223 Sample Changer
User's Guide

April 2005

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Introduction 1

The 223 Sample Changer is an XYZ robot that can automate sample handling procedures. It is controlled via a program running on a computer or Keypad Controller.

Unpacking

The 223 Sample Changer arrives with all major components already assembled except for auxiliary parts such as the vertical arm, probe, tray, racks, etc. Keep the original container and packing assembly in case the sample changer must be returned.

Standard Equipment

Once the sample changer and accessories are unpacked, you should have the following:

- 223 Sample Changer and *User's Guide*
- Vertical arm
- Polypropylene tray with spacers
- Accessory package with terminal block connectors, fuse drawers, fuses, power cords, serial cable, level sensing cable, and 3 feet of 7 mm ID Tygon tubing
- 223 Utility Programs CD-ROM

Accessories

Based on your requirements, you may have also received additional accessories such as:

- probe
- holder/guide kit
- tray
- tray spacers
- support bar
- rinse station
- rack holder
- racks
- liquid level detection cable
- diverting valve
- filler port
- transfer port kit
- tubing/cable support rod
- GSIOC cable
- RS-232 cable
- Keypad Contoller
- syringe pump or peristaltic pump

If necessary, refer to ***Appendix A*** for part numbers.

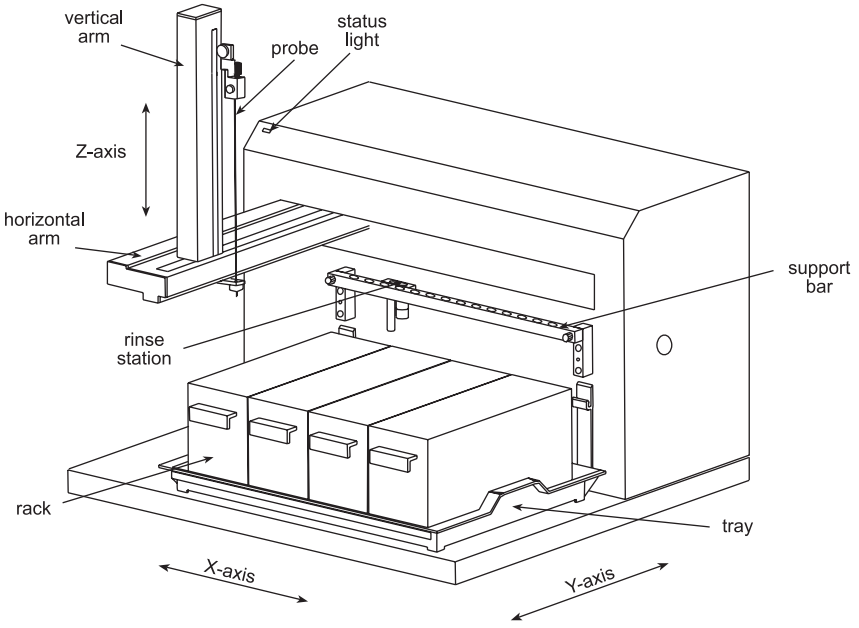
Technical Specifications

<table>
<tr><th>Technical Specification</th><th>Definition</th></tr>
<tr><td>Arm speed</td><td>>250 mm/sec. (>9.85 in/sec.) in X/Y dimension
Z dimension has five programmable speeds for upward and downward movement:
<table>
<tr><th>Index</th><th>Speed (mm/sec.)</th><th></th></tr>
<tr><td>1</td><td>19.9</td><td></td></tr>
<tr><td>2</td><td>30.2</td><td>Default for level seeking</td></tr>
<tr><td>3</td><td>61.8</td><td></td></tr>
<tr><td>4</td><td>126.9</td><td>Default for normal travel</td></tr>
<tr><td>5</td><td>247.3</td><td></td></tr>
</table></td></tr>
<tr><td>Contact control</td><td>Four inputs (contact closure, TTL, or open-collector), four relay outputs, and one switched +12V DC output (500 mA max)</td></tr>
<tr><td>Environmental conditions</td><td>Indoor use
Altitude: up to 2000 m
Temperature range: 5°–40°C
Air pressure: 75–105 kPa
Pollution degree: 1 or 2, in accordance with IEC 66
Humidity: Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C</td></tr>
<tr><td>Front panel</td><td>One yellow LED</td></tr>
<tr><td>Horizontal motion strength</td><td>X: 2 kg (5 lbs.)
Y: 1.5 kg (3 lbs.)</td></tr>
<tr><td>Liquid level sensing</td><td>Capacitive</td></tr>
<tr><td>Number of racks</td><td>Up to four Code 20- or Code 30-series racks</td></tr>
<tr><td>Manufacturing standards</td><td>Meets applicable Safety and EMC certification standards; UL and CE certified.</td></tr>
</table>

Physical space requirement	53.5 x 43.7 x 60.0 cm (21.1 x 17.2 x 24.0 in.)* *Maximum height. Z-arm height is adjustable to accommodate vessel heights between 1 and 150 mm (dependent on installed Z-arm).
Power requirements	Frequency: 50 to 60 Hz Voltage: 90–120V or 220–240V, mains voltage fluctuations not to exceed ±10% of the nominal voltage Current rating: One 2.0A fuse for 90–120V or two 2.0A fuses for 220–240V
Probe positioning performance	Accuracy: +/- 1.0 mm in the XYZ dimensions Repeatability: +/- 0.25 mm in the XYZ dimensions
Probe rinse	Probe rinsing occurs through a dedicated rinse station for rinsing the inside and outside of the probe.
Sampler type	XYZ with stationary rack design
Software control	Computer control via RS-232 or GSIOC and Gilson control software Local control via Gilson Keypad Controller
Vertical punch strength	1 kg (2 lbs.)
Weight	18.6 kg (41 lbs.)
Working Dimensions (w x d x h)	33.0 x 24.1 x 18.3 cm (13.0 x 9.5 x 7.2 in.)* **Maximum height. Z-arm height is adjustable to accommodate vessel heights between 1 and 150 mm (dependent on installed Z-arm).

Installation 2

This section describes how to set up the 223 Sample Changer. The diagram below shows a possible configuration of the sample changer.



Rear Panel

Before operating the sample changer, you must connect a computer or Keypad Controller to its rear panel, install the fuse(s), and connect its power cord to an outlet. GSIOC and contact connections are optional. The following pages describe how to make rear panel connections.

Note: Do not connect both a computer and a Keypad Controller to the sample changer. An error or damage may result.

1 Input/Output (I/O) contact ports

2 Unit ID selector

3 Baud rate selector

4 Gilson Serial Input/Output Channel (GSIOC) port

5 Keypad port

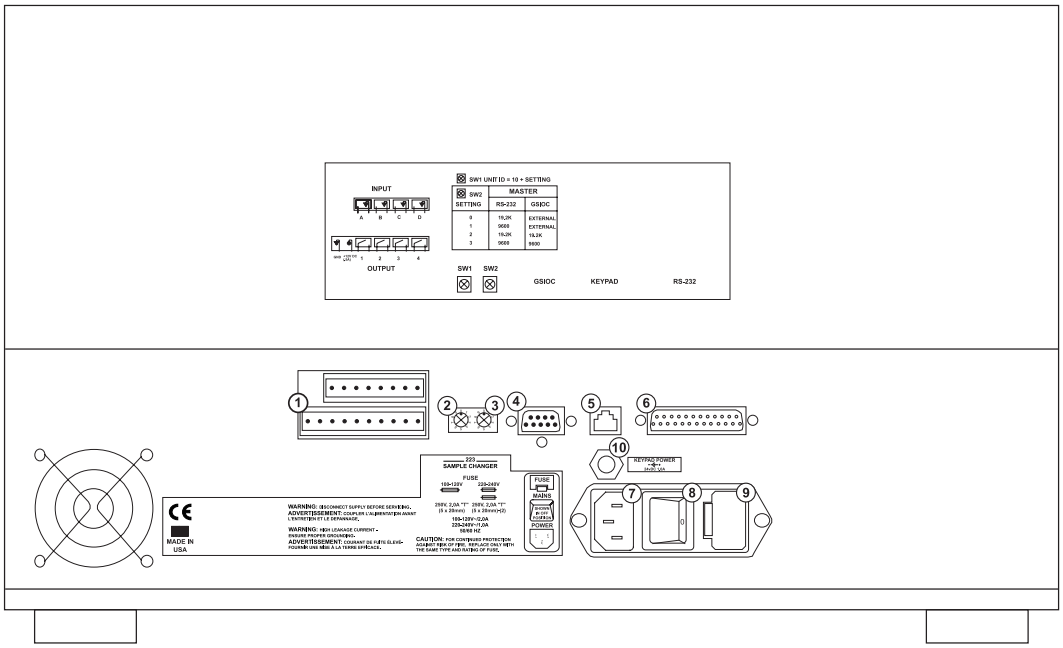
6 RS-232 port

7 Power receptacle

8 Power switch

9 Fuse drawer

10 Keypad power port



Fuses

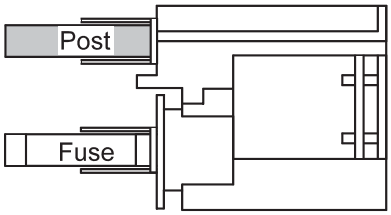
You receive the sample changer without any fuses installed.

1 Locate the accessory package containing the fuse drawer appropriate for your line voltage. Discard the other fuse drawer.

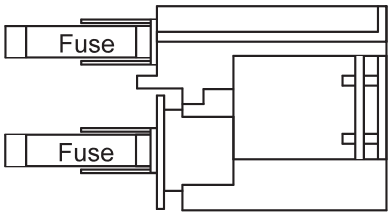
2 Locate the accessory package containing the 2.0 amp fuses.

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.

4 Insert the fuse drawer into its receptacle in the sample changer. See rear panel diagram on page 2-2.



Fuse installation for 100/120 voltage



Fuse installation for 220/240 voltage

RS-232

The RS-232 port is used to transfer information between the sample changer and a computer. For the location of the RS-232 port, refer to the diagram on page 2-2.

Using the computer, you can run programs that control the sample changer. See ***Section 3*** for more information.

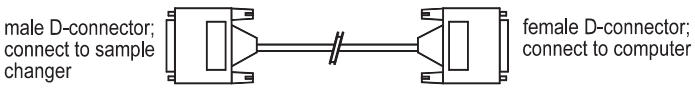
Be sure your computer is turned off before making any connections.

To connect your computer to the sample changer, you need an RS-232 cable. Obtain a cable with D-connectors that are appropriate for the sample changer and your computer. The sample changer requires a 25-pin male D-connector. Refer to the rear panel of your computer or its documentation to determine which type of D-connector it requires.

Connecting the RS-232 Cable

Attach the male end of the RS-232 cable to the RS-232 port located on the rear panel of the sample changer. Tighten the retaining screws.

Attach the other end of the RS-232 cable to the computer's RS-232 port. (Do not mistake it for the female 25-pin parallel printer port!) Again, tighten the retaining screws.



Keypad

The Keypad port is used to connect a Keypad Controller to the sample changer. Connect the keypad's coiled cable to the sample changer's Keypad port. For the location of the Keypad port, refer to the diagram on page 2-2.

Using the keypad, you can run programs that control the sample changer. See ***Section 3*** for more information.

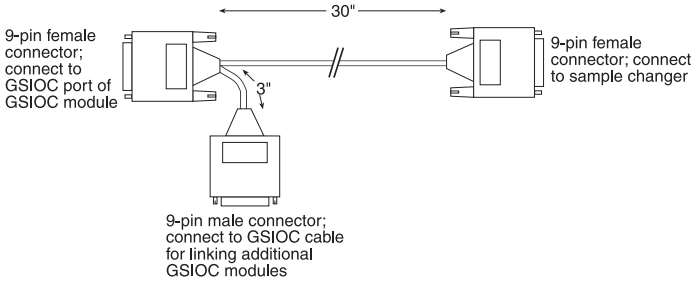
Keypad Power

The Keypad Power port is used to provide power to the Keypad Controller when connected to the sample changer. Connect the power supply (ordered separately, part number 59444524) to the Keypad Power port. Then, connect the appropriate power cord (ordered separately, part number 594445241 for 110V or 594445242 for 220V) to the receptacle on the power supply and to a power source. For the location of the Keypad Power port, refer to the diagram on page 2-2.

GSIOC

The GSIOC port enables you to link a GSIOC-compatible module to the sample changer and control both devices via a program executed on the computer or Keypad Controller.

1 Locate the accessory package with the GSIOC cable.

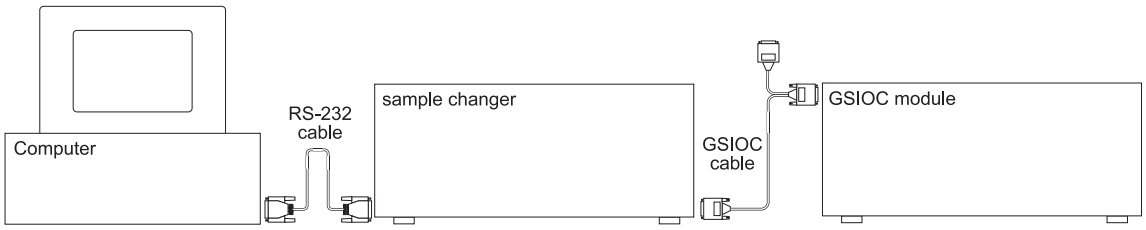


2 Connect the female connector, located individually at one end of the cable, into the GSIOC port of the sample changer. Tighten the retaining screws.

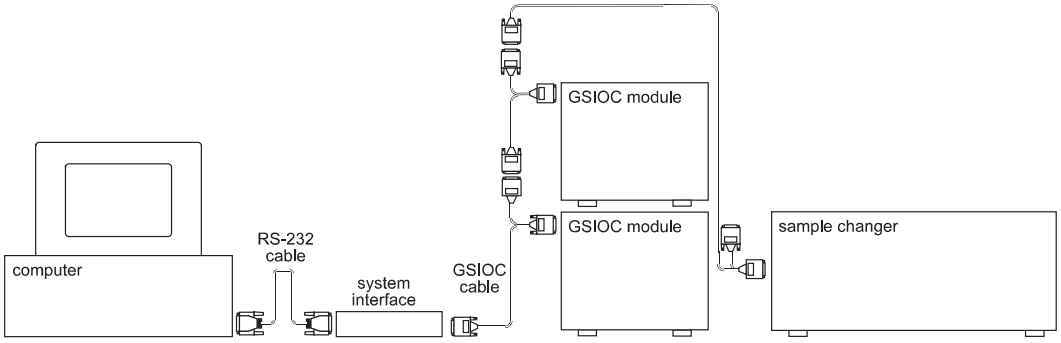
3 Connect the other female connector, located on the same end as the male connector, to the GSIOC module. Tighten the retaining screws.

4 If you are connecting another GSIOC module, use the male connector to join another GSIOC cable and make the necessary connection to the next GSIOC module.

The following diagram shows the cabling connections between a computer, sample changer, and GSIOC module.



If the 506C System Interface is the master device, the GSIOC port also enables you to link the sample changer and other GSIOC-compatible modules. In this configuration, a 506C System Interface is connected to a computer via an RS-232 cable. The sample changer and other GSIOC-compatible modules are connected to the system interface by linking GSIOC cables. If necessary, use the GSIOC cable (ordered separately, part number 36078143) to connect the sample changer to the GSIOC. Use the diagram below as a reference.



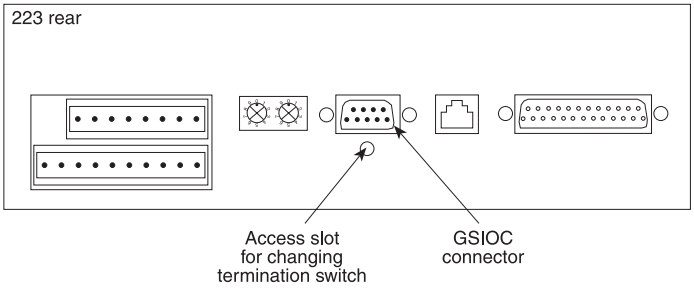
Changing Termination Switch

If you are controlling the sample changer via a GSIOC connection, you must change the position of the termination switch. The termination switch is inside of the sample changer and has three positions: break passive, no termination, and break active. The default position is break passive which is appropriate if you are controlling the sample changer via an RS-232 connection. However, for GSIOC control, you must place the switch in the no termination position.

To change the position of the termination switch:

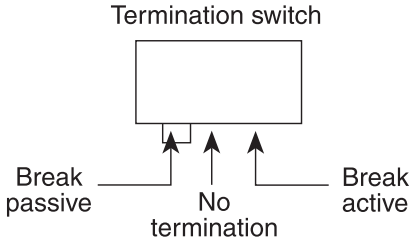
1 Turn off the power to the sample changer.

2 Locate the access slot in the rear panel. Refer to the following diagram.



3 Insert a small screwdriver into the access slot.

4 Use the screwdriver to move the switch from its default left position (break passive position) to the center position (no termination position). The right position is the break active position. Refer to the following diagram.

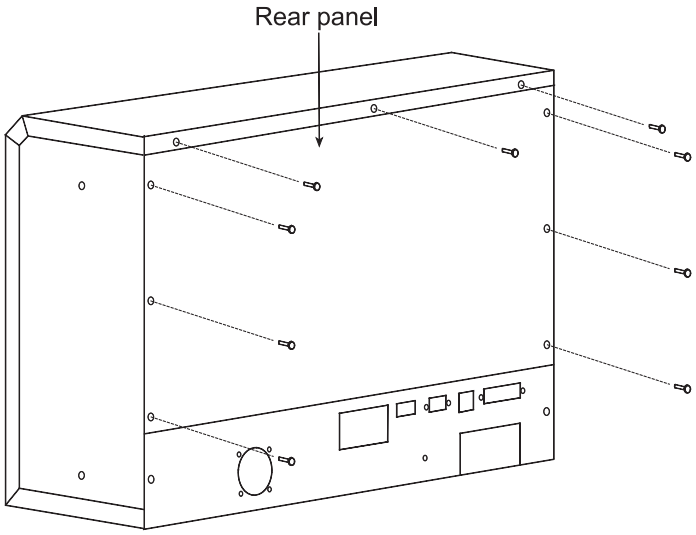


Alternate method for changing the termination switch

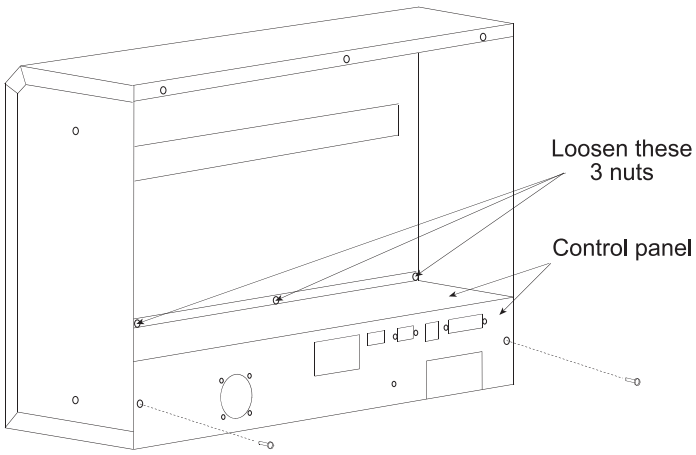
If your sample changer does not have an access slot on its rear panel, follow these steps to change the position of the termination switch:

1 Turn off power and disconnect the power cord to the sample changer.

2 Remove the nine screws that secure the rear panel and then remove the rear panel. Refer to the following diagram.



3 Locate the control panel. It includes the sample changer's connectors and switches. Refer to the following diagram.

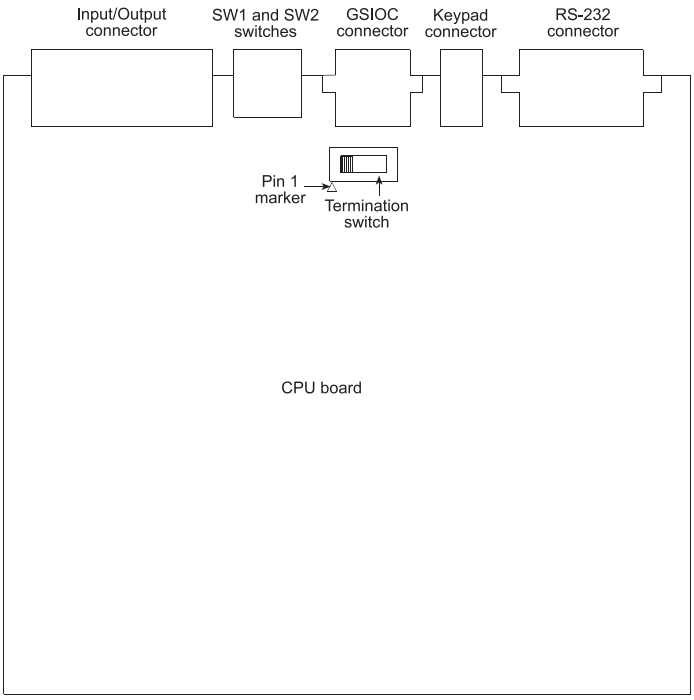


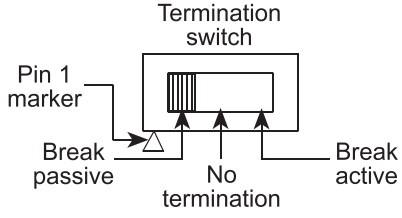
4 Loosen the three internal nuts that secure the control panel to the front of the sample changer. And, remove the two screws that secure the control panel to the back side of the sample changer.

5 Remove the control panel by tilting it downward to free it from the three screws that secure it to the front of the sample changer. And, then pull the control panel away from the sample changer.

6 Turn over the control panel so you can see its components.

7 Locate the termination switch. The switch is below the GSIOC connector. Refer to the following diagram.





8 Move the termination switch to the break active position. Refer to the following diagram.

9 Reinstall the control panel and tighten its screws.

10 Reinstall the rear panel and tighten its screws.

11 Connect the power cord and turn on power to the sample changer.

Input/Output Contacts

You can use the input and output contacts found on the rear panel of the sample changer to control peripheral devices. Refer to the diagram on page 2-2 for the location of the input/output ports.

Inputs

The sample changer has connections for four inputs. All of the inputs are paired, and each of the pairs includes a GROUND reference (⏚).

The contact input pairs are labeled A, B, C, and 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 sample changer has connections for five outputs. All of the outputs are paired.

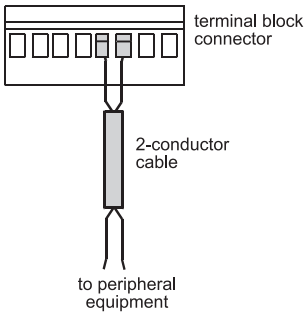
Pins 1 and 2 supply ground and a +12V DC output. **Do not use this output unless the receiving device can accept 12V power. Do not allow more than 500 mA load.**

Pins 3 through 10 are paired, isolated-relay contact closures and are labeled 1, 2, 3, and 4.

Items You Need to Make Connections

To make connections, you need the following:

- 2-conductor cable (22–30 gauge for each wire)
- wire insulation stripper
- small-blade screwdriver



Making Connections

To prepare and make connections with the 2-conductor cable:

1 Cut the cable into pieces of appropriate length.

2 Strip about 1.1 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 slots while the one for outputs has ten.

4 Insert each wire into the appropriate slot on the terminal block connector. Push the wire all the way in; then tighten its corresponding pin screw.

Note: When making connections, be sure to maintain the correct orientation of the terminal block connector relative to the port. This is especially important if making connections to the +12V DC output.

5 Connect the terminal block connector to the sample changer. 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.

Power Cord

Locate the appropriate power cord for your line voltage. Discard the other power cord.

Use the power cord to connect the sample changer to an AC power source.

Arm Locking Screw Removal

During shipment, a screw locks the horizontal arm into place.

1 Locate and remove the black plastic plug located on the right side panel of the sample changer.

2 With your left hand, hold the horizontal arm into place.

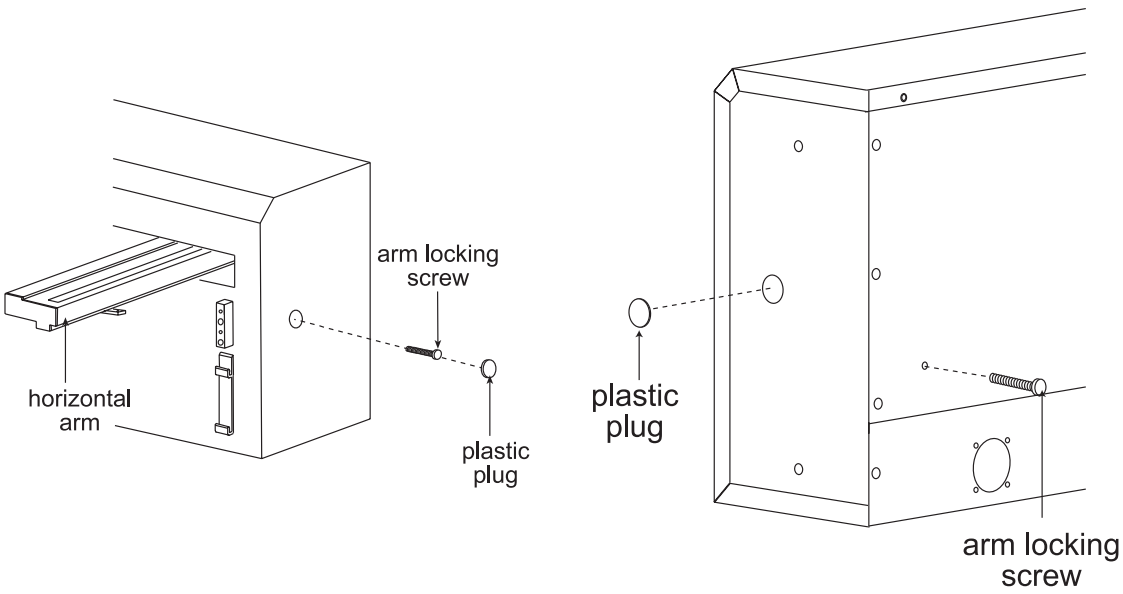
3 Using a Phillips screwdriver, remove the arm locking screw, located inside the sample changer.

4 Insert the arm locking screw into its storage location on the rear panel.

5 Replace the plastic plug on the side panel.

6 Ensure that the horizontal arm can move by pushing it to the left as far as it will go.

Before packing the sample changer for shipment, always secure the horizontal arm using the arm locking screw.



Vertical Arm Installation

Before installing or changing the vertical arm, check that the power is turned off and the power cord is disconnected from the power socket. Also ensure that the arm locking screw has been removed and the horizontal arm can move.

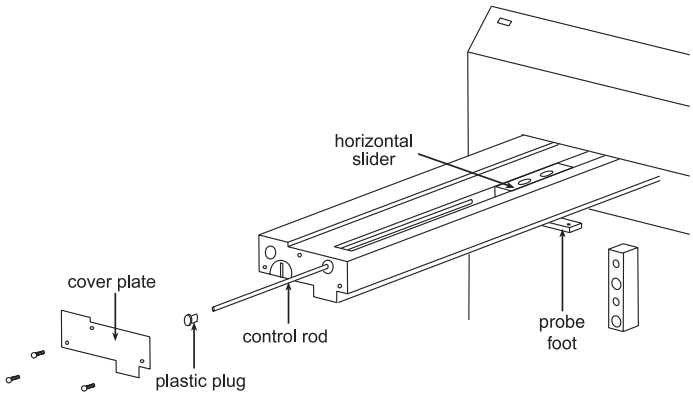
To install the vertical arm:

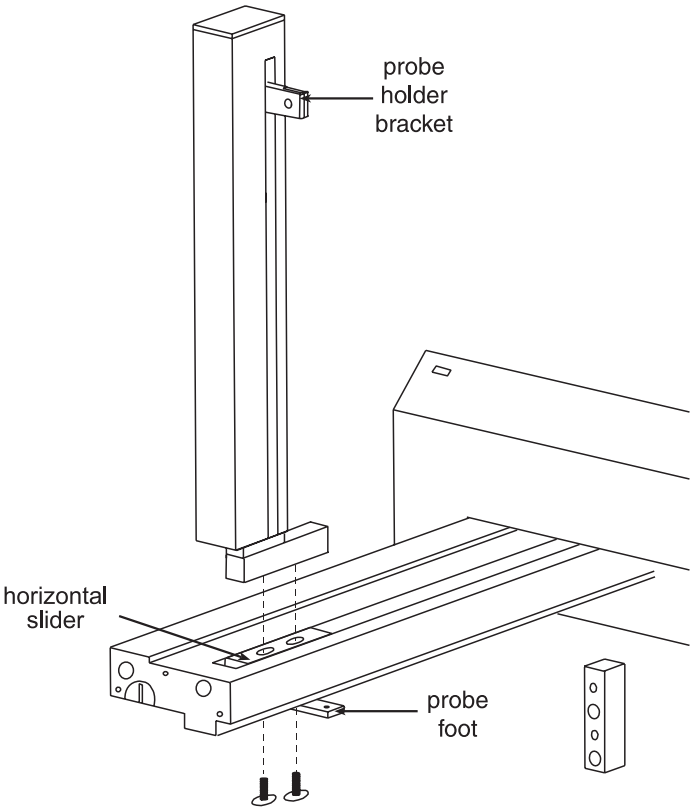
1 Remove the cover plate from the front of the horizontal arm by removing its three screws.

2 Locate the hexagonal-shaped control rod and horizontal slider by looking down into the horizontal arm. See the diagram below.

3 Using your finger, press on the control rod where it passes through the horizontal slider. At the same time, pull the probe foot towards the front of the horizontal arm. This causes the white plastic plug and control rod to move forward slightly. When the white plastic plug is no longer flush with the front of the horizontal arm, remove it and the control rod from the horizontal arm.

4 Pull the probe foot, towards the front of the horizontal arm, as far as it will go.





5 Position the vertical arm onto the horizontal slider. When viewed from the front of the sample changer, the vertical arm's probe holder bracket is on the right.

6 Use the supplied screws to secure the vertical arm to the horizontal slider. The screws insert into the bottom of the mounting holes in the horizontal slider. You may need to move the vertical arm back and forth slightly to align its mounting holes with those in the horizontal slider.

7 Re-insert the control rod as far as it will go. While inserting the control rod, you may need to rotate it back and forth slightly to get it to pass through the gearing and motor drive socket in the horizontal slider.

8 Applying pressure at the vertical arm's base, push the vertical arm to the back of the horizontal arm.

9 While slightly moving the probe holder bracket up and down, push the control rod until it clicks into position.

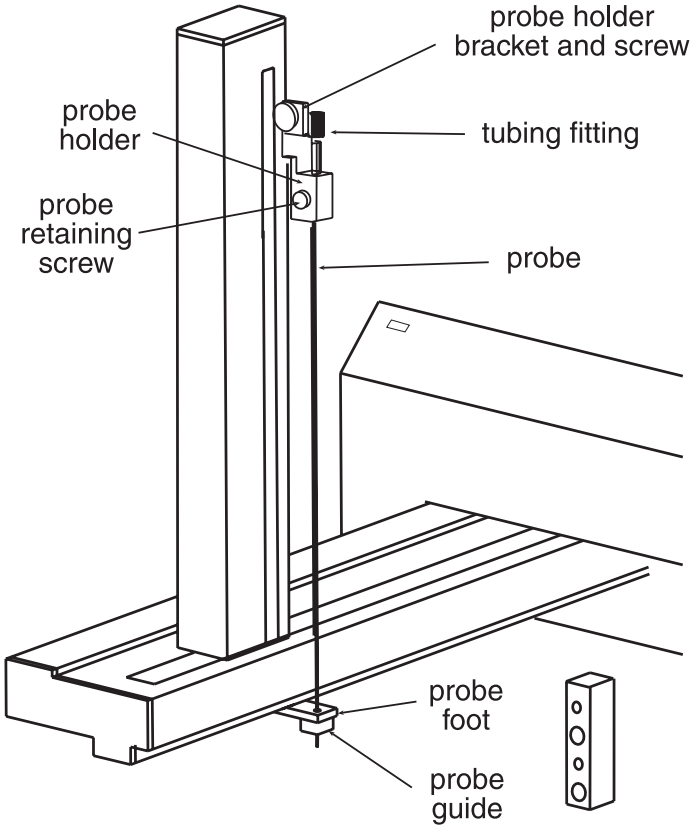
10 Re-insert the white plastic plug.

11 Re-attach the cover plate to the front of the horizontal arm.

Probe Installation

Locate the accessory packages containing the probe and the probe holder/guide kit.

When installing the probe, refer to the following diagram that shows where the probe, probe holder, and probe guide are installed on the sample changer.

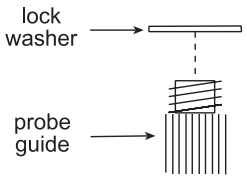


Installing Probe Guide

To install the probe guide:

1 Place the metal lock washer onto the probe guide.

2 Screw the probe guide with lock washer into place on the bottom side of the probe foot.



Installing Probe Holder

To install the probe holder, slide it into place on the probe holder bracket and secure with the supplied screw.

Installing Probe

To install the probe:

1 Slide the probe into the tubing fitting.

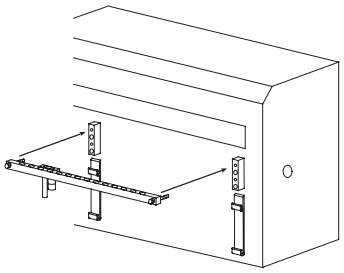
2 Connect the transfer tubing from the dilutor, if installed, to the tubing fitting.

3 Slide the probe assembly into the probe holder on the vertical arm making sure that the probe is centered over the probe guide.

4 Secure the probe by tightening the probe retaining screw.

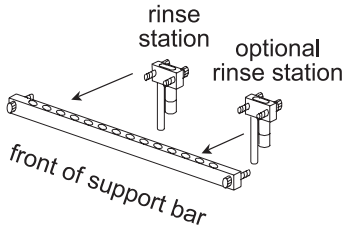
Rinse Station and Support Bar Installation

The support bar attaches to the front face of the sample changer. Its rear contains mounting holes for rinse stations and its top contains mounting holes for transfer ports and filler ports.



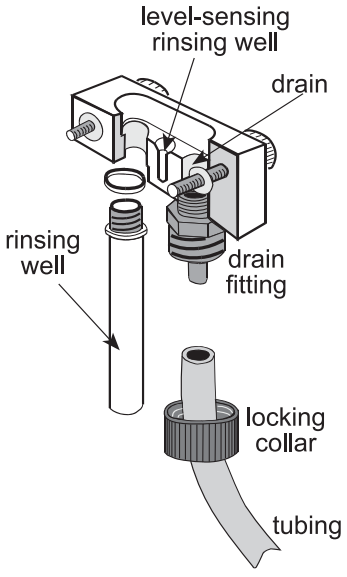
Note: If you ordered rack holder (part number 1907142) or rack holder (part number 1907143), the support bar is part of the rack holder assembly. Attach any rinse stations, transfer ports, or filler ports to the rack holder's support bar.

1 Attach the rinse station(s) to the support bar. If using only one rinse station, the default position for the rinse station is the left side of the support bar when the bar is attached to the sample changer.



From left to right, the ports in a rinse station are the rinsing well, level-sensing rinsing well, and drain.

To attach tubing to the drain, locate the Tygon drain tubing (part number 470321803) or Isoversinic drain tubing (part number 13420034). Remove the locking collar from the drain fitting. Slide the tubing through the locking collar. Attach the tubing to the drain fitting. Then screw the collar onto the drain fitting. Place the other end of the tubing in a drain receptacle, located lower than the tray.



If you ordered a flow-through rinsing well, remove the rinsing well and attach the flow-through rinsing well in its place. Then attach tubing (part number 470331206) to the flow-through rinsing well and connect the other end to a liquid source.

2 Attach the support bar to the front of the sample changer using the knurled screws.

Tray Installation

The tray positions the racks and any accessories that fit onto the bed of the sample changer. It also contains liquid spills, such as those caused by overflowing vessels. The tray can be installed in an upper or lower position on the sample changer's bed depending on the size of tubes being used.

Lower Position

If you are using tubes that are more than 100 mm in height, install the tray in the lower position on the tray mounting brackets. Make sure that it fits securely and that the drain outlet is located at the left rear of the tray. Attach one end of the drain tubing (part number 470343706) to the drain outlet and place the other in a drain receptacle, located lower than the tray.

Upper Position

If using tubes that are less than 100 mm in height:

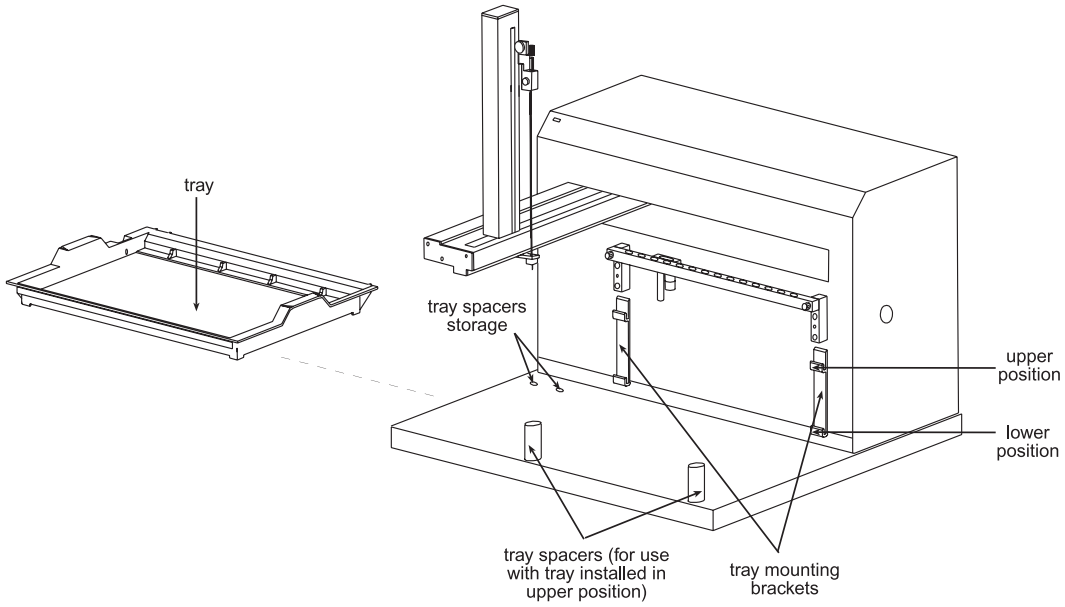
1 Screw the tray spacers into place. See the diagram on the next page.

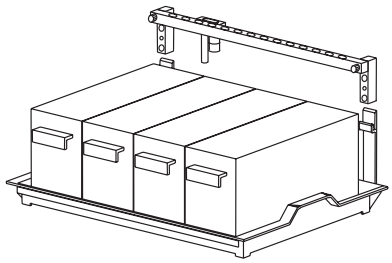
Note: When not being used, screw the tray spacers into the holes located in the left rear of the sample changer's bed.

2 Place the tray on top of the tray spacers making sure it fits securely in the tray mounting brackets and that the drain outlet is located at the left rear of the tray. Attach one end of the drain tubing (part number 470343706) to the drain outlet and place the other in a drain receptacle, located lower than the tray.

Tray Removal

To remove the tray, first lift it straight up and then bring it towards you.





Rack Installation

The sample changer is equipped to hold up to four Code 20-series or thermostated Code 30-series racks. Place each rack into the tray so the rack is perpendicular to the front panel of the sample changer. The rack code assigned to the rack should face you. (See ***Appendix B*** for a list of racks available for the sample changer.)

To use a Code 0, 7, 8, or 9 rack, you must install rack holder part number 1907143. To use Code 30P-series racks, you must install rack holder part number 1907142. Installing rack holder part number 1907143 or part number 1907142 is described on the next page.

To use microplates, you must install microplate holder part number 1907151. See page 2-24.

Accessory Installation

Rack Holder

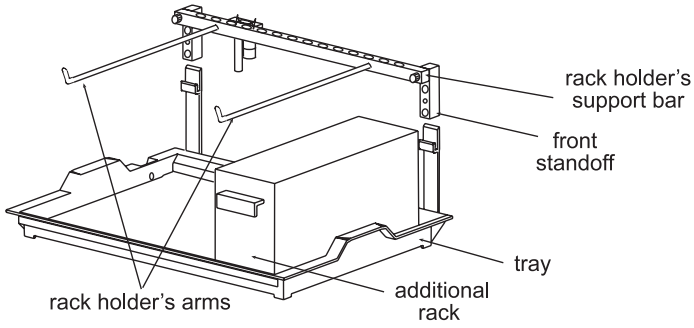
Installing a rack holder enables you to position a single rack sideways within the sample changer's work area. A Code 0, 7, 8, or 9 rack requires rack holder part number 1907143. A Code 30P-series rack requires rack holder part number 1907142.

Note: You can also install one Code 30-series rack on rack holder part number 1907142.

Before installing the rack holder, you may need to remove the support bar from the sample changer. Then remove any rinse stations, filler port, and transfer ports from the support bar and place each one in the corresponding location on the rack holder's support bar.

Connect the rack holder's support bar to the upper position of the front standoffs of the sample changer (in the same position that the previous support bar was located). Place the rack onto the rack holder's arms. A Code 20- or 30-series rack can be placed on the tray in the far right position.

Note: If the 85 mm rinsing well is installed on the rinse station, install the tray in the lower position.



Microplate Holder

To use microplates with the sample changer, you must install the microplate holder. You can use standard or deep-well microplates.

A bracket must be attached to the microplate holder before the microplate is installed. Assembly and installation of the microplate holder depends on the type of microplates to be used. Refer to the appropriate instructions below.

Instructions for standard microplates

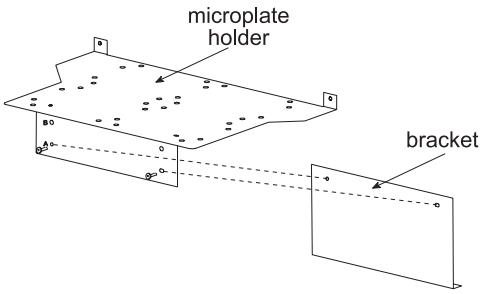
For standard microplates:

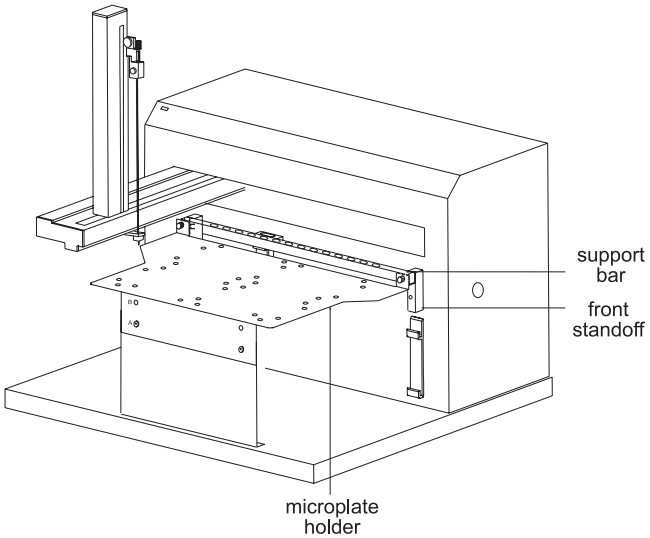
1 Align the lower set of holes (labeled A) in the microplate holder with the holes in the metal bracket. Insert the supplied Phillips screws and tighten.

2 If installed, remove the polypropylene tray.

3 Install the microplate holder, in the upper position on the front standoffs, using the two knurled screws.

Note: If a support bar is installed, install the rack holder in front of the support bar.





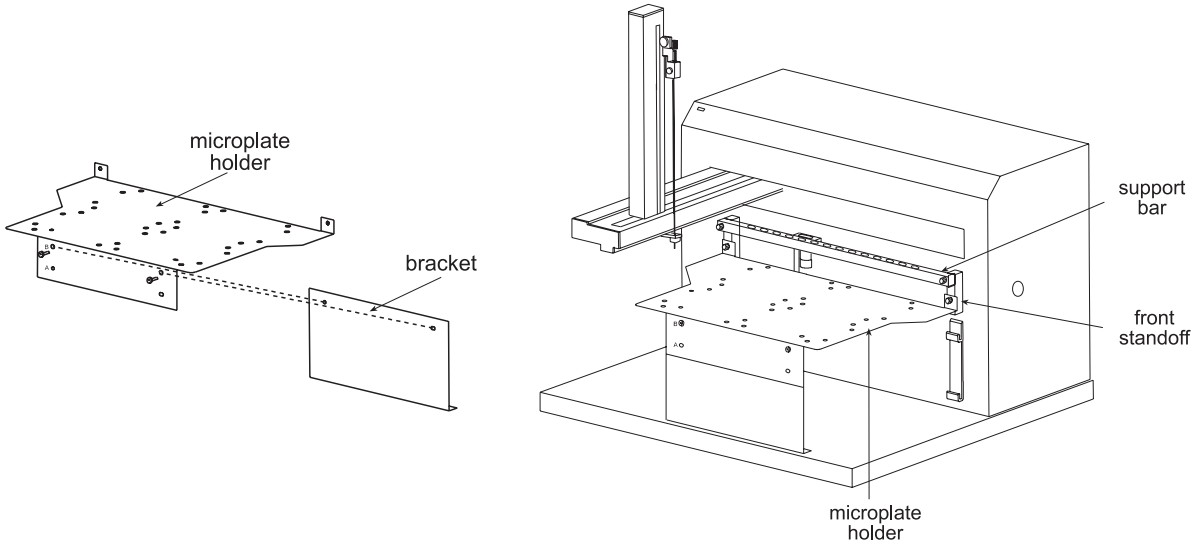
Instructions for deep-well microplates

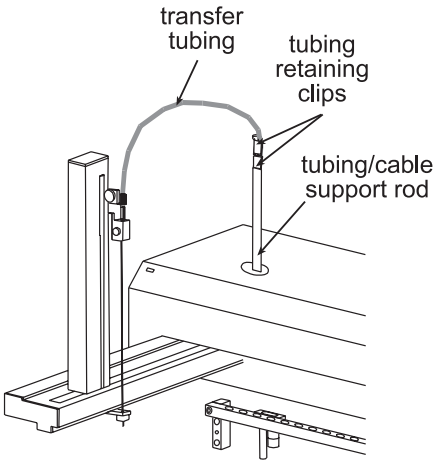
For deep-well microplates:

1 Align the upper set of holes (labeled B) in the microplate holder with the holes in the metal bracket. Insert the supplied Phillips screws and tighten.

2 If installed, remove the polypropylene tray.

3 Install the microplate holder, in the lower position of the front standoffs, below the support bar if installed. Use the two knurled screws supplied with the microplate holder.





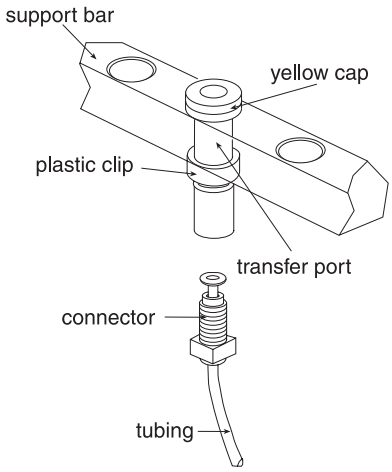
Tubing/Cable Support Rod

The tubing/cable support rod restrains excess transfer tubing. Place the tubing/cable support rod on top of the sample changer. A magnet at the bottom of the rod holds it into place on top of the sample changer.

Snap the transfer tubing between the probe and dilutor into the small grooves on the clips installed on the tubing/cable support rod. (You may need to pry the grooves apart using a flat-blade screwdriver before snapping the tubing into place.) Also remember to leave enough tubing to allow for the movement of the probe.

Gather any excess transfer 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 near the rear of the sample changer.

Transfer Port



To install a transfer port:

1 Place the transfer port in any mounting hole on the support bar.

2 Screw the male tubing connector into the bottom of the transfer port.

3 Fit a yellow cap to the top of the transfer port.

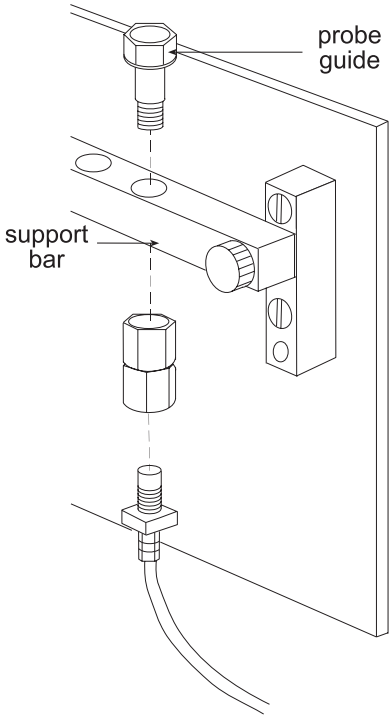
4 Connect the other end of the tubing to a filter and place it in a solvent or sample bottle. Make sure the solvent or sample bottle is at the same level as or higher than the sample changer's tray.

5 Fix the plastic clip onto the transfer port.

Using transfer ports

Be aware of the following when using transfer ports:

- Place the solvent or sample bottle at the same level as or higher than the tray.
- Use a beveled edge constricting probe.
- Prime each transfer port before use.



Filler Port

When a sample is prepared, it can be injected into a peripheral instrument via a filler port which can be installed on the support bar. Refer to the diagram when installing the filler port.

1 Separate the probe guide from the filler port assembly by unscrewing it. The probe guide has a hexagonal head.

2 Insert the probe guide into a mounting hole on the support bar and tighten.

3 Attach the bottom portion of the filler port assembly to the probe guide.

Liquid Level Detector

The liquid level detector detects when the probe has reached the liquid surface. This permits the program controlling the sample changer to calculate the change in the liquid level so the tip of the probe remains a predetermined distance below the liquid's surface.

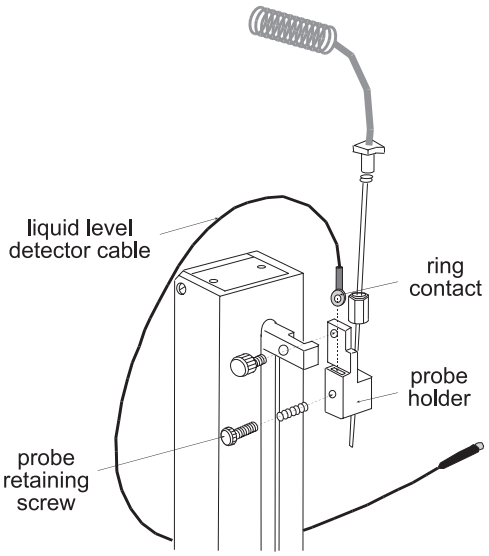
To install the liquid level detector cable:

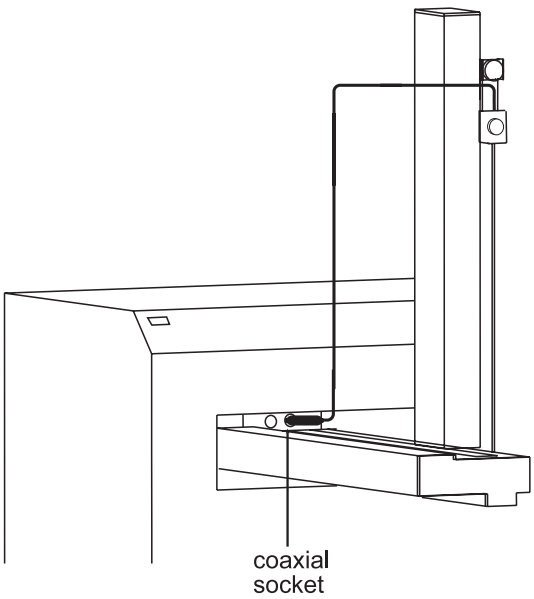
1 Remove the probe retaining screw from the probe holder.

2 Slide the ring contact of the liquid level detector cable into the slot provided on the probe holder.

3 Secure the probe retaining screw.

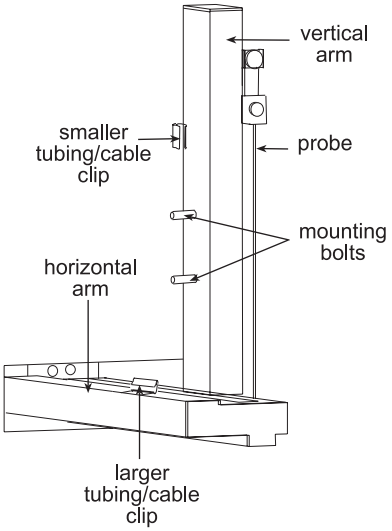
4 Plug the end of the cable into the coaxial socket.





To disconnect the cable from the front face of the sample changer, you need to pull the collar on the connector towards you before you can detach the connector.

Diverting Valve



To install the diverting valve:

1 Turn off power to the sample changer and, if installed, its dilutor.

2 If installed, disconnect the dilutor's transfer tubing from the probe.

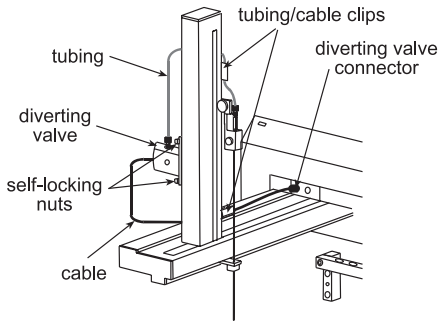
3 Locate the larger tubing/cable clip supplied with the diverting valve. Attach the clip to the left of the vertical arm, in the center of the horizontal arm.

4 Locate the smaller tubing/cable clip. Attach the clip to the back of the vertical arm (the side that faces the rear panel of the sample changer); position the clip approximately 1/3 of the distance from the top of the vertical arm to its bottom.

5 Remove the protective covers from the bolts located on the left side of the vertical arm.

6 Attach the valve to the left side of the vertical arm by inserting the mounting bolts through the two holes on the valve's mounting bracket. Secure the valve using the two self-locking nuts. When placing the nuts onto the bolts, the plastic side faces outward. Use a 5/16" wrench to fully tighten the nuts.

7 Snap the diverting valve's cable into the tubing/cable clip attached to the horizontal arm. Then connect the cable to its connector on the front face of the sample changer.



8 Since the top port of the diverting valve is the common port, attach one end of the supplied tubing to the top port and the other end to the probe. Snap the tubing into the tubing/cable clip attached to the back of the vertical arm. If necessary, lower the probe so you can route the tubing through the clip.

9 Attach the transfer tubing from each dilutor to the side ports.

Unit ID and Baud Rate Selection

Use the SW1 selector to choose a different unit ID and the SW2 to choose a different baud rate. These selectors are located on the sample changer's rear panel; see page 2-2 if necessary.

Unit ID

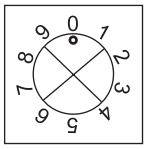
The unit ID identifies the sample changer to software packages that can issue GSIOC commands to the sample changer.

At the factory, the unit ID is set to 10. There is no need to change this number unless it is the same as that assigned to another GSIOC device that is 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 10 plus the selected number.

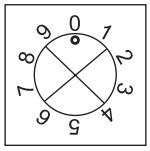


Baud Rate

As a default, the baud rate selector is set to 0 for identifying a baud rate of 19200 for keypad or computer control, or for identifying an external clock for GSIOC control.

The baud rate for the Keypad Controller is 19200 so do not modify the SW2 selection if a keypad is connected to the sample changer.

If your computer's baud rate is 9600, change the setting for the SW2 selector to 1 or 3.

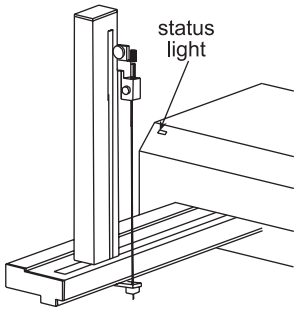


1 Gently insert a small flat-blade screwdriver into the SW2 selector on the rear panel and turn it.

2 Align the white dot with 1 or 3.

Operation 3

The 223 Sample Changer is controlled by a program running on a personal computer or Keypad Controller.



Start Up

To start the sample changer:

1 Make sure the sample changer is connected to a power source.

2 Turn on the sample changer using the power switch located on the rear panel. The status light on the front panel becomes lit.

If the status light begins blinking, there is a problem with the sample changer. See page 5-6.

Running Programs

The sample changer is controlled by programs executed from a personal computer or Gilson Keypad Controller.

Programs for Windows® 98, Windows NT®, Windows® 2000, and Windows® XP Users

The computer is connected to the sample changer via an RS-232 cable. Refer to ***Section 2, Installation*** for correct installation of the RS-232 cable between the sample changer and the computer.

The following utility programs are supplied on the 223 Utility Program CD-ROM supplied with your sample changer.

223 Setup Utility - Specifies configuration parameters for the sample changer.

GSIOC Utility - Issues commands to Gilson GSIOC instruments. (See ***Appendix E, GSIOC Utility***.)

GSIOC Configuration Editor - Modifies COM (serial communications) port and baud rate information. (See ***Appendix D, GSIOC Configuration Editor***.)

Programs for Gilson Keypad Users

The following programs are copied to your computer's disk as part of the 709 Sampler Manager Software* installation procedure and can be used if you are controlling the sample changer via the Gilson keypad.

Note: 709 Sampler Manager Software will not run under Windows NT.

* 709 Sampler Manager Software has been discontinued and is no longer available for purchase.

The Pascal versions of these programs are also copied to the computer as part of the software's installation. You can modify them as required using the software.

- SET_223.EXE
- CONTACT.EXE
- XYZ_TEST.EXE
- POSN_223.EXE

Running Programs from the Keypad

A Gilson Keypad Controller can be used as an alternate interface between the user and the sample changer. The keypad is connected to the sample changer via a coiled cable. Refer to ***Section 2*** for correct installation of the cable to the Keypad port, located on the sample changer's rear panel.

The keypad consists of:

- an 8-line, 40-character display (white characters on a blue background)
- numeric keypad with an ENTER key
- four cursor direction keys
- four programmable soft keys
- three function keys, HELP, ESC, CLEAR
- 3 1/2" disk drive with protective cover

Supplied with the 709 Sampler Manager Software installation disks is the 223 Keypad disk that contains the programs listed on page 3-4 and the files listed below. In order to run an executable file from the keypad, the disk on which the program is stored must contain the following files.

- MGSIOC.SYS
- AUTOEXEC.BAT
- CONFIG.SYS
- MENU.EXE

An optional program to set the time and date is also provided on the disk but is not required to run programs controlling the sample changer. Files for this optional program are DAYTIME.EXE and DAYTIME.TXT.

To copy your sample changer program(s) onto the keypad disk use the Windows Explorer in Microsoft Windows.

The MENU.EXE program allows you to view and select one of up to 100 executable files stored on the disk. If you have more than 100 files and you want to maintain your keypad disk, move the utility programs and example programs to another disk or to a computer for storage.

To run an executable file, enter the number of the program corresponding to the menu selection and press ENTER. To stop a program, follow the program-specific instructions on stopping the program.

If a program prompts you for a yes or no (Y/N) response, press 1 on the keypad to indicate yes or 0 to indicate no.

Checking Configuration Options

The sample changer comes from the factory with its configuration already set. Configuration information is stored in the non-volatile memory (NV-RAM) of the sample changer. Prior to using the sample changer for the first time, review and adjust the default configuration to ensure it is correct for your setup.

The 223 Setup Utility program allows you to review and if necessary change the configuration options set for the sample changer.

When you execute the 223 Setup Utility from the computer, the following tabs appear:

- About
- Error Handling
- Arm Travel
- XYZ Coordinates
- Contacts
- Homing
- Adjust XY
- Liquid Detector
- Z-Arm

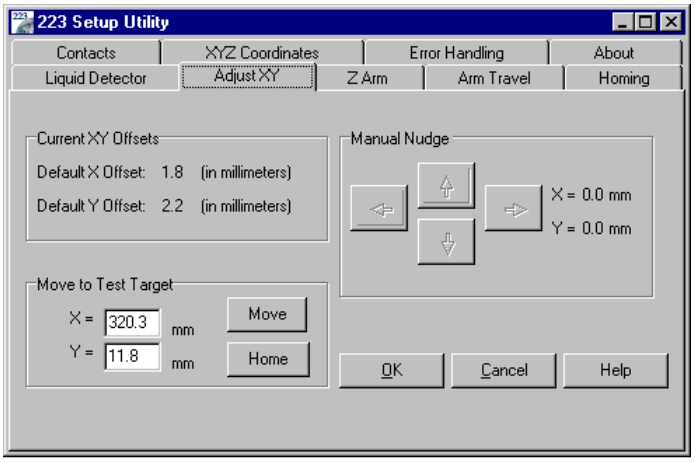
Following is a description of each of the tabs.

About

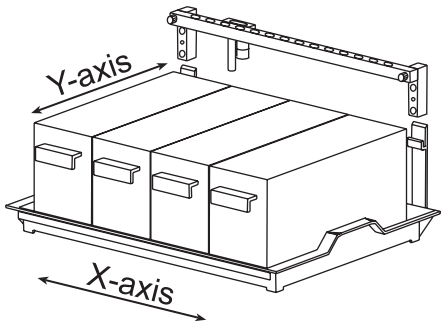
The About tab allows you to indicate the unit ID of the instrument being configured so the 223 Setup Utility can communicate with that instrument.

This tab also lists software version and copyright information for the 223 Setup Utility.

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 transfer port, filler port, 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(s) need(s) to be adjusted in the X- or Y-direction:

1 Select a test point.

2 Click on *Move*. When the probe reaches the target site, the software relaxes the Z-Arm so you can manually raise and lower the probe for visual alignment confirmation on the target site.

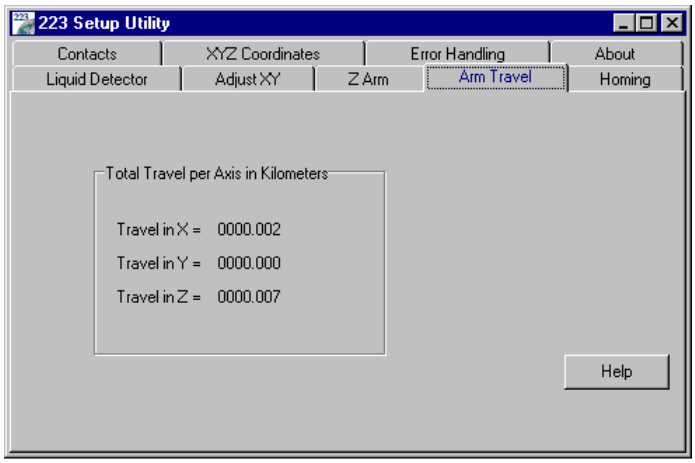
3 If the probe is not aligned over the target location, use the Manual Nudge arrow buttons to move the probe in the appropriate X- or Y-direction.

4 To store changes to the X- and Y- offsets, click *Ok*.

Or, to display the X- and Y-offsets currently set in the instrument's memory, click *Cancel*.

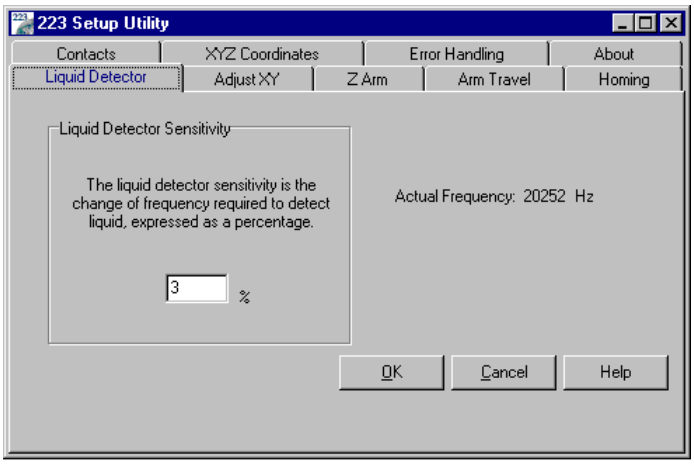
5 Click *Home* to home the instrument.

Arm Travel



The Arm Travel tab displays the XYZ travel in kilometers.

Liquid Detector



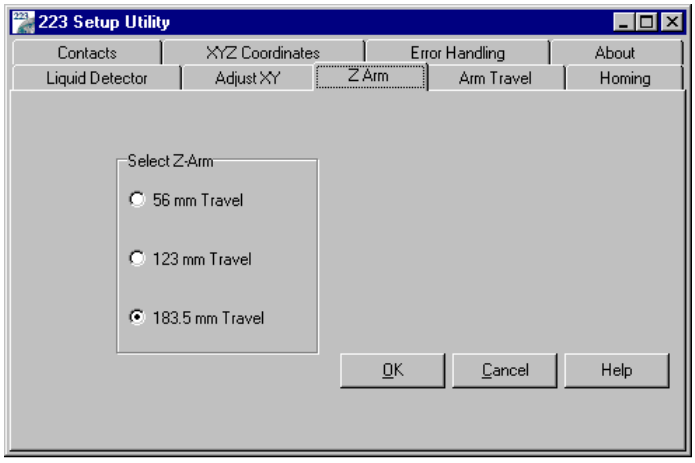
The Liquid Detector tab allows you to adjust the sensitivity of liquid detection. The factory default setting is 3%.

Raising the percentage suppresses false liquid detection while lowering the percentage increases sensitivity for situations where liquid is harder to detect. By lowering the probe so it touches the liquid for one of your samples, you can manually test the current sensitivity of the liquid detection. In this manner, you can observe the amount of change you might expect with each sample.

To store the sensitivity setting to the sample changer's memory, click *Ok*.

To display the sensitivity setting currently set in the sample changer's memory, click *Cancel*.

Z Arm

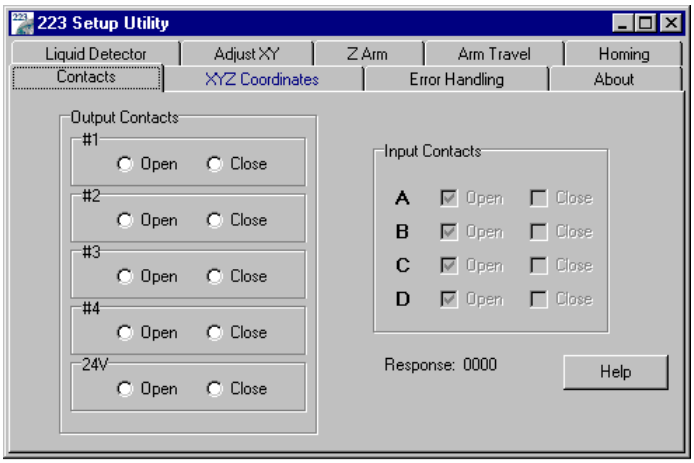


Use the Z Arm tab to identify the size of the installed Z-Arm. Setting the size of the Z-Arm controls the amount of travel in the Z-axis.

To store the selected Z-height settings to the sample changer's memory, click *Ok*.

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

Contacts

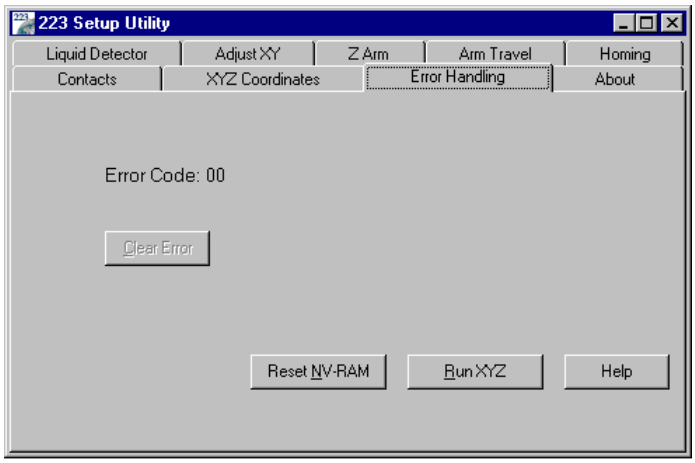


The Contacts tab allows you to toggle output contacts to determine if the correct contact connections have been made to peripheral devices to be controlled by the 223 Sample Changer.

Before using this tab, you need to connect the peripheral device's inputs to the appropriate output pair on the sample changer. If necessary, refer to ***Section 2*** for information on making contact connections.

To exit the software, click on *Done*.

Error Handling



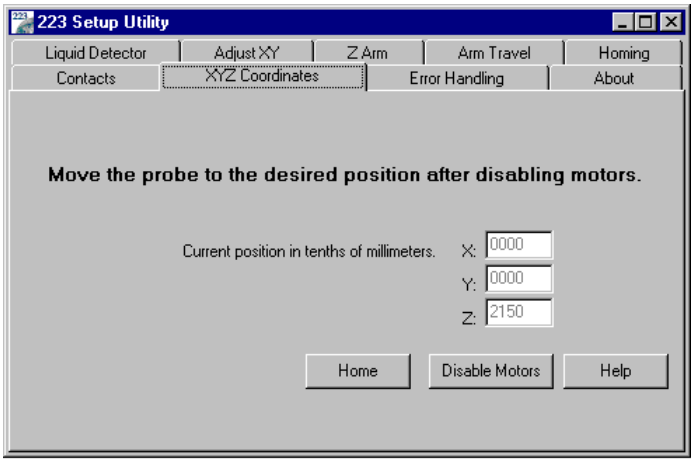
This tab displays the current error when the instrument is in an error state. For error solutions, refer to ***Section 5, Troubleshooting***. To clear the error, click *Clear error*.

Click *Reset NV-RAM* to reset the configuration options to the factory defaults.

Click *Run XYZ* to demonstrate the capabilities of the sample changer by performing an XYZ test. The XYZ test moves the probe to several locations.

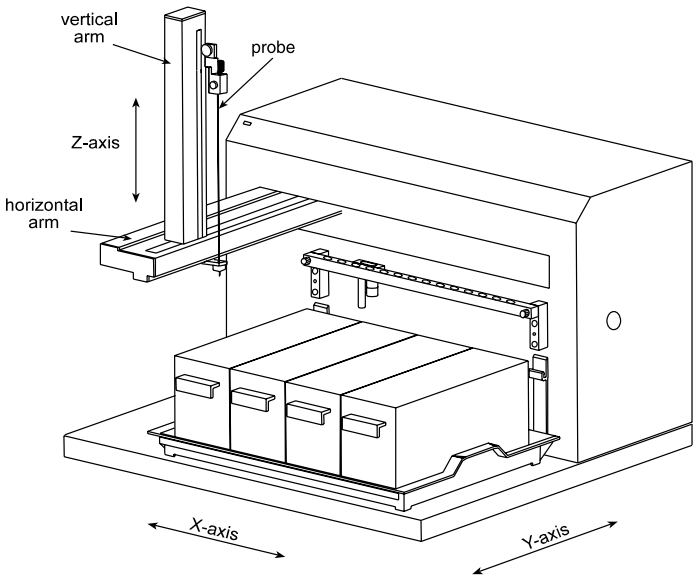
Warning! Remove the probe before running this test!

XYZ Coordinates

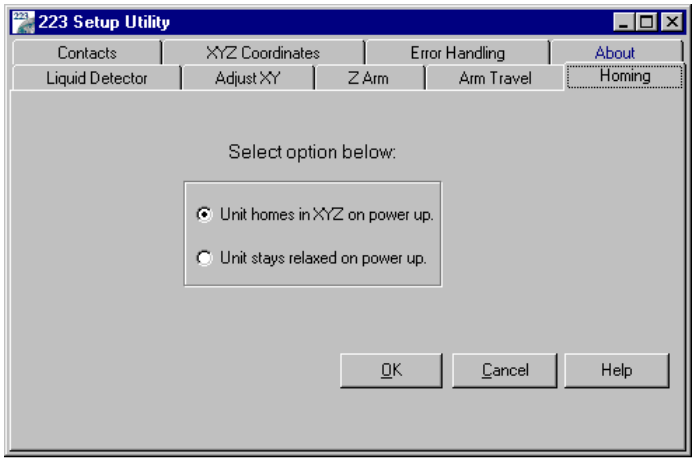


Use this tab to identify the X-, Y-, Z-coordinates of locations on the sample changer's work area and Z coordinate of the probe's tip.

First, click *Disable Motors*. Then, manually move the horizontal and vertical arms to a location on the sample changer's work area. Finally, manually lower or raise the probe to the appropriate height. The 223 Setup Utility displays the X-, Y-, and Z-coordinates.



Homing



This tab allows you to choose whether the instrument should home when powered up (click *Unit homes in XYZ on power up.*) or whether the motors in the arm should be disabled when the instrument powers up (click *Unit stays relaxed on power up.*).

Maintenance 4

To obtain optimum performance and maximum life from the sample changer, keep it well-maintained.

This section contains some general guidelines for maintaining your sample changer.

Cleaning the Sample Changer

The sample changer 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 sample changer, wipe the instrument using a dry, clean cloth.

Replacing Parts

Replacing the Probe

Refer to the appropriate instructions below depending on whether you are replacing the probe with one of the same type or one of a different type.

Installing same type of probe

To install a replacement probe of the same type that is currently installed:

1 Remove the transfer tubing's 1/4"-28 fitting from the tubing fitting.

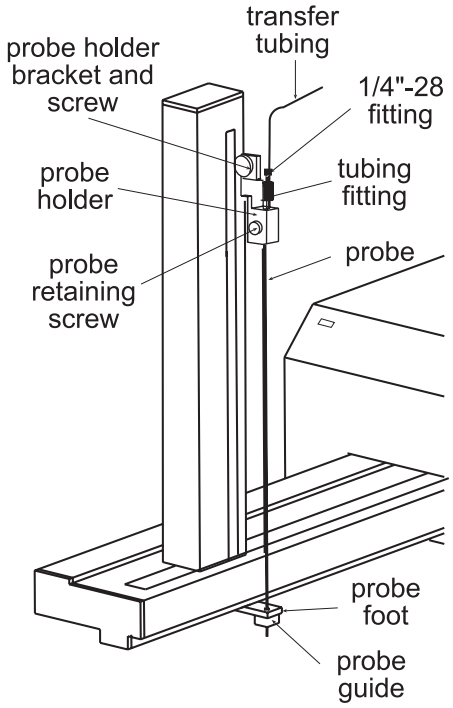
2 Loosen the probe retaining screw and remove the probe and tubing fitting from the probe holder.

3 Remove the old probe from the tubing fitting and insert the replacement probe.

4 Slide the probe assembly into the probe holder making sure that the probe is centered over the probe guide.

5 Secure the probe by tightening the probe retaining screw.

6 Re-attach and tighten the transfer tubing's 1/4"-28 fitting.



Installing different type of probe

To install a different type of probe, you may need to obtain a different probe holder and guide for the probe. See ***Appendix A.***

1 Remove the transfer tubing's 1/4"-28 fitting from the tubing fitting.

2 Loosen the probe retaining screw and remove the current probe and tubing fitting.

3 Unscrew the current probe guide from probe foot. Then screw the new probe guide into place.

4 Remove the screw securing the probe holder to the bracket and then pull the probe holder from the bracket. Insert the new probe holder into the bracket and secure using the screw.

5 Install the new probe into the tubing fitting. Slide the probe assembly into the probe holder making sure that the probe is centered over the probe guide. Secure the probe by tightening the probe retaining screw.

6 Re-attach and tighten the transfer tubing's 1/4"-28 fitting.

Replacing a Fuse

A blown fuse may indicate the existence of another problem in the instrument. If the replacement fuses blow, do not try others.

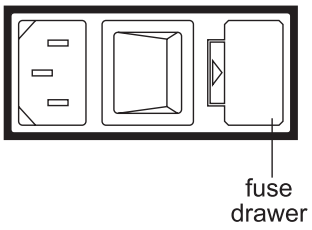
To change a fuse, follow these steps.

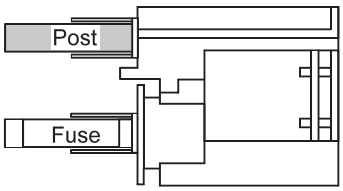
1 Disconnect the power cord from the power outlet and from the rear panel receptacle.

2 Locate the fuse drawer on the rear panel. See page 2-2 if necessary.

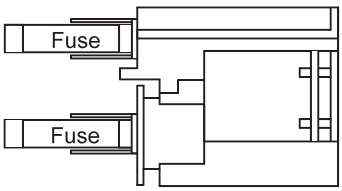
3 Insert a small screwdriver into the notch located at the left of the fuse drawer.

4 Twist the screwdriver to open and remove the fuse drawer. The fuse drawer contains one 2.0A "T" Slo-Blo fuse (5 x 20 mm size) for a 100/120 voltage selection. It contains two 2.0A fuses for a 220/240 voltage selection.





Fuse installation for 100/120 voltage

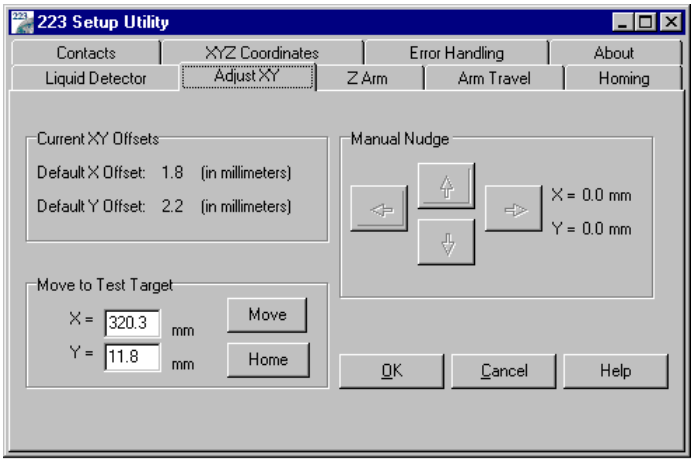


Fuse installation for 220/240 voltage

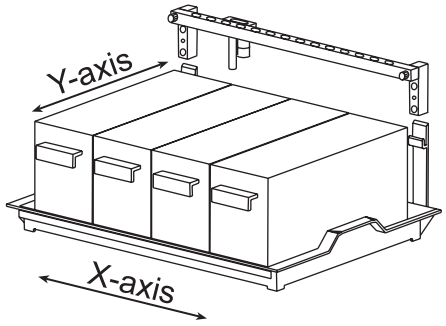
5 Remove the old fuse(s) and insert the new fuse(s).

6 Insert the fuse drawer into its receptacle in the sample changer.

Checking Position Alignment



The 223 Setup Utility (Adjust XY tab), described in ***Section 3***, 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 transfer port, filler port, 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(s) need(s) to be adjusted in the X- or Y-direction:

1 Select a test point.

2 Click on *Move*. When the probe reaches the target site, the software relaxes the Z-Arm so you can manually raise and lower the probe for visual alignment confirmation on the target site.

3 If the probe is not aligned over the target location, use the Manual Nudge arrow buttons to move the probe in the appropriate X- or Y-direction.

4 To store changes to the X- and Y-offsets, click *Ok*.

Or, to display the X- and Y-offsets currently set in the instrument's memory, click *Cancel*.

5 Click *Home* to home the instrument.

Transporting the Sample Changer

When moving the sample changer:

1 Re-install the arm locking screw using the following procedure. Refer to the diagrams on page 2-14 if necessary.

   a) Turn off the sample changer.

   b) Move the horizontal arm to the right as far as it will go.

   c) Locate and remove the arm locking screw from its storage location on the rear panel.

   d) Remove the plastic plug located on the right side panel.

   e) While holding the horizontal arm in its far right position, install the arm locking screw into place inside the sample changer.

   f) Replace the plastic plug.

2 Lift the sample changer by grasping the base. **Do not use the horizontal arm as a handle.**

Transporting the Sample Changer

If packaging the sample changer for shipment, remove the vertical arm. To remove the vertical arm, refer to the diagrams on pages 2-16 and 2-17 and follow the instructions below.

1 Disconnect the transfer tubing from the probe.

2 Loosen the probe retaining screw and remove the probe.

3 Remove the plate from the front of the horizontal arm by removing its three screws.

4 Locate the hexagonal-shaped control rod by looking down into the horizontal arm. Lightly press on the rod with your finger and push the rod towards you. When the end of the rod is no longer flush with the end of the horizontal arm, grasp the rod and completely remove it.

5 Pull the vertical arm towards the front of the horizontal arm as far as it will go. Then, while holding the vertical arm, loosen the two screws on the underside of the horizontal arm that secure the vertical arm. Remove the vertical arm.

6 Re-insert the control rod as far as it will go. While inserting the rod, you may need to rotate the rod back and forth slightly to get it to pass through the vertical arm's gearing and motor drive socket.

7 Re-attach the plate to the front of the horizontal arm.

Troubleshooting 5

If you encounter a problem while operating the 223 Sample Changer, refer to the following pages.

Error Messages

To obtain the current error code number, send the immediate e command using the GSIOC Utility described in ***Appendix E***.

Error	*Description*	*Solution*
15	NV-RAM checksum is invalid	Send the buffered ~9 GSIOC command to reset the NV-RAM and initialize to the default value. Run SET_223.EXE or the 223 Setup Utility program to check configuration options. Replace the NVM.
20	X motor position error	Cycle power to the sample changer. Check for obstructions.
21	Y motor position error	Cycle power to the sample changer. Check for obstructions.
22	Z motor position error	Cycle power to the sample changer. Check for obstructions.
23	X sensor inactive	Check if the sensor disk is bent. Then contact the Gilson Customer Service Department.
24	Y sensor inactive	Check if the sensor disk is bent. Then contact the Gilson Customer Service Department.
25	Z sensor inactive	Check if the sensor disk is bent. Then contact the Gilson Customer Service Department.
26	X target position out of range	Correct the error in the program controlling the sample changer.
27	Y target position out of range	Correct the error in the program controlling the sample changer.
28	Z target position out of range	Send the immediate Q command using the GSIOC Utility Program to read the travel range. Correct the error in the program controlling the sample changer.

29	X-offset out of range	Run SET_223.EXE or the 223 Setup Utility (Adjust XY tab) program to correct the problem. If the problem persists, contact the Gilson Customer Service Department.
30	Y-offset out of range	Run SET_223.EXE or the 223 Setup Utility (Adjust XY tab) program to correct the problem. If the problem persists, contact the Gilson Customer Service Department.
31	Z-offset out of range	Run SET_223.EXE or the 223 Setup Utility (Adjust XY tab) program to correct the problem. If the problem persists, contact the Gilson Customer Service Department.

Mechanical Problems

Probe not finding tube center

- Probe may be bent. Straighten or replace the probe.
- The sample changer may be misaligned. Perform the position alignment procedure described on page 4-6.

Electrical Problems

Input functions not operating

- Make sure connections into the terminal block connector are secure.
- Make sure the terminal block connector is secure in input/output port.
- 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 the device supplying the input signal to the sample changer is working.
- Check logic of controlling program.

Output functions not operating

- Make sure connections into the barrier strip are secure.
- Make sure the terminal block connector is secure in the input/output port.
- Check connections for proper pin assignments.
- Output from the sample changer should be compatible with the device to which it is interfaced. Outputs are contact closures.
- Check logic of controlling program.

Status light not illuminated

- Ensure power is turned on.
- Check AC power cord connections.
- Try different AC outlet.
- Check fuse(s); replace if necessary.
- Check all sample changer connections.

Status light blinking

- Check for obstructions to horizontal or vertical arms or probe.
- Restart controlling program.
- Check for error code from sample changer.
- Issue buffered ~9 command to reset NV-RAM and initialize default parameters. See ***Appendix C*** for more information on GSIOC commands.

Sample changer blows fuses

- Contact the Gilson Customer Service Department.

Liquid Level Detector Problems

Not detecting liquid level

- Ensure that the liquid level detector cable is plugged in.
- Check if liquid is detectable. Liquid level detection works only if there is electrical conductivity in your liquid. Liquid level detecting will not work with most non-polar liquids. For intermediate polarity liquids and polar liquids, check the sensitivity setting in the 223 Setup Utility or SET_223.EXE.
- Check that the liquid level sensing switch is in the correct position. Follow the liquid level detector cable to where it is plugged in. The liquid level sensing switch is to the right of the connector. Make sure the switch is in the right position.
- Call the Gilson Customer Service Department if this is caused by faulty circuitry.

Replacement Parts and Accessories A

For part numbers for available racks, refer to ***Appendix B.***

Vertical Arms

190610	183 mm vertical arm
190611	123 mm vertical arm
190613	56 mm vertical arm

Probes for 183 mm Vertical Arm

Stainless Steel

27067361	Beveled edge probe (not septum-piercing); 220.5 x 1.5 x 1.1 mm
27067373	Non septum-piercing probe; constricted tip, stainless steel. Dimensions: 221 x 1.5 x 1.1 mm ID (tip dimensions: 2 x 1.1 x 0.4 mm ID)
27067374	Non septum-piercing probe; bevelled constricting tip, stainless steel. Dimensions: 221 x 1.5 x 1.1 mm ID (tip dimensions: 2 x 1.1 x 0.4 mm ID). For use with transfer ports.
27067362	Side-entry probe (septum-piercing); 220.5 x 1.5 x 1.1 mm
27067384	Probe, septum-piercing Z=183

Teflon

27067369	Teflon-coated probe for non-metal applications; (220 x 0.9 mm ID)

Probes for 123 mm Vertical Arm

Stainless Steel

27067211	Beveled-tip probe (not septum-piercing); 160.5 x 1.5 x 1.1 mm ID. Requires probe holder/guide kit (part number 19061040).
27067213	Tapered-tip probe (not septum-piercing); 160.5 x 1.5 x 1.1 mm ID. Requires probe holder/guide kit (part number 19061040).
27067212	Side entry-tip probe (septum-piercing); 160.5 x 1.5 x 1.1 mm ID. Requires probe holder/guide kit (part number 19061040).
27067272	Beveled edge probe for use with transfer ports (not septum-piercing); 160.5 x 1.5 x 1.1 mm. Requires probe holder/guide kit (part number 19061040).
27067235	Beveled edge probe (septum-piercing); 162 x 0.7 x 0.42 mm. Requires probe sleeve (part number 27067236) and probe holder/guide kit (part number 19061040).
27067236	Probe sleeve for septum-piercing probe; 133 x 2 x 0.8 mm (part number 27067235). Requires probe holder/guide kit (part number 19061040).
27067231	Beveled edge probe (not septum-piercing); 162 x 0.7 x 0.42 mm. Requires sleeve (part number 27067232) and probe holder/guide kit (part number 19061040).
27067232	Probe sleeve for non-septum-piercing probe (part number 27067231). Requires probe holder/guide kit (part number 19061040).
27067276	Flat tipped probe for drop transfer; 165 x 0.7 x 0.4 mm. Requires probe sleeve (part number 27067277) and probe holder/guide kit (part number 19061040).
27067277	Probe sleeve for flat-tipped probe, 155 mm, without “V” cut at top. Requires probe holder/guide kit (part number 19061040).
27067238	Grooved septum-piercing probe (sleeve not required), 162 x 0.7 x 0.4 mm ID. Requires 1.6 mm probe guide insert (part number 27067239).

Titanium

27067237	Titanium beveled edge probe (septum-piercing); 162 x 0.7 x 0.42 mm. Requires probe sleeve (part number 27067236) and probe holder guide/kit (part number 19061040).
27067236	Probe sleeve for septum-piercing probe (part number 27067237).

Teflon

27067218	Teflon-coated probe for non-metal applications; 157.5 x 0.9 mm ID (22 GA). Requires probe holder/guide kit (19061041).

Double Probe Kit

27167215	Double probe kit; allows different simultaneous or successive liquid handling operations in same test tube. Requires 3-way valve. Includes flat tipped probe (181.5 x 1.5 x 1.1 mm ID), triangular flat tipped probe (169.5 x 2.5 x 1.1 mm ID), Teflon connector, probe holder and probe guide.

Probes for 56 mm Vertical Arm

Stainless Steel

27067131	Beveled edge probe (septum-piercing); 95 x 0.7 x 0.42 mm. Requires probe sleeve (part number 27067132) and probe holder guide/kit (part number 19061040).
27067132	Probe sleeve for septum-piercing probe (part number 27067131)
27067113	Constricting tip probe; 93.5 x 1.5 x 1.1 mm. Requires probe holder/guide kit (part number 19061040).

Titanium

27067133	Beveled edge probe (septum-piercing); 95 x 0.7 x 0.42 mm. Requires probe sleeve (part number 27067132) and probe holder guide/kit (part number 19061040).
27067132	Probe sleeve for septum-piercing probe (part number 27067133)

Adjustable Probe Sleeve

27067267	Adjustable probe sleeve for septum-piercing probes, stainless steel; 160 x 1.2 x 0.8 mm ID. Cut to required length according to probe length and sample vial.

Probe Holder/Guide Kits

19061040	Probe holder/guide kit; includes probe holder, guide and probe connecting nut (part number 27072001) for 1.5 mm outer diameter probes.
19061041	Probe holder/guide kit; includes probe holder, guide and probe connecting nut (part number 23074002) for Teflon probes.

Transfer Tubing

2954583	1 mL coiled FEP tubing, 2200 x 1.6 x 0.8 mm ID
2954671	3 mL coiled FEP tubing, 1.5 mm ID
29425066	5 mL coiled FEP tubing, 1.5 mm ID
2954672	10 mL coiled FEP tubing, 1.5 mm ID
49943392	200 µL FEP transfer tubing, 1000 x 1.6 x 0.5 mm
49942392	440 µL FEP transfer tubing, 1000 x 1.6 x 0.8 mm
49948392	2800 µL FEP transfer tubing, 1000 x 3 x 2 mm
F1410153	Coupling for 1/4"-28 fitting, PVDF
27072001	Probe connecting nut for 1.5 mm probe; connects probe and transfer tubing.
23074002	Probe connecting nut for Teflon probe; connects probe and transfer tubing.

Rinse Stations and Accessories

2707251L	Rinse station with 85 mm rinsing well and locking collar
2707261L	Rinse station with 45 mm rinsing well and locking collar
2707263	Polypropylene rinsing well, 45 mm
2707253	Polypropylene rinsing well, 85 mm
2707252	Polypropylene rinsing well, flow-through
29501017	Plastic locking collars to connect drain tubing to rinse station drain; package of 6.
470331206	Tubing for flow-through rinsing well (3/16 ID x 5/16 OD); per foot.
470321803	Tygon tubing for rinse station drain (5/32 ID x 7/32 OD); per foot.
470343706	Tygon tubing for polypropylene tray drain (5/16 ID x 7/16 OD); per foot
13420034	Isoversinic drain tubing for rinse station drain (7 mm ID); per foot
4701177592	Rinse station tubing, Isoversinic, 4.5 mm ID (6 mm OD), per foot. For rinse stations with locking collar

Control Options

2106171	706 GSIOC Device Driver Software (Programmer's Tool Kit) for MS DOS-based systems. Includes tools for programmers to write computer programs to control Gilson instruments: the GSIOC Device Driver to extend MS DOS or PC DOS to use Gilson devices, and sample programs written in BASICA, Turbo Pascal, Microsoft Pascal and C which demonstrate how to write programs to address Gilson instruments. Use with Model 605 RS-232 Adapter or 506C System Interface Module.
270230	XL Keypad Controller
36083121	Serial Cable, 25-pin/25-pin
36083122	Serial Cable, 9-pin/25-pin (most common)
36083123	Serial Cable Adapter, 9-pin/25-pin

Safety Shield

1907175	223 Safety Shield kit. Encloses sides and front of 223 working area.

Accessories

2749767	Filler port to transfer samples from the 223 Sample Changer to another instrument
49944107	0.3 mm ID Teflon Tubing; 10 feet plus 2 end fittings. To connect filler port to other instrument.
49942107	0.8 mm ID Teflon Tubing; 10 feet plus 2 end fittings. To connect filler port to other instrument.
2954709	Transfer port accessory set for 1 port. Includes one polyamide molded transfer port, PTFE inlet tubing (1000 x 3 x 2 mm ID) with filter, PE disposable sealing caps, and instruction leaflet.
2954714	Replacement transfer port; does not include inlet tubing, extra sealing caps or instruction leaflet

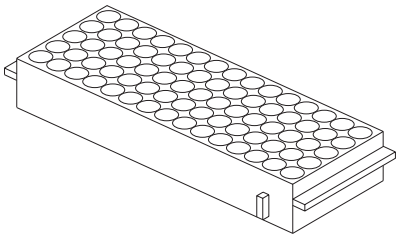
2954698	Caps, natural PE, for tabless 1 mL column, 1000/pkg
190711	Diverting valve assembly for 223 Sample Changer. Includes mounting bracket, tubing and two tubing/cable clips.
1907111	Diverting valve for 223 Sample Changer
030722	Tubing to connect diverting valve and 223 probe

Replacement Parts

1907141	Support bar for mounting rinse station(s), transfer port(s) and filler port.
27072001	Probe connecting nut for 1.5 mm probes
23074002	Probe connecting nut for Teflon probe
190712	Level sensing cable.
190713	Tubing/cable support rod.
2507023	Tubing retaining clip for support rod.
638308513	Terminal block connector, 8-pin.
638310513	Terminal block connector, 10-pin.
709910206	2-conductor interconnect wire, 6'
36078143	Shielded GSIOC cable, 30"
6730204007	Fuse; 2 amp (250V) T-type, 5 mm x 20 mm
36083122	Serial cable, IBM AT-type, 9-pin female to 25-pin male

Racks B

You can configure the sample changer with a variety of rack types and sizes. The sample changer can hold a maximum of four Code 20-Series racks or thermostated Code 30-Series racks.



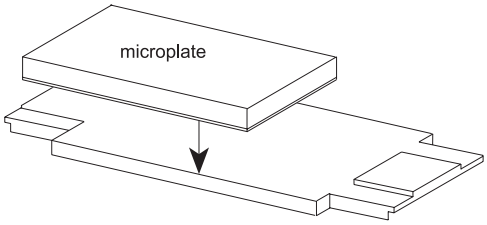
Code 0 rack

For 80 vessels

Material: polypropylene

Vessels and maximum capacity: 12 x 32 mm tubes (9 mL)

Part number: 270430



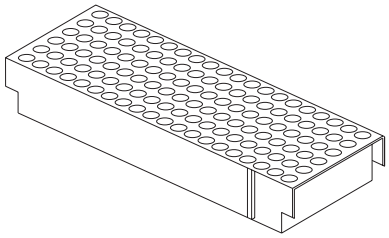
Code 7 rack holder

For one 96-well microplate

Vessel capacity: 0.3 mL/well

Part number: 2707401

Note: Requires installation of rack holder (part number 1907143). See ***Section*** **2**.



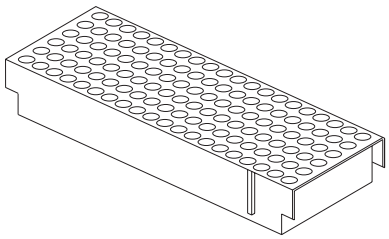
Code 8 rack

For 120 vessels

Material: polypropylene

Vessels and maximum capacity: 6 x 32 mm tubes (0.3 mL)

Part number: 270438



Code 9 rack

For 120 vessels

Material: polypropylene

Vessels and maximum capacity: 7 x 40 mm tubes (0.7 mL)

Part number: 270439

Note: Requires installation of rack holder (part number 1907143). See ***Section*** **2**.

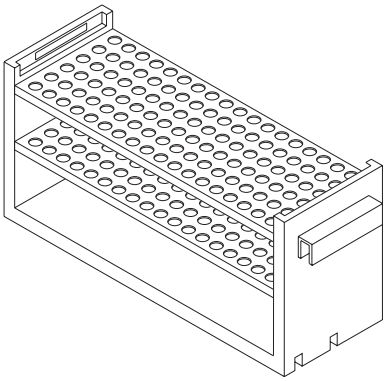
Code 20 rack

For 108 vessels

Material: polypropylene

Vessels and maximum capacity: 10 x 100 mm tubes (4.5 mL)

Part number: 150425



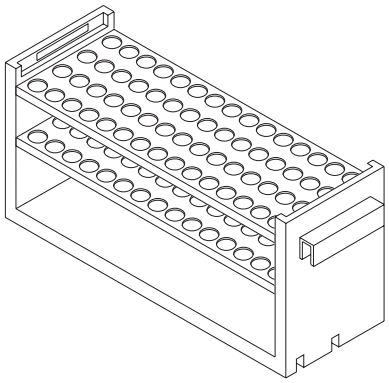
Code 21 rack

For 60 vessels

Material: polypropylene

Vessels and maximum capacity: 13 x 100 mm tubes (9 mL)

Part number: 150422



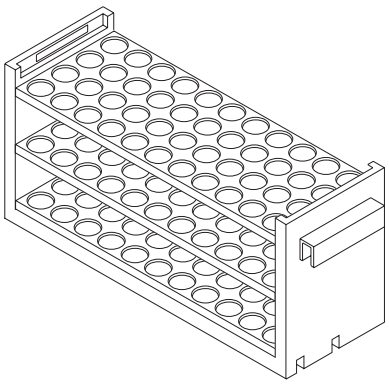
Code 22 rack

For 44 vessels

Material: polypropylene

Vessels and maximum capacity: 18 x 150 mm tubes (25 mL)

Part number: 150424



Code 22U rack

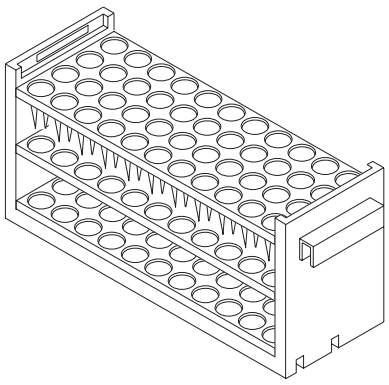
For 44 vessels

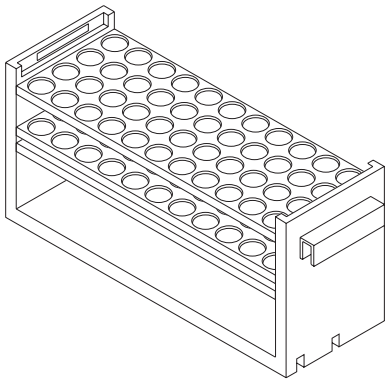
Material: polypropylene

Vessels and maximum capacity: from 10 x 75 mm tubes (3.5 mL) to 18 x 180 mm tubes (32 mL)

Part number: 150498

Note: Each of the reception cavities contains four positioning and retaining clips.





Code 23 rack

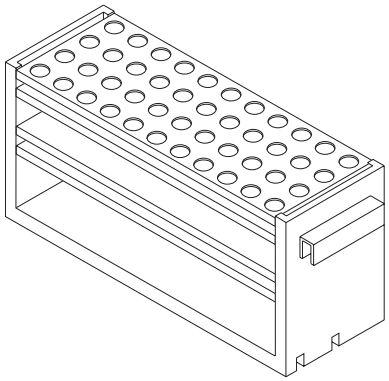
For 44 vessels

Material: polypropylene

Vessels and maximum capacity: 17 x 55 mm vials (6.8 mL)

17 x 65 mm vials (8 mL)

Part number: 150426



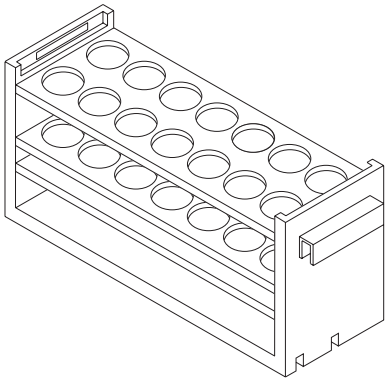
Code 23W rack

For 44 Waters WISP vials

Material: polypropylene and stainless steel

Vessels and maximum capacity: 15 x 45 mm (4 mL)

Part number: 270433



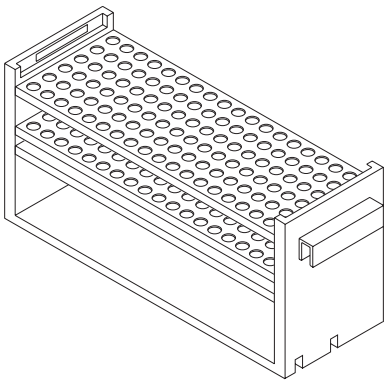
Code 24 rack

For 14 scintillation vials

Material: polypropylene

Vessels and maximum capacity: 28 x 60 mm (20 mL)

Part number: 150427



Code 28 rack

For 108 vessels

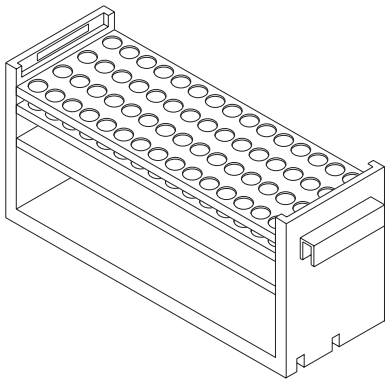
Material: polypropylene

Vessels and maximum capacity: 10 x 65 mm tubes (3 mL)

10 x 75 mm tubes (3.5 mL)

Part number: 150420

Code 29 rack



For 60 vessels

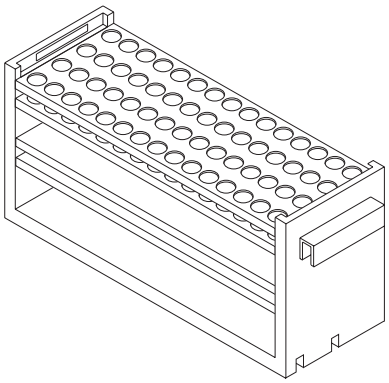
Material: polypropylene

Vessels and maximum capacity: 12 x 75 mm tubes (5 mL)

13 x 75 mm tubes (6 mL)

Part number: 150429

Code 29 LE rack



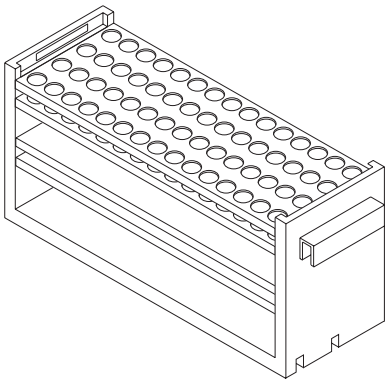
For 60 large (1.5 mL) Eppendorf vials

Material: polypropylene and stainless steel

Vessels and maximum capacity: 11 x 40 mm (1.5 mL)

Part number: 2704342

Code 29 SE rack



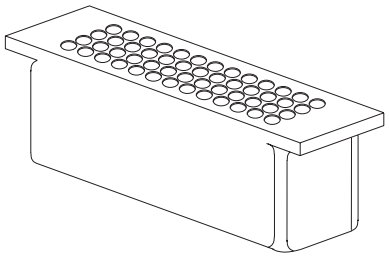
For 60 small (0.5 mL) Eppendorf vials

Material: polypropylene and stainless steel

Vessels and maximum capacity: 7 x 30 mm (0.5 mL)

Part number: 2704341

Code 30 rack

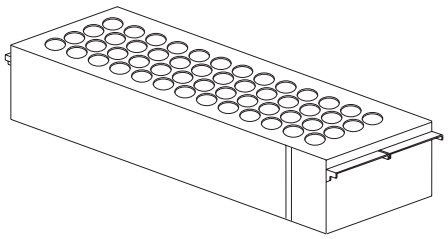


For 60 vessels

Material: aluminum

Vessels and maximum capacity: 12 x 32 mm vials (2 mL)

Part number: 2704430



Code 30P rack

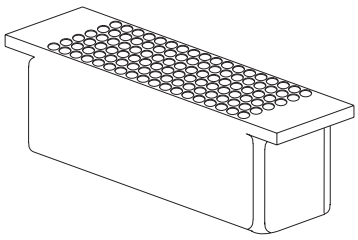
For 60 vessels

Material: polypropylene

Vessels and maximum capacity: 12 x 32 mm vials (2 mL)

Part number: 2704530P

Note: Requires installation of rack holder (part number 1907142). See ***Section 2***.



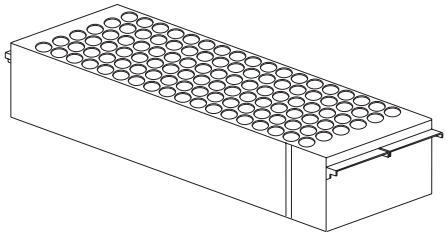
Code 31 rack

Thermostated rack for 108 vessels

Material: aluminum

Vessels and maximum capacity: 7 x 40 mm vials (0.7 mL)

Part number: 2704431



Code 31P rack

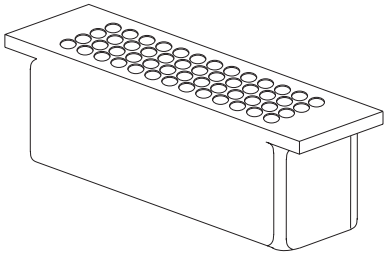
For 108 vessels

Material: polypropylene

Vessels and maximum capacity: 7 x 40 mm tubes (0.7 mL)

Part number: 2704531P

Note: Requires installation of rack holder (part number 1907142). See ***Section 2***.



Code 32 rack

Thermostated rack for 60 vessels

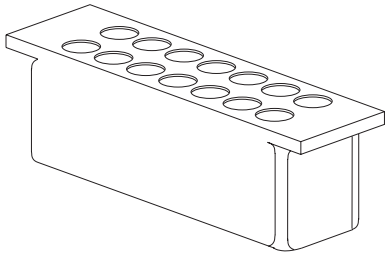
Material: aluminum

Vessels and maximum capacity: 13 x 65 mm tubes (6 mL)

13 x 100 mm tubes (9 mL)

Part number: 2704432

Code 33 rack



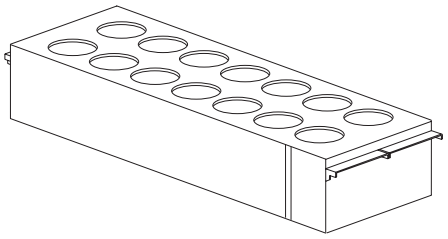
Thermostated rack for 14 scintillation vials

Material: aluminum

Vessels and maximum capacity: 28 x 60 mm (20 mL)

Part number: 2704433

Code 33P rack



For 14 scintillation vials

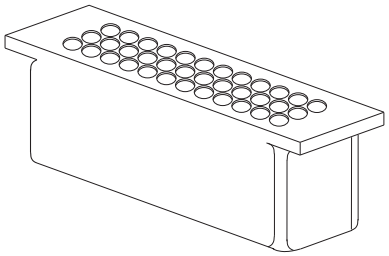
Material: polypropylene

Vessels and maximum capacity: 28 x 60 mm (20 mL)

Part number: 2704533P

Note: Requires installation of rack holder (part number 1907142). See ***Section 2***.

Code 34 rack



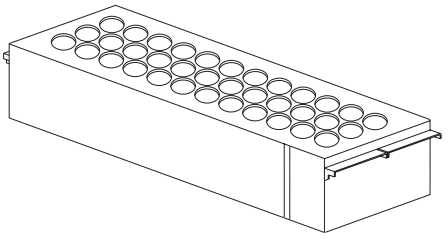
Thermostated rack for 36 Waters WISP vials

Material: aluminum

Vessels and maximum capacity: 15 x 45 mm (4 mL)

Part number: 2704434

Code 34P rack



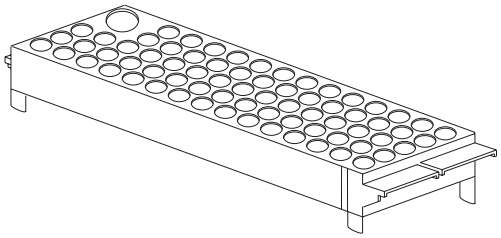
For 36 Waters WISP vials

Material: polypropylene

Vessels and maximum capacity: 15 x 45 mm (4 mL)

Part number: 2704534P

Note: Requires installation of rack holder (part number 1907142). See ***Section 2***.



Code 35P rack

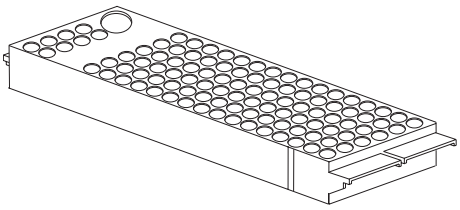
For 71 vessels and one scintillation vial

Material: polypropylene

Vessels and maximum capacity: 12 x 32 mm (2 mL)
28 x 60 mm (20 mL)

Part number: 2704535P

Note: Requires installation of rack holder (part number 1907142). See ***Section 2***.



Code 36P rack

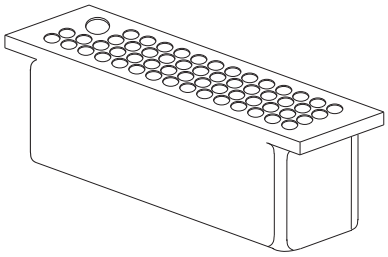
For 120 microvials and one scintillation vial

Material: polypropylene

Vessels and maximum capacity: 7 x 40 mm (0.7 mL)
28 x 60 mm (20 mL)

Part number: 2704536P

Note: Requires installation of rack holder (part number 1907142). See ***Section 2***.



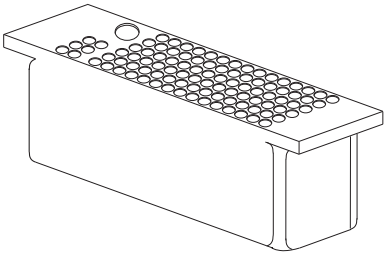
Code 37 rack

Thermostated rack for 56 vessels and one scintillation vial

Material: aluminum

Vessels and maximum capacity: 12 x 32 mm (2 mL)
28 x 60 mm (20 mL)

Part number: 2704437



Code 38 rack

Thermostated rack for 96 microvials and one scintillation vial

Material: aluminum

Vessels and maximum capacity: 7 x 40 mm (0.7 mL)
28 x 60 mm (20 mL)

Part number: 2704438

GSIOC Commands C

The GSIOC is a communications interface that enhances the power of the sample changer. It incorporates an EIA RS-485 interface and allows up to 32 slave devices to be controlled from a single master device.

Each slave device is identified by a unique number that must be known to the device and to the master device. The default ID code of the sample changer is 10.

To control the sample changer via the GSIOC interface, you need the following:

- a computer with any Gilson control software or 706 Device Driver Software installed
- an unused RS-232 communication port

From the computer, you:

- specify the sample changer as the instrument to control by indicating its unit ID
- issue commands that set operating parameters, control operation, or request information from the sample changer.

GSIOC Commands

There are two kinds of commands that you can send over the GSIOC:

- **Buffered commands** send instructions to the sample changer. These commands are executed one at a time.
- **Immediate commands** request status information from the sample changer. These commands are executed immediately, temporarily interrupting other commands in progress.

GSIOC Command List

In the command list on the following pages, the GSIOC command must be entered in the proper upper or lower case format. If a buffered command requires additional information, you see *italicized* text next to the command. The description of the command identifies what you need to enter in place of the italicized parameter. Also note that if a parameter is optional, it appears within brackets, [ ].

I - Immediate
B - Buffered

Command	Type	Description
%	I	Returns the character string: "223Vx.yz", where x, y, and z identify the software version for the sample changer.
$	I	Returns a "$" and resets the sample changer to its power-up state.
@	I	Reads non-volatile memory (NV-RAM) at current address. Returns "AA=xxxx" where: AA - Value is the address (0–39). xxxx - Data at the address. AA will be advanced automatically.

@AA[=xxxx]	B	Sets the value at NV-RAM address where: AA - Value is the address (0–39, see list below). xxxx - (Optional) Data at the address.
~n	B	Sets test mode. Indicate one of the following for n: 1 - Performs XYZ test. **Must be run without probe from the home position.** 9 - Resets NV-RAM and initializes to defaults.
9	I	Reads contact input event FIFO. If the queue is empty, "|000000" is returned. If the queue is not empty, returns "Xtttttt" where: X - State of the four contact inputs: 1 for closed, 0 for open. See table below. ttttt - Time in 10 ms units since the last buffered 9 command.

if X=	*then* *A=*	*B=*	*C=*	*D=*
@	0	0	0	0
A	1	0	0	0
B	0	1	0	0
C	1	1	0	0
D	0	0	1	0
E	1	0	1	0
F	0	1	1	0
G	1	1	1	0
H	0	0	0	1
I	1	0	0	1
J	0	1	0	1
K	1	1	0	1
L	0	0	1	1
M	1	0	1	1
N	0	1	1	1
O	1	1	1	1

Whenever the status of a contact input changes, the state of all four contacts and the time since the last buffered 9 command was issued are stored in the event FIFO.

9	B	Clears the contact input event FIFO and resets the contact input event timer.

a	I	Reads the X travel length. Returns "XXXX.XXXX" which is the X travel length in kilometers.
b	I	Reads the Y travel length. Returns "YYYY.YYYY" which is the Y travel length in kilometers.
c	I	Reads the Z travel length. Returns "ZZZZ.ZZZZ" which is the Z travel length in kilometers.
e	I	Reads the current error number. Returns "n" which identifies the error number; see page 5-2 for listing of errors. If no error has occurred, returns 0.
e	B	Clears error number.
E*xyz*	B	Sets X, Y, and Z motor status: x - 0 for disable or 1 for enable X motor. y - 0 for disable or 1 for enable Y motor. z - 0 for disable or 1 for enable Z motor. For example, the following command disables the motors: E000.
H	B	Moves probe to home position.
I	I	Reads status of input contacts. Returns "cccc" where: cccc - Status of input contacts A, B, C, D: 1 if the contact is closed (shorted), 0 if open.
J	I	Reads status of output contacts and +12V external auxiliary power. Returns "ccccp" where: cccc - Status of output contacts 1, 2, 3, and 4: 1 if the output is connected, 0 if disconnected. p - Status of +12V external auxiliary power: 1 if on, 0 if off. Auxiliary power is off when sample changer is turned on.

J*cccc*[*p*]	B	Sets status of output contacts and +12V external auxiliary power. cccc - Output contacts 1, 2, 3, and 4: 1 to connect, 0 to disconnect, X for no change. p - (Optional) Auxiliary power: 1 for on, 0 for off, X for no change.
j*c[tttt]*	B	Pulses an output contact: c - Number of the output contact, 1–4. tttt - Duration of the pulse in tenths of seconds; default is 1. Range is 1 to 9999.
L*x*	B	Sets liquid level sensing threshold frequency based on current frequency and data at NV-RAM frequency threshold field. x - H for high frequency setting or L for low frequency.
M	I	Reads X, Y, Z motor status. Returns “xyz”. For each motor status, you see “U” for unpowered, “P” for powered, “R” for running, or “E” for error.
n	I	Reads the actual frequency of liquid level detector oscillator. Returns “fffff” which is frequency in Hz.
N	I	Reads the liquid level detector output. Returns “Ifffff” where: I - A for air or L for liquid. fffff - Current sensitivity threshold frequency in Hz.
N*fffff*	B	Sets the liquid level sensing threshold frequency (fffff) in Hz.
P	I	Reads the XYZ position in tenths of millimeters, based on the internal encoder wheel. Returns “xxxx/yyyy/zzzz.”
Q	I	Reads the Z travel range. Returns “min–max” where: min - Lowest position in tenths of millimeters. max - Highest position in tenths of millimeters.
S	I	Reads the command in the synchronization buffer. Returns “|” if buffer is empty.

S*mm*	B	Sends a synchronized buffered command (mm) that is executed when the sample changer is quiescent. Sending a command can overwrite unexecuted, existing commands. If you send this command without indicating a parameter (mm), the buffer is cleared.
v*zzzz,sss*	B	For tracking liquid height, raises or lowers the Z height of the probe at the designated speed: zzzz - Z height in tenths of millimeters. sss - speed, in tenths of millimeters per second, at which to move the probe.
V	I	Reads diverting valve status. Returns one of the following: 0 - Valve status off; the port connected to the probe is the one facing the rear of the sample changer. 1 - Valve status on; the port connected to the probe is the one facing you. When you turn off the sample changer, the valve status is set to off.
V*x*	B	Sets status of diverting valve. For *x*, indicate "1" for on or "0" for off. See V command above for a description of "1" and "0".
x	I	Reads X motor status. Returns one of the following: "U" for unpowered, "P" for powered, "R" for running, or "E" for error.
X	I	Reads the X- and Y-axis locations of the probe, based on the microstep position. Returns "xxxx/yyyy" which is X- and Y-axis locations in tenths of millimeters.
X*xxxx*[/*yyyy*]	B	Sets new X- and Y-axis positions for the probe where: xxxx - X-axis position in tenths of millimeters. yyyy - Y-axis position in tenths of millimeters.
y	I	Reads Y motor status. Returns one of the following: "U" for unpowered, "P" for powered, "R" for running, or "E" for error.
Y	I	Reads the Y-axis location of the probe, based on the microstep position. Returns "yyyy" which is the location in tenths of millimeters.

Y*yyyy*	B	Sets new Y-axis position for the probe where: yyy - Y-axis position in tenths of millimeters.
z	I	Reads Z motor status. Returns one of the following: "U" for unpowered, "P" for powered, "R" for running, or "E" for error.
z*ppp*[,*s*]	B	For use with liquid level sensing, sets new Z-axis position for the probe. pppp - Z-axis position in tenths of millimeters. If liquid level detection is on, movement of the probe is stopped if liquid is detected before this position is reached. s - Speed index of 1 to 5; default is 4. See table below.
Z	I	Reads the Z-axis location of the probe, based on the microstep position. Returns "zzzz" which is the location in tenths of millimeters.
Z*zzzz*[,*s*]	B	Sets new Z-axis position for the probe where: zzzz - Z-axis position in tenths of millimeters. Even if liquid level sensing is on, the probe is moved to this position. s - Speed index of 1 to 5; default is 4. See table above.

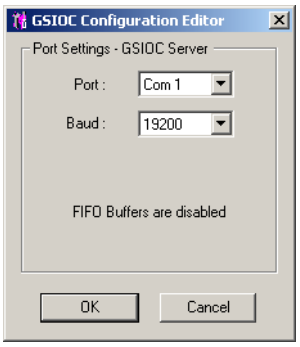
s	*Speed (mm/sec)*
1	19.9
2	30.2 (default for liquid level sensing)
3	61.8
4	126.9 (default for normal travel)
5	247.3

GSIOC Configuration Editor D

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.

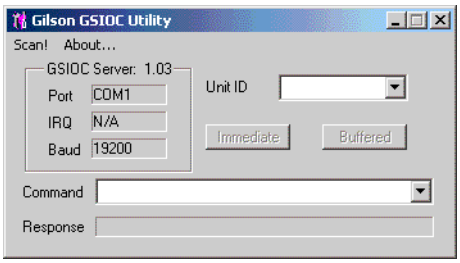
GSIOC Utility E

The GSIOC Utility allows you to issue commands to Gilson GSIOC instruments. Gilson Customer Service 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.

Starting the GSIOC Utility

1 Locate the GSIOC Utility (GSUTIL32.EXE) using Windows Explorer or the shortcut at Start—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.



Using the GSIOC Utility

Reviewing 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 D***.

Listing GSIOC Instruments

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

1 Click Scan!

The Unit ID box displays the current GSIOC instruments and their Unit IDs.

If all Gilson instruments are not listed, ensure that the proper RS-232 or GSIOC connection exist between the computer and Gilson instruments.

Sending Commands

Using the GSIOC Utility, you can send commands to Gilson instruments. Each instrument has a set of commands that it understands. A complete list of GSIOC commands for any instrument is given in its *user's guide*.

1 Type or select the unit ID assigned to the instrument in the Unit ID box. If you don't know the Unit ID, click Scan! to reveal a list box with the GSIOC instruments and their Unit IDs.

2 In the Command box, type the command string.

Commands consist of strings of no more than 40 characters that specify an instruction to the specified instrument.

3 Click on the appropriate command button to select a command type according to the function of the desired command. The command is issued when you select the command type.

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

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

4 Monitor the instrument's response to your command in the Response area of the box. The response to a successfully completed buffered command is a period (.). Immediate status responses also appear in this area. Refer to the *user's guide* for the Gilson instrument for a description of the valid responses to immediate commands.