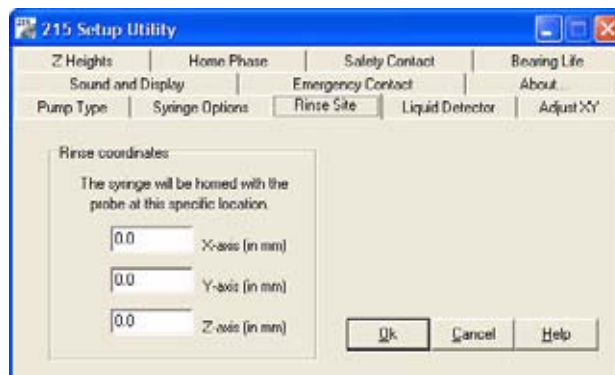
Clicking **Lower Syringe** facilitates replacement with a new syringe by causing the syringe pistons to move to the bottom of the stroke.

Clicking **Raise Syringe** facilitates replacement with a new syringe by causing the syringe pistons to move to the top of the stroke.



Rinse Site

The instrument stores the location of a rinse site in memory. This allows the instrument to move to this location before homing the syringe and prevents the spilling of waste liquid or rinse diluent.



Review, and if necessary, change the rinse site coordinates. Refer to the following table to select the correct X, Y, and Z coordinates (in millimeters) depending on the location of the rinse station (default is left-side) and the kind of probe rinse to be performed. The coordinates identify the rinse site for the left-most probe installed on the Multiple Probe 215 Liquid Handler.

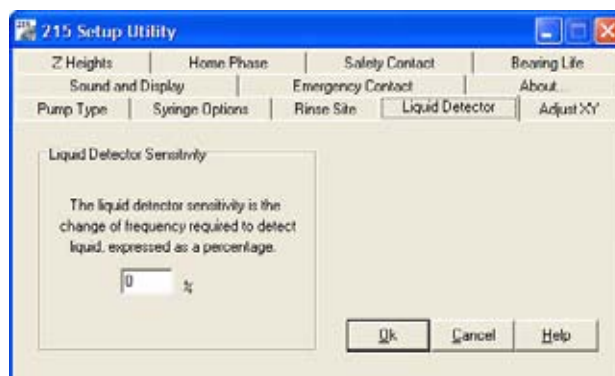
	<i>Left-side rinse station</i>			<i>Right-side rinse station</i>		
	<i>X</i>	<i>Y</i>	<i>Z</i>	<i>X</i>	<i>Y</i>	<i>Z</i>
Shallow-pocket rinse	82.9	16.5	100.0	441.6	16.5	100.0
Deep-pocket and Flow-through rinse	82.9	3.8	47.5	441.6	3.8	47.5

To store the rinse site coordinates to memory, click **OK**.

To display the rinse site coordinates currently set in the memory, click **Cancel**.

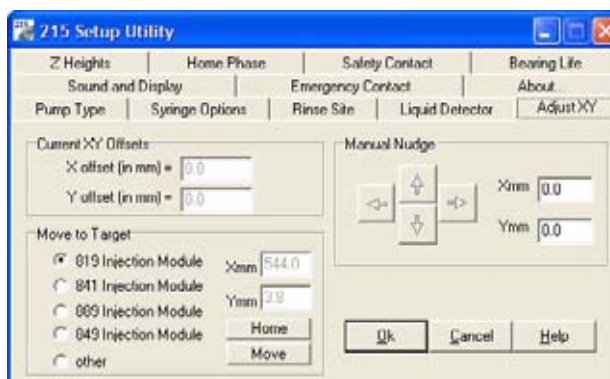
Liquid Detector

The Liquid Detector tab is not applicable for the Multiple Probe 215 Liquid Handler.



Adjust XY

The Adjust XY tab allows you to test whether the instrument is properly adjusted and to make minor adjustments to the X- and Y-axis offsets if needed. You may need to use the options under this tab if the probe is not accessing the injection port of the injection module installed or the vessels in the installed racks.



The X offset and Y offset text boxes display the current offsets stored in the instrument's memory.

To determine if the probe needs to be adjusted in the X or Y direction:

Select the model of the injection module that is on your Multiple Probe 215 Liquid Handler (likely an 849 Injection Module) or select other for a user-defined test point. The default X,Y coordinates are shown next to the model number.

<i>Injection Module</i>	<i>Coordinates</i>
<i>849:</i>	X-coordinate: 336.1 mm Y-coordinate: 3.8 mm
<i>other:</i>	

Z Heights

Use the Z Heights tab to identify the size of the installed Z-arm and the height at which the Z arm is clamped.

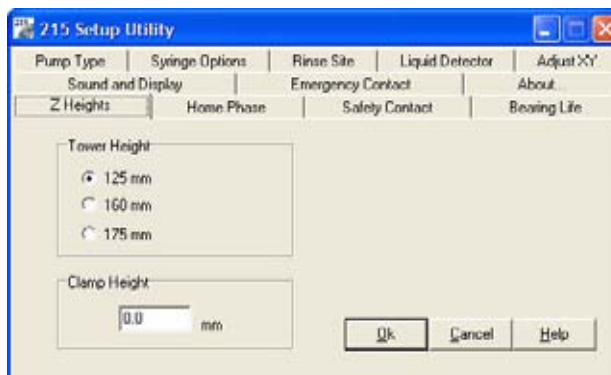
Use the option buttons to select the correct tower height in millimeters.

Setting the tower height of the Z-arm determines the amount of possible travel in the Z-axis. If you do not know the height of the tower installed, check the Z-arm for a label or the container in which the tower was shipped for height information. An incorrect setting could cause the probes to be damaged during liquid handler operation.

The Z-arm can be clamped at an adjustable height over the locator plate. You can set this height so that the liquid handler is able to properly find heights that you specify. Type the clamp height in millimeters. A clamp height of 0 mm means the bottom of the Z-arm is flat on the locator plate.

To store the selected Z-height settings to memory, click **OK**.

To display the Z-height settings currently set in memory, click **Cancel**.



Home Phase

Use the Home Phase tab to display the current X and Y phase of the instrument.

Clicking **Start** causes the liquid handler to perform the phase procedure. This procedure consists of the liquid handler homing itself 10 times.



The liquid handler finds out where home is located by "feeling" for the back and left walls of the unit. The liquid handler expects to find these walls in the same place each time. If it does not, you will get an error. If this error was caused by an obstruction, just clear the obstruction and try again. If the problem does not clear or if a change is made to the mechanics, you will probably need to repeat this option to find the true home location.

Once the process completes, the spreadsheet displays the values generated from each phase procedure.

To store the new phases to memory, click **OK**.

To display the home phase information currently set in memory, click **Cancel**.

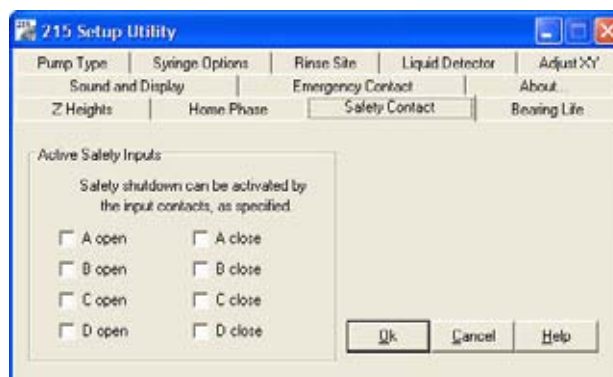
Safety Contact

The instrument has provisions for connecting safety devices that your application may require, as long as they present a contact closure or TTL type interface. The

Safety Contact tab allows you to specify which input contact is connected to the safety device and what is the active state of that device. The function of the safety contact is equivalent to pressing the Stop button on the instrument's front panel.

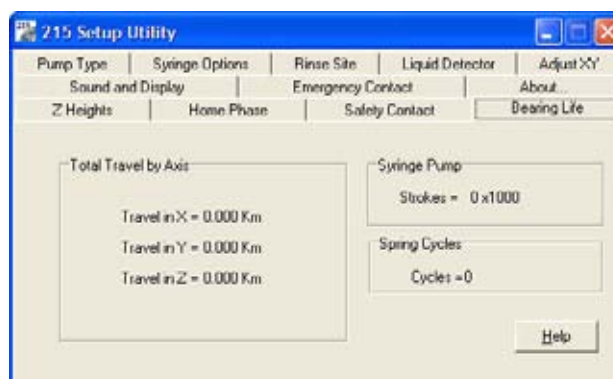
To use this option, choose one or more of the check boxes and then click **OK** to store the information to memory.

Or, to display the safety contacts currently set in memory, click **Cancel**.



Bearing Life

The Bearing Life tab displays the XYZ travel in kilometers, the number of full strokes performed by the syringe pump (if applicable). Spring Cycles is not applicable to the Multiple Probe 215 Liquid Handler.



Sound and Display

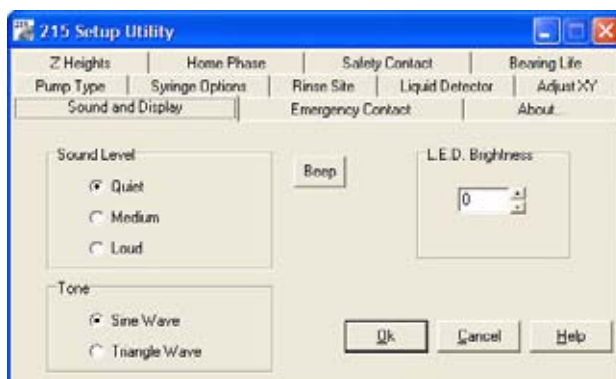
Use the options in the Sound / Display tab to adjust the brightness of the display, sound level, and tone.

Clicking **Beep** tests the sound level and tone that are currently selected.

For the display brightness, you can select a range of 0 through 7 where 0 is the dimmest and 7 is the brightest. Default setting is 5.

To store the selected options to memory, click **OK**.

Or, to display the options currently set in memory, click **Cancel**.



Emergency Contact

The emergency contact option provides for sending a signal to a peripheral device whenever the 215's Stop button is pressed or safety input is activated.



To store changes to the emergency contacts, click **OK**.

To display the emergency contact(s) currently set in memory, click **Cancel**.

About...

The About tab allows you to indicate the unit ID of the instrument being configured so the 215 Setup Utility can communicate with that instrument.



This tab also lists software version and copyright information for the 215 Setup Utility.

The Set Type button allows you to manually set the type of 215 you are using. Unless the Non-Volatile RAM has been cleared, this information will appear automatically.

Next to the "Model 215 Unit ID" text box you will see the following:

Multiple Probe 215 = 215MULvX.XX

To change this setting, click the drop down menu next to the Set Type button and select the appropriate 215 type. Click **Set Type** to accept the change.

215 Priming Utility

The 215 Priming Utility primes your syringes and transfer tubing lines with liquid from your syringe pump's reservoir. Gilson recommends using the 215 Priming Utility before using the liquid handler for the first time or if the liquid handler has not been used for some time. Using the software will eliminate air in the transfer tubing.

Start the Priming Cycle

In the software, indicate a priming speed (in milliliters per minute). Then click on the **Prime** option button. Before priming begins, the liquid handler homes the probes and then moves them to the rinse station. When the probes are at the rinse station, priming begins.

Pause the Priming Cycle

You can pause the priming cycle at any time by clicking on the **Pause** option button. If a pause is activated while the syringes are in a downward motion, the software stops the syringes at the bottom of the stroke. If a pause is activated while the syringe pump is in an upward motion, the software stops the syringes at the top of the stroke. When you pause the priming cycle, 'Pause' appears on the liquid handler's display. To continue the priming cycle, click on the **Prime** option button.

Stop the Priming Cycle

To terminate priming, click the **Stop** option button. This causes the syringes to home.

Exit the Software

Click **Done** to close the software.

Test the Liquid Handler's Contacts

The 215 Contact Test Utility allows you to activate output contacts that determine if the correct contact connections are made to peripheral devices controlled by the liquid handler. It also identifies the state of input contacts.

Before using this program, you need to connect the peripheral device's inputs to the appropriate output pair on the liquid handler. If necessary, refer to [Input/Output Ports](#) on page 2-18 for information on making contact connections.

While the 215 Contact Test Utility is running, the program continuously displays the state of outputs and inputs. When an output contact is active, a check displays next to the output contact and when inactive, it remains blank. For example, to activate output contact 24V, click the toggle box next to 24V. A check displays indicating 24V is active. Click the toggle for an active output contact and it becomes inactive.

To exit the software, click **Done**.

To obtain optimum performance and maximum life from the Multiple Probe 215 Liquid Handler, it is important to keep the instrument well-maintained.

The Multiple Probe 215 Liquid Handler is intended to be used in a laboratory environment by trained technical personnel.

This chapter contains the following information to help you to maintain your liquid handler:

- **Helpful Hints**
- **Cleaning**
- **Replace Parts**
- **Check Position Alignment**
- **Transport the Liquid Handler**

Helpful Hints

In order to keep your liquid handler at peak performance, Gilson recommends that you do the following:

- Change or clean the piston seals and tubing regularly to maintain maximum syringe pump performance.
- Do not cycle the syringe pump without fluid. Doing this causes excessive piston seal wear.
- Flush the syringe pump, probes, and rinse stations daily with distilled or deionized water. On a weekly basis, flush with a 10% solution of bleach or weak detergent.
- If bubbles remain in the syringes after priming, clean the syringes with alcohol.
- Check periodically to ensure that all fittings are tight.
- Check that each syringe is tightly connected to the solenoid valve retainer and multiple probe syringe slide. Refer to diagram on next page.
- Wipe up all spills immediately.
- Cold fluids may cause leakage; warm fluids to room temperature before running them through the system.

Cleaning

Clean the Liquid Handler

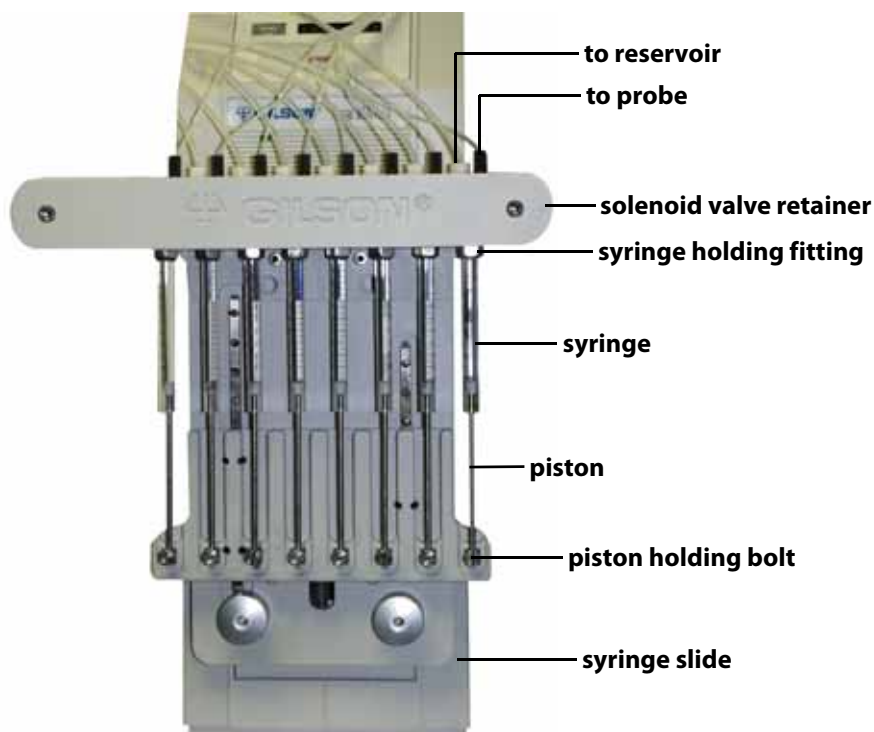
The liquid handler should be cleaned occasionally using a dry, clean cloth. Or, if necessary, use a cloth dipped in soapy water. If liquid is accidentally spilled on the liquid handler, wipe the instrument using a dry, clean cloth.

Clean a Syringe

Clean a syringe when some or all of the following occurs:

- Corrosive or hazardous liquids have been pumped
- Possible back flow of liquids into the waste tubing
- Leakage
- Aspiration of samples or reagents into a syringe

To clean a syringe, follow the procedures on the next page and use the diagram below as a reference.



Remove Syringe

Before cleaning a syringe, disconnect it from the solenoid valve retainer and multiple probe syringe slide as described below. The following procedures use the 215 Setup Utility.

- 1 Start the 215 Setup Utility, described on [page 3-8](#).
- 2 Select the Syringe Options tab. The option button for the installed syringe size is selected. Click **Lower Syringe**. This causes the piston to descend as the syringe pump aspirates from the reservoir. The syringe pump will stop at the bottom of the stroke, switching the valve to the outlet position.
- 3 After the syringe has been lowered, remove the syringe's piston holding bolt from the syringe slide.
- 4 Unscrew the syringe from the solenoid valve retainer. You may need to use a wrench or needle-nosed pliers to accomplish this step.

Clean Syringe

After the syringe has been removed, it can be cleaned:

⚠ CAUTION To prevent injury, observe good laboratory practices when handling solvents. Know the physical and chemical properties. Refer to the Material Safety Data Sheets for the solvents used.

- 1 Place the syringe in a beaker containing methanol. Then aspirate and dispense several volumes of methanol through the syringe.
- 2 Place the syringe in a beaker containing distilled or deionized water. Then aspirate and dispense several volumes of water through the syringe.
- 3 Hold the syringe housing in one hand. Clean the syringe using a non-abrasive cloth dampened with alcohol. Remove the piston and clean the piston with a non-abrasive cloth dampened with alcohol.
- 4 Dry the syringe and piston using a clean, lint-free cloth.

Reinstall Syringe

When the syringe is clean, reinstall it:

- 1 Lubricate the piston with reservoir solvent in order to reduce friction on the piston seals during reinstallation.
- 2 Finger tighten the syringe holding fitting into the solenoid valve retainer. Then using a wrench, tighten the screw 1/8 turn.
- 3 Pull the syringe's piston until it is aligned with the hole in the syringe slide.
- 4 Insert and finger tighten the piston holding bolt. Then using a flathead screwdriver, tighten the screw 1/4 turn.

Clean the Fluid Path

Depending upon your use of the liquid handler, it may be necessary to flush the entire fluid path. When flushing the fluid path it is recommended to use a volume that is equal to ten times the syringe volume plus the transfer tubing volume times the number of syringes.

flush volume =

10 * (syringe volume+ transfer tubing volume) * number of syringes

It's important to clean the fluid path if you won't be using the liquid handler for a while or if you're using a solution with a high salt concentration for a probe wash or as a diluent.

⚠ CAUTION To prevent injury, observe good laboratory practices when handling solvents. Know the physical and chemical properties. Refer to the Material Safety Data Sheets for the solvents used.

Refer to the instructions below:

- 1 Prime the fluid path with distilled or deionized water.
- 2 Flush the fluid path with 30% ethanol. The fluid path has now been cleaned appropriately for weekend storage (or longer).
- 3 Prime and flush the fluid path with distilled or deionized water before running applications.

Cleaning Methods

Depending on the samples or reagents that come into contact with the fluid path, you may need to vary your cleaning methods accordingly. Use the following cleaning protocols as references and make any changes to them as required for the samples and reagents being pumped for your application.

Proteins and peptides - Follow this procedure if the fluid path is in contact with proteins and peptides:

CAUTION To prevent injury, observe good laboratory practices when handling solvents. Know the physical and chemical properties. Refer to the Material Safety Data Sheets for the solvents used.


- 1 Prime the fluid path with distilled or deionized water.
- 2 Flush the fluid path using a weak detergent solution.
- 3 Pause the priming sequence.
- 4 After 30 minutes, resume flushing and priming the fluid path using distilled or deionized water to pump the remaining detergent from the tubing into a waste container.
- 5 When you're satisfied that the entire fluid path has been flushed with water, end the priming sequence.

Acidic compounds, basic compounds, or salt solutions - Follow this procedure if the fluid path is in contact with acidic compounds, basic compounds, or salt solutions:

CAUTION To prevent injury, observe good laboratory practices when handling solvents. Know the physical and chemical properties. Refer to the Material Safety Data Sheets for the solvents used.

- 1 Prime the fluid path with distilled or deionized water.
- 2 Flush the fluid path using a 0.1N NaOH solution.
- 3 Pause the priming sequence.
- 4 After 10 minutes, resume priming the fluid path using distilled or deionized water. Prime until the fluid path has been flushed with water.
- 5 Pause the priming sequence.
- 6 Prime the fluid path using a 0.1N HCl solution.
- 7 Pause the priming sequence.
- 8 After 10 minutes, resume priming the fluid path using distilled or deionized water.

Biological fluids - Follow this procedure if the fluid path is in contact with biological fluids such as blood products:

 **CAUTION** To prevent injury, observe good laboratory practices when handling solvents. Know the physical and chemical properties. Refer to the Material Safety Data Sheets for the solvents used.

- 1 Prime the fluid path with distilled or deionized water.
- 2 Make a solution of 10% bleach by adding one part of commercial bleach to nine parts of water.
- 3 Flush the fluid path using the bleach solution.
- 4 Pause the priming sequence.
- 5 After 30 minutes, resume priming the fluid path using distilled or deionized water to pump the remaining bleach solution from the tubing into a waste container.

Replace Parts

Tubing

It is important to keep all tubing clean and free of crimps. Tubing that has become dirty, blocked or crimped can result in poor accuracy and precision, loss of air gap or the syringe stalling.

Replace both the transfer tubing and inlet tubing as needed. See [Appendix A, Replacement Parts and Accessories](#) for part numbers for replacement tubing. For tubing installation procedures, see [Chapter 2, Installation](#).

Piston Seal

To change a piston seal, refer to the instructions supplied with the replacement seal. For part numbers for replacement seals, contact your Gilson-authorized representative.

Syringe

If necessary, refer to the diagram [Clean a Syringe](#) on page 4-3 while performing the procedures below. The following procedures use the 215 Setup Utility.

Remove Syringe

Before cleaning a syringe, disconnect it from the solenoid valve retainer and multiple probe syringe slide as described below. The following procedures use the 215 Setup Utility.

- 1 Start the 215 Setup Utility, described on [page 3-8](#).
- 2 Select the Syringe Options tab. The option button for the installed syringe size is selected. Click **Lower Syringe**. This causes the piston to descend as the syringe pump aspirates from the reservoir. The syringe pump will stop at the bottom of the stroke, switching the valve to the outlet position.
- 3 After the syringe has been lowered, remove the syringe's piston holding bolt from the syringe slide.
- 4 Unscrew the syringe from the solenoid valve retainer. You may need to use a wrench or needle-nosed pliers to accomplish this step.

Install New Syringe

- 1 Lubricate the piston with reservoir solvent in order to reduce friction on the piston seals during reinstallation.
- 2 Finger tighten the syringe holding fitting into the solenoid valve retainer. Then using a wrench, tighten the screw 1/8 turn.
- 3 Pull the syringe's piston until it is aligned with the hole in the syringe slide.
- 4 Insert and finger tighten the piston holding bolt. Then using a flathead screwdriver, tighten the screw 1/4 turn.

Note: If you are installing new syringes and they are a different size than the ones being replaced, run the 215 Setup Utility (Syringe Options tab) and change the syringe size.

Solenoid Valve

To replace a nonworking solenoid valve, follow these steps:

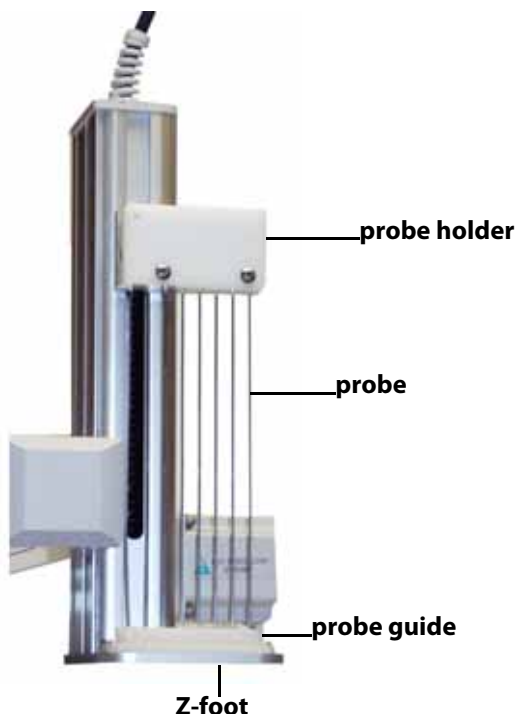
- 1 Remove the valve's syringe, as described under **Remove Syringe** on page 4-4.
- 2 From the top of the solenoid valve retainer, detach the reservoir tubing for the nonworking valve.
- 3 From the top of the solenoid valve retainer, detach the transfer tubing for the nonworking valve.
- 4 Using a 9/64" hex wrench, loosen the screws that secure the cover of the solenoid valve retainer.
- 5 Looking down into the solenoid valve retainer, locate the nonworking valve.
- 6 Locate the cable and connector for the nonworking valve. Then disconnect the connector from the electronics board. Note the orientation and location of the connector so it can later be reinstalled to the appropriate location.
- 7 Remove the connector located above or below the connector that you disconnected in step 6. Once again, note the orientation and location of the connector so it can later be reinstalled to the appropriate location.
- 8 Remove the nonworking valve by grasping the valve and gently pulling it about 3/8" towards you. Lift the valve upward when its collar is beyond the collars of the adjacent valves.
- 9 Install the replacement valve.
- 10 Attach the replacement valve's connector to the appropriate location on the electronics board.
- 11 Reattach the connector for the adjacent valve to the appropriate location on the electronics board.
- 12 Reinstall the syringe as described in mounting new syringe under **Reinstall Syringe** on page 4-5.

Probes

Refer to the diagram and appropriate instructions below.

Install the Same Type of Probe

- 1 Remove the transfer tubing's 1/4"-28 fitting connected to the top of the probe holder.
- 2 Grasp the current probe and push it up through the top of the probe holder.
- 3 Install the new probe by pushing it through the top of the probe holder. Make sure the tip of the probe sits inside the probe guide.
- 4 Replace and tighten the 1/4"-28 fitting.



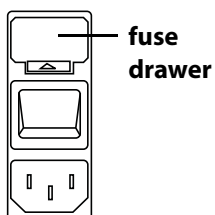
Install Different Type of Probes

To install replacement probes of a different type than are currently installed, you must obtain a probe holder/guide kit and the replacement probes.

- 1 Remove the transfer tubing fittings connected to the top of the probe holder.
- 2 Remove each probe by pushing it up through the top of the probe holder.
- 3 Remove the screws that attach the current probe holder to the Z-arm. Install the new probe holder.
- 4 Remove the screws that attach the current probe guide to the Z-arm foot. Install the new probe guide.
- 5 Install each new probe by pushing it through the top of the probe holder. Make sure the tip of each probe sits inside the probe guide.
- 6 Reattach the transfer tubing to the probe holder.

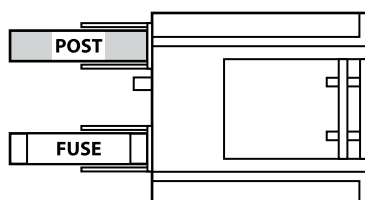
Fuse

A blown fuse may indicate the existence of another problem in the instrument. If the replacement fuses blow, do not try additional fuses. Contact your Gilson-authorized representative. See [Before Calling Us](#) on page 5-9.

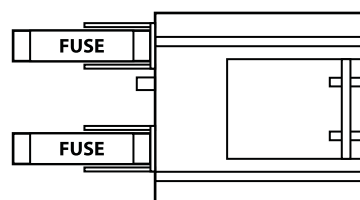


To change a fuse, follow these steps.

- 1 Disconnect the power cord from the power outlet and from the rear panel receptacle.
- 2 Locate the fuse drawer on the rear panel. See [Rear Panel Diagram](#) on page 2-17 if necessary.
- 3 Insert a small screwdriver into the notch under the fuse drawer.
- 4 Twist the screwdriver to open and remove the fuse drawer. The fuse drawer contains one 2.5A "T" Slo-Blo fuse (5 x 20 mm size) for a 100/120 voltage selection. It contains two 2.5A fuses for a 220/240 voltage selection.
- 5 Remove the old fuse(s) and insert the new fuse(s).
- 6 Insert the fuse drawer into its receptacle in the liquid handler.



Fuse drawer for 100–120 voltage selection



Fuse drawer for 220–240 voltage selection

Check Position Alignment

The 215 Setup Utility, described in [Chapter 3, Operation](#), allows you to test whether the liquid handler is properly aligned and to make minor adjustments to the X-axis and Y-axis offsets if needed. For example, after changing the probes, alignment should be reviewed. To check the current alignment and make adjustments as needed, select the Adjust X&Y tab.

The X offset and Y offset text boxes display the current offsets stored in the instrument's memory.

To determine if the probes need to be adjusted in the X or Y direction, select the model of the injection module that is on your Multiple Probe 215 Liquid Handler (likely an 849 Injection Module) or select other for a user-defined test point. The default X,Y coordinates are shown next to the model number.

<i>Injection Module</i>	<i>Coordinates</i>
<i>849:</i>	X-coordinate: 336.1 mm Y-coordinate: 3.8 mm
<i>other:</i>	

Transport the Liquid Handler

When moving the liquid handler to another location or when sending it in for service, do not use the Y-arm as a handle. Reinstall the armlock (see [page 2-3](#)) and always lift the liquid handler from the base.

This chapter provides information on the following topics:

- **Error Messages**
- **Mechanical**
- **Electrical**
- **Tubing and Syringe Pump**
- **Repair and Return Policies**

Error Messages

Error	Description	Solution
10	Invalid Pump Type	Run the 215 Setup Utility to correct the problem.
11	Undefined syringe size	Run the 215 Setup Utility to correct the problem.
12	Pump not found	Contact your Gilson-authorized representative.
13	Syringe speed out of range	<p>This can be caused by an incorrect syringe size setting. Run the 215 Setup Utility (Syringe Options tab) to check that the correct syringe capacity was selected. If you do not know the size of the syringe installed, check the container the syringe was shipped in for size information.</p> <p>Or, the requested aspirate or dispense speed is too fast for the installed syringe. Refer to the table listing the maximum flow rates on page 1-9 and then change the speed accordingly in the control software.</p>
14	Invalid syringe volume	Requested aspirate or dispense volume is too large for syringe installed. Modify the syringe aspirate and dispense volumes in the program controlling the liquid handler. An incorrect syringe size setting can also cause improper volumes to be aspirated or dispensed during operation or can cause an error to occur. Run the 215 Setup Utility (Syringe Options tab) to check that the correct syringe capacity was selected.
15	NV-RAM checksum is invalid	<ul style="list-style-type: none"> Send the buffered ~9 GSIOC command to reset the NV-RAM and initialize to the default value. Run the 215 Setup Utility. Replace the main board.
16	X scale factor is invalid	Contact your Gilson-authorized representative.
17	Y scale factor is invalid	Contact your Gilson-authorized representative.
18	Z scale factor is invalid	Contact your Gilson-authorized representative.
20	X motor position error	Turn power on/off to the liquid handler.
21	Y motor position error	Turn power on/off to the liquid handler.

Error	Description	Solution
22	Z motor position error	Turn power on/off to the liquid handler.
24	X target less than minimum X	Send the immediate Q command using the GSIOC Utility to read the travel range. Correct the error in the program controlling the liquid handler.
25	X target more than maximum X	Send the immediate Q command using the GSIOC Utility to read the travel range. Correct the error in the program controlling the liquid handler.
26	Y target less than minimum Y	Send the immediate Q command using the GSIOC Utility to read the travel range. Correct the error in the program controlling the liquid handler.
27	Y target more than maximum Y	Send the immediate Q command using the GSIOC Utility to read the travel range. Correct the error in the program controlling the liquid handler.
28	Z target less than minimum Z	Send the immediate Q command using the GSIOC Utility to read the travel range. Correct the error in the program controlling the liquid handler.
29	Z target more than maximum Z	Send the immediate Q command using the GSIOC Utility to read the travel range. Correct the error in the program controlling the liquid handler.
30	X encoder inactive	Contact your Gilson-authorized representative.
31	Y encoder inactive	Contact your Gilson-authorized representative.
32	Z position sensor inactive	Contact your Gilson-authorized representative.
33	Safety contact activated	Release contact; restart.
34	X home phase is invalid	Run the 215 Setup Utility to correct the problem.
35	Y home phase is invalid	Run the 215 Setup Utility to correct the problem.
36	X and Y home phases are invalid	Run the 215 Setup Utility to correct the problem.
40	Gilson m402 invalid valve position	This is caused by the valve stem not turning properly or the encoder not registering properly. Try operating without a valve. If that fails, you will probably need a new module. If that works, check the valve assembly for smooth operation. If necessary, replace valve.

<i>Error</i>	<i>Description</i>	<i>Solution</i>
41	Gilson m402 valve missing	Contact your Gilson-authorized representative.
42	Gilson m402 undefined valve command	Try operating without a valve. If that fails, you will probably need a new module. If that works, check the valve assembly for smooth operation. If necessary, replace valve.
43	Gilson m402 valve communication error	Try operating without a valve. If that fails, you will probably need a new module. If that works, check the valve assembly for smooth operation. If necessary, replace valve.
44	Gilson m402 valve unit busy	Try operating without a valve. If that fails, you will probably need a new module. If that works, check the valve assembly for smooth operation. If necessary, replace valve.
45	Gilson m402 syringe overload	<ul style="list-style-type: none"> • Slow down flow rate indicated for aspirate and dispense commands in the program controlling the liquid handler. • Use less viscous liquid. • Use larger ID transfer tubing.
46	Gilson m402 syringe missing	Try operating without a valve. If that fails, you will probably need a new module. If that works, check the valve assembly for smooth operation. If necessary, replace valve.
47	Gilson m402 undefined syringe command	Try operating without a valve. If that fails, you will probably need a new module. If that works, check the valve assembly for smooth operation. If necessary, replace valve.
48	Gilson m402 syringe communication error	Replace the syringe pump.
49	Gilson m402 syringe unit busy	Replace the syringe pump.

Mechanical

Probe No Longer Finding Tube Center

- Probe may be bent. Straighten or replace the probe.
- Liquid handler may be misaligned. Perform the position alignment procedures, described on [page 4-13](#).

Electrical

Input Functions Not Operating

- Make sure connections into the terminal block connector are secure.
- Make sure the terminal block connector is secure in the input/output ports.
- Check connections for proper pin assignments.
- Be sure pins from external devices are assigned correctly.
- Check polarity of input. Inputs should be a contact closure. If not, it must be TTL level (logic 0 activates).
- Confirm that source supplying input to the liquid handler is working.

Output Functions Not Operating

- Make sure connections into the terminal block connector are secure.
- Make sure the terminal block connector is secure in the input/output ports.
- Check connections for proper pin assignments.
- Output from the liquid handler should be compatible with the device to which it is interfaced. Outputs are contact closures.

Unit Not Operational

- Make sure power is turned on.
- Check power cord connections.
- Try different outlet.
- Check fuse(s); replace if necessary.
- Check all liquid handler connections and make sure that the unit is plugged in.

Unit Blows Fuses

A blown fuse may indicate the existence of another problem in the instrument. If the replacement fuses blow, do not try others. Contact your Gilson-authorized representative. See **Before Calling Us** on page 5-9.

Tubing and Syringe Pump

Instrument Will Not Draw in Reagent

- Make certain all fittings are tight.
- Check valve fitting threads on the syringe pump. Replace if damaged.

No Fluid Being Dispensed

- Make sure the syringe is tight in the valve fitting.
- If tubing is kinked or blocked, replace defective tubing.
- Replace solenoid valve if damaged. Turn the power to the liquid handler off and then on to re-initialize.

Reagent Being Pulled Back Into Reservoir

- Replace solenoid valve if damaged. Turn the power to the liquid handler off and then on to re-initialize.

Air Gap Breaks Up

- When aspirating a liquid, if the air gap breaks up, check to see if the tubing is the correct size.
- Reduce speed of aspiration.
- Increase size of air gap.
- Clean or replace any dirty tubing.

Syringe Bubbles

- Make sure that all tubing fittings are tight and air-free.
- Make sure the syringe is tightened into the valve retainer block.
- Clean the syringe if dirty. Refer to [Clean a Syringe](#) on page 4-3.
- If any of the valve fittings are damaged, replace the valve.

Fluid Leak

- Make sure fittings are tight.
- Replace any worn piston seals on the syringe piston. Instructions are supplied with replacement seals. (Condensation within a syringe indicates a worn piston seal.)
- Allow reagents to warm to room temperature before using.

Incorrect Aspirating and Dispensing

- Check for leaks on all fittings and tubing leading to the probes.
- Tighten or replace fittings on inlet and transfer tubing as needed.
- Replace solenoid valve if damaged. Turn the power to the liquid handler off and then on to re-initialize.

Syringe Stalls

- If the syringe on the syringe pump stalls, there may be a blockage in the tubing or valve. Inspect all tubing and the valve.
- If the syringe stalls due to an accelerated aspirate or dispense flow rate, reduce the flow rate in the program controlling the liquid handler.

Poor Accuracy

- Worn piston seals and tubing can cause the liquid handler to perform with poor volumetric accuracy and precision. Inspect seals and tubing and replace if necessary. (Condensation within a syringe indicates a worn piston seal.)
- If the aspirate and dispense flow rates are too fast, slow down the flow rates to adapt to the tubing and probe type.

Repair and Return Policies

Before Calling Us

Gilson-authorized representatives will be able to serve you more efficiently if you have the following information:

- the serial number and model number of the instruments involved. The serial number is visible on the inside right support of the liquid handler.
- the installation procedure you used
- list of concise symptoms
- list of operating procedures and conditions you were using when the problem arose
- list of other devices connected to the liquid handler and a description of those connections
- list of other electrical connections in the room

Warranty Repair

Units covered under warranty will be repaired and returned to you at no charge. If you have any questions about applicability, please contact your local distributor.

Non-Warranty Repair

For out-of-warranty repairs, contact your local distributor. A Customer Service representative will discuss service options with you and can assist in making arrangements to return the equipment, if necessary.

Rebuilt Exchange

For some units, rebuilt exchange components are available. Contact your local distributor for details.

Return Procedure

Contact your local distributor's Customer Service Department to obtain authorization before returning any Gilson equipment. To return a piece of equipment:

- Carefully pack the unit to prevent damage in transit. Check with your distributor regarding proper method of shipment. No responsibility is assumed by Gilson or your distributor for damage caused by improperly packaged instruments. Indicate the authorization on the carton and on the packing slip.
- Always insure for the replacement value of the unit.
- Include a description of symptoms, your name, address, phone number, and purchase order to cover repair costs, return and shipping charges, if your institution requires it.

Unit End-of-Life



When a unit reaches the end of its useful life, refer to www.gilson.com for directions and information on the end-of-life policy. This is in accordance with the European Union Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

Replacement Parts and Accessories

A

Part Number Description

25101311 MULTIPLE PROBE 215 W/125MM Z DRIVE

Probe/Injection Port Compatibility Chart for the Multiple Probe 215 Injector (with 849 Multiple Injection Module)

Probe	Injection Port Bar			Z-Arm	Probe Holder/ Guide Kit
	0.7 mm 250512861	1.3 mm 250512862	1.5 mm 250512863		
27067377			X	125 mm	253652
27067361			X	125 mm	253652
27067373			X	125 mm	253652
2507414		X		125 mm	253651
27067374			X	125 mm	253652
2507252	X			125 mm	253652
2507215		X		175 mm	253651
25073645		X		175 mm	253651

Probes

Probes for 125 mm Z-Arm

Part Number	Description
27067361	Non septum-piercing probe; bevel tip, capacitive level-sensing, stainless steel. Dimensions: 220.5 x 1.5 x 1.1 mm ID. Compatible with 849 Multiple Injection Module; requires injection port bar (part number 250512753 for the 889 or part number 250512863 for the 849). Requires probe holder/guide kit (part number 253652).
2507414	Non septum-piercing probe; constricted tip, capacitive level-sensing, stainless steel. Dimensions: 220 x 1.3 x 0.8 mm ID (tip dimensions: 1.5 x 0.9 x 0.45 mm ID). Compatible with 849 Multiple Injection Module; requires injection port bar (part number 250512752 for the 889 or part number 250512862 for the 849). Requires probe holder/guide kit (part number 253651).
27067373	Non septum-piercing probe; constricted tip, capacitive level-sensing, stainless steel. Dimensions: 221 x 1.5 x 1.1 mm ID (tip dimensions: 2 x 1.1 x 0.4 mm ID). Compatible with 849 Multiple Injection Module; requires injection port bar (part number 250512753 for the 889 or part number 250512863 for the 849). Requires probe holder/guide kit (part number 253652).
27067374	Non septum-piercing probe; constricted bevel tip, capacitive level-sensing, stainless steel. Dimensions: 221 x 1.5 x 1.1 mm ID (tip dimensions: 2 x 1.1 x 0.4 mm ID). Compatible with 849 Multiple Injection Module; requires injection port bar (part number 250512753 for the 889 or part number 250512863 for the 849). Requires probe holder/guide kit (part number 253652).
2507252	Micro septum-piercing probe; constricted 45° bevel tip, capacitive level-sensing, stainless steel. Dimensions: 221.5 x 1.5 x 1.1 mm ID (tip dimensions: 10 x 0.7 x 0.4 mm ID). Compatible with 849 Multiple Injection Module; requires injection port bar (part number 250512751 for the 889 or part number 250512861 for the 849). Requires probe holder/guide kit (part number 253652).
27067377	Grooved septum-piercing probe; beveled-tip, stainless steel. Dimensions: 221 x 1.5 x 0.4 mm ID. Compatible with 849 Multiple Injection Module; requires injection port bar (part number 250512753 for the 889 or part number 250512863 for the 849). Requires probe holder/guide kit (part number 253652).
27067375	Non-septum-piercing probe: beveled-tip, Teflon-coated stainless steel. Dimensions: 221 x 1.5 x 1.1 mm ID. Requires probe holder/guide kit (part number 253652).

Probes for 175 mm Z-Arm

Part Number	Description
2507215	Non septum-piercing probe; constricted tip, capacitive level-sensing, stainless steel. Dimensions: 269 x 1.3 x 0.8 mm ID (tip dimensions: 1.5 x 0.9 x 0.45 mm ID). Compatible with 849 Multiple Injection Module; requires injection port bar (part number 250512752 for the 889 or part number 250512862 for the 849). Requires probe holder/guide kit (part number 253651).
25073645	Non septum-piercing probe; beveled tip, capacitive level-sensing, stainless steel. Dimensions: 269 x 1.3 x 0.8 mm ID. Compatible with 849 Multiple Injection Module; requires injection port bar (part number 250512752 for the 889 or part number 250512862 for the 849). Requires probe holder/guide kit (part number 253651).

Probe Holder/Guide Kits

Part Number	Description
253651	Probe holder/guide kit; includes probe holder and guide for 1.3 mm outer diameter probes.
253652	Probe holder/guide kit; includes probe holder and guide for 1.5 mm outer diameter probes.

Syringes, Transfer Tubing, and Waste Bottle

Part Number	Description
25053146	100 µL syringe
25053147	250 µL syringe
25053148	500 µL syringe
25053141	1 mL syringe
25053143	2.5 mL syringe
25053145	5 mL syringe
499421202	1.5 mL FEP tubing; 0.8 mm ID x 10 feet
25053173	1.5 mL Teflon transfer tubing assembly, 0.8 mm ID; for use with 100 µL, 250 µL, 500 µL and 1 mL syringes on the Multiple Probe 215. Includes eight bundled and labeled lengths of transfer tubing and fittings.
499471112	5.5 mL FEP tubing; 1.5 mm ID x 9.27 feet; with Omnifit 1/4"-28 fittings
25053174	5.5 mL Teflon transfer tubing assembly, 1.5 mm ID; for use with 2.5 mL and 5 mL syringes on the Multiple Probe 215. Includes eight lengths of bundled and labeled transfer tubing.
F1410050	PVDF coupling for 1/4"-28 fitting, package of 5
25053172	Waste bottle (8 liter) with lid and quick-connect fitting
470343706	Tygon tubing (5/16" ID x 7/16" OD) for connection between rinse station and waste bottle; per foot
23077332	Quick-connect fitting to connect Tygon tubing to waste bottle

Rinse Station

Part Number	Description
25045525	Multiple Probe 215 rinse station; connects to rinse station base
25245512	Rinse station base; attaches directly to 215 locator plate

Racks

For part numbers for available racks, refer to [Appendix B, Racks](#). To create your own code 200-style rack, order the blank rack kit (part number 254461) and rivet gun (part number 4391002).

Cables and I/O Accessories

Part Number	Description
36083121	Serial cable, IBM PS/2-type, 25 to 25 pin
36083122	Serial cable, IBM AT-type, 9-pin female to 25-pin male
36083123	Serial cable adapter, 9-pin female to 25-pin male
638308512	Terminal block connector, 8-pin
638310512	Terminal block connector, 10-pin
709910206	2-conductor interconnect wire, 6' for making contact connections
36078143	Shielded GSIOC cable, 30"
6730254007	2.5A, T-2.5 Slo-Blo fuse

Miscellaneous

Part Number	Description
23077333	Y-connector to connect two rinse stations to one waste bottle
2509211	Armlock with hex screw
4311403	9/64" ball driver (hex wrench for armlock)
54118025	Spiral wrap

This appendix describes the racks that can be purchased for use on the Multiple Probe 215 Liquid Handler.

**Code 201 rack**

For two microplates, two microcentrifuge tubes, and two 13x100 mm tubes

Material: aluminum

Vessels and maximum capacity: 96 well microplates
microcentrifuge tubes (1.5 mL)
13 x 100 mm tubes (9 mL)

Part Number: 2504601

**Code 201H rack**

For two microplates, two Eppendorf vials, and two 13 x 100 mm tubes; with microplate covers

Material: aluminum

Vessels and maximum capacity: 96-well microplates
Eppendorf vials (1.5 mL)
13 x 100 mm tubes (9 mL)

Part Number: 2504601H

Code 205 rack

For two deep-well microplates, two microcentrifuge tubes, and two 13 x 100 mm tubes

Material: aluminum

Vessels and maximum capacity: 96 deep-well microplates

Eppendorf vials (1.5 mL)

13 x 100 mm tubes (9 mL)

Part Number: 2504605



Code 205H rack

For two deep-well microplates, two Eppendorf vials, and two 13 x 100 mm tubes; with microplate covers

Material: aluminum

Vessels and maximum capacity: 96 deep-well microplates

Eppendorf vials (1.5 mL)

13 x 100 mm tubes (9 mL)

Part Number: 2504605H



**Code 217 rack**

For 96 tubes

Material: aluminum

Vessels and maximum capacity: 96 10 x 75 mm (3.5 mL) culture tubes

Part number: 2504617

Note: The zigzag pattern allows all eight probes to draw from one row of test tubes.

**Code 218 rack**

For two microplates and eight 10 x 75 culture tubes

Material: aluminum

Vessels and maximum capacity: two 96-well microplates and eight 10 x 75 mm culture tubes (3.5 mL)

Part number: 2504618

Note: Instead of microplate(s), you can install Beckman modular reservoirs.

**Code 228 rack**

For 27 conical bottom tubes

Material: aluminum

Vessels and maximum capacity: 27 (50 mL)

Part Number: 2504622

Code 505 rack

For 10 standard or deep-well microplates

Material: aluminum

Part Number: 2504651

**Racks****Code 505H rack**

For 10 standard or deep-well microplates with hold-down covers

Material: aluminum

Part Number: 2504651H



GSIOC Configuration Editor

C

The GSIOC Configuration Editor enables you to modify COM (serial communications) port and baud rate information. Or, you can use this editor if incorrect information appears in the GSIOC Utility window.

- 1 Locate the GSIOC Configuration Editor (GSCONFIG.EXE) using Windows Explorer or the shortcut at **Start—Programs—Gilson Applications—Utilities—GSIOC Configuration Editor**. During installation, this editor was stored to C:\GILSON\UTIL unless the installation path was changed.
- 2 Start the editor. The GSIOC Configuration Editor window appears.

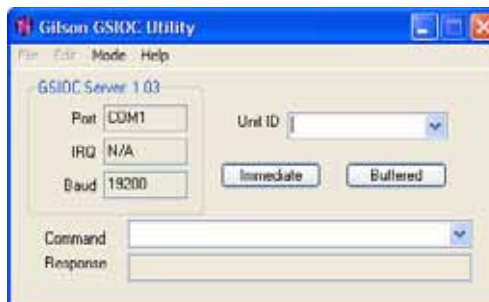


- 3 In the Port box, indicate the computer's serial communications port (COM) port to which the Gilson interface instrument (such as the liquid handler or 506C System Interface) is connected.
- 4 Click 19200 or 9600 to select the baud. The baud is the rate of data transmission between the computer and the Gilson instrument.
- 5 Click OK to save the changes. A message box appears indicating that the computer must be restarted before any changes become effective.

The GSIOC Utility allows you to issue commands to Gilson GSIOC instruments. Your Gilson-authorized representative may ask you to use this utility to verify that an instrument is connected correctly to the computer. For communication to occur, the Gilson instrument must be connected via an RS-232 connection to the computer or connected via a GSIOC connection to a Gilson interface instrument that is connected to the computer.

Start the GSIOC Utility

- 1 Locate the GSIOC Utility (GSUTIL32.EXE) using Windows Explorer or the shortcut at **Start > (All) Programs > Gilson Applications > Utilities > GSIOC Utility**. During installation, this utility was stored to C:\GILSON\UTIL unless the installation path was changed.
- 2 Start the utility. The GSIOC Utility window appears.



Review the Port and Baud Information

In the GSIOC Utility window, review the COM port and baud information. If any information is incorrect or missing, close the GSIOC Utility and use the GSIOC Configuration Editor to update the information. Refer to [Appendix C, GSIOC Configuration Editor](#).

Listing GSIOC Instruments

Using the GSIOC Utility, you can determine the instruments currently connected to the computer.

In the Mode menu, select **Scan!**

The Unit ID list box displays the unit IDs and the version of the connected instruments. If any connected instruments are missing from the list, ensure that the proper RS-232 or GSIOC connection exists between the computer and the instruments, and that the instruments do not have duplicate unit ID numbers.

Basic Mode

In the Basic mode, immediate and buffered GSIOC commands can be sent to specific Gilson instruments.

Review the Port, IRQ, and Baud information in this window. If any information is incorrect or missing, close the GSIOC Utility and use the GSIOC Configuration Editor to update the information.

There are two drop-down menus in the Basic mode of the Gilson GSIOC Utility: Mode Menu and Help Menu.

Basic Mode Buttons and Features

Immediate Button

Sends an immediate command to the Unit ID selected.

Immediate commands request status information from an instrument. These commands are executed immediately, temporarily interrupting any command in progress.

You can find a list of valid immediate commands for each instrument in its commands list or user's guide.

Buffered Button

Sends a buffered command to the Unit ID selected.

Buffered commands send instructions to an instrument. These commands are executed one at a time.

You can find a list of valid buffered commands for each instrument in its commands list or user's guide.

Command Field

Where the command to be sent is specified. For more information on sending commands, see [Send an Immediate Command](#) on page D-16 or [Send a Buffered Command](#) on page D-16.

Response Field

Returns a response to an immediate or buffered command.

The response to a successfully completed buffered command is "ok".

Refer to the user's guide for the Gilson instrument for a description of the valid response to immediate commands.

The response to an unsuccessfully completed immediate or buffered command is "#error".

Basic Mode Menus

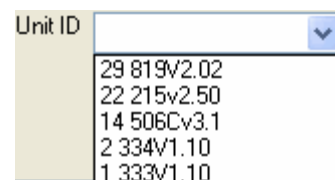
Mode Menu

There are three options in the Mode menu: Scan!, Advanced, and Ghost.

Scan!

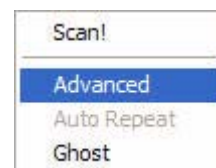
The Scan! option on the Mode menu allows you to scan for GSIOC instruments. After a scan, the Unit ID list box displays the unit IDs and the version of the connected instruments. If any connected

instruments are missing from the list, ensure that the proper RS-232 or GSIOC connection exists between the computer and the instruments, and that the instruments do not have duplicate Unit ID numbers.



Advanced

The advanced option in the Mode menu allows you to switch between the Basic and Advanced modes. A check mark means that the GSIOC Utility is in Advanced mode.



Ghost

The Ghost option in the Mode menu makes the GSIOC Utility window transparent (and always on top). This allows you to view another window behind the Utility. The Utility will remain fully functional in the Ghost mode.

Help Menu

Help Topics

When selected, the Help window for the Gilson GSIOC Utility appears.

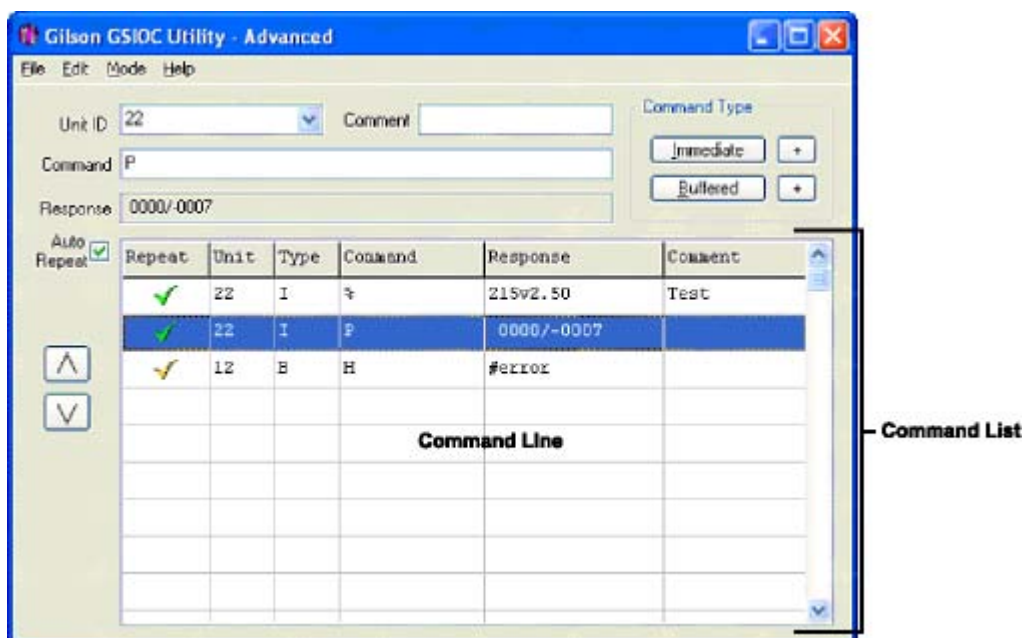
About

When selected, the About window appears.

This window displays the version of the Gilson GSIOC Utility, the GSIOC32.DLL, and the GSIOC Server or Driver; and the Port, IRQ, and Baud set by the GSIOC Configuration Editor.

Advanced Mode

In the Advanced mode, immediate and buffered GSIOC commands can be sent to specific Gilson instruments. In this mode, immediate and buffered commands with comments can be saved to a command list to be used as needed. The command lines can be repeated automatically to monitor the status of the instrument.







Review the Port, IRQ, and Baud information by selecting About... from the Help menu. If any information is incorrect or missing, close the GSIOC Utility and use the GSIOC Configuration Editor to update the information.

There are four drop-down menus in the Advanced mode of the Gilson GSIOC Utility: File Menu, Edit Menu, Mode Menu, and Help Menu.



Advanced Mode Buttons and Features

+ Button



The  next to  is used to insert an immediate command in the command list. For more information, see [Insert an Immediate Command](#) on page D-14.

The  next to  is used to insert a buffered command in the command list. For more information, see [Insert a Buffered Command](#) on page D-15.

Arrow Up or Arrow Down Button

These buttons ( or ) are used to change the position of a command in the command list.

To move a command

Highlight the command in the command list and use  to move the command up in the list or  to move the command down in the list.

Immediate Button

Sends an immediate command to the Unit ID selected. The Comment field is not used.

Selecting the Immediate button will not add the command to the command list.

For more information, see [Send an Immediate Command](#) on page D-16.

Buffered Button

Sends a buffered command to the Unit ID selected. The Comment field is not used.

Selecting the Buffered button will not add the command to the command list.

For more information, see [Send a Buffered Command](#) on page D-16.

Response Field

Returns a response to an immediate or buffered command.

The response will become gray after 15 seconds if no response is registered.

The response to a successfully completed buffered command is "ok".

Refer to the user's guide for the Gilson instrument for a description of the valid response to the immediate commands.

The response to an unsuccessfully completed immediate or buffered command is "#error".

To send a command line

Double-click on the Unit, Type, Command, Response, or Comment field to send the immediate or buffered command for that specific command line.

Command Line Column Headings

Repeat

A green check mark (✓) in the Repeat column means that an immediate command will automatically repeat when the Auto Repeat option is checked. Double-click on the Repeat field to select or deselect the Auto Repeat for that command line.

A yellow check mark (👉) in the Repeat column means that a buffered command will automatically repeat when the Auto Repeat option is checked. Double-click on the Repeat field to select or deselect the Auto Repeat option for that command line.

Unit

This is the Unit ID for the instrument in the command line.

Type

I - Immediate Command, B - Buffered Command

Command

This is the GSIOC command for the command line.

Response

This is the GSIOC response when the command line is initiated with a double-click on the Unit, Type, Command, Response, or Comment field. The response will become gray after 15 seconds if no response is registered.

Comment

This is an optional comment that can be added to the command line.

Advanced Mode Menus

File Menu

There are four options in the File menu: Open, Save, Save As..., and Exit.

Open

The Open option in the File menu allows you to open previously created command lists (GSUTIL32 files). The extension for a GSUTIL32 file is .GSU.

Save

The save option in the File menu allows you to save the Advanced commands to GSUTIL32.GSU. The GSUTIL32.GSU file is automatically created in the location where GSUTIL32.EXE is stored.

The Advanced commands will automatically be saved to GSUTIL32.GSU if the Gilson GSIOC Utility is exited without saving.

The GSUTIL32.GSU is automatically opened when the Advanced mode is selected from the Mode menu.

Save As...

The Save As... option on the File menu allows you to save the Gilson GSIOC Utility commands that are currently defined. The file's name and path must be specified.

Exit

Closes the Gilson GSIOC Utility software.

Edit Menu

There are four options in the Edit Menu: Insert Immediate, Insert Buffered, Selection, and Font....

Insert Immediate

The Insert Immediate option in the Edit menu allows you to insert an immediate command in the command list. The new command will be added to the last line in the command list.

The GSIOC Command will not be inserted if there is already a command line in the list with the same Unit ID and Command.

For more information, see [Insert an Immediate Command](#) on page D-14.

Insert Buffered

The Insert Buffered option in the Edit menu allows you to insert a buffered command in the command list. The new command will be added to the last line in the command list.

The GSIOC Command will not be inserted if there is already a command line in the list with the same Unit ID and Command.

For more information, see [Insert a Buffered Command](#) on page D-15.

Selection

Delete (Ctrl + D)

Deletes the highlighted command from the command list.

Up (Ctrl + U)

Moves the highlighted command up in the command list.

Down (Ctrl + D)

Moves the highlighted command down in the command list.

Execute (Ctrl + E)

Executes the highlighted command.

Repeat (Ctrl + R)

Adds or removes the repeat option for the highlighted command.

Font...

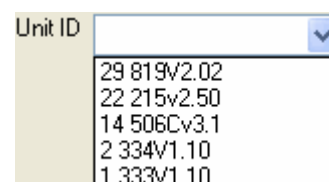
The Font... option on the Edit menu allows you to change the font options for the command list fields and headers, as well as the Unit ID, Comment, and Command text boxes.

Mode Menu

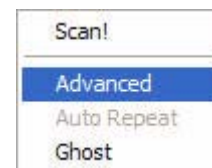
There are four options in the Mode menu: Scan!, Advanced, Auto Repeat, and Ghost.

Scan!

The Scan! option on the Mode menu allows you to scan for GSIOC instruments. After a scan, the Unit ID list box displays the unit IDs and the version of the connected instruments. If any connected instruments are missing from the list, ensure that the proper RS-232 or GSIOC connection exists between the computer and the instruments, and that the instruments do not have duplicate Unit ID numbers.

**Advanced**

The advanced option in the Mode menu allows you to switch between the Basic and Advanced modes. A check mark means that the GSIOC Utility is in Advanced mode.

**Auto Repeat**

The Auto Repeat option on the Mode menu allows you to repeat command lines that appear in the command list.

A command line will only repeat if a check mark appears in the Repeat field. A check mark can be added by double-clicking on the Repeat field and selecting the Auto Repeat check box.

Starting from the top command line, this mode will refresh one repeating command line every 1/10th of a second. For example, if there are ten command lines with Repeat selected, each of these command lines will be initiated every second.

Auto Repeat mode is useful for monitoring the instrument using immediate commands and is designated in the Repeat field with a green check mark.

Auto Repeat mode is not intended to be used as a programming tool with buffered commands. Repeating buffered commands will be executed at a fixed time interval regardless if a command has finished. For this reason, the check mark in the buffered command line is yellow.

Auto Repeat mode can be selected from the Mode menu or by selecting the check box next to Auto Repeat.

Auto Repeat is deselected by default with the Advanced mode is first opened. When Gilson GSIOC Utility - Advanced is saved or closed, the status of Auto Repeat is saved.

Ghost

The Ghost option in the Mode menu makes the GSIOC Utility window transparent (and always on top). This allows you to view another window behind the Utility. The Utility will remain fully functional in the Ghost mode.

Help Menu

Help Topics

When selected, the Help window for the Gilson GSIOC Utility appears.

About

When selected, the About window appears.

This window displays the version of the Gilson GSIOC Utility, the GSIOC32.DLL, and the GSIOC Server or Driver; and the Port, IRQ, and Baud set by the GSIOC Configuration Editor.

Commands

Immediate Command

Immediate commands request status information from an instrument. These commands are executed immediately, temporarily interrupting any command in progress.

You can find a list of valid immediate commands for each instrument in its commands list or user's guide.

Buffered Command

Buffered commands send instructions to an instrument. These commands are executed one at a time.

You can find a list of valid buffered commands for each instrument in its commands list or user's guide.

Insert an Immediate Command


There are two ways to insert an immediate command in Advanced mode.

Using the Edit Menu

- 1 From the Unit ID drop-down box, select the unit ID of the instrument to send the command to.
- 2 Type a Command and Comment. (The comment is optional.)
- 3 Select Insert Immediate from the Edit menu. The new command will be inserted at the bottom of the command list.

Note: The command will not be inserted if there is already a command line in the list with the same Unit ID and command.

Using the + Button

- 1 From the Unit ID drop-down box, select the unit ID of the instrument to send the command to.
- 2 Type a Command and Comment. (The comment is optional.)
- 3 Click the  button next to the Immediate button. The new command will be inserted at the bottom of the command list.



Note: The command will not be inserted if there is already a command line in the list with the same Unit ID and command.

Insert a Buffered Command


There are two ways to insert a buffered command in Advanced mode.

Using the Edit Menu

- 1 From the Unit ID drop-down box, select the unit ID of the instrument to send the command to.
- 2 Type a Command and Comment. (The comment is optional.)
- 3 Select Insert Immediate from the Edit menu. The new command will be inserted at the bottom of the command list.

Note: The command will not be inserted if there is already a command line in the list with the same Unit ID and command.

Using the + Button


- 1 From the Unit ID drop-down box, select the unit ID of the instrument to send the command to.
- 2 Type a Command and Comment. (The comment is optional.)
- 3 Click the  button next to the Buffered button. The new command will be inserted at the bottom of the command list.



Note: The command will not be inserted if there is already a command line in the list with the same Unit ID and command.


Send an Immediate Command

Basic Mode

- 1 From the Unit ID drop-down box, select the unit ID of the instrument to send the command to.
- 2 Type (or select) a Command.
- 3 Click .

Advanced Mode

Using the button

- 1 From the Unit ID drop-down box, select the unit ID of the instrument to send the command to.
- 2 Type a Command and Comment. (The comment is optional.)
- 3 Click .

Using Execute from the Edit menu


- 1 Highlight the command to be sent in the command list.
- 2 Choose Selection from the Edit menu and select Execute. (Or, type Ctrl + E.)

Using the command list

Double-click on the command line of the command you want to send.

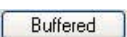
Send a Buffered Command

Basic Mode

- 1 From the Unit ID drop-down box, select the unit ID of the instrument to send the command to.
- 2 Type (or select) a Command.
- 3 Click .

Advanced Mode

Using the button

- 1 From the Unit ID drop-down box, select the unit ID of the instrument to send the command to.
- 2 Type a Command and Comment. (The comment is optional.)
- 3 Click .

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