GX-241 Liquid Handler

User's Guide

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Safety

Read this chapter before installing and operating the instrument.

Only trained technical personnel in a laboratory environment may use the instrument for non-medical, liquid handling purposes. For safe and correct use of the instrument, operating and service personnel must follow all instructions contained in this guide when installing, cleaning, and maintaining the instrument. All safety precautions must be observed during all phases of operation, service, and repair of the instrument.

Failure to comply with these precautions or with warnings described in the user's guide violates safety standards of design, manufacture, and intended use of the instrument. Gilson assumes no liability for customers failing to comply with these requirements.

The instrument has been certified to safety standards required in Canada, Europe, and the United States. Refer to the rear panel label on the instrument and the Declaration of Conformity document for the current standards to which the instrument has been found compliant.

Electronic and Hazard Symbols

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

Symbol	Explanation
– – –	Direct current Courant continu Gleichstrom
|	Electrical power ON Sous tension Netzschalter ein
O	Electrical power OFF Hors tension Netzschalter aus
⚠	Caution Attention Vorsicht
⚠ KEEP HANDS CLEAR OF PROBE!	Keep hands clear of probe Garder les mains éloignees de l'aiguille Halten Sie Hände fein von der Nadel

Safety Notices

The following safety notices may appear in this document:

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

Voltage

Ensure that the rear panel is easily accessible. Detach all sources of voltage from the instrument before the service, repair, or exchange of parts. Use only the grounded AC cord provided. Ungrounded power cords can result in electrical shock and serious personal injury. Use only approved fuses with the specified current rating. The instrument must be operated within the voltage specified on the rear panel of the instrument.

Probes

Keep clear of the probe while the X/Y/Z arm is in motion to avoid personal injury. Probes may contain hazardous substances.

Solvents

Observe safe laboratory practices when handling solvents. Adequate safety precautions, such as proper ventilation, safety glasses, etc., must be used when handling dangerous liquids. Refer to the Material Safety Data Sheet (MSDS) for each solvent before use.

Replacement Parts

Only use the replacement parts mentioned in this user's guide.

Sécurité

Veuillez lire ce paragraphe avant d'installer et de faire fonctionner le manipulateur de liquides.

Le manipulateur de liquides est prévu pour être utilisé dans l'environnement d'un laboratoire par du personnel technique formé.

Pour une utilisation correcte et en toute sécurité de cet instrument, il est recommandé que les opérateurs ainsi que le personnel de service suivent les instructions contenues dans le guide lors de l'installation, du nettoyage et de l'entretien du manipulateur de liquides.

Les précautions de sécurité suivantes doivent être observées pendant toutes les phases de fonctionnement, d'entretien, et de réparation de l'instrument. Si les précautions suivantes ou les avertissements spécifiques mentionnés dans ce guide utilisateur ne sont pas respectés, les normes de sécurité prévues lors de la conception, de la fabrication et l'utilisation du manipulateur de liquide seront transgressées. Gilson n'assume aucune responsabilité si un client ne respecte pas ces exigences.

Symboles Électroniques et de Dangers

Les symboles électroniques et de dangers suivants peuvent apparaitre sur l'instrument:

Symbole	Signification
▬ ▬ ▬ ▬	Direct current Courant continu Gleichstrom
|	Electrical power ON Sous tension Netzschalter ein
O	Electrical power OFF Hors tension Netzschalter aus
⚠	Caution Attention Vorsicht
⚠ KEEP HANDS CLEAR OF PROBE!	Keep hands clear of probe Garder les mains éloignees de l'aiguille Halten Sie Hände fein von der Nadel

Notes de Sécurité

Les notes de sécurité suivantes peuvent apparaitre dans ce document:

⚠WARNING	WARNING (AVERTISSEMENT) indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures graves.
⚠CAUTION	CAUTION (ATTENTION) indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures ou légères.
NOTICE	NOTICE (AVIS) indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des dommages matériels.

Tension

Un accès au panneau arrière est nécessaire car le manipulateur de liquides doit pouvoir être débranché de toutes sources électriques avant l'entretien, la réparation, ou le changement de pièces.

Utiliser l'instrument avec l'alimentation secteur fourni et uniquement à la tension indiquée sur l'étiquette située à l'arrière de l'instrument.

Sondes

Lors de l'utilisation du manipulateur de liquides, garder les mains éloignées de la sonde afin d'éviter tous risques de blessures par perforation.

La sonde étant installée sur le bras-Z qui peut contenir des substances dangereuses, ne pas s'immiscer dans le zone de travail de l'instrument jusqu'à ce que le manipulateur de liquides ait complétement terminé sa procédure.

Solvants

Observer les bonnes pratiques de laboratoire lors de la manipulation des solvants. Si des liquides dangereux sont utilisés, une protection adéquate tel qu'une ventilation correcte, des lunettes de sécurité, etc., doivent être utilisés.

Se reporter aux fiches signalétiques des solvants avant toute utilisation.

Pièces Détachées

S'assurer d'utiliser seulement les pièces détachées mentionnées dans le guide utilisateur. S'il est nécessaire de changer des pièces non listées, merci de contacter votre représentant Gilson local.

Introduction

Chapter One

This chapter provides information on the following topics:

- **Description** on page 10

- **Unpacking** on page 11

- **Technical Specifications** on page 14

- **Customer Service** on page 16

- **Trademarks** on page 16

- **Repair and Return Policies** on page 17

Description

The GX-241 Liquid Handler is a compact X/Y/Z instrument designed for automating general liquid handling procedures. The GX-241 Liquid Handler can be configured with a VERITY® syringe pump, GX Direct Injection Module, fraction collection valve, transfer ports, racks, rinse station, and a GX Rinse Pump.

The VERITY® syringe pump which is required, but ordered separately, is equipped with user-selectable, small- or large-capacity syringe(s) allowing for a wide range of liquid transfers, from 10 µL to 25 mL, in a single stroke. For more information about the syringe pump, refer to its user's guide (*VERITY® 4020 Single, VERITY® 4120 Dual with Tee, and VERITY® 4220 Dual Syringe Pumps User's Guide*, part number LT310090).

Integration of a GX Direct Injection Module allows for on-line injection onto an HPLC system. For more information about the GX Direct Injection Module, refer to the GX Direct Injection Module appendix in this user's guide.

The optional fraction collection (FC) valve is a three-way valve mounted on the base of the z-arm. The valve facilitates the collection of fractions onto the bed of the liquid handler. Uniquely, this valve extends the capabilities of the liquid handler to serve as both the front-end autoinjector and fraction collector when configured in an HPLC system. For more information about how to install the FC valve, refer to the Fraction Collection (FC) Valve appendix in this user's guide.

The optional transfer port bar includes two transfer ports for delivering liquids to off-bed devices. For more information, refer to the Transfer Port Bar appendix in this user's guide.

Integration of the optional GX Rinse Pump enables the option for a flowing rinse using high or low flow settings. For setup and installation instructions, refer to the GX Rinse Pump appendix in this user's guide.

Installation of the optional safety shield creates a safe working environment by preventing inadvertant contact with the XYZ arm. Installation instructions are provided in the Safety Shield appendix in this user's guide.

Figure 1: GX-241 Liquid Handler with VERITY® 4020 Syringe Pump

Unpacking

The GX-241 Liquid Handler is delivered with most major components already assembled. Keep the original container and packing assembly in case the GX-241 Liquid Handler must be returned to the factory.

To unpack the instrument:

1. Open the box.

2. Remove the boxed power supply.

3. Remove the bag of accessories.

4. Remove the packing material.

NOTE	The foam material on the locator plate contains the Z-arm.

5. Lift the unit out of the box and place it on a lab bench or cart.

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

    a. Grip the unit at the large rectangular opening.

    b. Lift the unit up and out of the foam packing material.

Standard Equipment

The following items are considered standard equipment and are provided with the GX-241 Liquid Handler:

- Accessory Kit, which includes:
    - Allen Wrenches (2 mm and 3 mm)
    - Cable Support Rod with Clip and Mounting Screw
    - Drain Tubing
    - Ethernet Cable or RS-232 Cable
    - Gilson Ethernet Utility (Ethernet communication configuration only)
    - GX-241 Offset Utility
    - Liquid Level Detection (LLD) Cable Assembly
    - Offset Tool
    - Power Cords
    - Spiral Wrap and Tubing Clips
    - Terminal Block Connectors (8-pin, qty 2)
    - Z-Height Adjustment Tool
- External Power Supply
- Z-Arm

Documentation

The following documentation is provided:

- GX-241 Liquid Handler Documentation CD, which includes:
    - GX-241 Liquid Handler User's Guide
    - GX-241 Liquid Handler IQ Procedure
- Declaration of Conformity
- Gilson Ethernet Utility Instructions on the Gilson Ethernet Utility CD
- GX-241 Offset Utility Instructions on the GX-241 Offset Utility CD
- Hazardous Materials Declaration (China RoHS)
- Items Included Checklist
- Quality Control Checklist

Accessories

Required

Some accessories are required, but are ordered separately:

- VERITY® Syringe Pump

- Transfer Tubing

- Probe

- Probe Guide Assembly

- Rinse Station

- Racks

For part numbers, refer to the **Replacement Parts and Accessories** appendix.

Optional

The following optional accessories are also available:

- GX Direct Injection Module

- Fraction Collection Valve Package

- Transfer Port Bar Assembly

- GX Rinse Pump

- Safety Shield

For part numbers, refer to the **Replacement Parts and Accessories** appendix.

Technical Specifications

Please be aware of the following before operating the instrument.

NOTICE	Changes or modifications to the instrument not expressly approved by Gilson could void the factory-authorized warranty.

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

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

Technical specifications for the following components are provided:

- **GX-241 Liquid Handler** on page 14
- **GX Direct Injection Module** on page 69
- **Fraction Collection Valve** on page 77
- **GX Rinse Pump** on page 93

GX-241 Liquid Handler

Technical Specification	Definition
Arm Speed	0–350 mm/sec (300 mm/sec default) in X and Y dimensions 0–150 mm/sec (125 mm/sec default) in Z dimension
Communication	Ethernet or RS-232
Contact Control	Four inputs (contact closure, TTL), two relay outputs, and two switched +24V DC 1A outputs **NOTICE** Switching voltages higher than 30V or greater than 1A of current may damage the instrument.
Dimensions* **(W x D x H)** *with Z-Arm installed and connected	39 x 50 x 47 cm (15.4 x 19.8 x 18.5 in)
Environmental Conditions	Indoor use Altitude: up to 2000 m Temperature range: 5°C–40°C Humidity: Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
Front Panel	Two digit display and indicator lights for Power and Error
Horizontal Motion Strength	0.3 kg (0.7 lbs.)

GX-241 Liquid Handler

Technical Specification	Definition	
Liquid Contact Materials* *For more information, refer to the Materials appendix.*	**Description**	**Material**
	Probe Guide	PET
	Probe	316L Stainless Steel
	Rinse Station	PET
	Transfer Port	PEEK PET PTFE 316L Stainless Steel
	Tubing (Drain)	Tygon®
	Tubing (Transfer)	FEP
Liquid Level Detection (LLD)	Capacitive liquid level detection	
Locator Plate Capacity	Two racks, one rinse station, one transfer port bar, and one GX Direct Injection Module	
Number of Racks	Two Code 33X-series (Short), two Code 34X-series (Short), or a combination	
Power Requirements	**GX-241 Liquid Handler** Voltage: 24V DC Current Rating (Maximum): 6.25A, 150W	
	External Power Supply Voltage Input Frequency: 50 to 60 Hz Voltage: 100–240V AC Voltage Output Voltage: 24V DC Current rating: 6.25A, 150W	
Probe Positioning Performance	Accuracy: ±0.75 mm in X/Y/Z dimensions Repeatability: ±0.20 mm in X/Y/Z dimensions	
Probe Rinse	Probe rinsing occurs through a dedicated rinse station capable of performing inside and outside rinses, and a flowing outside rinse when the system includes a GX Rinse Pump	
Safety and Compliance	The instrument has been certified to safety standards specified for Canada, Europe, and the United States. Refer to the instrument rear panel label and the Declaration of Conformity document for the current standards to which the instrument has been found compliant.	
Sampler Type	Small footprint X/Y/Z instrument with stationary rack design	

Technical Specification	Definition
Solenoid Driver	Three +12V DC solenoid drivers (one designated for fraction collection valve and two unassigned)
Software Control	PC control via Ethernet and TRILUTION® LH
Vertical Punch Strength	1.8 kg (4 lbs.)
Weight* *without power supply, but with Z-arm installed	7.7 kg (17 lbs.)

Customer Service

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

If you need assistance, please contact your local Gilson representative. Specific contact information can be found at **www.gilson.com**. To help us serve you quickly and efficiently, please refer to **Before Calling Us** on page 17.

Trademarks

The following trademarks may appear in this document:

- Fortron® is a registered trademark of Fortron Industries Corp.

- Microsoft® and Windows® are registered trademarks of the Microsoft Corporation in the United States and/or other countries.

- PharMed® is a registered trademark of Saint Gobain Performance Plastics.

- Ryton® is a registered trademark of Phillips Petroleum Co.

- Teflon® is a registered trademark of E.I. du Pont de Nemours & Co, Inc.

- Tygon® is a registered trademark of Saint-Gobain Performance Plastics Corp.

All other trademarks within are trademarks or registered trademarks of Gilson, Inc.

Repair and Return Policies

Refer to the following information and then contact your local Gilson representative. Specific contact information can be found at **www.gilson.com**.

Before Calling Us

Your local Gilson representative will be able to serve you more efficiently if you have the following information:

- Serial number and model number of the instruments involved

  ○ The serial number is located under the Y-arm near the rear of the GX-241 Liquid Handler.

  ○ The serial number is located on the right side of the GX Direct Injection Module.

  ○ The serial number is located on the right side of the GX Rinse Pump.

- Installation procedure you used

- List of concise symptoms

- List of operating procedures and conditions you were using when the problem arose

- List of all instruments in the configuration and the connections to those instruments

- List of other electrical connections in the room

Warranty Repair

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

Non-Warranty Repair

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

Return Procedure

Contact your local Gilson representative to obtain authorization before returning any Gilson equipment. To return a piece of equipment:

● Carefully pack the unit to prevent damage in transit. Check with your local Gilson representative regarding proper method of shipment. No responsibility is assumed by Gilson or your local Gilson representative for damage caused by improperly packaged instruments. Indicate the authorization on the carton and on the packing slip.

● Always insure for the replacement value of the unit.

● Include a description of symptoms, your name, address, phone number, and purchase order to cover repair costs, return and shipping charges, if your institution requires it.

Unit End-of-Life

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

Installation

Chapter Two

The instrument and its components should be set up and installed in the order shown below. Complete instructions for each step are included in this chapter.

1. **Locator Plate Setup**

2. **Z-Arm Setup**

3. **Plumbing Connections**

4. **Rear Panel Connections**

5. **Rack Installation**

Locator Plate Setup

The locator plate, on which the rinse station, transfer port bar, GX Direct Injection Module, and racks are placed, is factory-installed. The GX Rinse Pump (optional) is positioned next to the GX-241 Liquid Handler.
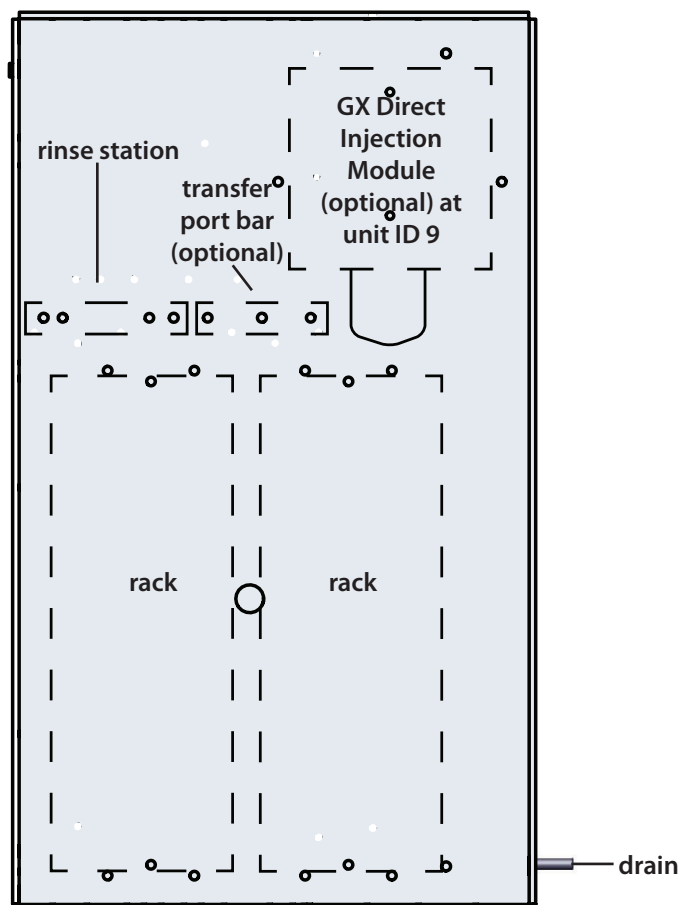
Figure 2: Locator Plate

Refer to the installation instructions for:

- **Rinse Station Installation** on page 21
- **Rack Installation** on page 34
- **GX Direct Injection Module** on page 69
- **Transfer Port Bar** on page 87

Rinse Station Installation

To install the rinse station on the locator plate:

1. Align the holes in the base of the rinse station with the pins on the locator plate. The fittings on the rinse station should point toward the rear of the instrument.

2. Locate the two hex screws included with the rinse station and place them through the holes in the base of the rinse station. Tighten the hex screws using the supplied 2 mm Allen wrench.

If installing the optional Transfer Port Bar, install that now. Refer to the instructions in the **Transfer Port Bar** appendix.

If installing the optional GX Direct Injection Module, install that now. Refer to the instructions in the **GX Direct Injection Module** appendix.

rinse station hex screws

pins for rinse station installation
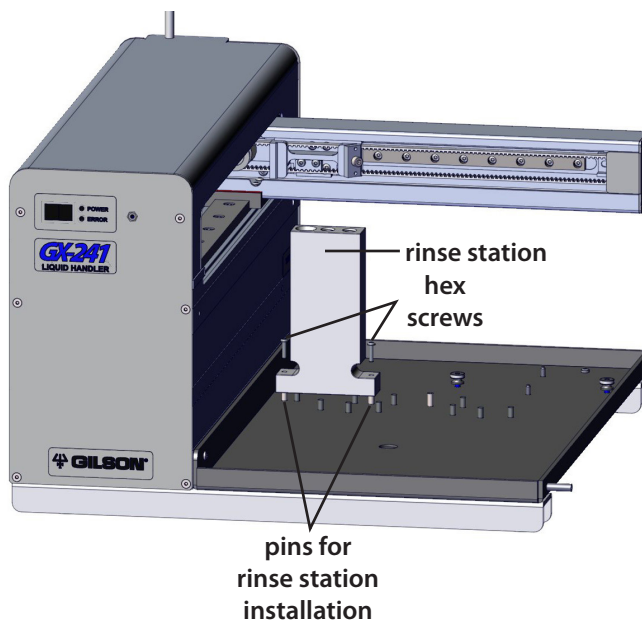
Figure 3: Rinse Station Location on Locator Plate

Z-Arm Setup

It is recommended to perform the Z-arm setup in the following order:

1. **Lower Probe Holder Installation**

2. **Z-Arm Installation**

3. **Probe Guide Insert Installation**

4. **Probe Installation**

5. **Liquid Level Detection (LLD) Cable Installation**

6. **Z-Arm Cable Support Rod Installation**

Lower Probe Holder Installation

The lower probe holder is supplied in the probe guide assembly (part number 26056015), which also includes the probe guide insert, retainer bracket, and four M3 x 5 mm hex screws.

Install the lower probe holder on the threaded probe holder sleeve. Refer to the diagram, if necessary.

Part Number	Description
26056016	Probe Guide Assembly for 1.3 mm OD Probe
26056017	Probe Guide Assembly for 1.5 mm OD Probe
26056018	Probe Guide Assembly for 1.8 mm OD Probe
26056019	Probe Guide Assembly for 2.3 mm OD Probe
26056020	Probe Guide Assembly for 2.7 mm OD Probe

threaded probe holder sleeve
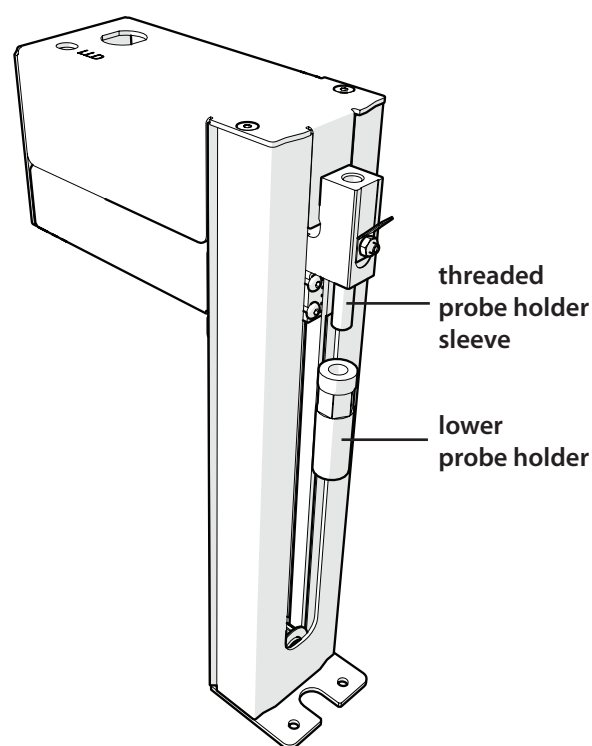
lower probe holder

Figure 4: Lower Probe Holder Installation

Z-Arm Installation

To install the Z-arm:

1. Locate the Z-height adjustment tool (part number 25051094) in the accessory kit.

2. Using the 3 mm Allen wrench included in the accessory kit, turn the mounting screw on the Z-arm mounting bracket counterclockwise.

3. Partially pull out the bracket. Do not remove completely.

4. Place the Z-arm into the mounting bracket. Insert one side of the Z-arm into place at a time (right to left).

5. Place the Z-height adjustment tool under the Z-arm.

6. While holding the adjustment tool in place, use the other hand to lower the Z-arm until it lightly rests on the adjustment tool.

7. Tighten the mounting screw on the Z-arm mounting bracket so the Z-arm is secure.

8. While holding the adjustment tool in place, slide the Z-arm off the tool. Ensure that the bottom of the Z-arm lightly rubs against the adjustment tool. If necessary, loosen and readjust the Z-arm until it does.

9. Confirm and note the installed height of the Z-arm using the vertical ruler located on one side of the Z-arm. This clamp height is required for software control.

If the liquid handler will also be used as a fraction collector, additional and different components must be installed. Refer to the **Fraction Collection (FC) Valve** appendix.

vertical ruler

use top of mounting bracket for measurement

mounting screw in mounting bracket
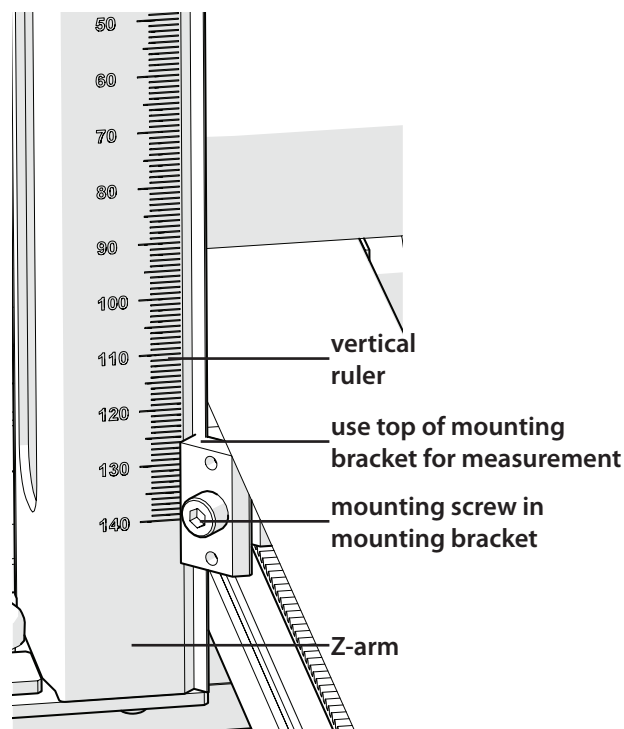
Z-arm

Figure 5: Z-Arm Installation

Probe Guide Insert Installation

NOTE	If the liquid handler will also be used as a fraction collector, additional and different components must be installed. Refer to the **Fraction Collection (FC) Valve** appendix.

To install the probe guide insert:

1. Locate the probe guide insert and slide it into the opening in the Z-foot. The probe guide insert should be oriented so the thicker part is at the top and the flat side is on the right. It will be a tight fit.

   Each insert is marked with a number of indentations on the insert for identification purposes. Refer to the table below.

Probe Guide Insert	Number of Indentations
1.3 mm	0
1.5 mm	1
1.8 mm	2
2.3 mm	3
2.7 mm	4

Figure 6: Probe Guide Insert Installation (Standard Retainer Bracket)

2. Slide the retainer bracket onto the Z-foot so that the opening in the retainer bracket surrounds and secures the probe guide insert.

3. Align the holes in the retainer bracket with the holes in the Z-foot. Place two of the M3 x 5 mm hex screws (part number 4013534051) through the retainer bracket into the Z-foot and then tighten using the supplied 2 mm Allen wrench.

Probe Installation

There are different probes available for use on the GX-241 Liquid Handler. Depending upon the application, purchase the appropriate probe and probe guide assembly.

To install the probe, insert the probe into the top of the probe holder and then pull it through until the tip of the probe is in the center hole of the probe guide insert.

probe holder

probe

probe guide insert
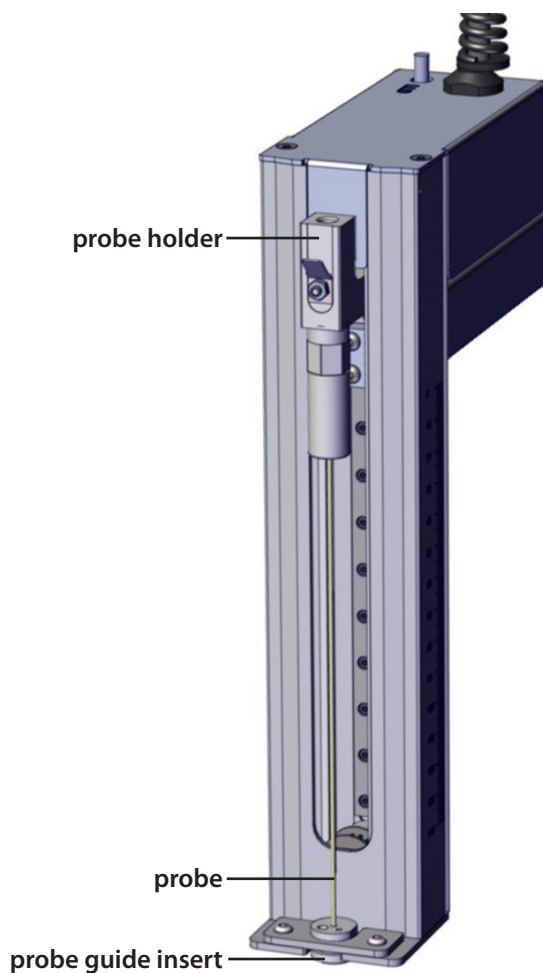
Figure 7: Probe Installation

Liquid Level Detection (LLD) Cable Installation

To install the liquid level detection cable assembly
(part number 26056014):

1. Plug the cable into the LLD port on the top of the Z-arm.
    Turn the metal ring until tight.

2. Place the metal slot end of the cable over the metal tab
    on the probe holder.

NOTE	Polypropylene racks, Teflon-coated probes, and microplates are not compatible with liquid level detection.

Z-Arm Cable Support Rod

Installation

1. Using the Phillips screw included with the Z-arm cable
    support rod, install the cable support rod on the rear of
    the instrument.

2. Attach the retaining clip to the Z-arm cable support rod, if necessary.

3. Snap the Z-arm control cable into the retaining clip on the Z-arm cable support rod.

4. Manually move the arm to ensure that it can travel freely around the bed. If not, adjust the cable in the
    clip until it can move freely around the bed.

Figure 8: LLD Cable Installation
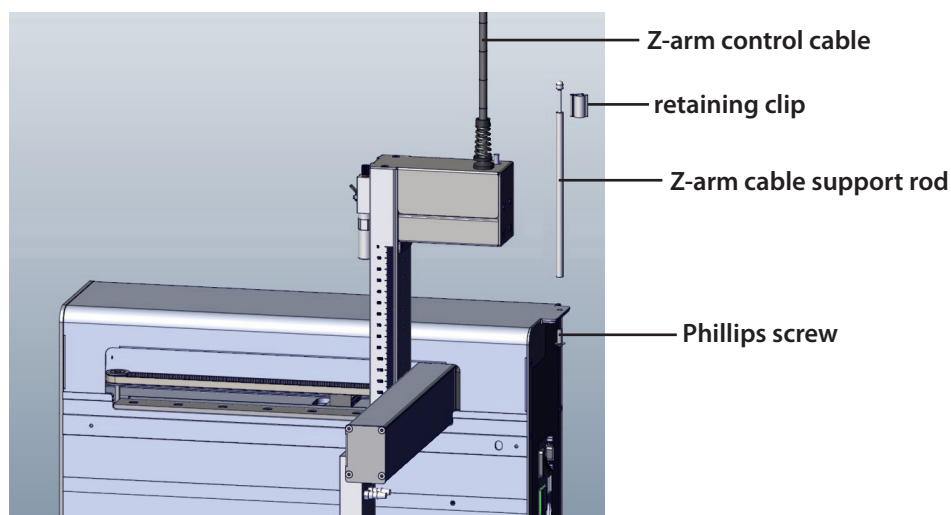
Figure 9: Z-Arm Cable Support Rod Installation

Plumbing Connections

Refer to the following sections for detailed information on making plumbing connections.

- **Rinse Station Plumbing** on page 27.

- **Transfer Tubing Connection** on page 28.

- **Drain Waste Tubing Connection** on page 29.

Information about plumbing connections for optional accessories can be found in its appendix.

Rinse Station Plumbing

The rinse station design accommodates three types of rinses:

- Inside Rinse/Drain

- Outside Static Rinse

  - Place the plug in the bottom hole and the drain in the top hole.

- Outside Flowing Rinse

  - Place the plug in the top hole and the drain at the bottom. Pump a second source of liquid to the rinse station.

To make the plumbing connections:

1. Connect the drain waste tubing(s), supplied with the rinse station, to the barbed drain fitting(s) installed on the rinse station.

2. For a flowing rinse, 1/16" ID tubing is needed to connect to the stainless steel barbed fitting from the external liquid source. This tubing is supplied with the GX Rinse Pump.
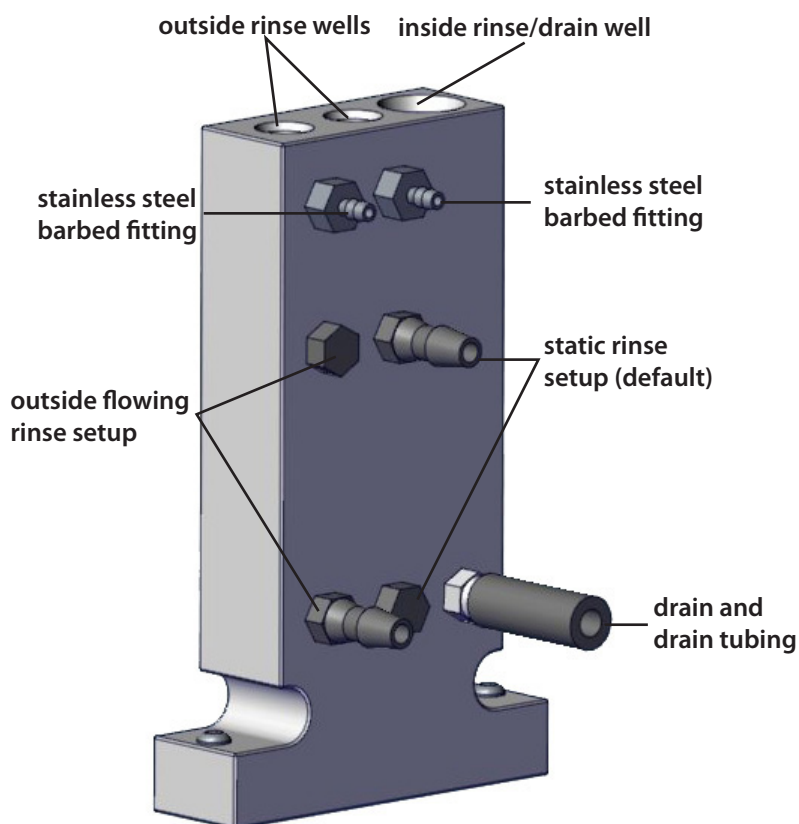
Figure 10: Rinse Station (Rear View)

Transfer Tubing Connection

The transfer tubing is routed from the syringe pump to the probe.

The transfer tubing is ordered separately. Refer to the table below for part numbers.

Part Number	Syringe Size	Description
499424013	100 µL, 250 µL, and 500 µL	Transfer tubing 1.1 mL
	1 mL (at flow rates up to 5 mL/min)	
499671112	1 mL (at flow rates over 5 mL/min)	Transfer tubing 5.5 mL
	5 mL	
499474103	10 mL	Transfer tubing 10.5 mL
499483602	25 mL	Transfer tubing, 30 mL

To install the transfer tubing:

1. Connect the fitting to the top of the probe holder.

2. Firmly tighten the fitting since it holds the probe in place.

3. Install the spiral wrap. Refer to **Spiral Wrap Installation** on page 28.

Spiral Wrap Installation

Use the spiral wrap included in the accessory kit to contain the tubing.

NOTE	If installing a fraction collection (FC) valve, install the spiral wrap after making rear panel connections. Refer to the instructions for FC valve installation in the **Fraction Collection (FC) Valve** appendix.

If necessary, attach the two adhesive-back tubing clips to the side panel and route the transfer tubing through them.

spiral wrap

transfer tubing connection from syringe pump

probe holder
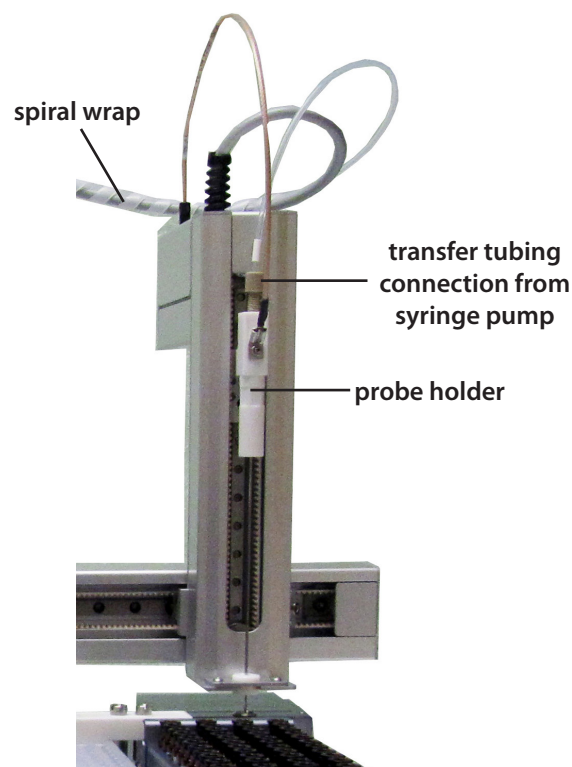
Figure 11: Transfer Tubing Connection

Drain Waste Tubing Connection

The locator plate includes a drain for liquid spills, such as those caused by overflowing vessels.

To connect waste tubing to the drain:

1. Push the waste tubing (part number 470331206, located in the accessory kit) onto the drain until secure.

2. Place the other end of the waste tubing in a waste container. Make sure the waste container is placed in a location that is lower than the instrument bed.
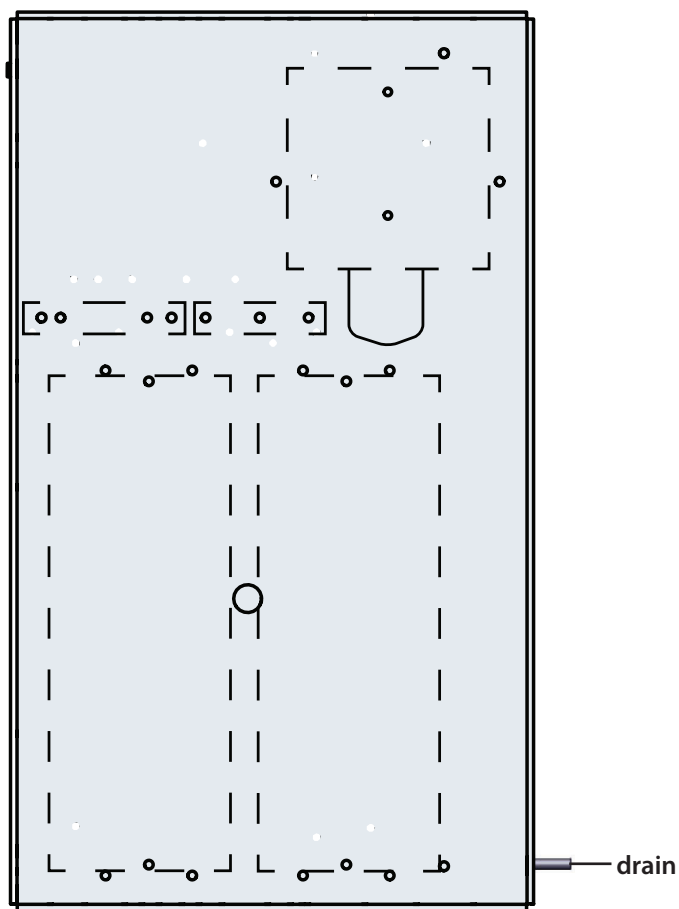
Figure 12: Drain Location on Locator Plate

Rear Panel Connections

The following section provides detailed information on making rear panel connections.

For information about making rear panel connections for optional accessories, refer to its appendix.

Rear Panel Diagram

The liquid handler is shipped configured for one of two types of communication: Ethernet or RS-232. Ethernet is the Gilson software supported configuration.

Refer to the diagram when making the connections described in this section.

① Power switch (MAINS)

② Input/Output ports

③ Power receptacle

④ Z-arm

⑤ Communication

⑤a Ethernet
(Gilson software supported configuration)

⑤b RS-232

⑥ Solenoids

⑦ GSIOC

⑧ Unit ID (RS-232 configuration only)
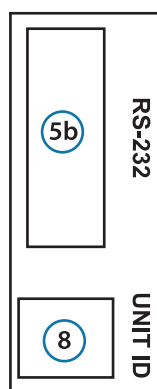
Figure 14: RS-232 Configuration
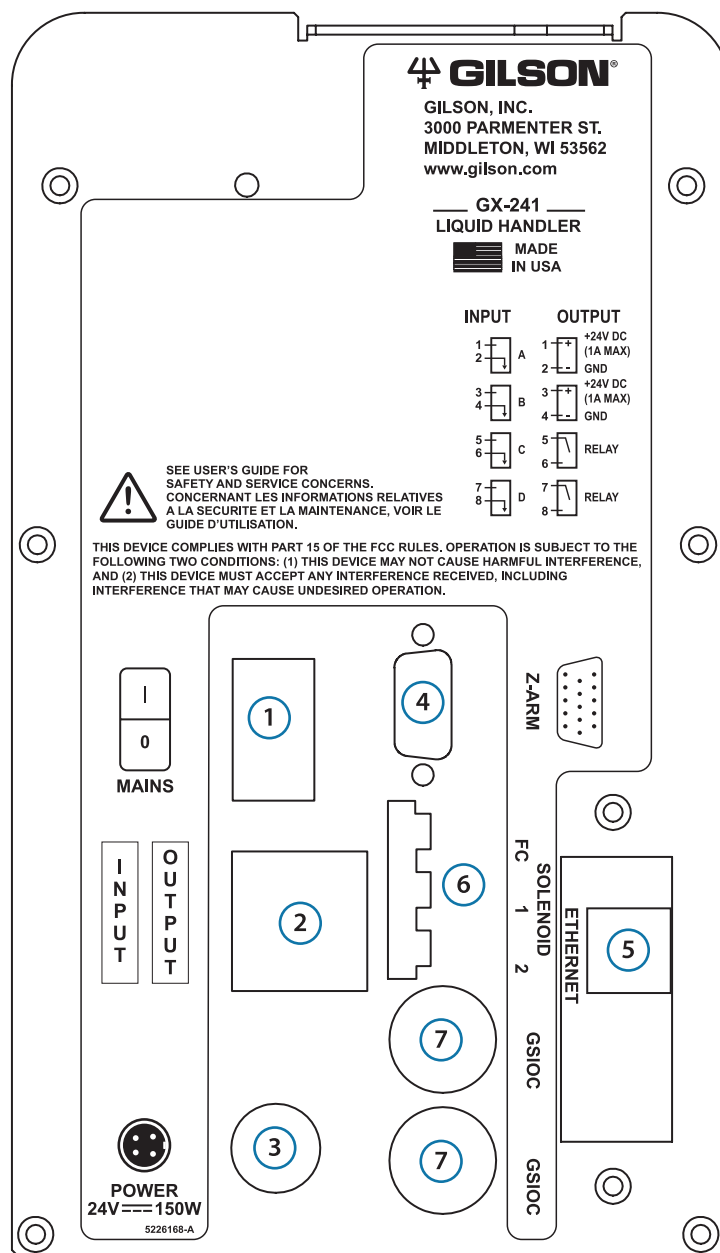
Figure 13: Rear Panel Diagram - GX-241 Liquid Handler

Ethernet

The liquid handler is shipped configured for one of two types of communication: Ethernet or RS-232. Ethernet is the Gilson software supported configuration.

To make the Ethernet connection to the instrument, a router (ordered separately) and Ethernet cables are required. Follow the steps below to make the Ethernet connection:

1. Locate the Ethernet cable provided with the router.

2. Plug one end of the Ethernet cable into an available Ethernet port on the router and the other to the PC.

3. Turn on the PC.

4. Connect the AC power cord to the router, then plug the power cord into a grounded outlet. If necessary, switch the router ON.

5. Ensure that the GX-241 Liquid Handler is powered OFF.

6. Locate the Ethernet cable provided in the accessory kit.

7. Plug one end of the Ethernet cable into the ETHERNET port on the GX-241 Liquid Handler and the other to an available Ethernet port on the router.

> **NOTE**   Do not turn on the GX-241 Liquid Handler until directed to in the **Operation** chapter.

RS-232

The liquid handler is shipped configured for one of two types of communication: Ethernet or RS-232. Ethernet is the Gilson software supported configuration.

To make an RS-232 connection between the computer and the liquid handler, use the RS-232 serial cable (part number 36083129) supplied in the accessory kit.

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

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

Unit ID

Refer to the **Rear Panel Diagram** on page 30 for the location of the unit ID selector.

The unit ID identifies the liquid handler to the software so that it can send GSIOC commands to and receive commands from the liquid handler.

At the factory, the unit ID on the liquid handler is set to 30. There is no need to change this number, unless it has been assigned to another Gilson instrument that is also connected along the GSIOC. If changing the unit ID, use 31, 32, 33, or 34.

To change the unit ID, gently insert a small flat-blade screwdriver into the selector on the rear panel and turn it. Align the arrow with a number (1, 2, 3, or 4). The unit ID is 30 plus the selected number.

Input/Output Ports

Use the input and output contacts found on the rear panel to control peripheral devices. Refer to the rear panel label or the **Rear Panel Diagram** on page 30 for orientation and identification of the ports.

Inputs

The terminal block has eight contact pins; four input pins labeled A through D paired with their associated ground reference. The inputs are biased high in the default state, so to activate them they need to be pulled low to their associated ground reference. Do not apply more than 5V DC to the input pins.

Outputs

The terminal block has eight contact pins; two pins and two associated grounds for switching 24V DC to the outputs connection. The remaining four pins are two pairs of relay switched outputs for controlling external devices. These connections must be limited to switching voltages less than 30V DC and currents less than 1A.

Making Connections

The following are needed to make connections:

- 2-conductor cable (22–30 gauge for each wire)
- Wire insulation stripper

A 6-foot piece of suitable cable (part number 709910206) is available for purchase from Gilson.

To make the cable connection:

1. Cut the cable into pieces of appropriate length.

2. Strip about 8 mm of insulation from each end of the cable.

3. Remove the terminal block connector from the instrument.

4. Press in the spring-loaded retainer for the appropriate terminal on the terminal block connector. Insert each wire into the appropriate terminal on the terminal block connector and then release the spring-loaded retainer.

5. Reconnect the terminal block connector to the instrument. Push the connector in as far as it will go. It is designed to fit snugly into its receptacle.

6. Connect the opposite ends of the wires to the other device(s). Be sure to match ground connections.

7. Label each cable to identify the purpose of the connection.

Z-Arm Connection

Connect the cable from the Z-arm to the Z-ARM port on the rear panel and then use a small, flat blade screwdriver to tighten the screws to secure it.

| NOTICE | It is recommended to ensure that the power is turned off to the liquid handler before connecting or disconnecting the Z-arm cable. |

Power Connections
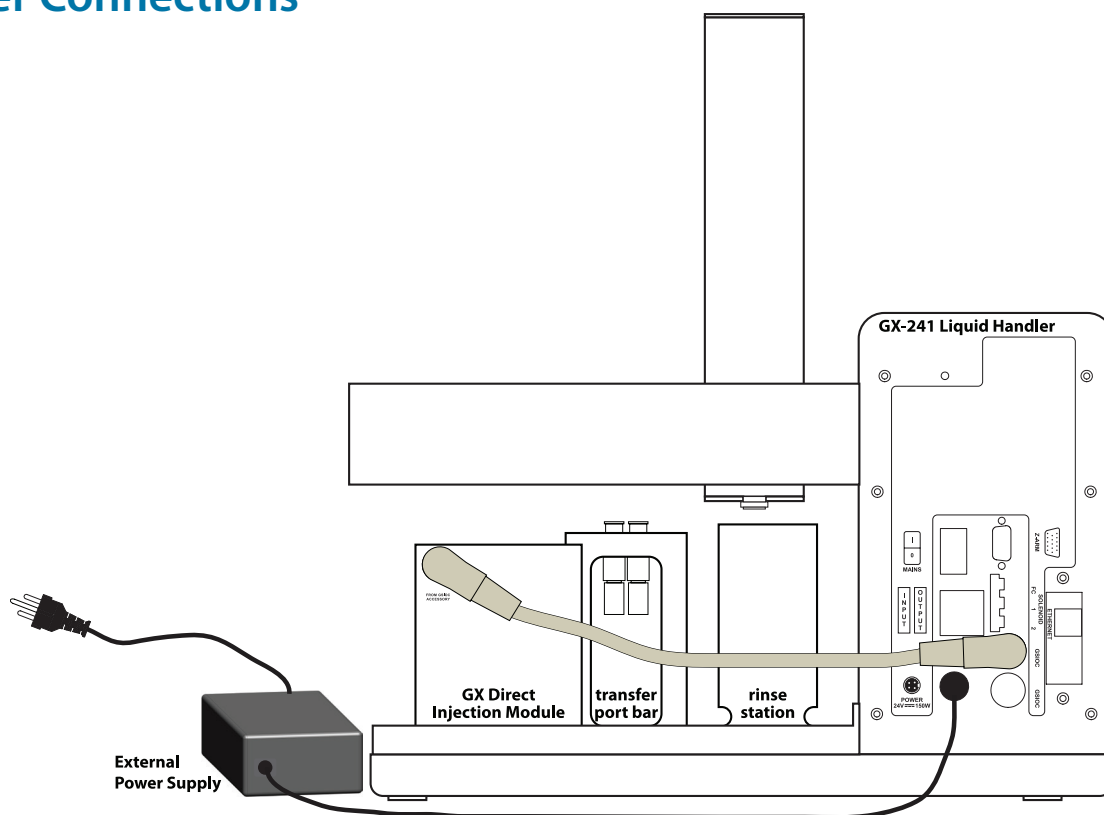
Figure 15: Power Connections

GX Direct Injection Module

Refer to the diagram when making the power connection from the GX-241 Liquid Handler to the GX Direct Injection Module using the cable (part number 26035455) supplied with it. The diagram shows the recommended orientation of the connector.

NOTE	The ends of the cable are different. If having trouble duplicating this orientation, try the other end of the cable.

NOTICE	Ensure that the power is turned off to the liquid handler before connecting or disconnecting the injection module.

GX-241 Liquid Handler

Use the power cord on the external power supply (part number 549512024) to make the connection between the power receptacle on the GX-241 Liquid Handler and the external power supply.

The connection from the external power supply to the GX-241 Liquid Handler uses a connector with a locking collar. Check the alignment of the pins and then push in until it clicks and locks in place. To disconnect, pull back on the locking collar and then disconnect the cable from the rear panel of the GX-241 Liquid Handler.

Locate the appropriate power cord for the line voltage and then make the connection between the external power supply and the AC power source.

Rack Installation

The GX-241 Liquid Handler is equipped to accommodate two racks.

To install a rack:

1. Orient the rack so that the code number is facing forward.

2. Locate the middle slot on the back of the rack. Slide this over the pins on the locator plate.

3. Fit the middle slot on the front of the rack over the pins in the front of the locator plate.

NOTE	If using a GX Direct Injection Module, the Code 336S rack cannot be used in the right position on the locator plate.

Figure 16: Rack Installation Location on Locator Plate

Rack Cover Installation

Rack covers for the Code 336S microplate rack are available, but ordered separately. Order one cover per microplate. Refer to the table below for part numbers.

Part Number	Description
26044032	Rack cover for shallow microplate on Code 336S rack
26044033	Rack cover for deep microplate on Code 336S rack

To install a rack cover, slide the cover in the guide rails and over the microplate.

Operation

Chapter Three

Install TRILUTION® LC v3.0 and Service Pack 3 (or higher) or TRILUTION® LH v3.0 Software and Service Pack 2 (or higher) per the installation guide included with the software. These software packages provide control of the GX-241 Liquid Handler. For more information about TRILUTION LC or TRILUTION LH software, refer to the respective user's guide and documentation supplied with the software.

This chapter provides information on the following topics:

- **Front Panel** on page 36

- **Start Up** on page 36

- **GX-241 Offset Utility** on page 37

Front Panel

The front panel includes a two-digit display for displaying error codes, a POWER indicator light, and an ERROR indicator light.

① **Power Indicator Light**

② **Error Indicator Light**

POWER Indicator Light

The green indicator becomes lit when the power is turned on using the MAINS power switch located on the rear panel. It flashes when preventative maintenance (PM) service is needed.

ERROR Indicator Light

The red indicator light flashes when an error has been encountered and the error code is displayed.

Figure 17: Front Panel

Start Up

Follow the instructions in the Installation chapter to make all rear panel and plumbing connections.

To start the GX-241 Liquid Handler:

1. Ensure that installed accessories are connected to the GX-241 Liquid Handler.

2. Power on the PC first, the router next, and then power on the external supply and the GX-241 Liquid Handler.

3. Power on the syringe pump.

4. Start TRILUTION® LH or TRILUTION® LC software.

GX-241 Offset Utility

It is recommended to use this utility at the time of installation and any time a change is made to the Z-arm, such as installing a different probe or changing the clamp height.

The GX-241 Offset Utility is supplied on the GX-241 Offset Utility CD (part number 21067549), which is located in the accessory kit. The offset tool used with the utility is also supplied in the accessory kit.

Install the GX-241 Offset Utility

Pre-Installation Checklist

Before beginning the installation:

❑   Log on as a Windows® Administrator

❑   Close all running applications

❑   Temporarily disable antivirus software

❑   Temporarily disable firewall

Installation

The installation of the GX-241 Offset Utility proceeds as follows:

1.   Insert the CD into the drive. If the setup program does not start automatically, browse for SETUP.EXE.

2.   Install the Gilson Server (if not previously installed).

3.   Install Microsoft® .NET Framework (if necessary).

4.   Install the GX-241 Liquid Handler Offset Utility. Follow the on-screen instructions. If a User Account Control window appears, click **Yes**.

  ●   The installation path on a Windows® XP and Windows® 7 (32-bit) system is:
       C:\Program Files\Gilson\Utilities\GX-241 Liquid Handler\Offset Utility.

  ●   The installation path on a Windows® 7 (64-bit) system is:
       C:\Program Files (x86)\Gilson\Utilities\GX-241 Liquid Handler\Offset Utility.

Prepare to Run the GX-241 Offset Utility

1.   Ensure that plumbing and electrical connections have been made as described in the **Installation** chapter.

      For communication to occur, the liquid handler must be connected via an Ethernet connection to the PC using a router or via an RS-232 cable connection between the liquid handler and the PC.

2.   Turn on the instrument.

3.   Remove all racks from the locator plate.

Start the GX-241 Offset Utility

To start the GX-241 Offset Utility, click the Start button and then select
All Programs > Gilson Applications > GX-241 Liquid Handler > GX-241 Offset Utility.

If any Windows Security Alerts appear with Gilson, Inc. as the Publisher, click **Allow access**.

The GX-241 Offset Utility window will appear.

Use the GX-241 Offset Utility

Specify and Set Configuration
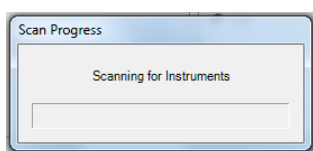
Figure 18: Scanning for Instruments   **Figure 19:** Connect to the Instrument   **Figure 20:** Select the Clamp Height
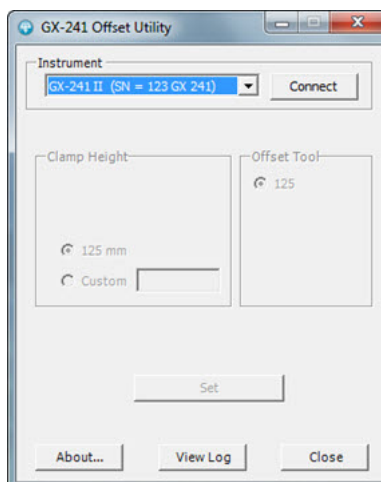
1. Allow the instruments to scan into the list.

    ○ Ethernet-controlled instruments will display the serial number (SN=).

    ○ RS-232-controlled instruments will display the unit ID (ID=).

2. Click **Connect**.

3. Select the Clamp Height and then click **Set**.

Determine and Set XY Offset
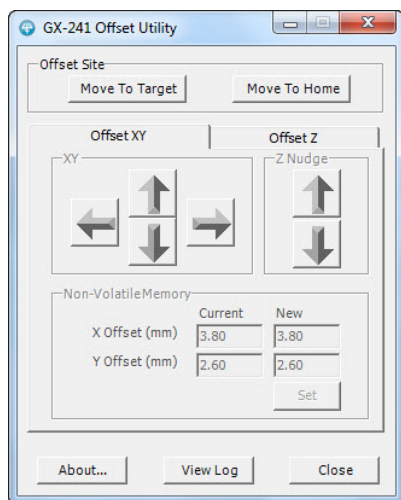
Figure 21: Determine and Set XY Offset
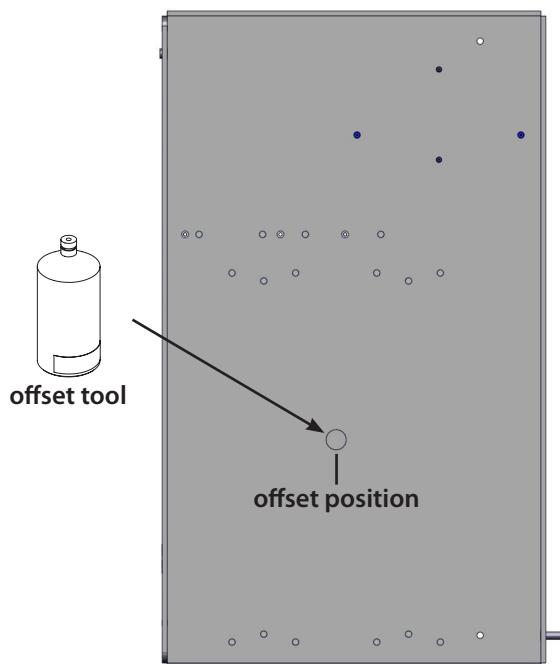
Figure 22: Default Offset Position on Locator Plate

1. Place the offset tool on the locator plate at the offset position. Refer to the diagram.

2. To move to the XY offset position, click **Move To Target**. The arm will move the probe to a position approximately 3 mm above the offset tool.

3. Use the Z Nudge arrows to move the probe down.

4. Offset the probe to the center of the offset tool using the XY arrow keys.

    If a message appears indicating that the minimum or maximum offset value has been reached, contact your local Gilson representative for assistance.

5. When the probe is centered, click **Set** to save the X and Y Offsets.

Determine and Set Z Offset
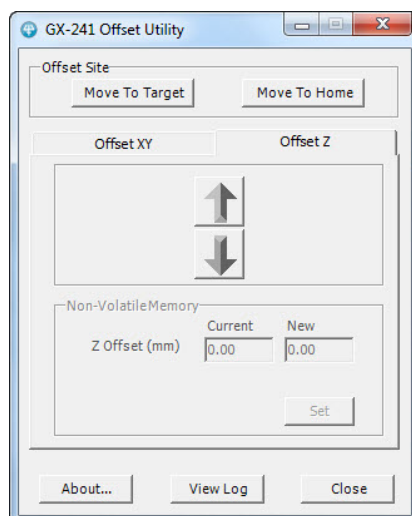
Figure 23: Determine and Set Z Offset

1. Select the Offset Z tab.

2. Click **Move To Target**. The arm will move to the offset position.

3. Use the arrows to align the tip of the probe with the top of the offset tool. Slide a small piece of paper between the tip of the probe and the offset tool. If the top of the paper touches the tip of the probe, the Z offset is correct.

   The offset values increase when the down arrow is clicked and the probe moves down. The offset values decrease when the up arrow is clicked and the probe moves up.

   If a message appears indicating that the minimum offset value (0 mm) has been reached, modify the Z clamp height, and then rerun the offset utility.

4. Click **Set** to save the Z offset.

Custom XY Position (Optional)

By default, the offset position is as shown and uses the offset tool. If an alternate position is used and then set, the utility software remembers and uses that position the next time the utility software is started.

Install Custom XY Position
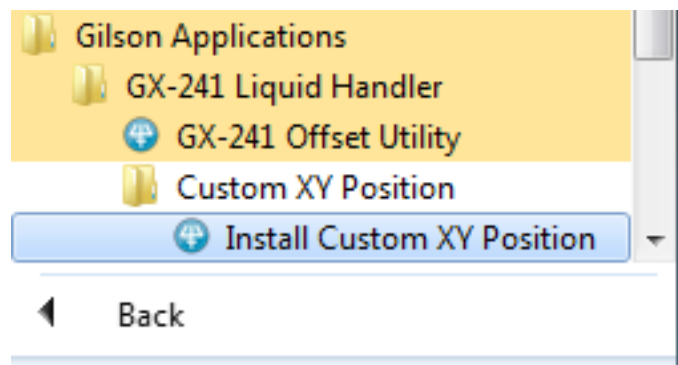
Figure 25: Install Custom XY Position

To enable the ability to set a custom offset position, select **Install Custom XY Position**. This copies a file required for using a custom offset position to the offset utility folder.

If a message like that shown at right appears, click Yes.

A command prompt will flash briefly as the file required for using a custom offset position is copied to the offset utility folder.
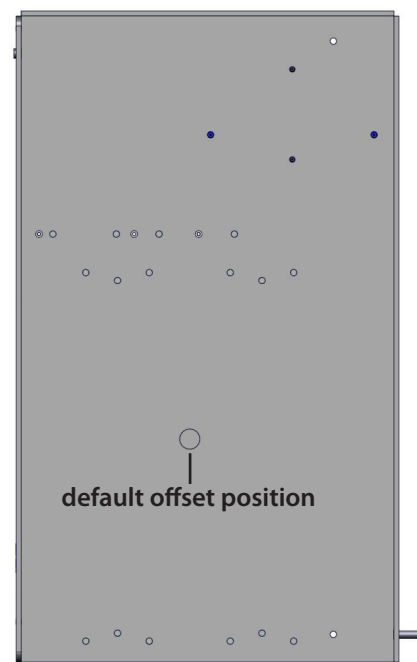
Figure 24: Default Offset Position on Locator Plate
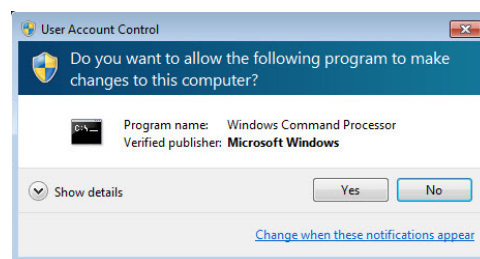
Figure 26: User Account Control Message

Specify Configuration
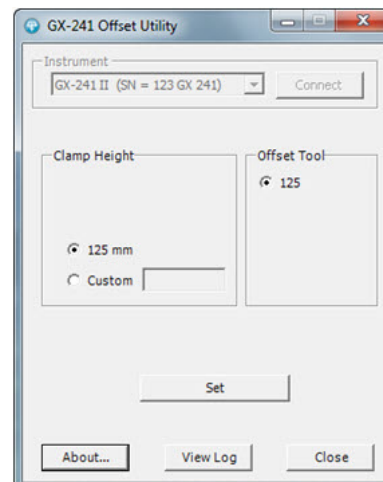
1. Allow the instruments to scan into the list.

   Ethernet-controlled instruments will display the serial number (SN=).

   RS-232-controlled instruments will display the unit ID (ID=).

2. Click **Connect**.

   Select or enter the Clamp Height and the Offset Tool. If selecting Custom for the Offset Tool, enter the height (in mm) of the custom offset position.

   If the standard offset position was last used, the on-screen text displays "Using standard position". If a custom offset position was used, the on-screen text displays "Using custom position".
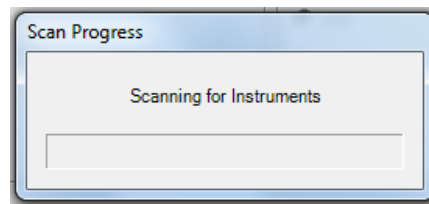
Figure 27: Scanning for Instruments
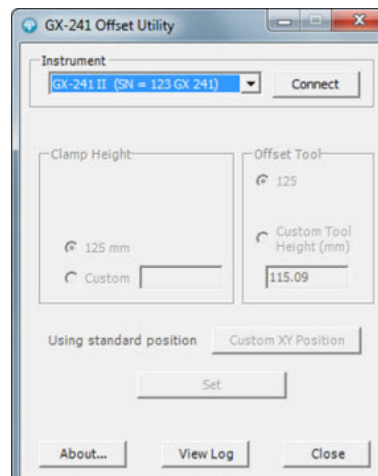
Figure 28: Connect to Instrument
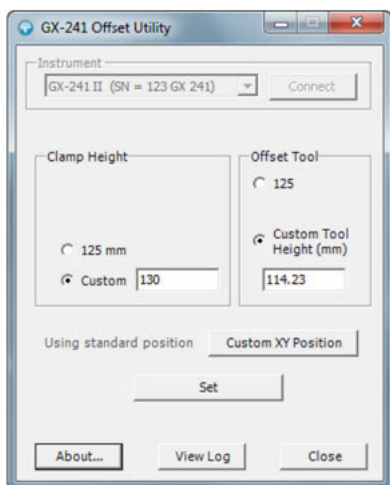
Figure 29: Offset Using Custom Position
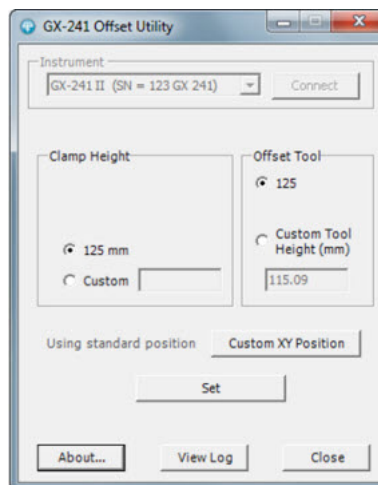
Figure 30: Offset Using Standard Position

Specify Custom Offset Position

1. To use a custom offset position or review the current offset position setting, click **Custom XY Position**. The message shown at right will appear. Click **OK**.

2. Review and/or enter a Custom X Position and Custom Y Position.

   To reset the positions to the factory defaults, click **Reset Defaults**.

3. Click **OK** to close the Custom XY Position dialog.

Set Configuration and Custom Offset Position

Click **Set** to set the configuration and custom offset position and instruct the utility software to remember the values.
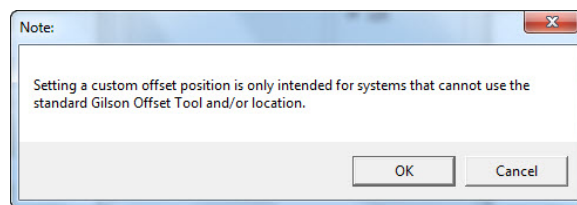
Figure 31: Notification Before Setting Custom Offset Position
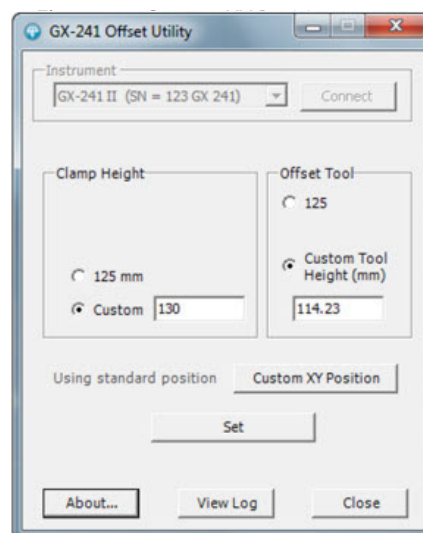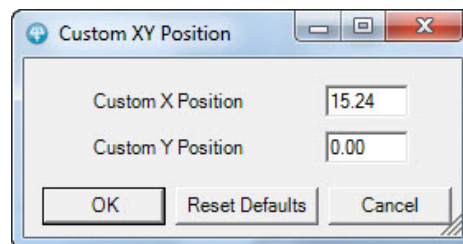
Figure 33: Set Configuration and Custom Offset Position

Determine and Set XY Offset

1. Click **Move To Target**. The arm will move the probe to a location approximately 3 mm above the custom offset position.

2. Use the Z Nudge arrows to move the probe down.

3. Offset the probe to the center of the custom offset position using the XY arrow keys.

   If a message appears indicating that the minimum or maximum offset value has been reached, contact your local Gilson representative for assistance.

4. When the probe is centered, click **Set** to save the X and Y Offsets.
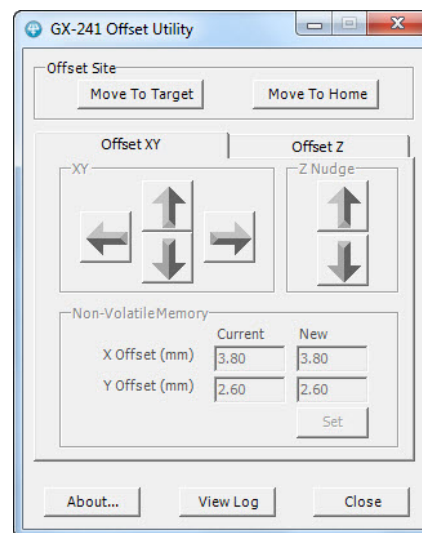
Figure 34: Determine and Set XY Offset

Determine and Set Z Offset

1. Select the Offset Z tab.

2. Click **Move To Target**. The arm will move to the custom offset position.

3. Use the arrows to align the tip of the probe with the top of the custom offset position. Slide a small piece of paper between the tip of the probe and the top of the offset tool. If the top of the paper touches the tip of the probe, the Z offset is correct.

    The offset values increase when the down arrow is clicked and the probe moves down. The offset values decrease when the up arrow is clicked and the probe moves up.

    If a message appears indicating that the minimum offset value (0 mm) has been reached, modify the Z clamp height, and then rerun the offset utility.

4. Click **Set** to save the Z offset.

Figure 35: Determine and Set Z Offset

View Log

Click **View Log** to view the offset history for the connected instruments.

Move to Home

Click **Move To Home** to home the instrument.

Close Utility and Remove Tool

Close the software and then remove and store the offset tool.

Maintenance

Chapter Four

When performing the maintenance described in this chapter, use good laboratory practice, including, but not limited to, wearing protective clothing and preparing the maintenance space for service. After completing the maintenance operation, verify the safe and good working order of the part and instrument.

This chapter contains information about the following to help maintain the instrument:

- **Helpful Hints** on page 46

- **Cleaning** on page 46

- **Part Replacement** on page 48

Helpful Hints

The GX-241 Liquid Handler will notify when preventative maintenance (PM) service is needed. The POWER indicator light on the front panel will flash. Schedule PM service by contacting your local Gilson representative or sending an email to **service@gilson.com**.

To keep the instrument at peak performance:

- Change or clean the tubing regularly to maintain maximum performance.

- Flush the probe and rinse station daily with appropriate solvents.

- Check periodically to ensure that all fittings are tight.

- Wipe up all spills immediately.

- Allow fluids to equilibrate to room temperature before running them through the system; cold fluids may cause leakage.

Cleaning

The instrument 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 instrument, wipe it using a dry, clean cloth.

Fluid Path

Depending upon your use of the instrument, it may be necessary to flush the entire fluid path.

It is important to clean the fluid path if you won't be using the system for a while or if you're using a solution with a high salt concentration for a probe wash or as a diluent. Refer to the instructions below.

1. Prime the fluid path with distilled or deionized water.

2. Flush the fluid path with 30% ethanol. The fluid path has now been cleaned appropriately for weekend storage (or longer).

3. Prime and flush the fluid path with distilled or deionized water before running applications.

Cleaning Methods

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

Proteins and Peptides

1. Prime the fluid path with distilled or deionized water.

2. Flush the fluid path using a weak detergent solution.

3. Pause the priming sequence.

4. After 30 minutes, resume flushing and priming the fluid path using distilled or deionized water to pump the remaining detergent from the tubing into a waste container.

5. When you are satisfied that the entire fluid path has been flushed with water, end the priming sequence.

Acidic Compounds, Basic Compounds, or Salt Solutions

1. Prime the fluid path with distilled or deionized water.

2. Flush the fluid path using a 0.1N NaOH solution.

3. Pause the priming sequence.

4. After 10 minutes, resume priming the fluid path using distilled or deionized water. Prime until the fluid path has been flushed with water.

5. Pause the priming sequence.

6. Prime the fluid path using a 0.1N HCl solution.

7. Pause the priming sequence.

8. After 10 minutes, resume priming the fluid path using distilled or deionized water.

Biological Fluids

1. Prime the fluid path with distilled or deionized water.

2. Make a solution of 10% bleach by adding one part of commercial bleach to nine parts of water.

3. Flush the fluid path using the bleach solution.

4. Pause the priming sequence.

5. After 30 minutes, resume priming the fluid path using distilled or deionized water to pump the remaining bleach solution from the tubing into a waste container.

Part Replacement

Refer to the instructions in this section to replace the probe, probe holder, and/or probe guide insert.

Tubing

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

Replace the transfer tubing as needed. Refer to the **Replacement Parts and Accessories** appendix for part numbers for replacement tubing. For tubing installation procedures, refer to **Transfer Tubing Connection** on page 28.

transfer tubing fitting
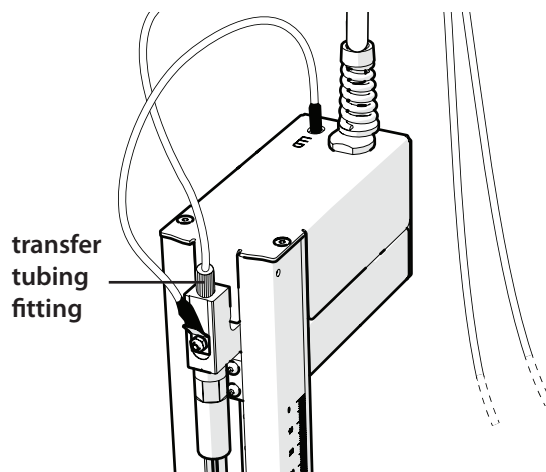
Figure 36: Transfer Tubing Fitting Location

Probe/Probe Holder/Probe Guide Insert

If installing a replacement probe with the same outer diameter (OD), refer to the instructions for **Same Outer Diameter (OD) Probe**.

If installing a replacement probe with a different outer diameter (OD), a new probe guide assembly is required. Refer to the instructions for **Different Outer Diameter (OD) Probe** on page 49.

Same Outer Diameter (OD) Probe

To install a replacement probe:

1. Remove the transfer tubing fitting connected to the top of the probe holder.

2. Grasp the current probe and push it up through the top of the probe holder.

3. Insert the new probe into the top of the probe holder and then pull it through until the tip of the probe is in the probe guide insert.

4. Replace and tighten the fitting.

probe holder
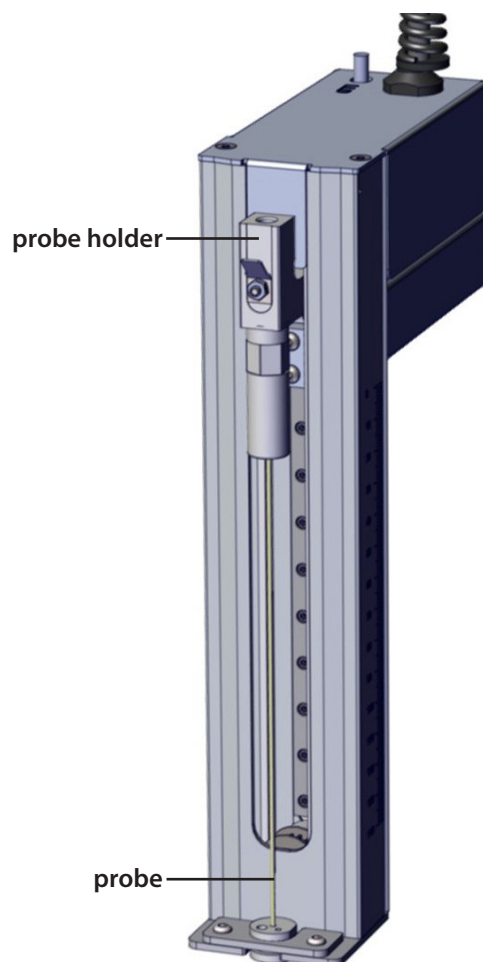
probe

Figure 37: Probe Replacement

Different Outer Diameter (OD) Probe

If installing a replacement probe with a different outer diameter (OD), a different probe guide assembly is required. The GX-241 probe guide assembly includes a probe guide insert, retainer bracket, four hex screws, and a lower probe holder. (Two of the hex screws are used to secure the retainer bracket onto the Z-foot and the other two screws are extra.)

Refer to the table below for part numbers.

Part Number	Description
26056016	Probe Guide Assembly for 1.3 mm OD Probe, GX-241
26056017	Probe Guide Assembly for 1.5 mm OD Probe, GX-241
26056018	Probe Guide Assembly for 1.8 mm OD Probe, GX-241
26056019	Probe Guide Assembly for 2.3 mm OD Probe, GX-241
26056020	Probe Guide Assembly for 2.7 mm OD Probe, GX-241

Transfer ports and injection ports should also be changed to accommodate the different outer diameter (OD) probe.

Remove Probe

1. Remove the transfer tubing fitting connected to the top of the probe holder.

2. Grasp the current probe and push it up through the top of the probe holder.

Remove Lower Probe Holder and Probe Guide Insert

1. Unscrew the lower probe holder from the threaded probe holder sleeve.

2. Use a 2 mm Allen wrench to remove the two hex screws that attach the retainer bracket to the Z-foot, and then remove retainer bracket and the probe guide insert.

Install Appropriate Lower Probe Holder and Probe Guide Insert

1. Install the lower probe holder on the threaded probe holder sleeve.

2. Locate the probe guide insert and slide it into the opening in the Z-foot. The probe guide insert should be oriented so the thicker part is at the top and the flat side is on the right. It will be a tight fit.

   Each insert is marked with a number of indentations for identification purposes. Refer to the table below.

Probe Guide Insert	Number of Indentations
1.3 mm	0
1.5 mm	1
1.8 mm	2
2.3 mm	3
2.7 mm	4

Figure 38: Probe Replacement

3. Slide the retainer bracket onto the Z-foot so that the opening in the retainer bracket surrounds and secures the probe guide insert.

4. Align the holes in the retainer bracket with the holes in the Z-foot. Place two of the hex screws through the retainer bracket into the Z-foot and then tighten them using a 2 mm Allen wrench.

Install Replacement Probe

1. Insert the new probe into the top of the probe holder and then pull it through until the tip of the probe is in the probe guide insert.

2. Replace and tighten the fitting.

Replacement Parts and Accessories

Appendix A

GX-241 Liquid Handler

Part Number	Description
26150004	GX-241 Liquid Handler

Transfer Tubing

Part Number	Syringe Size	Description
499424013	100 µL, 250 µL, and 500 µL	Transfer tubing 1.1 mL
	1 mL (at flow rates up to 5 mL/min)	
499671112	1 mL (at flow rates over 5 mL/min)	Transfer tubing 5.5 mL
	5 mL	
499474103	10 mL	Transfer tubing 10.5 mL
499483602	25 mL	Transfer tubing, 30 mL

Rinse Station

Part Number	Description
26054000	Rinse Station Assembly (includes Drain Tubing)

Probes (125 mm)

The following are commonly used probes. Contact your local Gilson representative for information about probe choices for other applications.

1.5 mm OD

Part Number	Description
2507252	Micro septum-piercing probe; constricted 45° bevel tip, stainless steel Dimensions: 220 x 1.5 x 1.1 mm ID (tip dimensions: 10 x 0.7 x 0.4 mm ID)
2507256	Grooved, septum-piercing probe; beveled-tip, stainless steel Dimensions: 221 x 1.5 x 0.4 mm ID
27067361	Non septum-piercing probe; beveled-tip, stainless steel Dimensions: 220.5 x 1.5 x 1.1 mm ID
27067373	Non septum-piercing probe; constricted tip, stainless steel Dimensions: 221 x 1.5 x 1.1 mm ID (tip dimensions: 1.5 x 1.1 x 0.45 mm ID)
27067375	Non septum-piercing probe; beveled-tip, Teflon-coated stainless steel Dimensions: 221 x 1.5 x 1.1 mm ID. **Note:** Teflon® coated probes are not compatible with liquid level detection.
27067382	Grooved, septum-piercing probe; beveled-tip, stainless steel, 100 µL volume Dimensions: 221 x 2.0 x 0.8 mm ID (tip dimensions: 21 x 1.5 x 0.8 mm ID)
270673821	Grooved, septum-piercing probe; beveled -tip, coated stainless steel, 100 µL volume Dimensions: 221 x 2.0 x 0.8 mm ID (tip dimensions: 2.1 x 1.5 x 0.8 mm ID) **Note:** Teflon® coated probes are not compatible with liquid level detection.
27067383	Grooved, septum-piercing probe; beveled-tip, stainless steel, 28.73 µL volume Dimensions: 221 x 1.5 x 0.4 mm ID
270673831	Grooved, septum-piercing probe; beveled-tip, coated stainless steel, 28.73 µL volume Dimensions: 221 x 1.5 x 0.4 mm ID **Note:** Teflon® coated probes are not compatible with liquid level detection.

1.3 mm OD

Part Number	Description
2507414	Non septum-piercing probe; constricted tip, stainless steel Dimensions: 220 x 1.3 x 0.8 mm ID (tip dimensions: 1.5 x 0.9 x 0.45 mm ID)

Probe Guide Assemblies

Part Number	Description
26056016	Probe Guide Assembly for 1.3 mm OD Probe, GX-241
26056015	Probe Guide Assembly for 1.5 mm OD probe, GX-241
26056018	Probe Guide Assembly for 1.8 mm OD Probe, GX-241
26056019	Probe Guide Assembly for 2.3 mm OD Probe, GX-241
26056020	Probe Guide Assembly for 2.7 mm OD Probe, GX-241

Racks and Rack Accessories

Racks

All of the following racks are aluminum.

Racks

Part Number	Image	Rack Code	Vessels	Additional Instructions for Use
26044020		333S	14 scintillation vials 28 x 60 mm (20 mL)	
26044021		334S	14 scintillation vials 28 x 95 mm (40 mL)	

Racks

Part Number	Image	Rack Code	Vessels	Additional Instructions for Use
26044022		335S	48 vials 15 x 45 mm (4 mL)	
26044023		336S	Two 96-well (shallow or deep) microplates	• If using a GX Direct Injection Module, the Code 336S rack cannot be used in the right position on the locator plate. • Microplates are not compatible with liquid level detection.
26044024		338S	64 vials 12 x 32 mm (2 mL)	
26044025		341S	108 tubes 10 x 75 mm (4 mL)	

Racks

Part Number	Image	Rack Code	Vessels	Additional Instructions for Use
26044026		344S	64 tubes 13 x 100 mm (9 mL)	
26044027		346S	44 tubes 16 x 100 mm (12 mL)	

Rack Covers

Rack covers for the Code 336S microplate rack are available, but ordered separately. Order one cover per microplate. Refer to the table below for part numbers.

Part Number	Description
26044032	Rack cover for shallow microplate on Code 336S rack.
26044033	Rack cover for deep microplate on Code 336S rack.

Transfer Port Bar

Transfer Port Bar Assemblies

Part Number	Description
26057008	Transfer Port Bar Assembly (2 Ports) for 1.3 mm OD Probe, GX-241
26057005	Transfer Port Bar Assembly (2 Ports) for 1.5 mm OD Probe, GX-241

Transfer Ports

Part Number	Description
25051214	Transfer Port, 1.3 mm
29546401	Transfer Port, 1.5 mm

Transfer Port Seals

Part Number	Description
250510153	Transfer Port Seal, 1.3 mm
2954674	Transfer Port Seal, 1.5 mm

Fraction Collection (FC) Valve

FC Valve Packages

Part Number	Description
26057010	GX-241 FC Pkg, Low Flow
26057011	GX-241 FC Pkg, High Flow

FC Valves

Part Number	Description
26052008	GX-241 FC Valve Assembly, High Flow
26092009	GX-241 FC Valve Assembly, Low Flow

Plumbing Packages

Part Number	Description		
26057012	PLMB PKG,GX-241 LOW FLOW FC VLV Includes the following:		
	Part Number	**Description**	**Qty**
	25077423	COLLECTION TUBE, 1/16" TFE .031 I.D.	1
	25077436	COLLECTION TUBE, 1/16" TFE .012 I.D.	1
	490031	TBG,PTFE .031 ID x .0625 OD	12 ft
	49041011	FERRULE, 1/16", RED (P-200R)	3
	49041012	NUT, 1/16", BLACK (P-201)	3
	49951059	TUBING,.010" X 5FT, PEEK	1
	49953059	TUBING,.030" X 5FT, PEEK	1
	F1410153	COUPLING, 1/4-28	1
	54118025	SPIRAL WRAP, 1/4"	2 ft

Part Number	Description
26057013	PLMB PKG,GX-241 HIGH FLOW FC VLV Includes the following:

Part Number	Description	Qty
25077422	COLLECTION TUBE, 1/8" TFE .063 I.D.	1
25077423	COLLECTION TUBE, 1/16" TFE .031 I.D.	1
490032	TBG,PTFE .063 ID x .125 OD	12 ft
49041011	FERRULE, 1/16", RED (P-200R)	3
49041012	NUT, 1/16", BLACK (P-201)	3
49041015	FERRULE, FLANGELESS, 1/8", TEFZEL(P-300)	1
49041016	NUT,1/4-28 X 1/8, DELRIN (P-304	1
49953059	TUBING,.030" X 5FT, PEEK	1
F1410153	COUPLING, 1/4-28	1
54118025	SPIRAL WRAP, 1/4"	2 ft

Tubing and Cable Retainer

Part Number	Description
26053029	Tubing and Cable Retainer for GX-241 with Fraction Collection Valve

Safety Shield

Part Number	Description
26057009	Safety shield for GX-241

GX Direct Injection Module

Part Number	Description
261354	GX Direct Injection Module, 1/16" Prep
261356	GX Direct Injection Module, 1/16", Analytical, Stainless Steel
261357	GX Direct Injection Module, 1/16", Analytical, PEEK

Injection Ports

Part Number	Description
26035412	GX Direct Injection Port for 1.3 mm OD Probes, SS
26035413	GX Direct Injection port for 1.5 mm (OD) probes, SS
26035410	GX Direct Injection Port for 1.3 mm OD Probes, PPS
26035411	GX Direct Injection Port for 1.5 mm OD Probes, PPS

Parts and Accessories

Part Number	Description
26035470	Plumbing package for the GX Direct Injection Module
490318041	Valco MZN1PK PEEK nut (0.062" long) for 1/16" (OD) tubing (x10)
4903180411	Valco MZN1PK PEEK nut (0.062" long) for 1/16" (OD) tubing (x1)
490318051	Valco ZF1PK PEEK ferrule, 1/16" (x10)
4903180511	Valco ZF1PK PEEK ferrule, 1/16" (x1)
495033	TFE Tubing, 0.5 mm (ID) x 1.5 mm (OD), 1/16", (10')

Sample Loops, 1/16" (OD), Stainless Steel

Part Number	Description
49440003	2 µL
49440004	5 µL
49440006	10 µL
49440007	20 µL
49440008	50 µL
49440009	100 µL
494400002	250 µL
494400005	500 µL
49440001	1 mL
49440002	2 mL
49440005	5 mL

Sample Loops, 1/16" (OD), PEEK

Part Number	Description
49440011	2 µL
49440012	5 µL
49440013	10 µL
49440014	20 µL
49440015	50 µL
49440016	100 µL
49440017	250 µL
49440018	500 µL

GX Rinse Pump

Part Number	Description
261452	GX Rinse Pump

Components

Part Number	Description
26035256	Power cable for GX rinse pump
26035221	PharMed Tubing Assembly 2.0 mm (ID)
4715187060	Tubing, 1/16" x 3/16" (OD), neoprene

Miscellaneous

Part Number	Description
6383087203	Terminal block connector, 8-pin
709910206	2-conductor interconnect wire, 6', for making contact connections
25051094	125 mm Z-height Adjustment Tool
36078142	Ethernet cable
36083129	Serial cable, D9Pin male to D9Pin female

Error Messages

Appendix B

When an instrument error occurs, a red indicator light flashes on the front panel of the instrument and the error number appears on the 2-digit, front panel display. For assistance with resolving an error, contact your local Gilson representative.

When an instrument error occurs on the GX-241 Liquid Handler, the error number appears on the 2-digit, front panel display. Refer to the table below for the error text.

Error	Error Text	Error	Error Text
0	No Error	26	Z Axis Moving
10	Unknown Command	28	X Axis Stall
11	Invalid NV-RAM Address	29	Y Axis Stall
12	Safety Stop Activated	30	Z Axis Stall
13	Bad Parameter Entered	32	X Axis Encoder
14	FIFO Full	33	Y Axis Encoder
15	FIFO Add	34	Z Axis Encoder
16	Character Limit	36	X Axis Speed Range
17	X Axis Park Location	37	Y Axis Speed Range
18	Y Axis Park Location	38	Z Axis Speed Range
20	X Axis Unhomed	40	X Axis Target Range
21	Y Axis Unhomed	41	Y Axis Target Range
22	Z Axis Unhomed	42	Z Axis Target Range
24	X Axis Moving	99	Accessory Error* *This is a software-controlled error. If an accessory errors, the software can send a command to put the instrument into this error state.
25	Y Axis Moving		

Materials

Appendix C

The information provided in the following table is accurate to the best of our knowledge and belief, but is intended for general information only.

Liquid Contact Materials

Material	Description
FEP	Fluorinated ethylene propylene is another member of the fluorocarbon family with similar chemical properties. It is generally more rigid than PTFE, with somewhat increased tensile strength. It is typically more transparent than PTFE, slightly less porous, and less permeable to oxygen. FEP is not as subject to compressive creep at room temperature as PTFE, and because of its slightly higher coefficient of friction is easier to retain in a compression fitting.
Nitronic 60	Chemical resistance is similar to Type 316 stainless, but its resistance to galling and oxidation make it superior to Type 316 or 303 in the majority of applications.
PAEK	Polyaryletherketone is the generic name for the family of polyketone compounds. PAEK includes PEK, PEEK, PEKK, and PEKEKK, which differ in physical properties and, to a lesser degree, in inertness. A range of PAEK-based composites are used for valves and fittings. These composites resist all common HPLC solvents and dilute acids and bases. However, concentrated or prolonged use of halogenated solvents may cause the polymer to swell. Avoid concentrated sulfuric or nitric acids (over 10%).

Material	Description
PEEK	Considered relatively inert and biocompatible, polyetheretherketone tubing can withstand temperatures up to 100°C. Under the right circumstances, 0.005"–.020" ID tubing can be used up to 5000 psi for a limited time, and 0.030" to 3000 psi. Larger IDs are typically good to 500 psi. These limits will be substantially reduced at elevated temperatures and in contact with some solvents or acids. Its mechanical properties allow PEEK to be used instead of stainless in many situations and in some environments where stainless would be too reactive. However, PEEK can be somewhat absorptive of solvents and analytes, notably methylene chloride, DMSO, THF, and high concentrations of sulfuric and nitric acid. This tubing is highly prone to "kinking," or sealing off, if held in a sharp bend over time.
PET	PET is a polyester plastic with excellent wear resistance, a low coefficient of friction and good chemical resistance. Its dimensional stability, combined with low moisture absorption, allows PET polyester plastics to be machined into precise, high-tolerance components. PET is both FDA and 3A-Dairy compliant, making it ideal for food applications. PET has good mechanical properties, and it works well for high load and wear conditions. PET can be formulated with additional lubricants to increase its wear characteristics without changing the basic attributes of the material.
PPS	Polyphenylene sulphide is the generic name for the material produced as Fortron®, Ryton®, and others. It is very resistant to all solvents, acids, and bases.
PTFE	Polytetrafluoroethylene is the generic name for the class of materials such as Teflon®. It offers superior chemical resistance but is limited in pressure and temperature capabilities. Because it's so easy to handle, it is often used in low pressure situations where stainless steel might cause adsorption. PTFE tubing is relatively porous, and compounds of low molecular weight can diffuse through the tubing wall.
Stainless Steel, Type 316L	Type 316L is an extra low carbon alloy that offers better corrosion resistance adjacent to brazes. This alloy contains a maximum of only 0.03% carbon. This amount of carbon is small enough to eliminate harmful carbon precipitation adjacent to brazes during the brazing operation. This extra low carbon grade is only recommended for equipment made for service below the lower sensitizing temperature of 800°F, especially when corrosive conditions are severe. It is not recommended for use at high temperature. This grade can be highly polished with no surface blemishes.

Material	Description
Tygon® Vacuum & Laboratory Tubing Formulation R-3603	Crystal-clear and flexible, Tygon® Tubing handles virtually all inorganic chemicals found in the lab. It is non-oxidizing and non-contaminating. Long-lasting and crack-resistant, Tygon® Laboratory Tubing is less permeable than rubber tubing. The glassy-smooth inner bore helps prevent buildup so that cleaning is facilitated. Coils are marked at 1-foot intervals for easy measuring. Autoclavable. Remains flexible at -45°F (43°C). Durometer hardness: Shore A, 55.
Valcon H	This composite, a carbon fiber reinforced, PTFE lubricated inert engineering polymer, has long been the standard for typical HPLC applications in which pressures are around 5000 psi and temperatures are not more than 75°C.

FEP, Nitronic 60, PAEK, PEEK, PPS, PTFE, and Valcon H descriptions provided by Valco Instruments Company Inc (**www.vici.com**).

PET description provided by Midland Plastics, Inc. (**www.midlandplastics.com**).

Stainless Steel, Type 316L description provided by New England Small Tube Corporation (**www.nesmalltube.com**).

Tygon® Vacuum & Laboratory Tubing Formulation R-3603 description provided by Saint-Gobain Performance Plastics Corp (**www.processsystems.saint-gobain.com**).

GX Direct Injection Module

Appendix D

Technical Specifications

Please be aware of the following before operating the instrument.

NOTICE	Changes or modifications to the instrument not expressly approved by Gilson could void the factory-authorized warranty.

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

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

GX Direct Injection Module

Technical Specification	Definition
Available Valves	**Analytical** Stainless steel direct injection valve (2-position, 6-port) 0.016" ID ports, 1/16" OD PEEK direct injection valve (2-position, 6-port) 0.016" ID ports, 1/16" OD
	Preparative Stainless steel direct injection valve (2-position, 6-port) 0.030" ID ports, 1/16" OD
Available Sample Loops	**Stainless Steel** 2 µL, 5 µL,10 µL, 20 µL, 50 µL, 100 µL, 250 µL, 500 µL, 1 mL, 2 mL, and 5 mL
	PEEK 2 µL, 5 µL,10 µL, 20 µL, 50 µL, 100 µL, 250 µL, and 500 µL
Dimensions (W x D x H)	12.1 x 8.9 x 10.1 cm (4.75 x 3.50 x 3.98 in)

GX Direct Injection Module

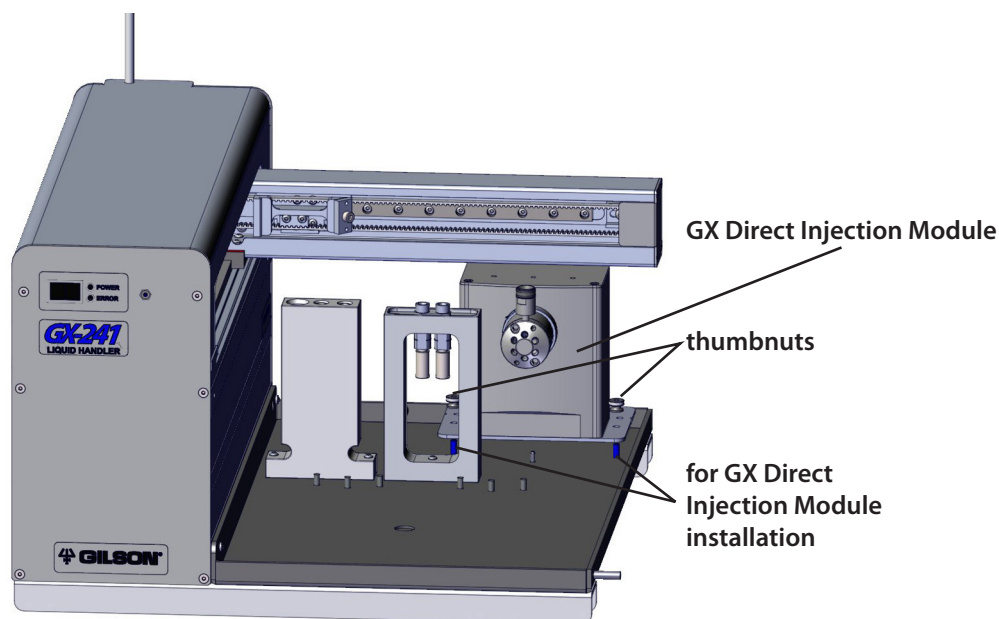| Technical Specification	Definition	
Front Panel	LED indicator for LOAD and INJECT positions	
Injection Carryover* *Contact **techsupport@gilson.com** to learn what methods and conditions were used to obtain the values	**Analytical** < 0.005% (20 μL loop, total loop overfill)	
Injection Repeatability* *Contact **techsupport@gilson.com** to learn what methods and conditions were used to obtain the values	**Analytical** CV < 0.7% (20 μL loop, total loop overfill)	
	Preparative CV <0.9% (1 mL loop, partial loop)	
Liquid Contact Materials* *For more information, refer to the **Materials** appendix.	*Description*	*Material*
	Injection Valve	Valcon H Nitronic 60 (N60) PTFE PAEK
	Injection Port	PPS
Power Requirements	Voltage: 24V DC Current rating: 1.0A	
Valve Switching Speed	200 msec	
Weight	1.2 kg (2.63 lbs.)	

Installation

Figure 39: GX Direct Injection Module Installation Location on Locator Plate

Install the GX Direct Injection Module at the back of the locator plate per the following instructions:

1. Remove the knurled thumbnuts from the threaded studs on the locator plate. These will be used when installing the GX Direct Injection Module on the locator plate.

2. Align the front set of holes on the GX Direct Injection Module base with the threaded studs in the locator plate.

3. Place one knurled thumbnut on each side of the GX Direct Injection Module and then finger tighten each.
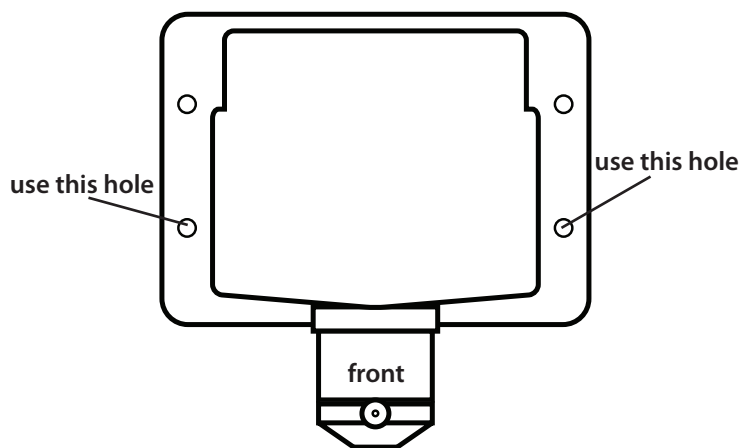

Figure 40: GX Direct Injection Module (Top View)

| NOTE | There are two locator pins included with the GX Direct Injection Module; these pins will not be used. |

Plumbing

This section provides the steps for plumbing the GX Direct Injection Module. Before making the tubing connections, locate the Plumbing Package for the GX Direct Injection Module (part number 26035470), which contains the following:

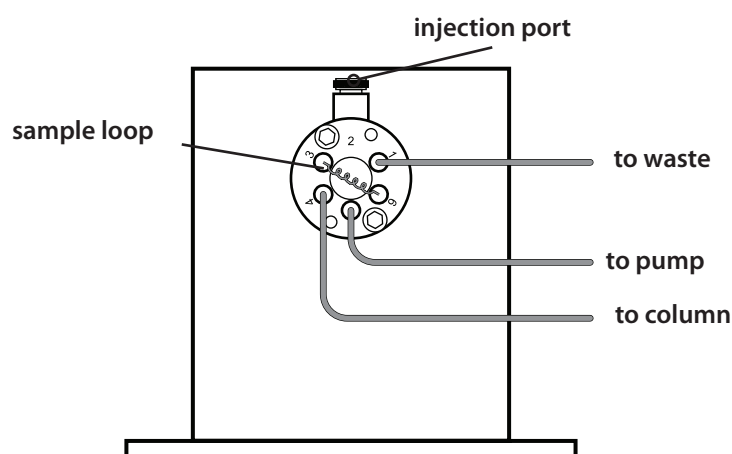| Part Number	Description	Quantity
4903180411	1/16" Nut, PEEK, (MZN1PK)	5
4903180511	1/16" Ferrule, PEEK, (ZF1PK)	5
495033	Teflon tubing, 0.020" ID x 1/16" OD, 10 ft/pk	1

Figure 41: GX Direct Injection Module for 1/16" (OD) Sample Loop

GX Direct Injection Module	Tubing	Connections
Port 1 to waste	Teflon® tubing, 0.020" ID x 1/16" OD, 10 ft. (part number 495033)	Use a 1/16" Nut, PEEK, (MZN1PK) (part number 4903180411) and a 1/16" Ferrule, PEEK, (ZF1PK) (part number 4903180511) to connect the tubing to port 1 on the valve.
Port 2 (Injection port)	N/A	One of the following: Injection port for 1.5 mm OD probe, PPS, (part number 26035411) Injection port for 1.5 mm OD probe, SS (part number 26035413)
Port 3 to port 6	Sample loop (ordered separately). Refer to the **Replacement Parts and Accessories** appendix for part numbers.	
Port 4 to column	Not supplied. Application specific.	Use a 1/16" Nut, PEEK, (MZN1PK) (part number 4903180411) and a 1/16" Ferrule, PEEK, (ZF1PK) (part number 4903180511) to connect the tubing to port 4 on the valve.
Port 5 to pump	Not supplied. Application specific.	Use a 1/16" Nut, PEEK, (MZN1PK) (part number 4903180411) and a ZF1PK 1/16" ferrule (part number 4903180511) to connect the tubing to port 5 on the valve.

Rear Panel Connection

Rear Panel

① From GSIOC Accessory port

② Unit ID

Connections

To make connections between the GX Direct Injection Module and the liquid handler refer to the instructions below and the diagram of **Power Connections** on page 33.

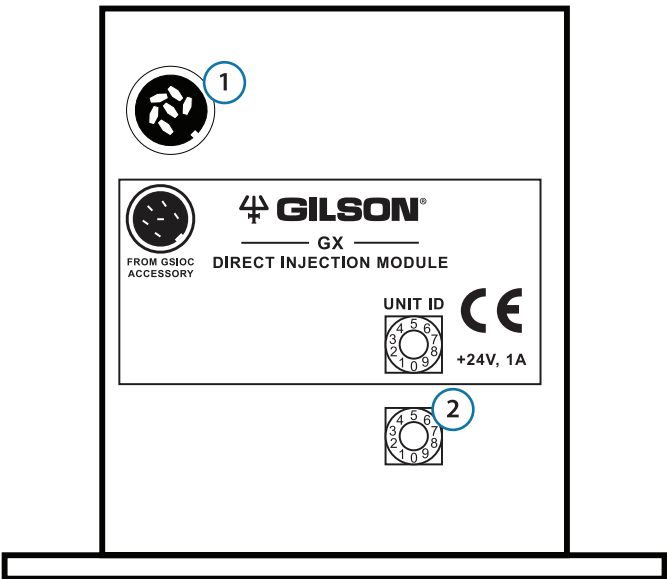1. Ensure that the power to the liquid handler is turned off.

Figure 42: Rear Panel Diagram - GX Direct Injection Module

NOTICE	Ensure that the power is turned off to the liquid handler before connecting or disconnecting the injection module.

2. Connect one end of the cable (part number 26035455) to the FROM GSIOC ACCESSORY port on the GX Direct Injection Module. The best orientation is with the cord facing right.

3. Connect the other end of the cable to one of the GSIOC ports on the rear panel of the liquid handler. The best orientation is to use the top GSIOC port with the cord facing left.

Unit ID

At the factory, the unit ID on the GX Direct Injection Module is set to 3. If the GX-241 Liquid Handler is being controlled via Ethernet by TRILUTION® LH or TRILUTION® LC Software, the unit ID on the injection module must be set to 9.

Refer to the table below for the correct setting, which is dependent on the type of communication to be used.

Unit ID	Communication
9	Ethernet
3	RS-232

To change the unit ID:

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

2. Align the arrow with a number.

Start Up

To start the injection module:

1. Make sure that the injection module is connected to the liquid handler. If not, ensure that the power is turned off to the liquid handler before making the connection.

NOTICE	Ensure that the power is turned off to the liquid handler before connecting or disconnecting the injection module.

2. Turn on power to the liquid handler. Power is supplied to the injection module by the liquid handler:

   ● The indicator lights on the injection module illuminate briefly.

   ● The injection module initializes. It stops with the valve set to the Inject position.

Fraction Collection (FC) Valve

Appendix E

Technical Specifications

Please be aware of the following before operating the instrument.

NOTICE	Changes or modifications to the instrument not expressly approved by Gilson could void the factory-authorized warranty.

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

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

Fraction Collection Valve

Technical Specification	Definition	
Available Valves	**Low flow** Three-port, 45 μL internal volume, up to 20 mL/min	
	High Flow Three-port, 120 μL internal volume, up to 200 mL/min	
Liquid Contact Materials* *For more information, refer to the Materials appendix.	*Description*	*Material*
	Low Flow Fraction Collection Valve	PTFE
	High Flow Fraction Collection Valve	PTFE PEEK

Installation

FC Valve Holder Clip

Follow these steps to install the holding clip for the fraction collection valve in the retainer bracket:

1. Locate the retainer bracket (part number 26053028, for fraction collection and included with the fraction collection package). The retainer bracket included with the probe guide insert will not be used with the fraction collection valve.

2. Locate the valve holding clip and the two 3 mm hex screws (part number 4013534031).

3. Place the two 3 mm hex screws through the valve holding clip into the retainer bracket and then tighten using the 2 mm Allen wrench.
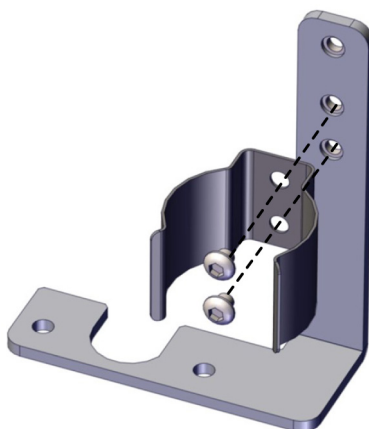

Figure 43: Holding Clip and Retainer Bracket

Probe Guide Insert in FC Valve Retainer Bracket

To install the probe guide insert:

1. Locate the probe guide insert and slide it into the opening in the Z-foot. The probe guide insert should be oriented so the thicker part is at the top and the flat side is on the right. It will be a tight fit.

    Each insert is marked with a number of indentations on the insert for identification purposes. Refer to the table below.

Probe Guide Insert	Number of Indentations
1.3 mm	0
1.5 mm	1
1.8 mm	2
2.3 mm	3
2.7 mm	4

2. Slide the retainer bracket onto the Z-foot so that the opening in the retainer bracket surrounds and secures the probe guide insert.

3. Align the holes in the retainer bracket with the holes in the Z-foot. Place two of the M3 x 5 mm hex screws (part number 4013534051) through the retainer bracket into the Z-foot and then tighten using the supplied 2 mm Allen wrench.
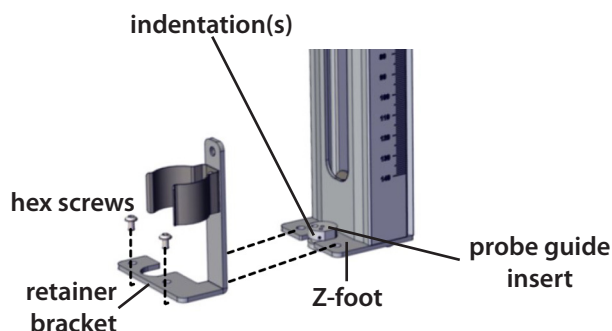

Figure 44: Probe Guide Insert Installation
(FC Valve Retainer Bracket)

FC Valve Tubing and Cable Retainer

Follow the instructions below to install the retainer for the tubing and the cable connected to the FC valve.

1. Locate the tubing and cable retainer (part number 26053029) supplied in the fraction collection valve package.

2. Insert the pointed end into the hole on the side and near the top of the Z-arm.

insert pointed end into hole
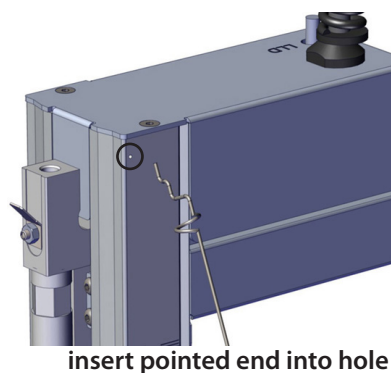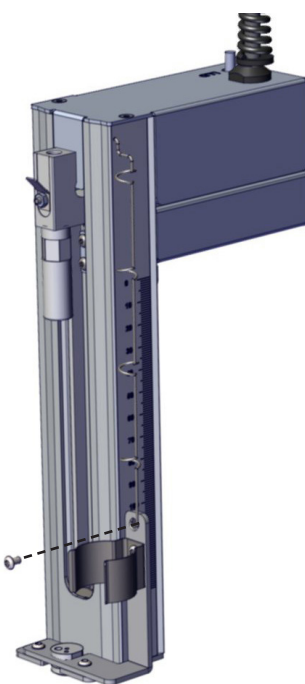

M3 x 5 mm
hex screw

Figure 45: Tubing and Cable Retainer Installation

3. While pushing in (and applying a little bit of pressure), rotate the tubing and cable retainer down.

NOTE	It is not necessary to bend the tubing and cable retainer.

4. Place the other end of the tubing and cable retainer in front of the top hole in the retainer bracket.

5. Place one M3 x 5 mm hex screw through the tubing and cable retainer and then through the top hole in the retainer bracket. Tighten using the supplied 2 mm Allen wrench.

FC Valve

Install the fraction collection valve in the valve holding clip. Turn the valve so that the COLLECT port is the closest port to the probe guide insert.
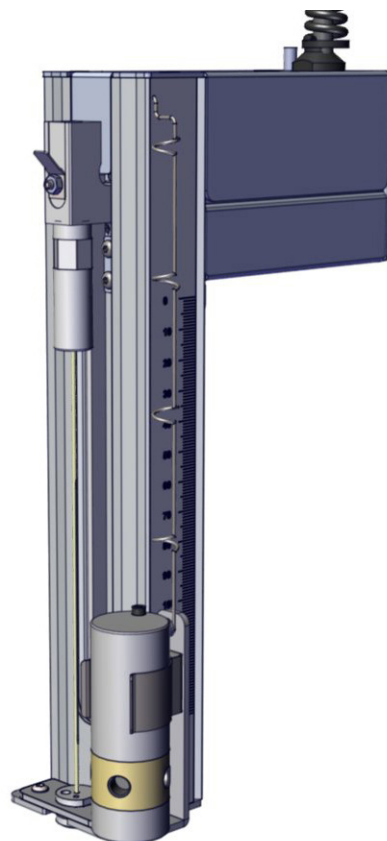

Figure 46: Fraction Collection Valve Installed

Plumbing

This section explains the steps for plumbing the fraction collection valve.

Before making the tubing connections, locate one of the plumbing packages listed below.

Part Number	Description		
26057012	PLMB PKG,GX-241 LOW FLOW FC VLV Includes the following:		
	Part Number	**Description**	**Qty**
	25077423	COLLECTION TUBE, 1/16" TFE .031 I.D.	1
	25077436	COLLECTION TUBE, 1/16" TFE .012 I.D.	1
	490031	TBG,PTFE .031 ID x .0625 OD	12 ft
	49041011	FERRULE, 1/16", RED (P-200R)	3
	49041012	NUT, 1/16", BLACK (P-201)	3
	49951059	TUBING,.010" X 5FT, PEEK	1
	49953059	TUBING,.030" X 5FT, PEEK	1
	F1410153	COUPLING, 1/4-28	1
	54118025	SPIRAL WRAP, 1/4"	2 ft
26057013	PLMB PKG,GX-241 HIGH FLOW FC VLV Includes the following:		
	Part Number	**Description**	**Qty**
	25077422	COLLECTION TUBE, 1/8 TFE .063 I.D.	1
	25077423	COLLECTION TUBE, 1/16 TFE .031 I.D.	1
	490032	TBG,PTFE .063 ID x .125 OD	12 ft
	49041011	FERRULE, 1/16", RED (P-200R)	3
	49041012	NUT, 1/16", BLACK (P-201)	3
	49041015	FERRULE, FLANGELESS, 1/8", TEFZEL(P-300)	1
	49041016	NUT,1/4-28 X 1/8, DELRIN (P-304	1
	49953059	TUBING,.030" X 5FT, PEEK	1
	F1410153	COUPLING, 1/4-28	1
	54118025	SPIRAL WRAP, 1/4"	2 ft

Assembly – Fraction Collection Tubing

Refer to the following procedures to assemble the fraction collection tubing using the items supplied in the appropriate plumbing package.

- For the 1/8" OD fraction collection tubing (part number 25077422)

  a. Cut a piece of the supplied 1/8" OD Teflon tubing to approximately 75 mm.

  b. Insert the supplied nut and ferrule onto the tubing.

- For the 1/16" OD fraction collection tubing (part number 25077423 and 25077436)

  c. Cut a piece of the supplied 1/16" OD Teflon tubing to approximately 70 mm.

  d. Insert the supplied nut and ferrule onto the tubing.

Installation – Fraction Collection Tubing

1. Insert the end of the fraction collection tubing with the fitting attached into the COLLECT port of the valve.

2. For the 1/8" tubing, press the tubing against the back of the port and finger tighten the screw.

   | NOTE | For the 1/16" tubing, make sure that the tubing does not extend past the ferrule. |

3. While holding the valve and the fraction collection tubing, insert the fraction collection tubing into the guide hole on the probe guide insert until 3 mm of tubing is exposed below the insert.

   The 1/8" tubing uses the larger guide hole and the 1/16" tubing uses the smaller guide hole.

1/8"   1/16"

Figure 47: Guide Holes on Probe Guide Insert

Refer to the diagram, and the table that follows, when making plumbing connections for the fraction collection valve.

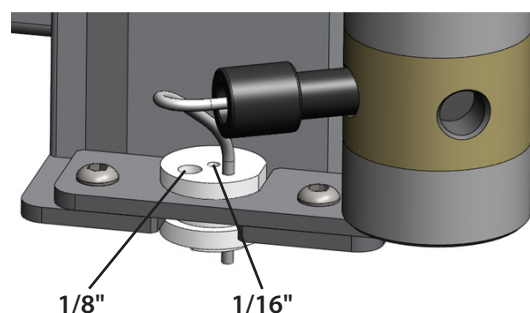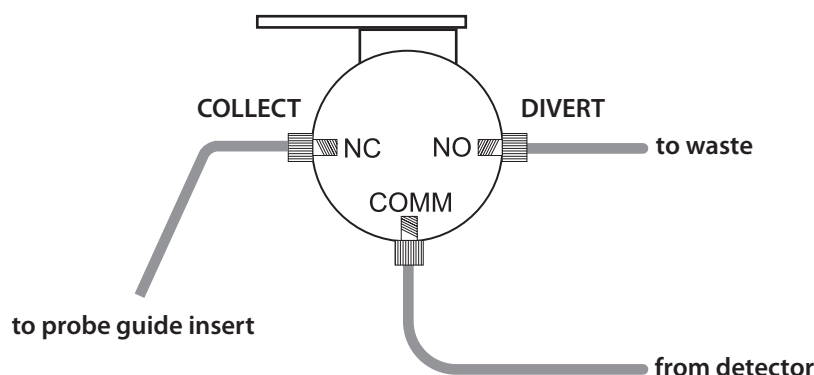**Figure 48:** FC Valve Connections (Top View)

3-Way Valve	Tubing	Connections	
INLET COMM (common) port to coupler	PEEK tubing 0.010" x 1/16" x 5 feet (part number 49951059) or PEEK tubing 0.030" x 1/16" x 5 feet (part number 49953059)	On both ends of the tubing, use an Upchurch P-201 nut (1/16", 1/4–28, part number 49041012) and P-200 ferrule (1/16", part number 49041011). Connect one end of the tubing to the IN port of the valve. Route the other end of the tubing through the tubing and cable retainer and connect it to a coupler (part number F1410153).	
DIVERT position NO (normally open) port to waste	**Low flow**: Teflon tubing 0.031" ID x 1/16" OD x 12 feet (part number 490031)	**Low flow**: Insert an Upchurch P-201 nut (1/16", 1/4–28, part number 49041012) and P-200 ferrule (1/16", part number 49041011) on one end of the tubing and then connect it to the DIVERT port of the valve. Route the other end of the tubing through the tubing and cable retainer.	
	High flow: Teflon tubing 0.063" ID x 1/8" OD x 12 feet (part number 490032)	**High flow**: Insert an Upchurch P-304 nut (1/8", 1/4–28, part number 49041016) and P-300 ferrule (1/8", part number 49041015) on one end of the tubing and then connect it to the DIVERT port of the valve. Route the other end of the tubing through the tubing and cable retainer.	
COLLECT position NC (normally closed) port to probe	1/16" fraction collection tubing (part number 25077423 or 25077436) or 1/8" fraction collection tubing (part number25077422)	Information on making these connections can be found on page 82.	

Figure 49: Tubing and Cable Routed Through Tubing and Cable Retainer

Rear Panel Connection - Solenoid (FC)

Power for the fraction collection valve (optional) is supplied by a rear panel connection to the solenoid port labeled FC. For the location of the port, refer to the Rear Panel Diagram on page 30.

1. Connect the extension cable (part number 26052007) to the cable attached to the fraction collection valve.

2. Route the cable through the tubing and cable retainer.

3. Connect the free end of the cable to the solenoid port labeled FC on the rear panel.

Spiral Wrap Installation

Use the spiral wrap included in the accessory kit to contain the tubing. Include the cable from the optional fraction collection valve, but do not include the LLD cable in the spiral wrap.

If necessary, attach the two adhesive-back tubing clips to the side panel and route the transfer tubing through them.
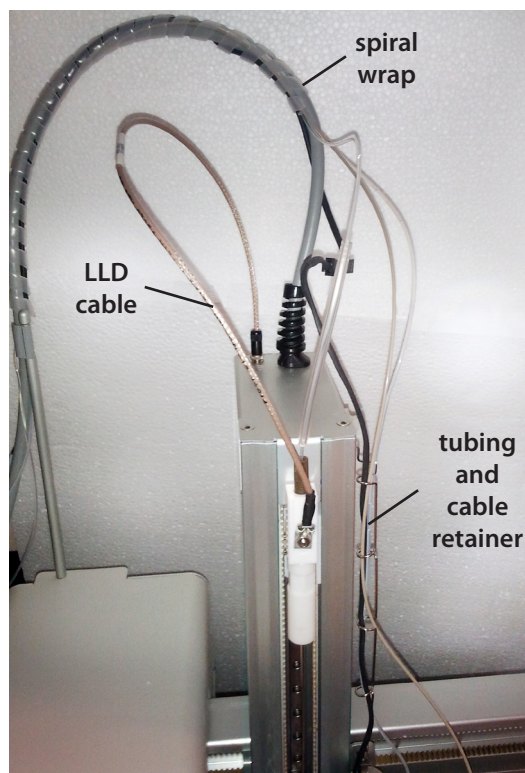

Figure 50: Spiral Wrap Installed

Transfer Port Bar

Appendix F

Installation

A transfer port bar with two, installed transfer ports is available for purchase as an optional accessory. Refer to the table below for part numbers.

Part Number	Description
26057008	Transfer port bar assembly (2 ports) for 1.3 mm OD probe, GX-241
26057005	Transfer port bar assembly (2 ports) for 1.5 mm OD probe, GX-241

Use the supplied hex screw to install the transfer port bar on the locator plate next to the rinse station. The drain fitting on the transfer port bar should point toward the rear.
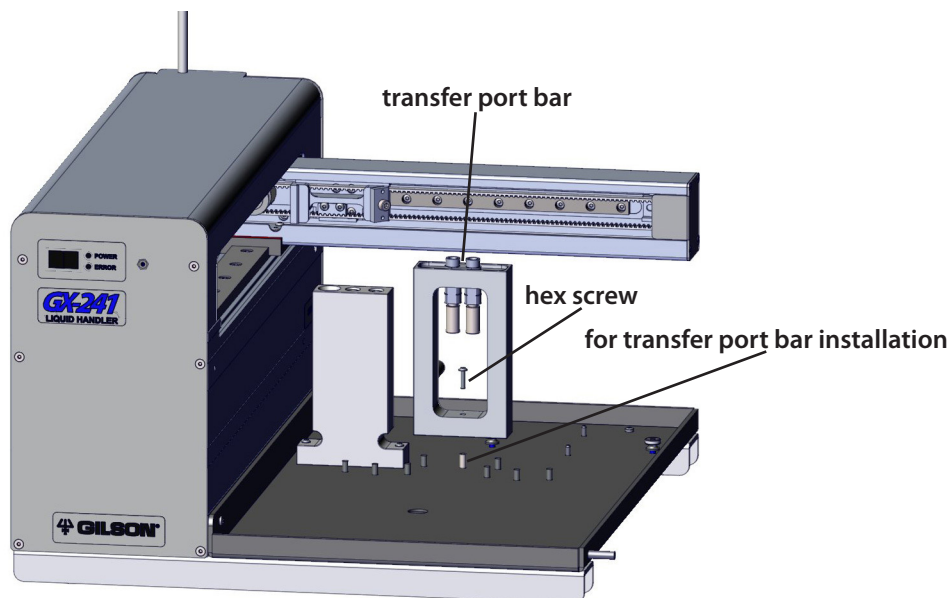
Figure 51: Transfer Port Bar Location on Locator Plate

Plumbing

After a sample is prepared, it can be directed to a peripheral instrument via a transfer port.

To make the plumbing connections:

1. Push the waste tubing (part number 470331206) onto the drain until secure.

2. Place the other end of the waste tubing in a waste container. Make sure the waste container is placed in a location that is lower than the instrument bed.

3. The tubing connection to each transfer port requires a 10/32 fitting and 1/16" OD tubing. Both are ordered separately.
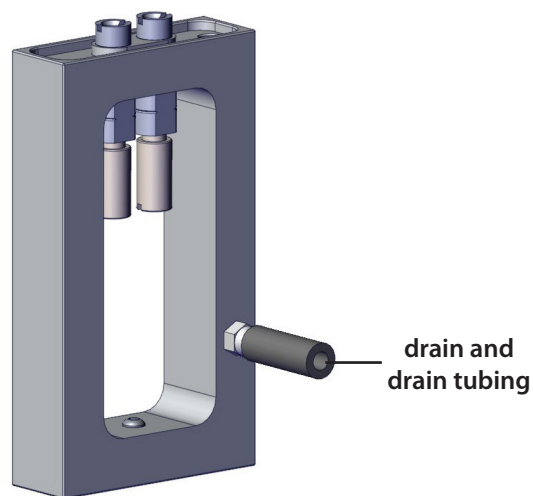
drain and
drain tubing

Figure 52: Transfer Port Bar (Rear View)

Part Replacement

Transfer Port/Transfer Port Seal

Refer to the table below for part numbers for a replacement transfer port or transfer port seal.

Part Number	Description
Transfer Ports	
25051214	PORT, 1.3MM
29546401	PORT, 1.5MM
Transfer Port Seals	
250510153	SEAL, PORT, 1.3MM
2954674	SEAL, PORT, 1.5MM

To replace a transfer port seal:

1. Disconnect the tubing from the transfer port that has the faulty seal.

2. Using a 5/16" offset screwdriver, remove the seal retainer from the transfer port. (Refer to the diagram.)

3. To remove the seal from the top of the seal retainer, insert a #6 wood screw into the seal, and then pull. Discard the old seal.

4. Using your fingers, push the replacement seal into place in the seal retainer.

5. Before reconnecting the seal retainer, ensure that the probe guide and spacer are secure in the port bar.

6. Finger tighten the seal retainer to the spacer. When secure, use a 5/16" offset screwdriver to tighten until snug.

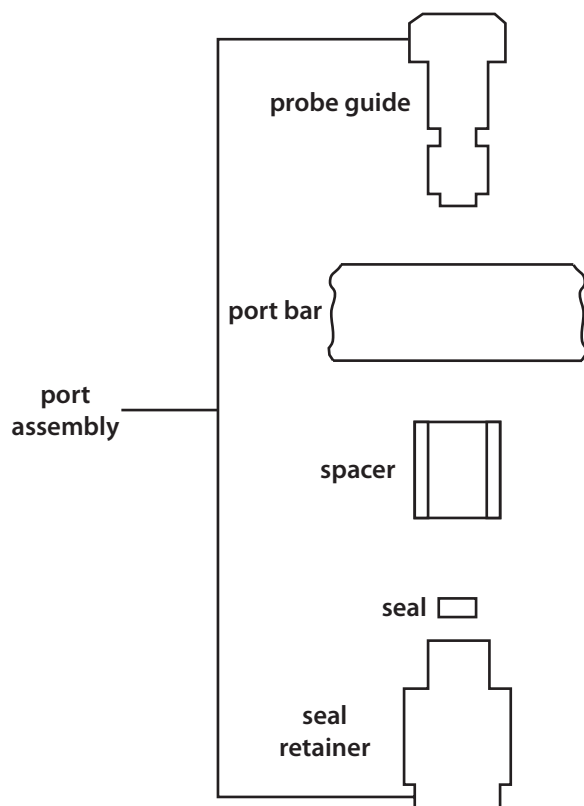7. Reconnect the tubing to the bottom of the transfer port.

Figure 53: Transfer Port Seal Replacement

Safety Shield

Appendix G

Installation

Refer to the instructions and diagram that follow to install the safety shield (part number 26057009).
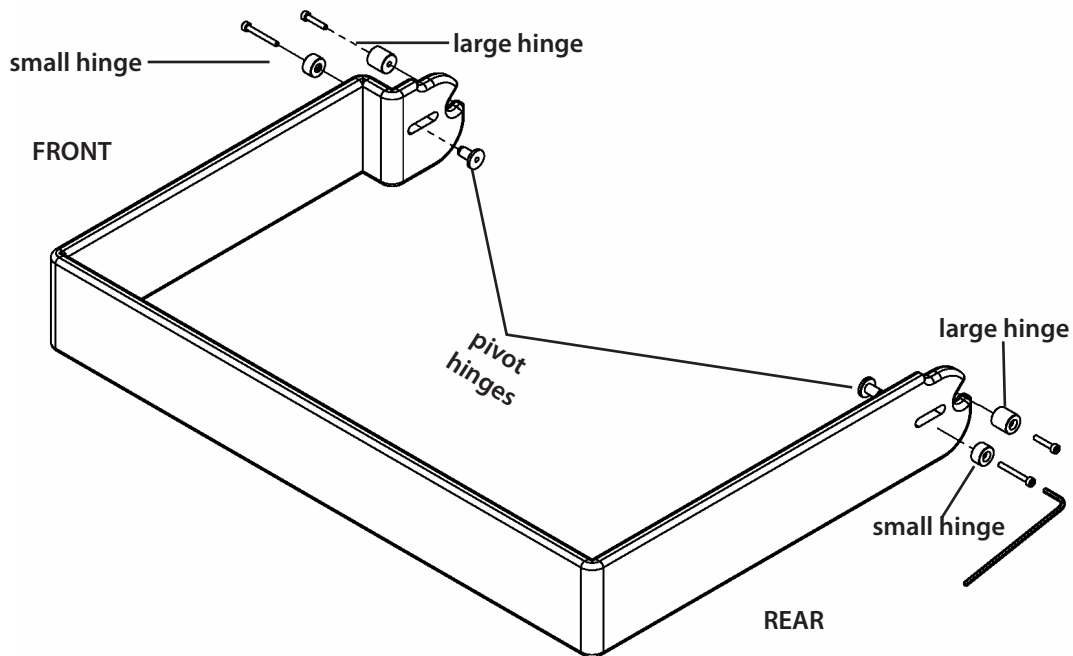
Diagram

Figure 54: Safety Shield Installation

Instructions

1. Using the supplied 2.5 mm Allen wrench, install one screw through the large hinge and then through the opening in the safety shield into the hole on the front of the instrument.

2. Using the 2 mm Allen wrench supplied in the accessory kit, remove the top screw on the right from the front of the instrument.

3. Install the other screw through the smaller hinge, pivot hinge, and finally through the hole from which the screw was just removed.

4. Repeat all steps to attach the other side of the safety shield to the rear of the instrument.
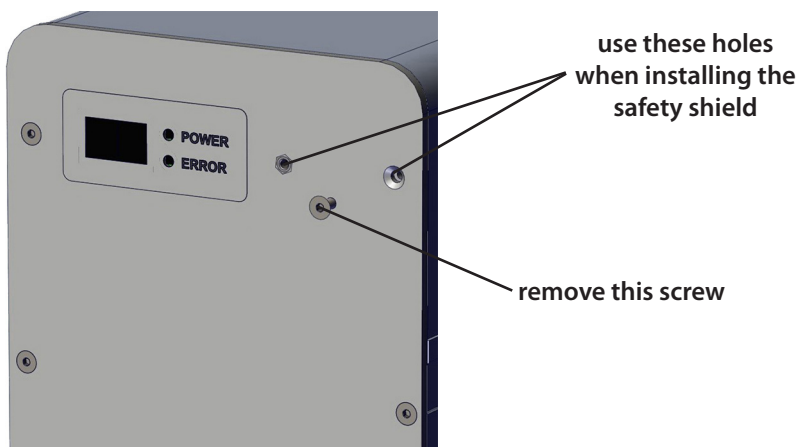
POWER
ERROR

use these holes when installing the safety shield

remove this screw

GX Rinse Pump

Technical Specifications

Please be aware of the following before operating the instrument.

> **NOTICE** Changes or modifications to the instrument not expressly approved by Gilson could void the factory-authorized warranty.

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

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

GX Rinse Pump

Technical Specification	Definition
Contact Control	One input (contact closure) and one switched +24V DC 1A input
Dimensions (W x D x H)	12.1 x 8.9 x 18.3 cm (4.76 x 3.5 x 7.2 in.)
Power Requirements	Voltage: 24V DC Current rating: 1A
Pump Type	Peristaltic
Rinse Speed	High speed Low speed
Weight	1.0 kg (2.28 lbs.)

Installation

The GX Rinse Pump should be placed near the rinse station.

Plumbing

Locate the following tubing included with the rinse pump:

● 2.0 mm ID PharMed® tubing assembly (part number 26035221)

● 1/16" ID x 3/16" OD neoprene tubing (part number 4715187060)

To install the tubing:

Figure 55: GX Rinse Pump

1. Remove the tubing clip from the top of the rinse pump by squeezing the sides and then pulling it out.

2. Remove the two pieces from the side of the pump head. Store the pieces for future use.

3. Place one end of the PharMed tubing assembly in the left side of the pump head and snap into place.

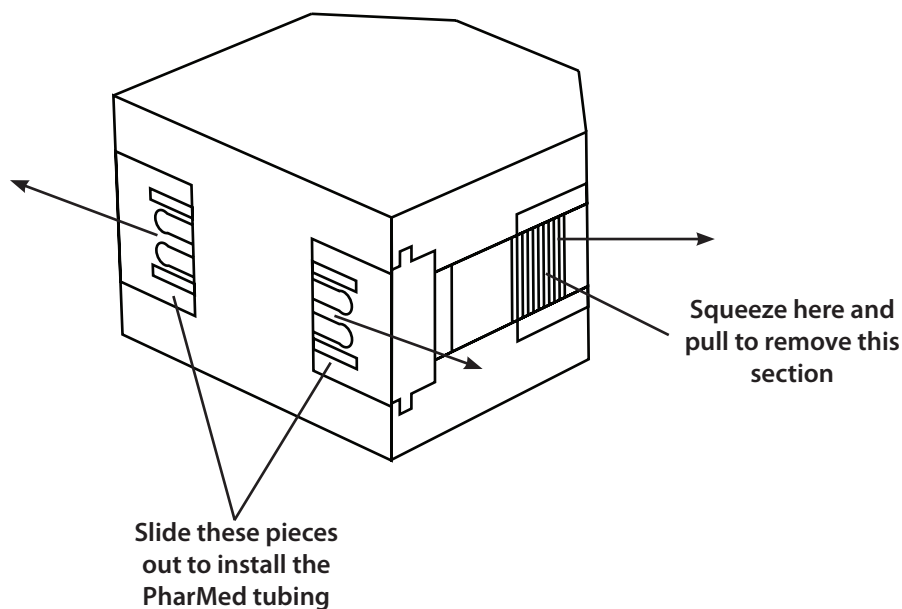4. Place the other end of the PharMed tubing assembly in the right side of the pump head and snap into place.

5. Replace the tubing clip.

6. Connect a length of neoprene tubing to the top barbed fitting on the right side and place the other end in a reservoir.

7. Connect a length of neoprene tubing to the top barbed fitting on the left side and connect to the rinse station.

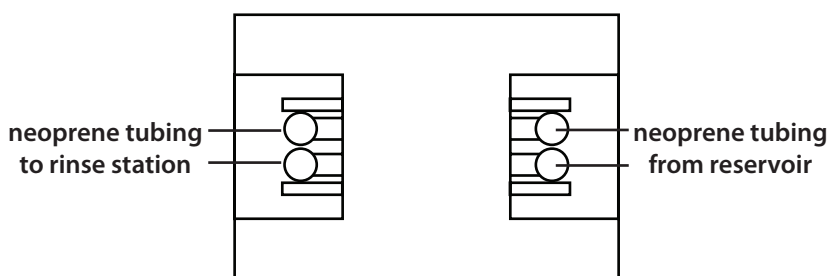8. Repeat steps 6 and 7 for the bottom set of fittings.

Squeeze here and pull to remove this section

Slide these pieces out to install the PharMed tubing

Figure 56: GX Rinse Pump Tubing Installation

neoprene tubing to rinse station

neoprene tubing from reservoir

Figure 57: GX Rinse Pump Tubing Installation
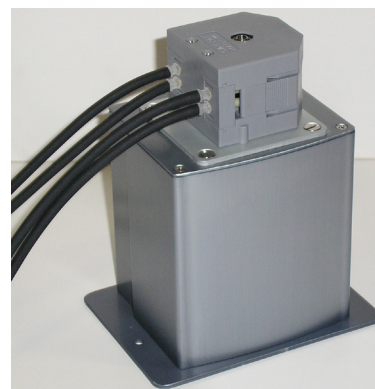
Rear Panel Connection

Rear Panel

(1) Inputs

Connections

To make connections between the GX Rinse Pump and the liquid handler, refer to the diagram and instructions below.

1. Ensure that the power is turned off to the liquid handler.

2. Locate the GX Rinse Pump cable connector (part number 26035257). This assembly contains two pre-wired terminal block connectors.

3. Another assembly, GX Rinse Pump cable connector (part number 26035256), is included, but will not be used.

4. Connect the 4-pin terminal block connector to the input ports on the rear panel of the GX Rinse Pump.

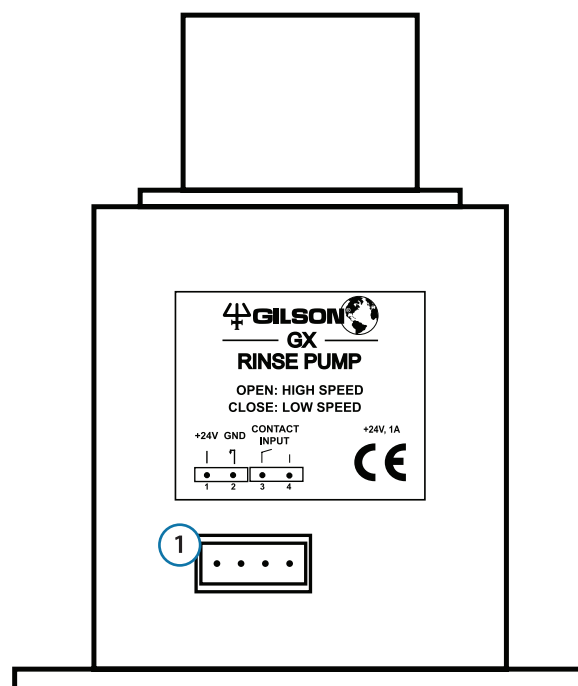5. Connect the 8-pin terminal block connector to the output ports on the rear panel of the liquid handler.

Figure 58: Rear Panel Diagram - GX Rinse Pump