User's Guide

VERITY® 3011 Isocratic Pump

GILSON®

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SAFETY

Read this chapter before installing and operating the instrument.

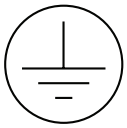
Only trained technical personnel in a laboratory environment may use the instrument for non-medical, liquid handling purposes. For safe and correct use of the instrument, operating and service personnel must follow all instructions contained in this guide when installing, cleaning, and maintaining the 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
	Protective conductor terminal Borne de terre de protection
|	Electrical power ON Sous tension
O	Electrical power OFF Hors tension
	Caution Attention
	Caution, risk of electric shock Attention, risque de choc électrique
	Caution, hot surface Attention, surface chaude

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 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.

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 specified in this user's guide.

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SÉCURITÉ

Veuillez lire ce chapitre avant d'installer et d'utiliser l'instrument.

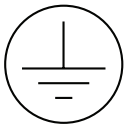
Seul un personnel technique qualifié dans un environnement de laboratoire peut utiliser l'instrument à des fins de manipulation de liquides non médicaux. Pour une utilisation sûre et correcte de l'instrument, le personnel d'exploitation et d'entretien doit suivre toutes les instructions figurant dans ce guide lors de l'installation, le nettoyage et l'entretien de l'instrument. Toutes les précautions de sécurité doivent être respectées pendant toutes les phases de fonctionnement, d'entretien et de réparation de l'instrument.

Tout manquement à ces précautions ou aux avertissements décrits dans le guide de l'utilisateur viole les normes de sécurité de la conception, de la fabrication et l'utilisation prévue de l'instrument. Gilson n'assume aucune responsabilité pour les clients ne se conformant pas à ces exigences.

L'instrument a été certifié conforme aux normes de sécurité exigées au Canada, en Europe et aux États-Unis. Reportez-vous à l'étiquette du panneau arrière de l'instrument et le document de déclaration de conformité pour les normes actuelles auxquelles l'instrument a été jugé conforme.

Symboles électroniques et de danger

Les symboles électroniques et de danger suivants peuvent apparaître sur l'instrument:

SYMBOLE	EXPLICATION
	Direct current Courant continu
	Protective conductor terminal Borne de terre de protection
|	Electrical power ON Sous tension
O	Electrical power OFF Hors tension
	Caution Attention
	Caution, risk of electric shock Attention, risque de choc électrique
	Caution, hot surface Attention, surface chaude

Consignes de sécurité

Les consignes de sécurité suivantes peuvent apparaître dans le présent document :

⚠WARNING	**WARNING indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures graves**
⚠CAUTION	**CAUTION indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures ou modérées**
NOTICE	**NOTICE indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des dommages matériels**

Tension électrique

Assurez-vous que le panneau arrière est accessible. Détachez toutes les sources de tension de l'instrument avant l'entretien, la réparation ou l'échange de pièces. Utilisez uniquement le cordon d'alimentation avec mise à la terre fournie. Des cordons d'alimentation sans mise à la terre peuvent entraîner des décharges électriques et des blessures graves. Utilisez uniquement des fusibles avec le courant nominal spécifié. L'instrument doit être exploité à la tension de secteur indiquée sur le panneau arrière de l'instrument.

Solvants

Observez les pratiques sécuritaires en laboratoire lors de la manipulation de solvants. Les précautions de sécurité adéquates, comme une ventilation adéquate, des lunettes de sécurité, etc., doivent être utilisées lors de la manipulation de liquides dangereux. Reportez-vous à la fiche de données de sécurité (FDS) pour chaque solvant avant utilisation.

Pièces de rechange

Utilisez uniquement les pièces de rechange spécifiées dans ce guide de l'utilisateur.

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Chapter 1

INTRODUCTION

IN THIS CHAPTER

Description

The VERITY® 3011 Isocratic Pump is a liquid delivery solution for chemical reaction monitoring in petroleum applications and for gel permeation chromatography (GPC) in environmental and food and beverage testing applications.

The VERITY 3011 Pump is a highly accurate pumping system delivering a virtually pulse-free, stable solvent flow for a wide variety of liquids, including high viscosity solvents. The pump allows for flow rates from 0.01 to 10 mL/min, depending on pump head, and pressures of up to 600 bar (8702 psi).

The VERITY 3011 Pump features the following system components:

- Quick-connect pump head that is easily interchangeable by users
- Integrated pulse dampener with pressure sensor
- Convenient prime/purge valve
- Intuitive touchscreen controller

Figure 1
VERITY® 3011 Isocratic Pump Features
Not Pictured: Integrated Pulse Dampener

Unpacking

The pump is delivered with most major components already assembled. Keep the original container and packing assembly so the unit may be shipped safely, if necessary.

Carefully unpack the pump and its accessories from the carton.

Verify that all parts are included and undamaged. Do this now, even if the pump will not be used immediately. Many carriers must receive concealed damage claims within seven days of delivery.

Standard Equipment

After the instrument and the accessories have been unpacked, you should have the following:

- VERITY® 3011 Isocratic Pump

An accessory kit that includes:

- 4-pin Terminal Block Connector
- 8-pin Terminal Block Connector (qty 2)
- Power Supply and Power Cord
- USB Cable

Documentation

The following documents are included with the VERITY 3011 Pump:

- Documentation USB
  - User's Guide
  - Installation Qualification (IQ) Procedure
  - Validation Certificate
- Items Included Checklist
- Declaration of Conformity
- China RoHS Declaration Table
- Quality Control Checklist

Accessories

REQUIRED

- Pump Head and Plumbing Package

OPTIONAL

- Solvent Bottle Tray
- Column Holder

Technical Specifications

Please be aware of the following before operating the pump.

NOTICE **Changes or modifications to the pump not expressly approved by Gilson could void the warranty.**

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

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

VERITY® 3011 Isocratic Pump

SPECIFICATION	DESCRIPTION
Pump Type	Isocratic Pump
Hydraulic System	Reciprocating single piston pump with passive dampening
Pump Head	5 SS (5 mL/min maximum); 10 SS (10 mL/min maximum)
Flow Rate Specifications	**Programmable Flow Rate Range**: 5 SS: 0.001–5 mL/min 10 SS: 0.05–10 mL/min **Recommended Flow Rate Range**: 5 SS: 0.01–5 mL/min 10 SS: 0.05–10 mL/min **Flow Rate Increment**: 0.001 mL/min
Flow Accuracy	± 2% of the requested flow rate with water at ambient temperature and pressure 1.4–600 bar (20–8700 psi) **5 SS** 0.1 to 5 mL/min **10 SS** 0.1 to 10 mL/min
Flow Precision	< 1% RSD with water at ambient temperature and pressure 1.4–600 bar (20–8700 psi) **5 SS** 0.05 to 5 mL/min **10 SS** 0.1 to 10 mL/min
Operating Pressure	0–600 bar (0–8702 psi)
Compressibility Compensation	Settable compensation range 0–2000 Mbar[1]
Pressure Pulsation	< ± 2% amplitude at 1 mL/min at 100 bar (1500 psi) and 410 bar (6000 psi)
Priming	Manual with built-in prime/purge valve via syringe
Liquid Contact Materials	316L stainless steel, sapphire, HDPE, PTFE, ruby, PCTFE For more information, refer to Liquid Contact Materials on page 68.
Operating Modes	Constant flow rate (Flow), constant volume or time (Dispense), and time-based sequence (Program)

TECHNICAL SPECIFICATIONS CONTINUED ON PAGE 13

VERITY® 3011 Isocratic Pump

SPECIFICATION	DESCRIPTION
Control and Communication Specifications	**Control** Remote control via GECP over USB or RS-232 or remote control via Modbus over RS-485
	Inputs Four digital inputs: Start/Stop; Pause/Resume; Program Wait; Error
	Outputs 24VDC; Relay (24VDC, 24 W) One Analog output channel for outputting pressure sensor reading (0–1V for 0–600 bar)
	Front Panel Capacitive touchscreen control
	Software TRILUTION® LC 3.0 with Service Pack 8 on Windows® 7
Electrical Specifications	**Line Voltage** 120 to 240 VAC
	Frequency 50 to 60 Hz
	Power Consumption 75 W
Physical Specifications	**Operating Altitude** Up to 2000 m (81 kPa or 604 mmHg)
	Operating Temperature 5°C to 40°C
	Operating Humidity Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Weight 7.26 kg (16 lbs.) with pump head
	Dimensions (W x D x H) 27.1 x 41.2 x 17.3 cm (10.7 x 16.3 x 6.8 in.)

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 **Repair and Return Policies** on page 58.

Chapter 2

INSTALLATION

This chapter explains the steps for setting up the VERITY® 3011 Isocratic Pump, which includes:

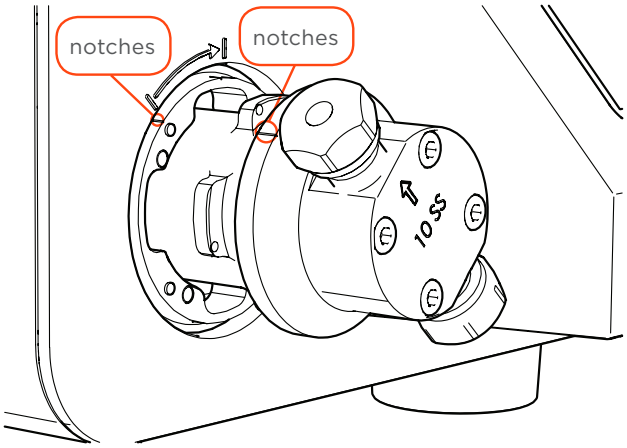
Figure 2
VERITY® 3011 Isocratic Pump with Pump Head Mounted

Pump Head Installation

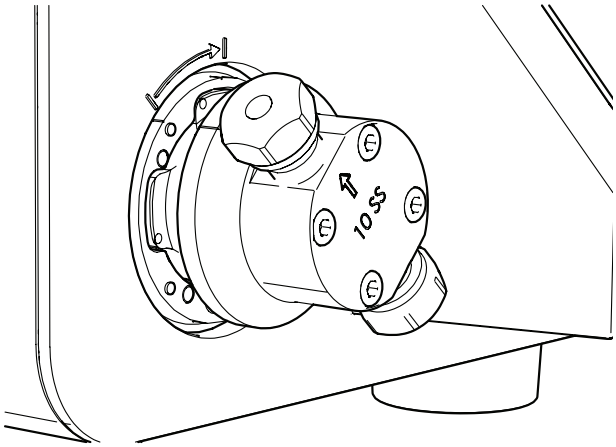
The pump head is ordered separately. Unpack the pump head and check that all of the parts are included. The pump head is shipped with plugs in the inlet and outlet ports. Remove before installation and use.

Installation of the pump head does not require the use of any tools or software. Insert the pump head and then twist clockwise to install.

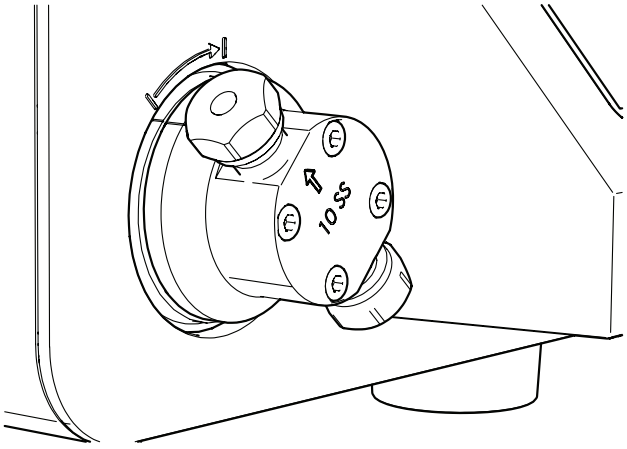
Step 1
Align the notch on the pump head with the notch on the front of the pump as shown.



Step 2
Insert the pump head in the opening.



Step 3
Twist clockwise to install.



Step 4
Pump head installation complete.

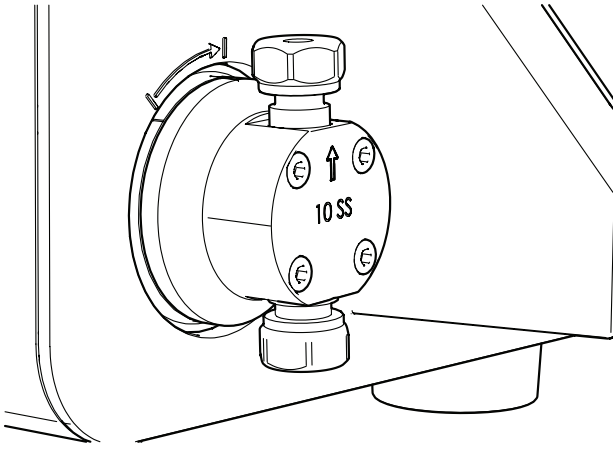


Figure 3
Pump Head Installation

Plumbing Connections

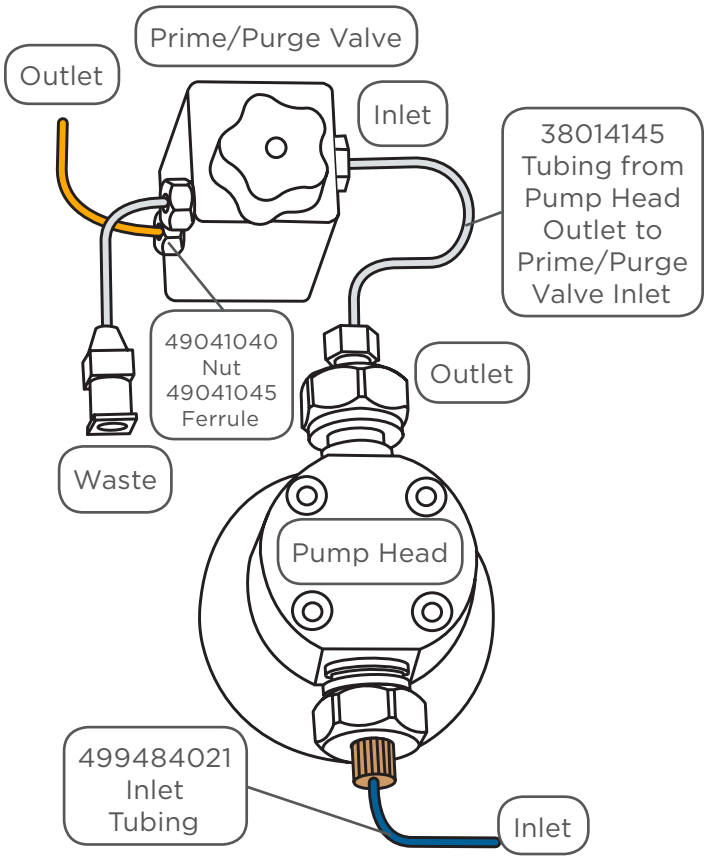
CONNECTION	DETAILS	DIAGRAMS
Pump Head Outlet to Prime/Purge Valve Inlet	Use the tubing assembly with fittings (part number 38014145) supplied in the pump head accessory kit.	
Pump Head Inlet	Use tubing assembly (part number 449484021) to connect the pump head inlet to a liquid reservoir. There is a PEEK fitting at one end of the tubing and a 20 µm filter on the other end. Screw the PEEK fitting into the inlet, and then put the end with the filter attached into the appropriate liquid reservoir.	

Figure 4
Plumbing Connections

PLUMBING CONNECTIONS CONTINUED ON PAGE 18

CONNECTION	DETAILS	DIAGRAMS
Prime/Purge Valve Outlet	Use nut (part number 49041040) and ferrule (part number 49041045) supplied in the pump head accessory kit and appropriate tubing to make the connection to the prime/purge valve outlet. Refer to **Plumbing Connections** on page 17.	
Prime/Purge Valve Waste	Connect the outlet tubing to waste assembly (part number 38014251). Use tubing (part number 490032). On one end of the tubing, connect nut (part number 49041016) and ferrule (part number 49041015), coupling (part number F1410153), and adapter (part number 49081881). Connect the tubing assembly to the luer lock fitting on the outlet tubing to waste assembly. Place the other end in a waste receptacle.	

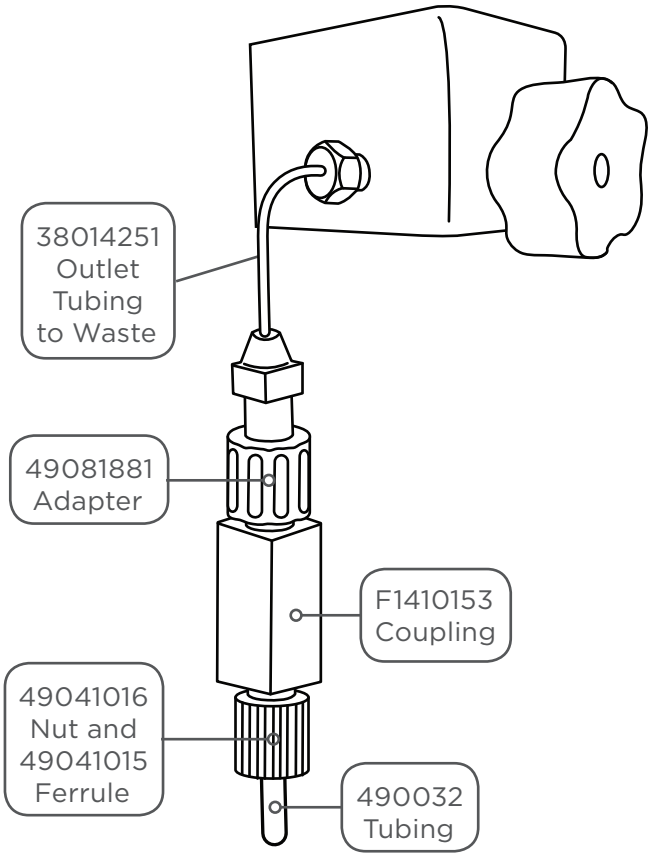


Figure 5
Drain Tubing Assembly

Rear Panel Connections

Rear Panel Diagram

The VERITY 3011 Pump rear panel includes connections for power, communication, analog output (pressure), and input and output contacts. Pump communication is available via USB, RS-232, or RS-485.

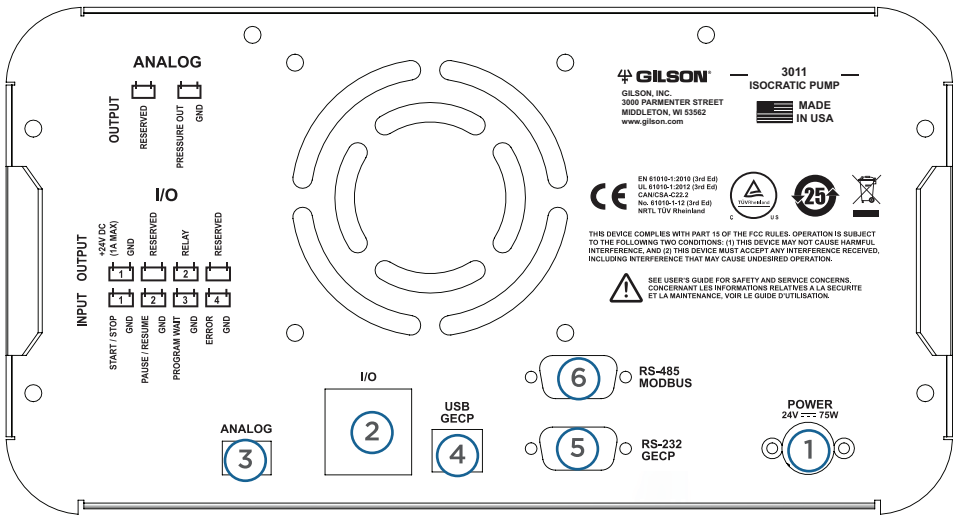


Figure 6
Rear Panel Diagram

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

1. Power receptacle
2. Input/Output (I/O) ports
3. Analog ports
4. USB GECP port
5. RS-232 GECP port
6. RS-485 Modbus port

USB GECP Port

Standard communication for the pump with a PC is via USB and TRILUTION® LC software.

To make the USB connection between the pump and the controlling device (PC), use the USB cable (part number 32000012) supplied in the accessory kit. Use the end with the "A-type" (flat) connector to connect to the controlling device and use the end with the "B-type" (square) connector to connect to the pump.

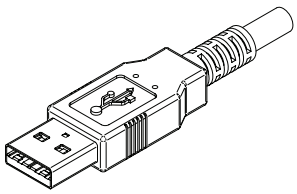


Figure 7
USB Cable
with "A-Type" Connector

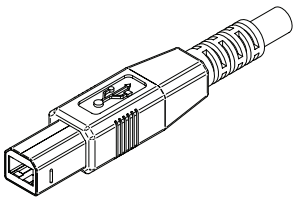


Figure 8
USB Cable
with "B-Type" Connector

RS-232 GECP Port

Intended for original equipment manufacturer (OEM) usage.

RS-485 Modbus Port

Intended for OEM usage.

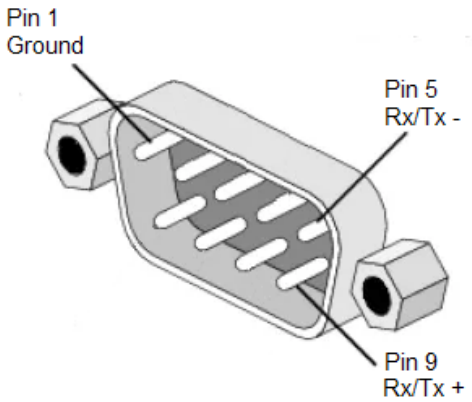


Figure 9
Modbus Pinout Diagram

Input/Output Ports

You can use the input and output contacts on the rear panel of the pump to control peripheral devices. Refer to Rear Panel Diagram on page 19 for the location of the input/output ports.

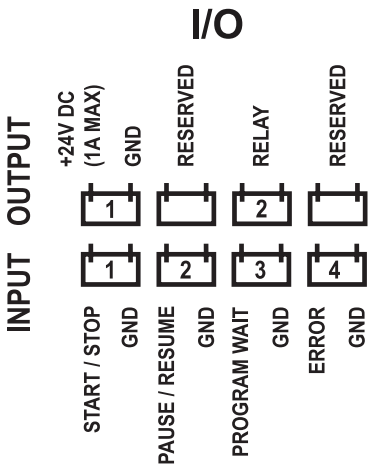


Figure 10
Input/Output Port Labels

CONTACT INPUTS

The bottom terminal block has four paired and labeled input contacts.

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

CONTACT OUTPUTS

The top terminal block has one paired and labeled isolated-relay contact closure.

DC POWER OUTPUT

The top terminal block has one +24V DC output.

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 connections with the 2-conductor cable:

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 pump, if connected.
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. Connect the terminal block connector to the pump. 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.

Analog Ports

The internal pump pressure sensor can be monitored externally using the analog output ports. If using standalone, front panel or TRILUTION® LC control, it is not necessary to use these ports to monitor pressure. For instructions to make the connections, refer to Making Connections above.

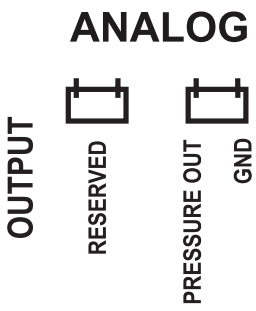


Figure 11
Analog Output Port Labels

Power Cord Connection

Make the connection between the power receptacle on the VERITY® 3011 Isocratic Pump and the external power supply (part number 5945150242). The connection from the external power supply to the VERITY® 3011 Isocratic Pump 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 VERITY® 3011 Isocratic Pump.

Use the supplied power cord to make the connection between the external power supply and the AC power source.

Chapter 3

OPERATION

The VERITY® 3011 Isocratic Pump can be controlled via its front panel or via external software, such as TRILUTION® LC.

This chapter provides the following information:

- A description of the **Front Panel**
- Information about **Priming**
- Instructions for **Using the Pump Control Software**
- A description of the **Modes** which include: **Flow Mode**, **Dispense Mode**, and **Program Mode**
- Instructions for **Running the Pump**

Front Panel

The front panel includes a touchscreen, soft power button, USB port, and status indicator light.

Touchscreen

The touchscreen is used for stand-alone control of the pump.

Soft Power Button

START UP

Press the soft power button to power up the pump into the LOCAL state.

SHUT DOWN

Press the soft power button to shut down the pump. When prompted, select the option to shut down the pump. (Recommended way to shut down the pump.)

Or, press and hold the soft power button for six seconds or longer to cause an immediate shutdown. (Forced shutdown— this is NOT the recommended way to shut down the pump.)

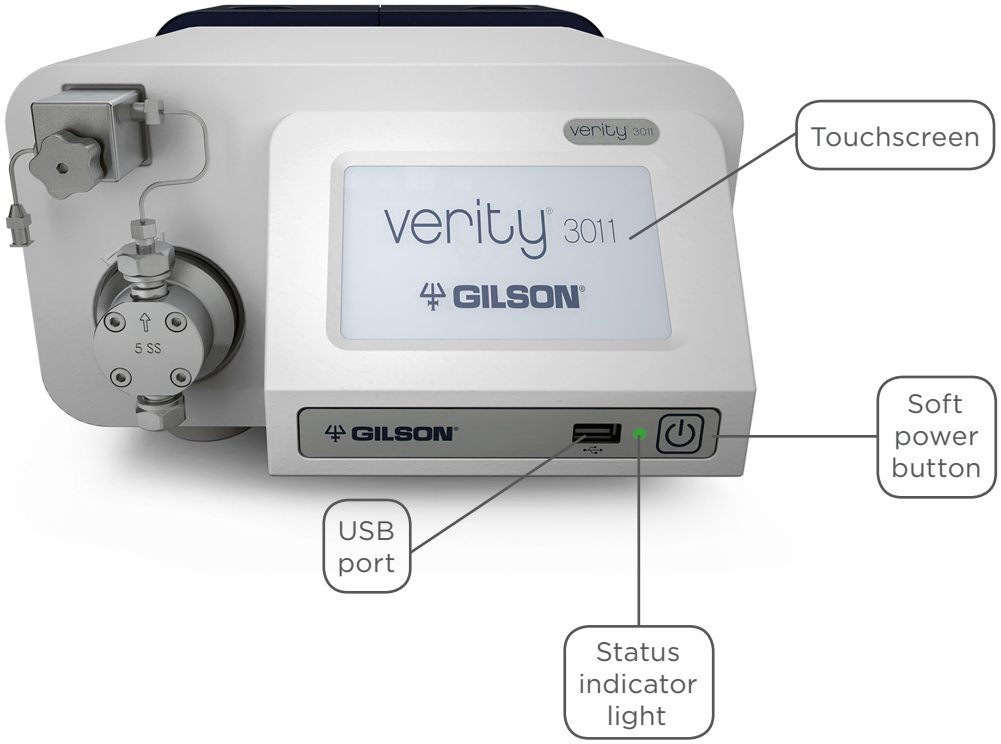


Figure 12
Front Panel Diagram

USB Port

The USB port is for connecting a USB drive for exporting methods. It is also used when updating the pump control.

Status Indicator

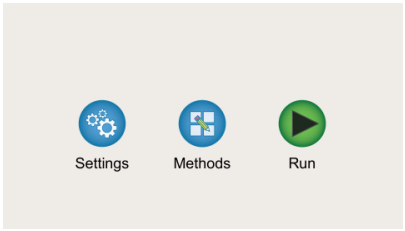
- Steady Green: Power is on and there are no errors.
- Steady Amber: Power is off, but the instrument is plugged in.
- Light Flashes: There is a hardware failure. Contact your local Gilson representative.

Using the Pump Control Software

The VERITY 3011 Pump includes embedded control software accessible via an intuitive touchscreen display for easy, stand-alone pump operation. Use the graphical software for setup of the pump, operation, and error handling during a run.

To type a value in a field, select the field and then enter the value using the on-screen numerical keypad or keyboard.

The following table explains the navigational buttons available on some screens in the software.

BUTTON ICON	DESCRIPTION	BUTTON ICON	DESCRIPTION
	Home - returns to the Home menu. 		Back - returns to the previous screen.
	Move to the top page.		Move to the bottom page.
	Move up one page.		Move down one page.
	Save changes and return to the previous screen.		Cancel without saving any selections.

If controlling the pump via TRILUTION® LC software, the touchscreen displays the lock screen. On the lock screen, the current flow rate and pressure are displayed in read-only fields. Press ■ to override external control and stop the pump.

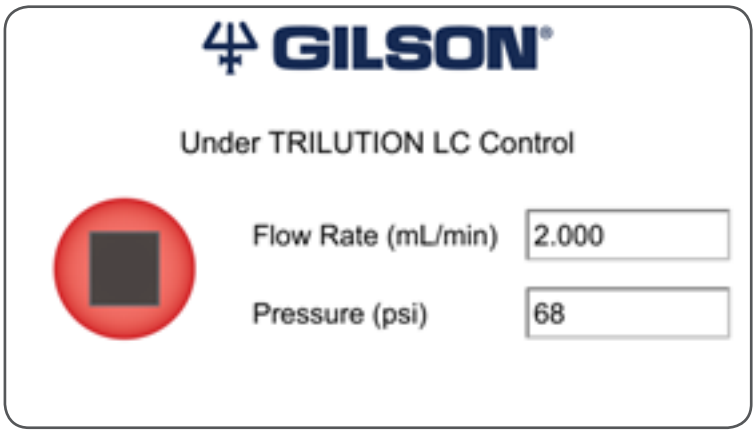


Figure 13
Lock Screen

Settings Menu

For all settings in the **Settings** menu, the default setting will be shown the first time. Any changes will be stored and the last saved values will display subsequent times.

SETUP

Refill Time (ms)

The **Refill Time** is the time required for the piston return stroke. Normally it is set at the lowest value (125 ms). If cavitation or degassing occurs, then a higher value must be used. Slower speeds may be necessary when pumping viscous fluid. The minimum value is 125 ms and the maximum value is 1000 ms.

> **NOTE** **If the selected flow rate is incompatible with the refill time, the refill time will be automatically adjusted. For more information, refer to** Maximum Refill Time vs. Set Flow Rate on page 67.

The default value is 125 ms.

Type the refill time and then select **Enter**.

Fluid

From the list, select the solvent that will be delivered from the pump or select **Other Liquid**.

If the solvent selected was **Other Liquid**, enter a value for **Compressibility**, which is a measure of how much the solvent being pumped can be compressed under pressure.

Compressibility

This data is used to calculate the flow rate compensation for the compressibility of the solvent. The compressibility value is automatically set based on the **Fluid** selected. If the solvent selected was **Other Liquid**, type a value, and then select **Enter**. The minimum value is 0 and the maximum value is 2000 Mbar[1]. The default value is 46 for water.

Inlet Pressure

The inlet pressure, P_o, is the pressure at the inlet of the pump head. This allows the accurate pumping of liquefied gas. It must be set to the same value as the pressure of the aspirated liquid, that is the saturating vapor pressure at the ambient temperature for liquefied gas delivered from a pressurized cylinder. When using carbon dioxide at a temperature of 22°C, the value of the inlet pressure should be defined as 6 MPa. A table of inlet pressures is shown below.

Inlet Pressures

AMBIENT TEMPERATURE (°C)	15	20	22	25	30	31	(T_C)
Pressure P_o (MPa)	5.1	5.8	6.0	6.5	7.2	7.4	(P_C)
Pressure P_o (bar)	51	58	60	65	72	74	
Pressure P_o (psi)	739	841	870	943	1044	1073	

The default value is 0. Type the **Inlet Pressure** and then select **Enter**.

Head Size

This parameter is the size of the pump head. Values for use with the VERITY 3011 Pump are 5 SS and 10 SS.

The default value is 5 SS.

PARAMETERS

Pressure

Set the units for pressure. These are the units that will be used when setting high or low pressure error conditions and are the units that will be displayed when running the pump. The default setting is **bar**.

Flow Rate

Set the units for flow rate. The default setting is **mL/min**.

Alarm

The alarm is a buzzer that sounds during an error. It can be programmed to be either **On** or **Off**. This function only controls the operation of the buzzer, it does not affect the operation of the pump when there is an error. The default setting is **On.**

Pause State

The pause state indicates what the pump should do when a run is paused while in **Program** mode. The default setting is **Flow On** which means that the pump will not stop pumping when ⏸ is selected. **Flow Off** means that the pump will stop pumping when ⏸ is selected.

CONTACTS

Read and/or set the state (Open/Off or Close/On) of the output contacts (Output 24V and Output 2) and read the state of the input contacts.

SERVICE

Displays the piston strokes count, last check valves service date, and last piston seal service date, which can be modified on screen. It also displays the operation hours (pumping time) as a read-only value.

Optionally (or when requested), export the service information to a text file (VERITY 3011 Pump Information.txt) by connecting a USB drive to the pump and then selecting **EXPORT**.

COMM SETTINGS

Displays the current setting for the communication mode. The default is **RS-232**, but there is also an option to select **Modbus**.

When Modbus is selected, additional parameters appear:

Baud Rate

Two options are available for baud rate selection: 9600 or 19200. The default selection is 19200.

Parity

Three options are available for parity selection: Even, Odd, and None. The default selection is Even.

Address

The address can be set to positive value, whole integers. The default address is 112 and the acceptable range is 1–247.

ERROR

Pressure High

To instruct the pump to recognize a high pressure error, select the box and then type the high pressure value. If the pressure while running exceeds this value, then the pump will trigger the error condition. The response to the error depends on the run mode. When running in **Flow** or **Dispense** mode, the pump will stop and the display will continue to show the high pressure error until the pressure is a percentage (user-specified in the **Pressure Restart %** field) of the high pressure error value, at which time the pump will begin pumping at the previous conditions. When running in **Program** mode, the pump will either run the **Method to Run** (if specified) or will stop the pump if no method is specified.

Method to Run

From the list of previously saved methods, select the method to run when the pressure exceeds the high pressure value. This method is only used when running in **Program** mode.

Pressure Restart (%)

The percentage of the **High Pressure Error Limit** value at which the pump will resume pumping at the previous conditions after a high pressure error has been triggered. For example, with a **High Pressure Error Limit** value of **100 bar** and a **Pressure Restart (%)** value of **75**, the pump will stop pumping if the pressure exceeds 100 bar and will resume pumping when the pressure falls below 75 bar. This value is only used when running in **Flow** or **Dispense** mode. The default value is 75%.

Pressure Low

To instruct the pump to recognize a low pressure error, select the box and then type the low pressure value. If the pressure while running falls below this value, then the pump will trigger the error condition. The response to the error depends on the run mode. When running in **Flow** or **Dispense** mode, the pump will stop. When running in **Program** mode, the pump will either run the **Method to Run** (if specified) or will stop the pump if no method is specified.

Method to Run

From the list of previously saved methods, select the method to run when the pressure falls below the low pressure value. This method is only used when running in **Program** mode.

NOTE	**After starting a pump run, the pump will ensure that the pressure is stabilized by waiting for ten seconds before checking the pressure. Waiting for this period of time gives the pump the opportunity to get up to pressure when first starting pumping. If the pressure does not exceed the low pressure value after ten seconds, the error handling condition will be triggered.**

Input 4 (Error)

To instruct the pump to recognize a contact closure signal from another device, select the box. If Input 4 receives a close signal, then the pump will trigger the error condition. The response to the error depends on the run mode. When running in **Flow** or **Dispense** mode, the pump will stop. When running in **Program** mode, the pump will either run the **Method to Run** (if specified) or will stop the pump if no method is specified.

Method to Run

From the list of previously saved methods, select the method to run when the Input 4 receives a close signal. This method is only used when running in **Program** mode.

INFO

Displays the software version, controller board firmware version, and motor board firmware version.

UPDATE button is used when updating pump firmware.

Methods Menu

From the **Methods** menu, accessed from the **Home** screen, options are available to:

- Create a New Method
- Edit an Existing Method
- Delete an Existing Method
- Import a Method
- Export a Method

Figure 14
Methods Menu

CREATE A NEW METHOD

To begin creating a new method, select 

. The **Method Editor** appears.

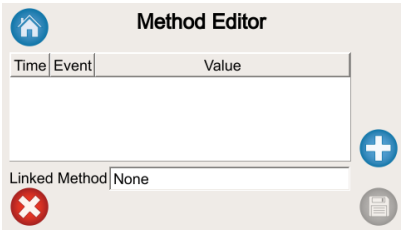


Figure 15
Method Editor

Add Event

Adding an event is the way to program a flow rate gradient, open and close outputs, and wait for inputs.

From the **Method Editor** screen, select  . The **Add Event** screen appears.

A method can contain up to 50 events, which must be separated by at least 0.02 minutes.

Add Flow Event

ACCEPTABLE FLOW RATE VALUES	
5 SS Pump Head	0 mL/min or 0.001–5 mL/min
10 SS Pump Head	0 mL/min or 0.05–10 mL/min

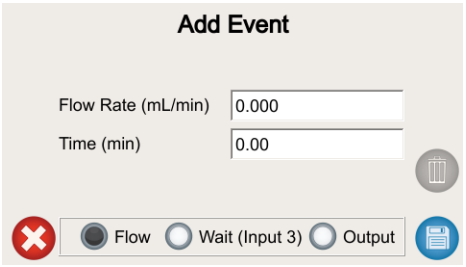


Figure 16
Add Flow Event

The flow rate can be set based on the pump head size. A flow rate value will not be accepted if it is larger than the pump head size selected on the **Setup** screen.

1. Type the **Flow Rate** in the specified units (default is mL/min) and then select **Enter**.

> **NOTE** **If the selected flow rate is incompatible with the refill time, the refill time will be automatically adjusted. For more information, refer to Maximum Refill Time vs. Set Flow Rate on page 67**

2. Type the **Time** at which the event should occur.

> **NOTE** **Events must be at least 0.02 minutes apart.**

3. Select  to save the settings and add the event to the method.

> **NOTICE** **To stop flow of solvent at the end of a run, you must add a flow event with flow rate of 0 mL/min. Otherwise, the pump will continue to run at the last programmed flow rate, even after the last event.**

Add Wait (Input 3) Event

The wait event tells the software to stop method execution until the specified contact state is detected for input 3.

1. Select the **Wait (Input 3)** option.
2. Specify the contact state to wait for on input 3. Choose from **Open**, **Close**, or **State Change**.
3. Type the **Time** at which the event should occur.
4. Select to save the settings and add the event to the method.

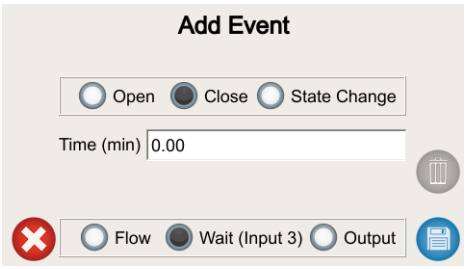


Figure 17
Add Wait Event

Add Output Event

The output event tells the software open, close, or pulse output 2 or open (power off) or close (power on) the 24V output.

1. Select the **Output** option.
2. Select the output (**Output 2** or **Output 24V**).
3. Select the action (**Open**, **Close**, or **Pulse** for **Output 2, Open** or **Close** for **Output 24V**).
4. Type the **Time** at which the event should occur.
5. Select to save the settings and add the event to the method.

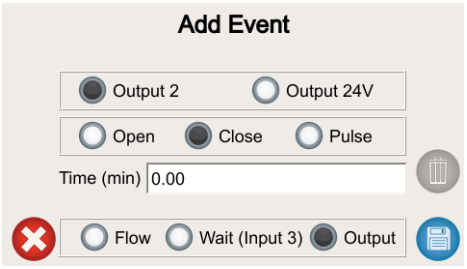


Figure 18
Add Output Event

Add a Linked Method

A linked method will run after the current method. If **Linked Method** is **None**, then only the current method will run.

1. Select the **Linked Method** field.
2. From the scrolling list, select a method and then to select or to cancel.

Save Method

After adding any or all events, name and save the method.

1. Select .
2. When prompted, type the name of the method (16 character limit).
3. Select to complete the method save or to cancel.

EDIT AN EXISTING METHOD

To edit a method, select Edit.

From the scrolling list, select a method and then select to open the **Method Editor** or to cancel.

Add Event

Optionally, add flow, wait, and/or output events to the method.

For more information, refer to Add Flow Event, Add Wait (Input 3) Event, or Add Output Event.

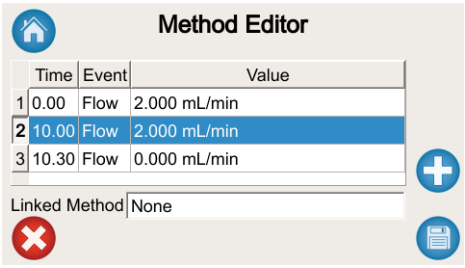


Figure 19
Method Editor - Edit

Edit Event

1. Select the row for the event to edit. The **Edit Event** screen appears.
2. On the **Edit Event** screen, make any desired changes to the event and then select to save the edit or to cancel.

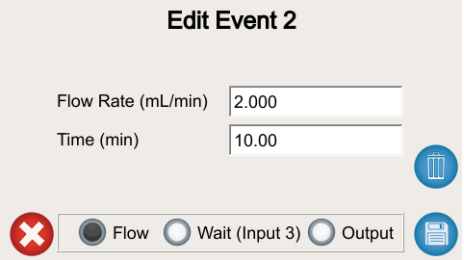


Figure 20
Method Editor - Edit Method

Delete Event

1. Select the row for the event to delete. The **Edit Event** screen appears.
2. On the **Edit Event** screen, select to delete the event.

Linked Method

Optionally, add a linked method or change which method is linked to the selected method.

1. Select the **Linked Method** field.
2. From the scrolling list, select a method and then to select or to cancel.

Save Method

After making changes, save the method.

1. Select .
2. When prompted, type the name of the method (16 character limit). The method can be saved as the same name (overwrite) or a unique name.
3. Select to complete the method save or to cancel.

DELETE AN EXISTING METHOD

To delete a method, select Delete.

1. From the scrolling list, select a method and then to select or to cancel.
2. When prompted, confirm the deletion request (YES) or cancel the request (NO).

NOTE	**If the selected method is a linked method or an error handling method, it cannot be deleted.**

IMPORT A METHOD

Before importing a method, connect a USB drive with exported methods to the USB port on the front of the pump.

To import a method, select 

.

From the scrolling list, select a method and then to select or to cancel.

If prompted, confirm that the method can be saved as the current name (YES - overwrite) or cancel the import request (NO).

If the method import is successful, a confirmation message will be displayed. Select OK .

NOTE **Importing a method will automatically import any linked methods.**

EXPORT A METHOD

Before exporting a method, connect a USB drive to the USB port on the front of the pump.

To export a method, select 

.

From the scrolling list, select a method and then to select or to cancel.

If prompted, confirm that the method can be saved as the current name (YES - overwrite) or cancel the export request (NO).

If the method export is successful, a confirmation message will be displayed. Select OK .

The method is saved to a METHODS folder at the root level of the USB drive.

NOTE **Exporting a method will automatically export any linked methods.**

Modes

After entering the data about the pumping system in the **Settings** menu, the pump is ready to run. The VERITY® 3011 Isocratic Pump can operate in three different modes, which are accessible from the home screen by selecting ▶. The last selected mode and entered values for parameters are remembered the next time the pump software is accessed either via contact control or touchscreen control.

- In **Flow** mode, the VERITY® 3011 Pump provides a constant flow rate. The pump starts when ▶ is selected and stops when ■ is selected. Refer to Run in Flow Mode on page 38 for more information.

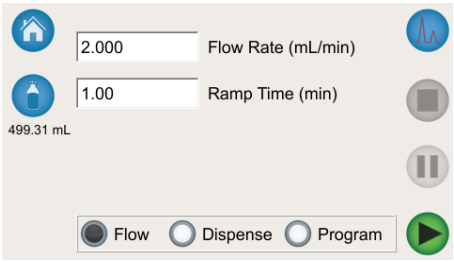


Figure 21
Flow Mode

- In **Dispense** mode, the VERITY® 3011 Pump dispenses a specified volume or dispenses for a specified time. The pump starts when ▶ is selected and stops when the specified volume has been dispensed or the specified time has elapsed. Refer to Run in Dispense (Time) Mode on page 39 and Run in Dispense (Volume) Mode on page 39 for more information.

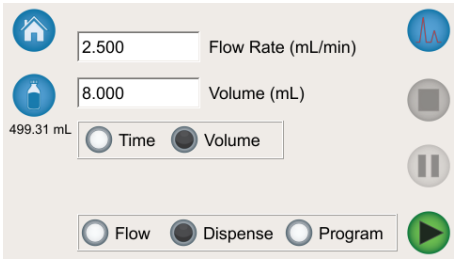


Figure 22
Dispense Mode - Volume

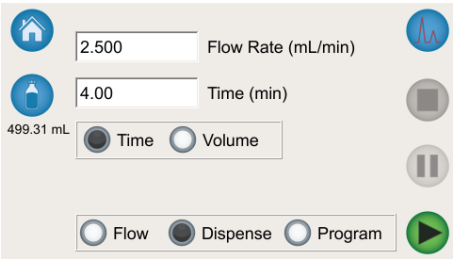


Figure 23
Dispense Mode - Time

- In **Program** mode, the VERITY® 3011 Pump can be instructed to run flow gradients, open and close outputs to control other instruments, and wait for signals from other instruments via the contact input. The pump starts running the method when ▶ is selected and stops when the method has ended. Refer to Run in Program Mode on page 40 for more information.

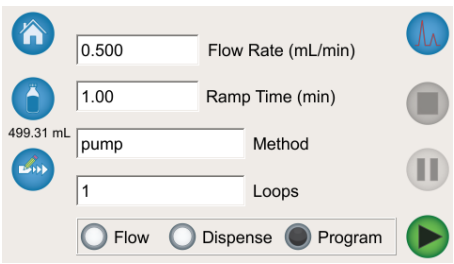


Figure 24
Program Mode

FLOW MODE

In this mode, the pump provides a constant flow rate, beginning when ▶ is selected or the **START** input is activated and stopping when ■ is selected or the **STOP** input is activated.

The flow rate can be set based on the pump head size. A flow rate value will not be accepted if it is larger than the pump head size.

ACCEPTABLE FLOW RATE VALUES	
5 SS Pump Head	0.001–5 mL/min
10 SS Pump Head	0.05–10 mL/min

Type the **Flow Rate** in the specified units (default is mL/min) and then select **Enter**. Optionally, type the **Ramp Time** (in minutes). The pump is now ready to run.

NOTE

If the selected flow rate is incompatible with the refill time, the refill time will be automatically adjusted. For more information, refer to Maximum Refill Time vs. Set Flow Rate on page 67.

Select ▶ to start the pump. Select ■ to stop the pump. If a **Ramp Time** is specified, then when ▶ is selected, the pump will ramp from the current flow rate to the specified flow rate during the ramp time.

During a run and after ramping, the flow rate can be modified at any time.

DISPENSE MODE

Time

In this mode, the pump delivers liquid at a specified flow rate beginning when ▶ is selected or the **START** input is activated and finishing when the specified time has elapsed. The parameters are flow rate and time. During a run, the **Flow Rate** and the **Final Time** can be modified at any time.

The following table shows the limits for each of the parameters.

PARAMETER	LIMIT
Maximum Dispense Time	10,000.00 minutes
Minimum Dispense Flow Rate	5 SS: 0.001 mL/min 10 SS: 0.050 mL/min
Maximum Dispense Flow Rate	5 SS: 5 mL/min 10 SS: 10 mL/min

NOTE

If the selected flow rate is incompatible with the refill time, the refill time will be automatically adjusted. For more information, refer to Maximum Refill Time vs. Set Flow Rate on page 67.

Volume

In this mode, the pump delivers a specified volume beginning when ▶ is selected or the **START** input is activated and finishing when the specified volume of liquid is delivered. The parameters are flow rate and volume. During a run, the **Flow Rate** and the **Final Volume** can be modified at any time.

The following table shows the limits for each of the parameters.

PARAMETER	LIMIT
Minimum Dispense Volume	0.002 mL
Maximum Dispense Volume	10,000.00 mL
Minimum Dispense Flow Rate	5 SS: 0.001 mL/min 10 SS: 0.050 mL/min
Maximum Dispense Flow Rate	5 SS: 5 mL/min 10 SS: 10 mL/min

NOTE **If the selected flow rate is incompatible with the refill time, the refill time will be automatically adjusted. For more information, refer to** **Maximum Refill Time vs. Set Flow Rate on page 67.**

PROGRAM MODE

In this mode, the VERITY® 3011 Pump can create flow rate gradients, open and close outputs, and wait for inputs.

The pump runs the selected method beginning when ▶ is selected or the **START** input is activated and finishing when the pump has executed the selected method for the number of loops and has run the linked method (if selected).

Flow Rate

Type the conditioning **Flow Rate** in the specified units (default is mL/min) and then select **Enter**.

PARAMETER	LIMIT
Minimum Flow Rate	5 SS: 0.001 mL/min 10 SS: 0.050 mL/min
Maximum Flow Rate	5 SS: 5 mL/min 10 SS: 10 mL/min

NOTE **If the selected flow rate is incompatible with the refill time, the refill time will be automatically adjusted. For more information, refer to** **Maximum Refill Time vs. Set Flow Rate on page 67.**

Ramp Time

Type the **Ramp Time** (in minutes) for conditioning. The acceptable range is 0.00–1000.00. The pump will ramp from the current flow rate to the conditioning flow rate specified during the ramp time.

Method

Select the method to run after **Ramp Time** has elapsed. For more information about creating or importing methods, refer to **Methods Menu** on page 30.

To edit the method, select  to open the method editor. For more information about editing methods, refer to **Edit an Existing Method** on page 31

Loops

The number of loops is the number of times that the method will repeat before stopping or running the optional linked method. The minimum value is 1 and the maximum value is 1000.

The default value is 1.

Running the Pump

While the pump is running, it is possible to:

- View or change the current solvent level
- View the current pressure value
- View the current pressure and the history of pump pressure on a graph
- Pause the run
- Stop the run

NOTE	**Priming helps prevent the introduction of air bubbles into the system. It is recommended to prime the pump before using it for the first time, or if it has not been used for some time. For priming instructions, refer to Priming on page 43.**
NOTICE	**Do not run the pump head dry, severe pump head damage can result. Use the syringe supplied with the pump head to prime the pump.**

RUN IN FLOW MODE

The pump provides a constant flow rate beginning when is selected or the **START** input is activated and ramp time has elapsed and then stopping when is selected or the **STOP** input is activated.

During a run (but not while ramping), the **Flow Rate** can be modified at any time. The **Flow Rate** and **Ramp Time** are remembered and displayed the next time **Flow** mode is used.

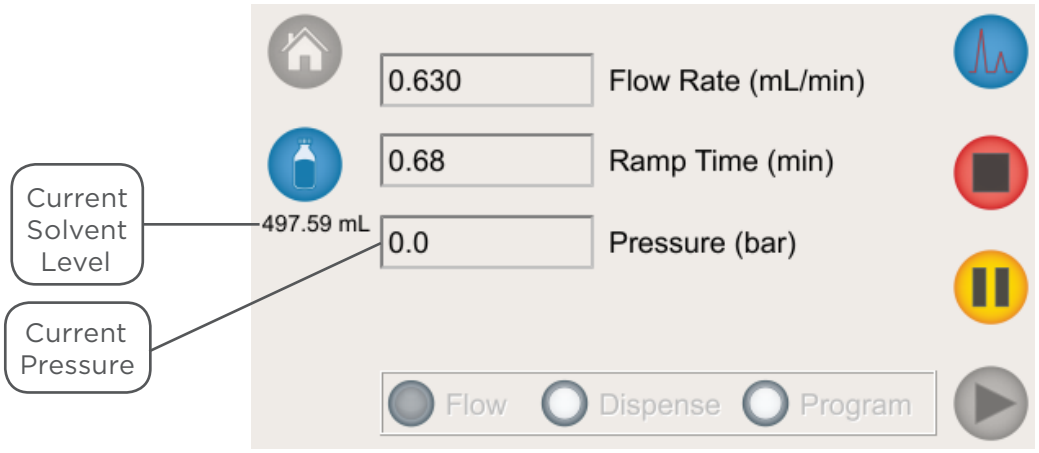


Figure 25
Flow Mode Ramping

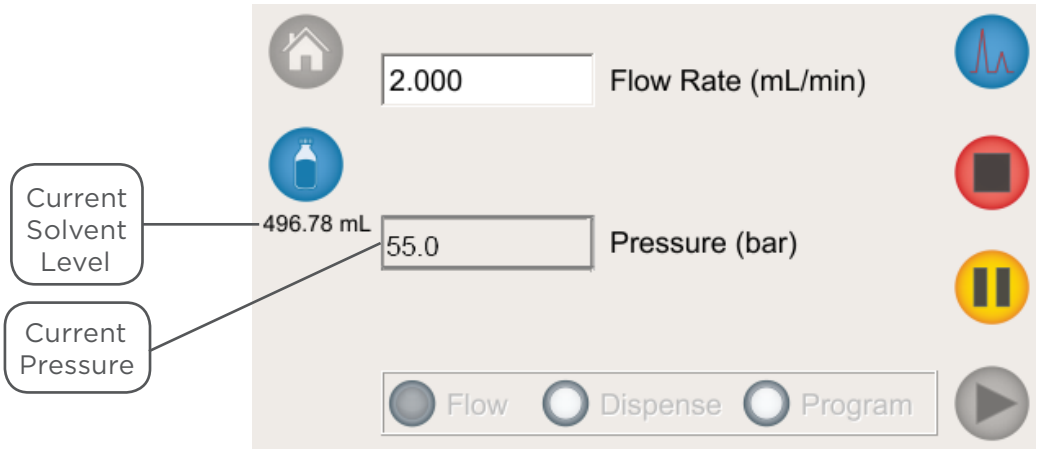


Figure 26
Flow Mode Running

RUN IN DISPENSE (TIME) MODE

The pump delivers liquid at the specified flow rate beginning when ▶ is selected or the **START** input is activated and finishing when the specified time has elapsed. During a run, the **Flow Rate** and the **Final Time** can be modified at any time. The **Flow Rate** and **Time** are remembered and displayed the next time **Dispense** mode is used.

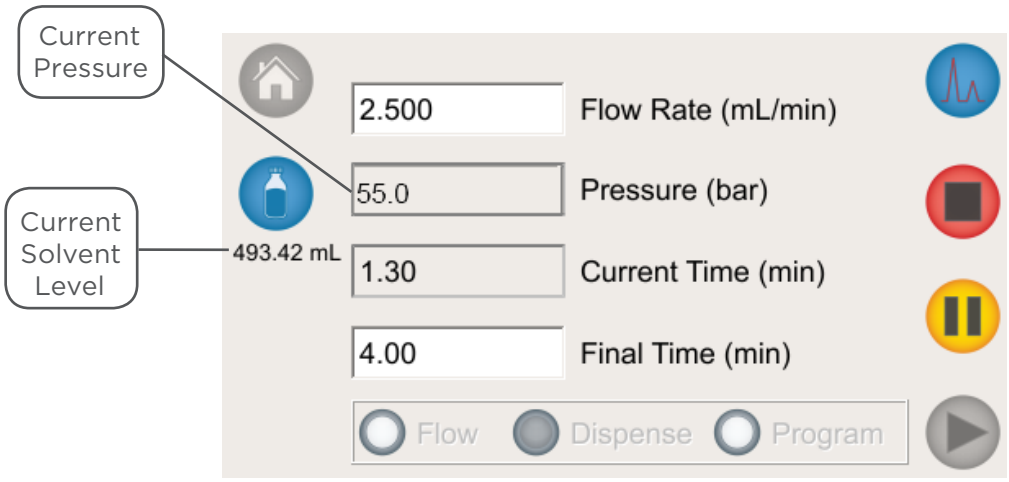


Figure 27
Dispense Mode (Time) Running

RUN IN DISPENSE (VOLUME) MODE

The pump delivers a specified volume beginning when ▶ is selected or the **START** input is activated and finishing when the specified volume of liquid is delivered. During a run, the **Flow Rate** and the **Final Volume** can be modified at any time. The **Flow Rate** and **Volume** are remembered and displayed the next time **Dispense** mode is used.

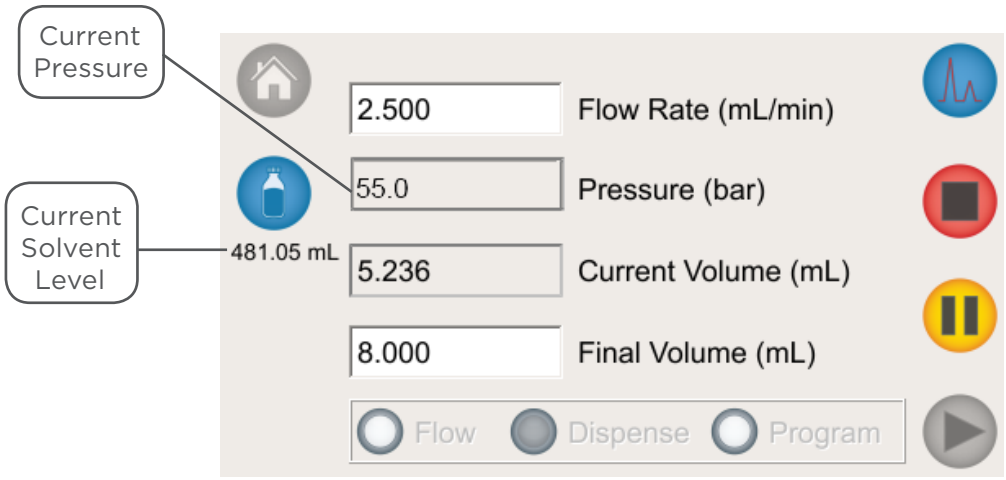


Figure 28
Dispense Mode (Volume) Running

RUN IN PROGRAM MODE

The pump runs pre-programmed timed events (a method) beginning when ▶ is selected or the **START** input is activated and the **Ramp Time** has elapsed and then finishing when the run is complete. All values are remembered and displayed the next time **Program** mode is used.

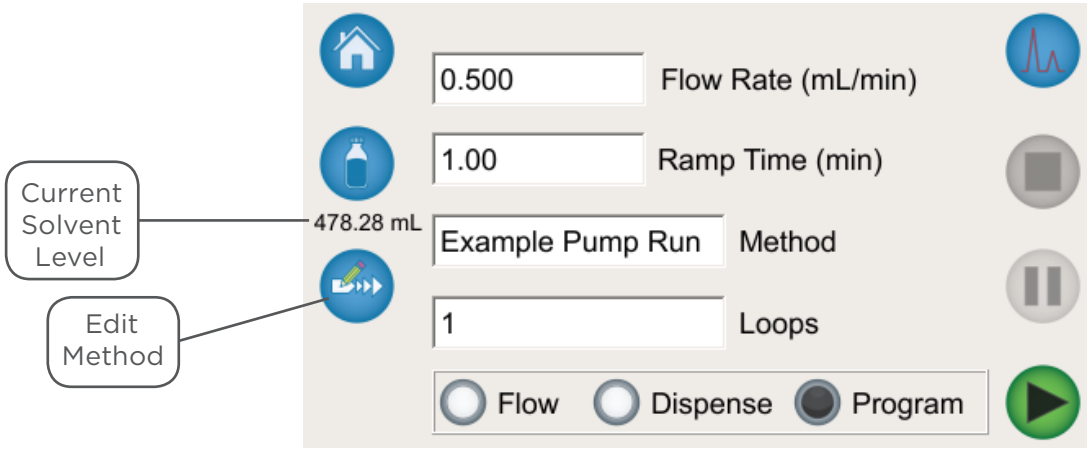


Figure 29
Program Mode - Ready to Run

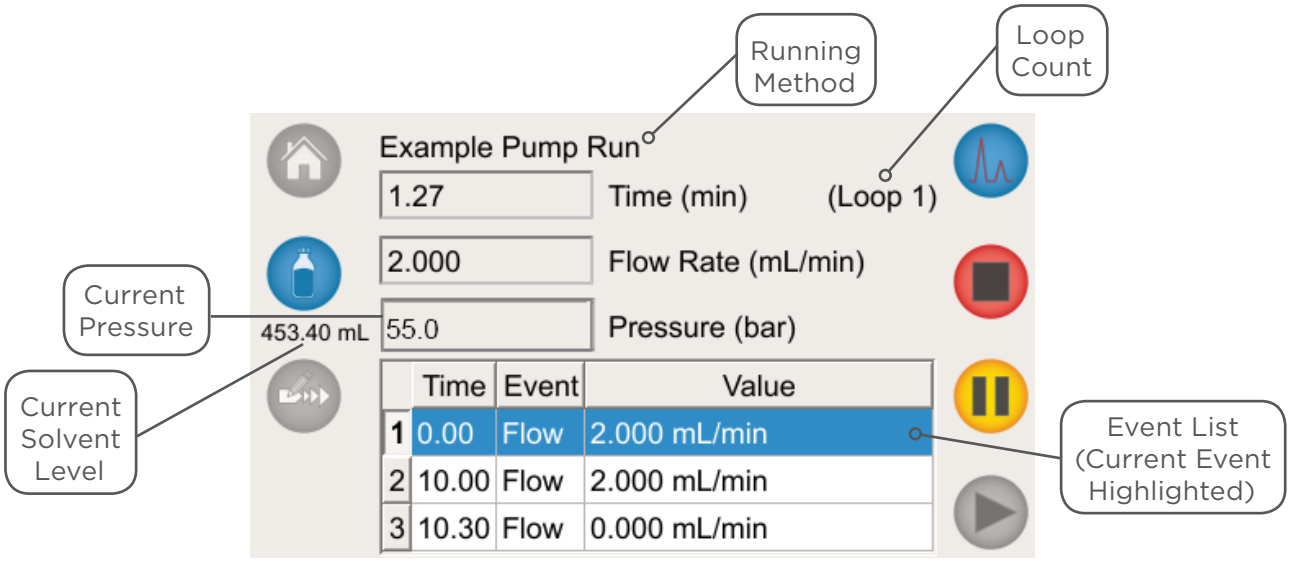


Figure 30
Program Mode Running

VIEW OR CHANGE SOLVENT MONITORING OPTIONS

Select to access solvent monitoring options.

Monitor Solvent Level

Select the check box to monitor the solvent level during the run. By default, solvent level monitoring is off.

Current Volume

Enter the current volume in the solvent bottle (1 to 20000 mL). This value can be changed while running (for example, if more solvent is added).

Optionally, set **Low Volume Error** options or select to save settings or to cancel.

Low Volume Error

Enter the volume of remaining solvent at which the run should pause. Solvent monitoring must be selected to select to set a low volume error. Select to save settings or to cancel.

VIEW PRESSURE GRAPH

Select to toggle the pressure graph display on or off. The pressure graph shows the current pump pressure and up to 60 minutes of pump pressure history. If low and/or high pressure limits are set, red lines are displayed on the pressure graph to depict the set error limits.

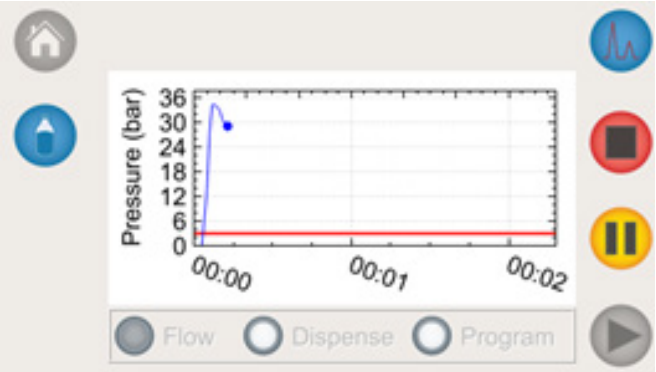


Figure 31
Pressure Display - Low Pressure Limit Set

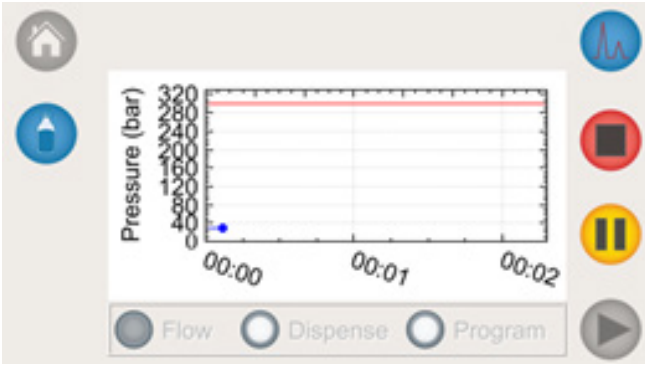


Figure 32
Pressure Display - High Pressure Limit Set

INTERRUPT OR STOP A RUN

It is possible to pause or terminate a run in progress.

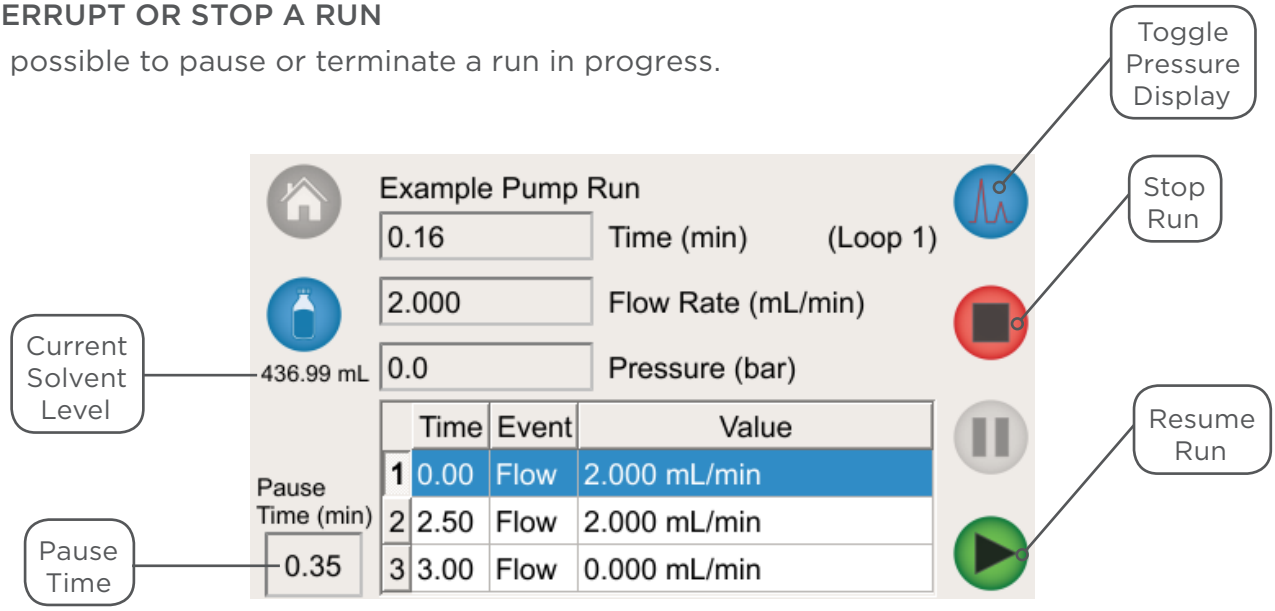


Figure 33
Paused Run (Program Mode)

To pause the run, select ⏸ or activate the **PAUSE** input.

In **Flow** mode or **Dispense** mode, the flow rate is set to 0 mL/min.

In **Program** mode, the pump response depends on the **Pause State** parameter setting. If the parameter selection was **Flow On**, then the pump continues to pump at the current flow rate (ramping is paused). If the parameter selection was **Flow Off**, then the flow rate is set to 0 mL/min.

While paused, the **Pause Time** is displayed. To resume the run, select ▶ or activate the **RESUME** input.

To stop the run, select ■ or activate the **STOP** input. In all modes, the flow rate is set to 0 mL/min.

Priming

Priming helps prevent the introduction of air bubbles into the system. It is recommended to prime the pump before using it for the first time, or if it has not been used for some time.

NOTE	**Ensure that all plumbing connections have been made as described in INSTALLATION.**
NOTICE	**Do not run the pump head dry, severe pump head damage can result. Use the syringe supplied with the pump head to prime the pump.**

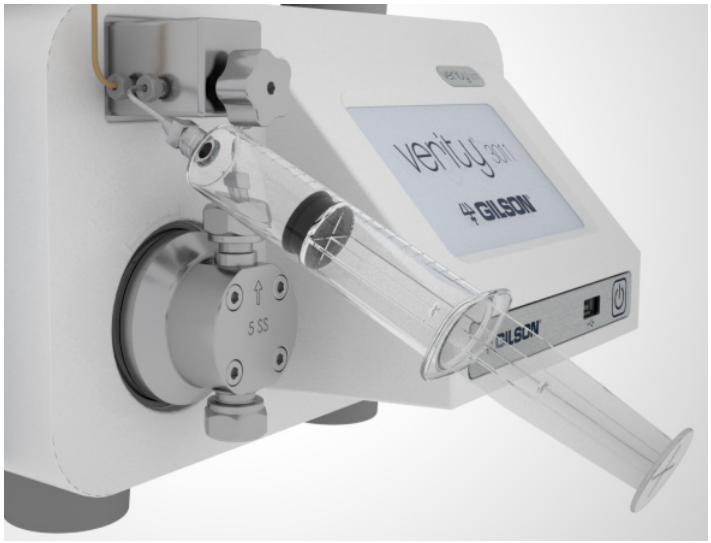


Figure 34
Syringe Connected to the Luer Fitting at the Waste Outlet of the Prime/Purge Valve.

Priming the Pump

1. Check that the solvent bottle is filled with HPLC-grade, degassed solvent.
2. Immerse the inlet tubing filter into the solvent reservoir.
3. Twist to connect the syringe to the luer fitting at the waste outlet of the prime/purge valve.
4. Turn the knob on the prime/purge valve all the way to the left (counterclockwise) to open the valve.
5. Draw liquid into the syringe. It is likely that it will first draw air, but then liquid droplets should start to appear.
6. Disconnect the syringe from the waste outlet.
7. Connect the waste tubing assembly (tubing part number 490032 with fittings) to the luer fitting and place the other end in a waste container.
8. Run the pump to dispense at a suitable flow rate.
9. When no bubbles can be seen at the waste tubing assembly, press ■ to end the priming procedure.
10. Turn the knob on the prime/purge valve all the way to the right (clockwise) to close the outlet to waste.

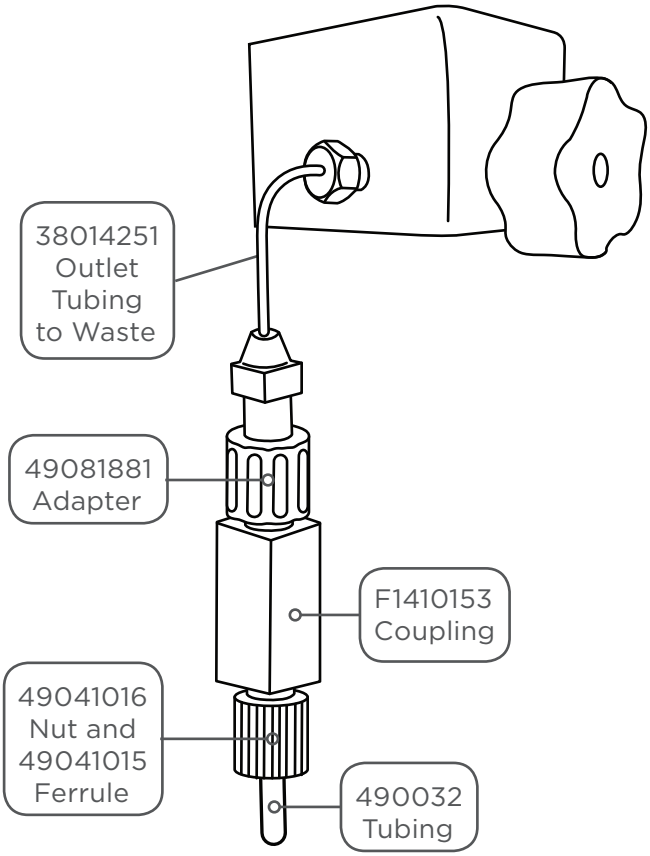


Figure 35
Drain Tubing Assembly

Cleaning

To avoid any deposit of solid crystal inside the pump head when pumping saline solutions (e.g., buffer salts or ion-pairing salts included in chromatographic mobile phases), it is recommended to perform the following cleaning procedures.

- At the end of the run, rinse the pump head with water to remove any salt that may have precipitated.
- At the end of the day, run the pump at a very low flow rate (~10 µL/min).

Chapter 4

MAINTENANCE

To obtain optimum performance and maximum life from the VERITY® 3011 Isocratic Pump, it is important to keep the instrument well-maintained.

The VERITY 3011 Pump is intended to be used in a laboratory environment by trained technical personnel.

This chapter contains the following information to help you to maintain the pump.

Maintenance Overview

The VERITY® 3011 Isocratic Pump has been designed to require a minimum level of care and maintenance. In practice, maintenance is limited to cleaning and replacing parts of the pump head.

General maintenance of a Gilson piston pump head, irrespective of type and model, consists of:

- Cleaning check valves.
- Replacing parts subject to wear and tear: piston seal, check valves, piston, anti-extrusion gasket, and return spring.
- Run-in the pump head and/or seal. Refer to **Run-In Procedure** on page 52.

The table below gives an indication of replacement periods for maintenance parts, according to the type of use, intensive, regular, or occasional. The data assumes that the pump is working at half of its maximum flow rate and pressure. The nature of the liquid and the pump head model have only a small influence on these figures.

Replacement Periods for Maintenance Parts

PARTS/USE	INTENSIVE (168 H/WEEK)	REGULAR (40 H/WEEK)	OCCASIONAL (10 H/WEEK)
Piston Seal	2–3 months 1300–2000 h	6–9 months 1000–1400 h	1 year 500 h
Set of Check Valves	3–6 months 2000–4000 h	1 year 2000 h	2 years 1000 h
Piston	6–12 months 4000–8000 h	2–3 years 2000–3000 h	5 years 2500 h
Anti-Extrusion Gasket	6–12 months 4000–8000 h	2–3 years 2000–3000 h	5 years 2500 h
Pump Head Return Spring	6–12 months 8000 h	2–3 years 2000–3000 h	5 years 2500 h
Cam Follower Spring	6–12 months 8000 h	2–3 years 2000–3000 h	5 years 2500 h
Cam Grease	3–6 months 2000–4000 h	1 year 2000 h	2 years 1000 h

Pump Head

Removal of the pump head is required for all maintenance described in this chapter. Refer to the instructions in this section when removing or installing the pump head.

The table contains part numbers for replacement pump heads.

PART NUMBER	DESCRIPTION
38014217	5 SS Pump Head (Stainless Steel)
38014216	10 SS Pump Head (Stainless Steel)

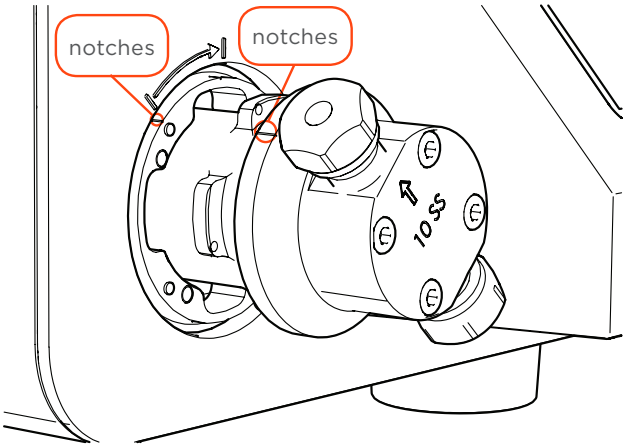
Remove the Pump Head

1. Turn off the pump.
2. Disconnect the inlet tubing and the outlet tubing from the pump head and prime/purge valve.
3. Twist the pump head counterclockwise and then pull to remove.

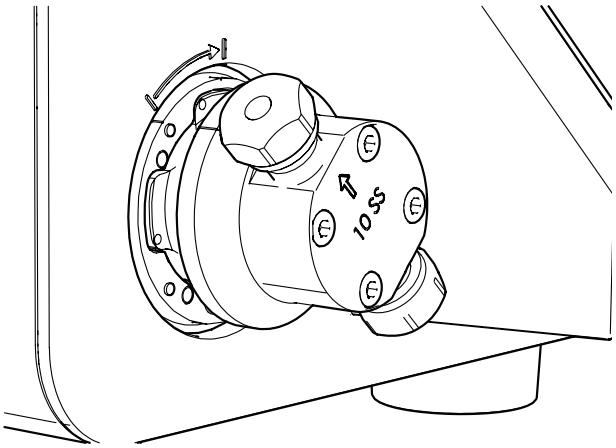
Install the Pump Head

1. Insert the pump head and then twist clockwise to install.

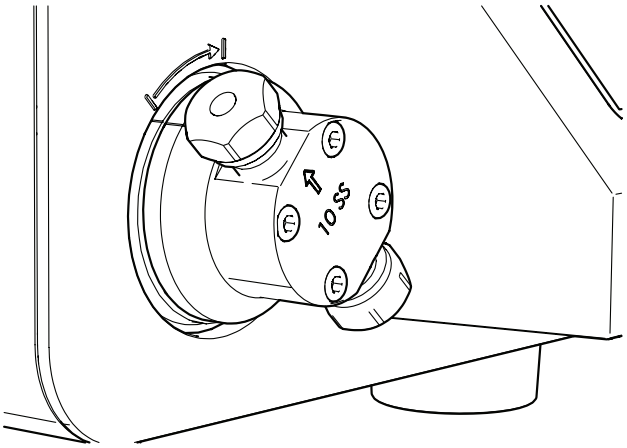
Step 1
Align the notch on the pump head with the notch on the front of the pump as shown.



Step 2
Insert the pump head in the opening.



Step 3
Twist clockwise to install.



Step 4
Pump head installation complete.

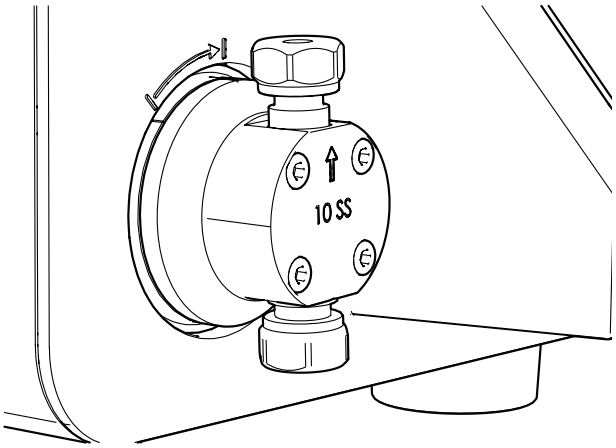


Figure 36
Pump Head Installation

2. Connect the inlet tubing and the outlet tubing. For a diagram and details about the connections, refer to Plumbing Connections on page 17.

Check Valves

Reliable flow rates will be achieved only if the check valves are kept in good operating condition by proper care and maintenance.

The check valve cartridge must be replaced if there is a check valve problem. This can be determined by an abnormal loss in flow rate.

The check valves must not be disassembled into sub-components. No check valve sub-component is available from Gilson.

Refer to the instructions in this section when replacing the inlet and outlet check valves. The check valve support screws can also be replaced while the check valves are removed. The table contains part numbers for replacement check valves and valve screws.

PART NUMBER	DESCRIPTION
3650170	INLET CHECK VALVE, 5/10/25/H1 HEAD
3650180	OUTLET CHECK VALVE, 5/10/25/H1/H2 HEAD
3645309	OUTLET VALVE SCREW, 5/10/25 PUMP HEAD
3645310	INLET VALVE SCREW, 5/10/25 PUMP HEAD

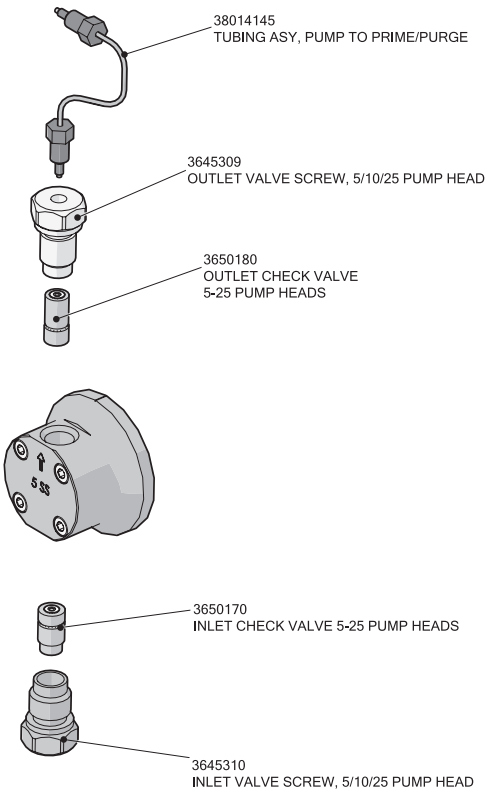


Figure 37
5 SS Pump Head - Check Valves (Exploded View)

Replace the Check Valves

1. Remove the Pump Head.
2. Unscrew the check valve support screws which contain the check valve cartridges.
3. Take out the check valve cartridges (if necessary, by means of a clean, compressed air flow).
4. Install the new check valve cartridges. The check valve cartridges and their support screws are not interchangeable from inlet to outlet.
5. Connect the check valve support screws to the pump head. Tighten the support screws at the nominal torque of 7 N.m which ensures tightness up to the maximum pressure. In the absence of a dynamometric wrench, tighten up to the mechanical stop, (i.e., to the metal on metal contact).
6. Install the Pump Head.

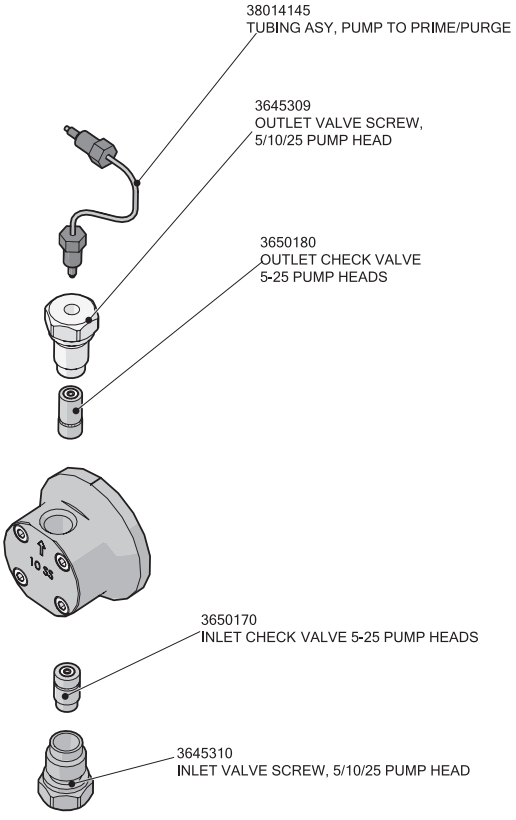


Figure 38
10 SS Pump Head - Check Valves (Exploded View)

Piston Seal

The piston seal consists of a seal ring made of either graphite reinforced PTFE (black) or HDPE (yellow) and a spring made of Hastelloy® C-276 (wire) or Elgiloy® HT (ribbon). It must be changed whenever a piston seal leak occurs.

Choose piston seals based on the solvents used:

- Use the black PTFE piston seals with organic solvents.
- Use the yellow HDPE piston seals with aqueous solvents. The pump is supplied from the factory with the yellow seal.

The table contains part numbers for replacement piston seals.

PART NUMBER	DESCRIPTION
5463088863	SEAL, PISTON, HDPE, YELLOW, 5SC/5SS
5463125895	SEAL, PISTON,HDPE,YELLOW,10SC/10WSC/10SS
5463088063	SEAL, PISTON, PTFE, BLACK, 5SC/5SS
5463125095	SEAL, PISTON,PTFE,BLACK, 10SC/WSC/WTI/SS

Due to fatigue of the steel, the return spring should be replaced with every five piston seal replacements. The table contains the part number for the replacement return spring.

PART NUMBER	DESCRIPTION
36300058	RETURN SPRING 5/10/25SC

The following parts of the pump head can also be replaced while the pump head is disassembled: anti-extrusion gasket, spring spacer, and piston tail guide. The table contains replacement part numbers.

PART NUMBER	DESCRIPTION
3650014K	ANTI EXT. GASKET, 5 SC
3650015K	ANTI EXT. GASKET, 10 SC
38014046	SPACER, PISTON TAIL GUIDE, 9.5MM SPHERE
3650008	PISTON FOR 5SC/5SS PUMP HEAD
3650009	PISTON FOR 10SC/10SS PUMP HEAD
38014045	PISTON TAIL GUIDE, 9.5MM SPHERE

Disassemble the Pump Head

When disassembling the pump head, refer to exploded view diagram for the pump head.

1. Remove the Pump Head
2. Unscrew the threaded cover.
3. Remove the piston tail guide, the piston, the spacer, and the return spring.
4. Using the 3 mm Allen wrench, remove the four screws from the pump head and separate from the pump body.
5. Remove the anti extrusion gasket.
6. Carefully take out the piston seal. If the piston seal remains tightly seated in the head body, pry it out with care in order to avoid damaging the pump head body.

NOTICE	Once the piston seal has been removed, it must not be re-used.

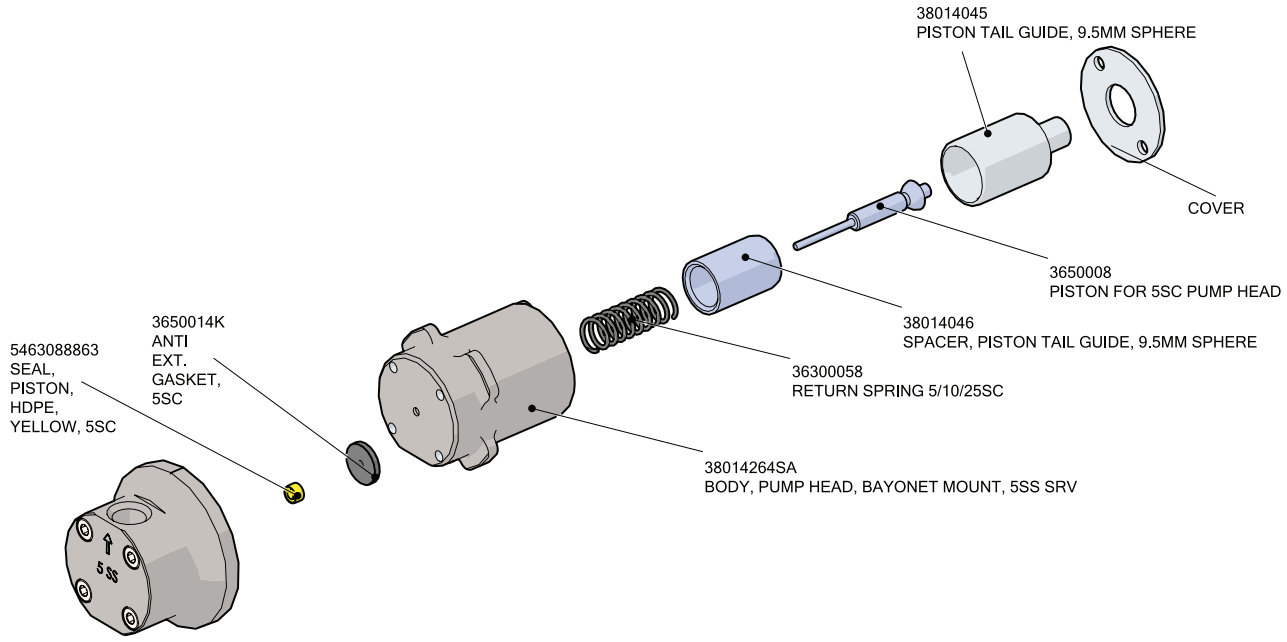


Figure 39
Exploded View of 5 SS Pump Head

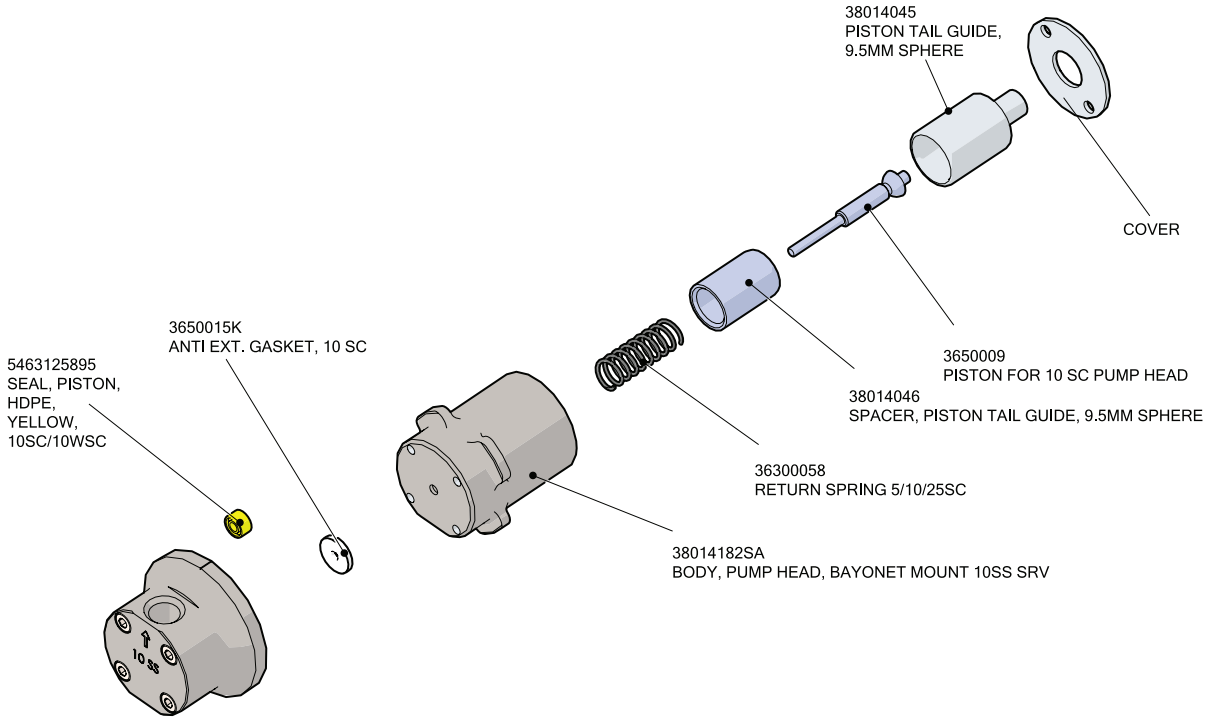


Figure 40
Exploded View of 10 SS Pump Head

Install the Piston Seal

Inspect the piston and the area around the piston seal to ensure that they are clean, undamaged and completely free of any particles.

Use the piston seal mounting tool (composed of a seal pusher and a seal guide) to install the new piston seal.

1. Set the seal guide onto the pump head body with its beveled edge out.
2. Insert the new piston seal in the guide with its spring side in.
3. Press the seal pusher with your finger until the piston seal goes down to the pump head.

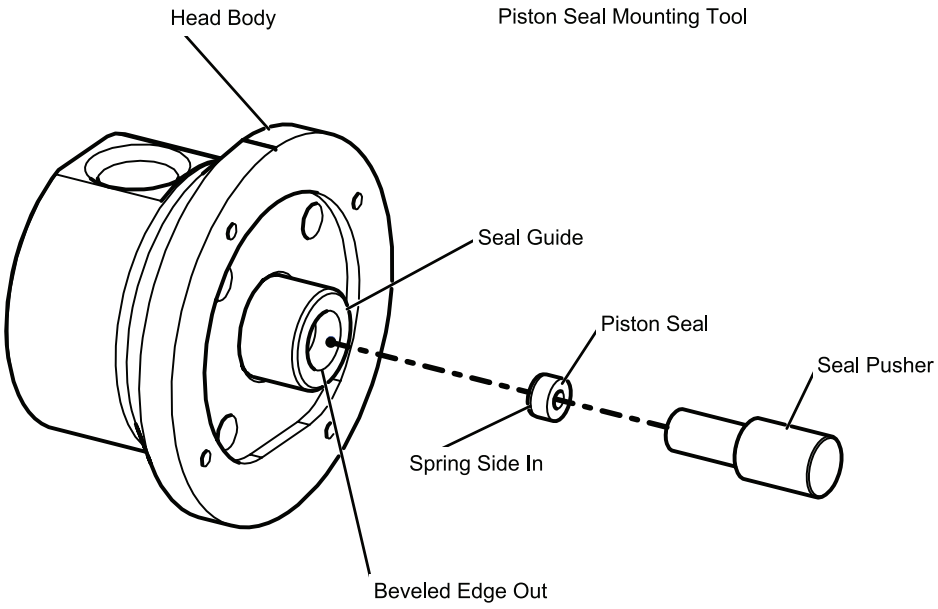


Figure 41
Piston Seal Installation

PART NUMBER	DESCRIPTION
36620122	SEAL REPLACING TOOL, 5 SC & 5 SS
36620123	SEAL REPLACING TOOL, 10 SC & 10 SS

Reassemble the Pump Head

1. Place the anti extrusion gasket over the piston seal.
2. Line up the pump head body with the matching flat profile in pump head.
3. Reinstall the four screws on the back of the pump head body.
4. Place the pump head body on a flat surface to facilitate the mounting of other parts.
5. Reinstall or replace the return spring.

NOTICE	Due to fatigue of the steel, the return spring should be replaced with every five piston seal replacements.

6. Reinstall the piston tail guide, the piston, and the spacer. Ensure that the piston and the spacer are correctly assembled (spherical male into spherical female).
7. Reinstall the threaded cover.
8. Install the Pump Head.

Piston

Refer to the instructions in this section when replacing the piston. The table contains part numbers for replacement pistons.

PART NUMBER	DESCRIPTION
3650008	PISTON FOR 5SC/5SS PUMP HEAD
3650009	PISTON FOR 10SC/10SS PUMP HEAD

Replace the Piston

1. Remove the Pump Head.
2. Unscrew the cover on the pump head.
3. Take out the piston tail guide and the piston.
4. Install the new piston assembly.
5. Reinstall the piston tail guide.
6. Reinstall the cover.
7. Install the Pump Head.

Run-In Procedure

Whenever using a new pump head or a new piston seal, it is strongly recommended to follow this run-in procedure.

1. Run the pump unloaded for 1–2 minutes at 20% of nominal flow rate with methanol.
2. Run the pump at maximum operating pressure for 4–5 minutes. While running, check for any leaks.
3. Repeat the first step, but for 30 minutes.

Chapter 5

TROUBLESHOOTING

This chapter provides information on the following topics:

NOTE Contact your local Gilson representative or techsupport@gilson.com for assistance resolving problems described in this chapter.

Error Messages

POTENTIAL HARDWARE ERRORS	
ERROR TEXT	REASON
Encoder Error	The pump motor has stalled or is losing steps because of high pressure or low drive current.
Home Failed	The homing sequence failed to detect the home position.
Pressure Sensor Failure	The pump failed to read pressure information from the pressure sensor. There may be an issue with the sensor or an issue with the wiring.
Maximum Pressure Limit	The pump maximum pressure limit of 624 bar has been exceeded.

The following errors may appear if controlling the pump remotely. It is highly unlikely to see these errors when using Gilson control software.

INVALID COMMAND ERRORS	
ERROR TEXT	REASON
Invalid Acceleration	The motor **Acceleration** parameter exceeded the allowable range (1–600).
Invalid Command or Command Not Supported	The pump received an unsupported command.
Invalid Flow Rate	The flow rate parameter is invalid or out of range for the selected pump head. For ranges, refer to Technical Specifications on page 12.
Invalid Interval	The **Start Pressure Samples Interval Time** parameter is invalid. The valid range is 200–65000 msec.
Invalid Liquid	The liquid is not in the list.
Invalid Mode Change Requested	The pump is currently running in another mode.
Invalid Num of Samples	The **Start Pressure Samples number of samples** parameter is invalid. The valid range is 1–10 samples per sample interval.
Invalid Parameter or Missing Parameter	A required command parameter is missing.
Invalid Percent Fast Decay	The **Percent Fast Decay** parameter in pump commands that have a PFD parameter is invalid. The valid range is 0–255.
Invalid Power	The **Power** parameter in pump commands that have a power parameter is invalid. The valid range is 0–100.
Invalid Pump Head	The string entered is not a valid pump head name.
Invalid Refill Time	The refill time is invalid. Valid range is 125–1000 msec.
Invalid State Requested	The pump failed to set the requested digital output to the specified state. Valid values are Open, Closed, or “” for no change in state.
Invalid Status Interval	The **Status Interval** parameter is supplied and not in range. Valid range is 1000–6000 msec.
Invalid Time	The **Time** parameter is invalid or out of range.
Invalid Volume	The **Volume** parameter is invalid or out of range
Requested IO invalid	The **Setting Output IO States parameter** is invalid.

POTENTIAL COMMUNICATION ERRORS	
ERROR TEXT	REASON
Unable to report pressure. Pump error.	Communication to the pressure sensor has failed.
Failed to get output contacts	Internal communication failure.
Failure reading pressure. Updates to pressure output suspended.	Internal communication failure.
Failure to connect to pump module. Contact Gilson support.	Internal communication failure.
Pressure data unavailable. Command rejected.	Internal communication failure during command execution.
Instrument under Local Control - ignored	Command cannot execute while pump is unlocked.
POTENTIAL GENERAL COMMAND ERRORS	
ERROR TEXT	REASON
Aborted Cmd Ignored	An error was generated while there were additional commands in the command queue.
Command Log Full, Command Ignored	Too many commands in the command log.
Relaxed Cmd Ignored	Command rejected because motor is in a relaxed, unpowered state.
Error Cmd Ignored	Command rejected because pump is in an error state.
POTENTIAL FIRMWARE UPGRADE ERRORS	
ERROR TEXT	REASON
External FW Upgrade not allowed - ignored	Firmware upgrades from remote host are not allowed.
Pump upgrade image invalid. [E099]	The manifest file is missing, update boards request canceled.
Pump firmware upgrade failed. [101]	The pump was updated but the name and/or version does not match the expected name and/or version.
Pump firmware upgrade failed. [102]	The pump was unable to load the firmware; however, the application update was successful.
Pump firmware failure. Please contact Gilson Support. [E110]	Internal communication failed.
Pump firmware failure. Please contact Gilson Support. [E111]	Internal communication failed after the pump was updated.
Pump firmware failure. Please contact Gilson Support. [E120]	The upgrade file is missing or invalid.
Pump firmware failure. Please contact Gilson Support. [E121]	The upgrade file is missing or invalid.

POTENTIAL FIRMWARE UPGRADE ERRORS	
ERROR TEXT	REASON
Pump firmware failure. Please contact Gilson Support. [E198]	Unexpected catastrophic error when updating.
Pump firmware upgrade failed. [201]	Pump controller was updated but the name and/or version does not match the expected name and/or version.
Pump firmware upgrade failed. [202]	Pump controller unable to boot the application (still in boot loader); however, the application update was successful.
Pump firmware failure. Please contact Gilson Support. [E210]	Communication to the pump controller failed (no response or invalid number of parameters).
Pump firmware failure. Please contact Gilson Support. [E211]	Communication to the pump controller failed (no response or invalid number of parameters) after the pump module was updated.
Pump firmware failure. Please contact Gilson Support. [E220]	Pump controller binary file missing or file exists on file system, but cannot be opened.
Pump firmware failure. Please contact Gilson Support. [E221]	Pump controller binary file has a size of zero.
Pump firmware failure. Please contact Gilson Support. [E298]	Unexpected catastrophic error when updating the pump controller (default when not a success or other error).

Electrical Problems

Pump Does Not Operate

- Make sure the power is turned on.
- Check all power connections.
- Try a different AC outlet.

Hydraulic Problems

Leaks from the Hole at the Bottom of the Pump Head

The piston seal may be defective; replace the piston seal. Refer to Piston Seal on page 49 for instructions.

Pump Does Not Stop at End of Program

The pump is not programmed to stop. To stop the flow at the end of a method program, you must program a flow rate of 0 mL/min.

Low Flow Rate

- Check all tubing and connections for leaks.
- The inlet filter may be plugged. Replace the inlet tubing assembly.
- A check valve may be defective. Clean or replace the check valve. Refer to Check Valves on page 48 for instructions.
- Check that the pump head is mounted properly.

Air Bubbles Appear in Both the Inlet and Outlet Tubing

- The inlet tubing may be loose; tighten the connection (but do not overtighten).
- The inlet tubing may be damaged; replace the inlet tubing.
- The nut and/or ferrule may be damaged; replace the nut and/or ferrule.
- The inlet filter may be clogged; clean or replace the inlet filter.
- The **Refill Time** may be too short for the solvent. Increase the **Refill Time**.

Air Bubbles Appear Only in the Outlet Tubing

The outlet tubing may be loose; tighten the connection (but do not overtighten).

Poor Dampening Effect

The membrane in the pulse dampener may be defective; contact your local Gilson representative.

Eluent from the Column is Colored Blue

The membrane in the pulse dampener may have broken; contact your local Gilson representative.

Repair and Return Policies

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 on the right side of the pump.
- Installation procedure you used
- List of concise symptoms
- List of operating procedures and conditions you were using when the problem arose
- List of other devices connected to the instrument and a description of those connections
- List of other electrical connections in the room

Warranty Repair

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

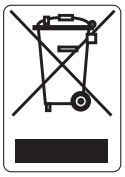
Return Procedure

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).



Appendix A

REPLACEMENT PARTS AND ACCESSORIES

The VERITY® 3011 Isocratic Pump is purchased with either a 5 SS (5 mL/min flow rate maximum) or 10 SS (10 mL/min flow rate maximum) stainless steel pump head.

VERITY 3011 Pump

VERITY 3011 PUMP (PART NUMBER 38114001)	INCLUDES
VERITY 3011 Pump	Touchscreen Control with software Dampener Prime/Purge valve
VERITY 3011 Pump Accessory Package (Part Number 38014261)	Documentation, including User's Guide on USB drive Contact I/O blocks Power supply and power cables USB cable

Pump Heads

PART NUMBER	DESCRIPTION	
38014217	5 SS Pump Head Assembly (Stainless Steel)	Includes pump head plumbing package accessory kit (part number 38014262)
38014216	10 SS Pump Head Assembly (Stainless Steel)	

Pump Head Parts

PART NUMBER	DESCRIPTION
3650170	INLET CHECK VALVE, 5/10/25/H1 HEAD
3650180	OUTLET CHECK VALVE, 5/10/25/H1/H2 HEAD
3645309	OUTLET VALVE SCREW, 5/10/25 PUMP HEAD
3645310	INLET VALVE SCREW, 5/10/25 PUMP HEAD
5463088863	SEAL, PISTON, HDPE, YELLOW, 5SC/5SS
5463125895	SEAL, PISTON,HDPE,YELLOW,10SC/10WSC/10SS
5463088063	SEAL, PISTON, PTFE, BLACK, 5SC/5SS
5463125095	SEAL, PISTON,PTFE,BLACK, 10SC/WSC/WTI/SS
36300058	RETURN SPRING 5/10/25SC

PUMP HEAD PARTS (CONTINUED ON PAGE 60)

PART NUMBER	DESCRIPTION
3650014K	ANTI EXTRUSION GASKET, 5 SC
3650015K	ANTI EXTRUSION GASKET, 10 SC
38014046	SPACER, PISTON TAIL GUIDE, 9.5MM SPHERE
3650008	PISTON FOR 5SC/5SS PUMP HEAD
3650009	PISTON FOR 10SC/10SS PUMP HEAD
38014045	PISTON TAIL GUIDE, 9.5MM SPHERE

Tubing

PART NUMBER	DESCRIPTION
38014251	TUBING, PRIME/PURGE LUER OUTLET
38014145	TUBING ASY, PUMP TO PRIME/PURGE
499484021	TUBING,INLET 1000 X 3 X 2MM ID, FEP
490032	TBG,PTFE .063 ID x .125 OD

Fittings

PART NUMBER	DESCRIPTION
49081881	FTG,ADAPTER, MALE LUER TO 1/4-28", PPL
F1410153	COUPLING, 1/4-28
49041015	FERRULE, FLANGELESS, 1/8" TEFZEL, P-300
49041016	NUT,1/4-28 X 1/8, DELRIN (P-304)
49041040	NUT, MALE, 10/32, SS,U-400
49041045	FERRULE, 1/16, SS (U-401)

Tools

PART NUMBER	DESCRIPTION
36620122	SEAL REPLACING TOOL, 5 SC & 5 SS
36620123	SEAL REPLACING TOOL, 10 SC & 10 SS
4320302	WRENCH,ALLEN 3MM
36610101	WRENCH, 5/16 - 1/4

Optional Accessories

PART NUMBER	DESCRIPTION	
38014274	Solvent Bottle Tray	Holds two 4L, two 2L, four 1L, or eight 0.5 L solvent bottles Includes a drain for spilled solvents.
38014269	107 mm Column Holder	Holds 4.6 to 21.2 mm ID columns For Isocratic HPLC
38014284	285 mm Column Holder	Holds 4.6 to 21.2 mm ID columns For Gel Permeation Chromatography

Optional Control Software

PART NUMBER	DESCRIPTION	NOTES
210631R30	TRILUTION LC v3.0 Media	New system purchase (Windows® 7)
21063133	TRILUTION LC 3.0 LICENSE, LIFETIME	
210631R30P8	TRILUTION LC 3.0 Service Pack 8	Upgrade from previous TRILUTION® LC version (Windows® 7) Includes VERITY 3011 Pump control

Miscellaneous

PART NUMBER	DESCRIPTION
6383087204	CONN, TERM BLK 4PIN 2.5MM
6383087203	CONN, TERM BLK 8PIN 2.5MM
709910206	WIRE, 2-CONDUCTOR INTERCONNECT, 6 FT
7080316106	POWER CORD, DETACHABLE, 220V
7080318107	POWER CORD, 18/3, 110V
5945150242	PWR SPLY, 150W 24V EXT CORDED
543501011	SYRINGE,10CC LUER LOK PLASTIC,INDIVIDUAL

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Appendix B

COLUMN HOLDER

This chapter provides instructions for:

- **Installation** on page 64

Figure 42
VERITY® 3011 Isocratic Pump with Column Holder Option

Installation

Refer to the instructions and diagram that follow to install the column holder.

1. Locate the column holder assembly, ordered separately.

PART NUMBER	DESCRIPTION	
38014269	107 mm Column Holder	Holds 4.6 to 21.2 mm ID columns For Isocratic HPLC
38014284	285 mm Column Holder	Holds 4.6 to 21.2 mm ID columns For Gel Permeation Chromatography

2. Insert the screws in the holes on either side of the pump.
3. Place the mounting bracket (keyhole openings) over the screws and then slide the mounting bracket down.
4. Tighten the screws.
5. Insert the three-pronged column holder pipe into the opening in the mounting bracket.
6. Orient and vertically position the column holder as desired and then tighten the knurled knob.
7. Place the column in the column holder(s).
8. Tighten the thumb screws.

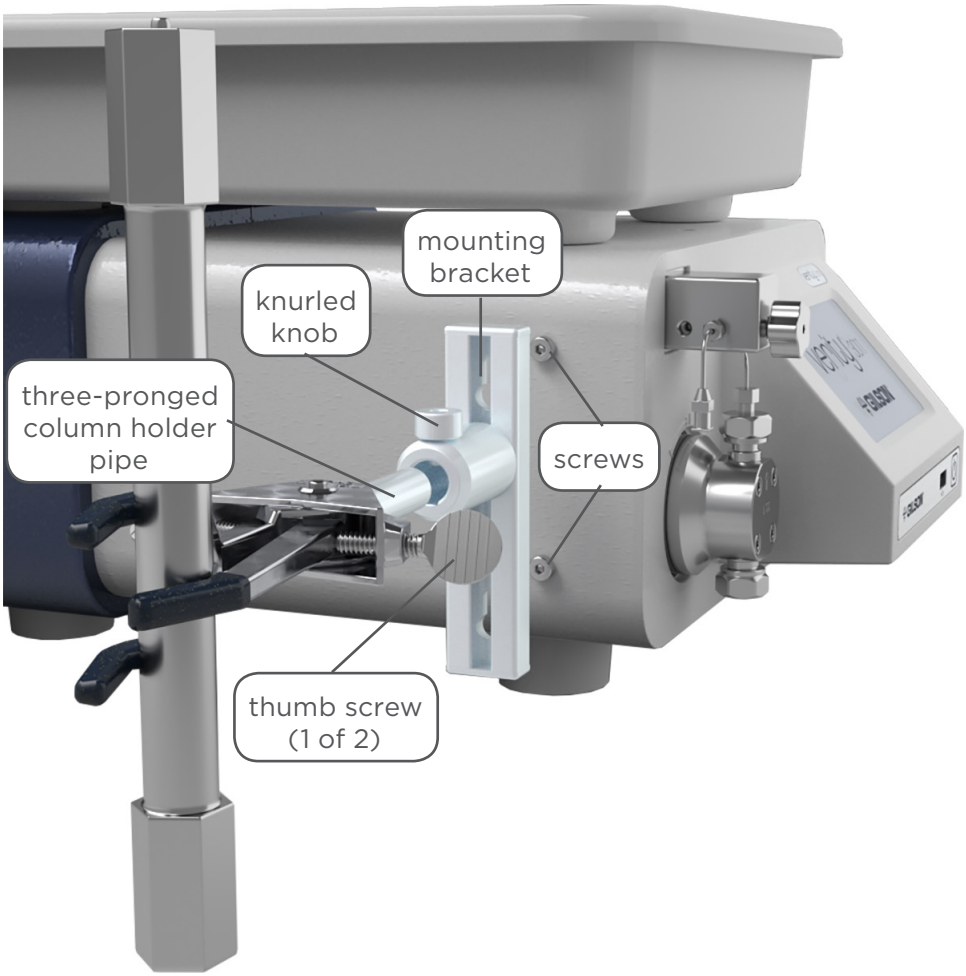

Figure 43
Column Holder Installation

Appendix C

SOLVENT BOTTLE TRAY

This chapter provides instructions for:

Figure 44
VERITY® 3011 Isocratic Pump with Solvent Bottle Tray

Installation

Refer to the instructions and diagram that follow to install the drain on the solvent bottle tray and the solvent bottle tray on the pump.

1. Install the barbed fitting (part number 49040682) and hex nut (part number 411125211).

NOTICE	**Do not overtighten the connector. The solvent bottle tray can be damaged if the nut starts to spin in the recess.**

2. Attach one end of the drain tubing (part number 47014386301) to the connector and place the other end in a waste container.
3. Place the solvent bottle tray on top of the pump with the drain to the back and the rear feet secure in the openings on the top of the pump.

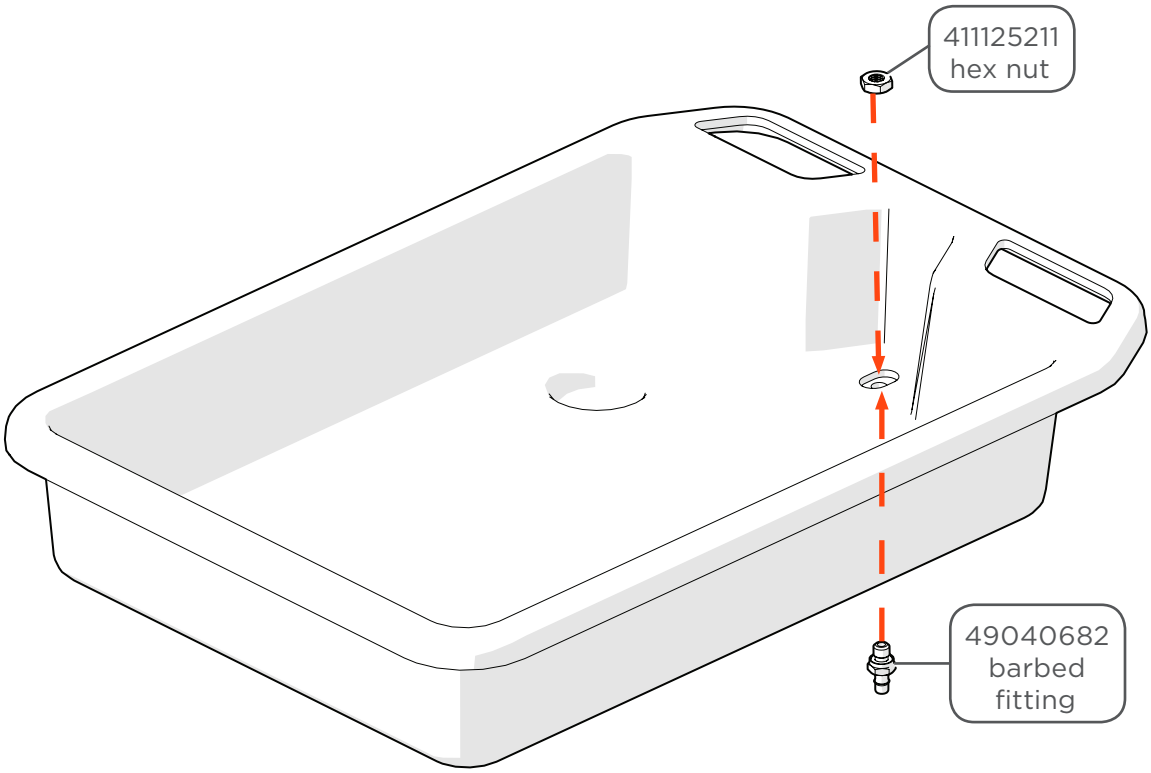

Figure 45
Solvent Bottle Tray Drain Installation

REFERENCE INFORMATION

Maximum Refill Time vs. Set Flow Rate

If the selected flow rate is incompatible with the refill time, the refill time will be automatically adjusted.

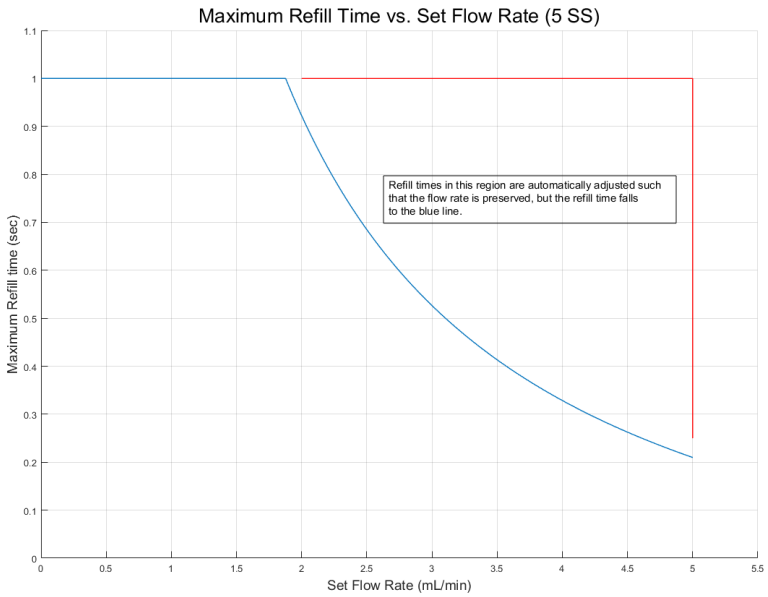

Figure 47
Maximum Refill Time vs. Set Flow Rate (5 SS Pump Head)

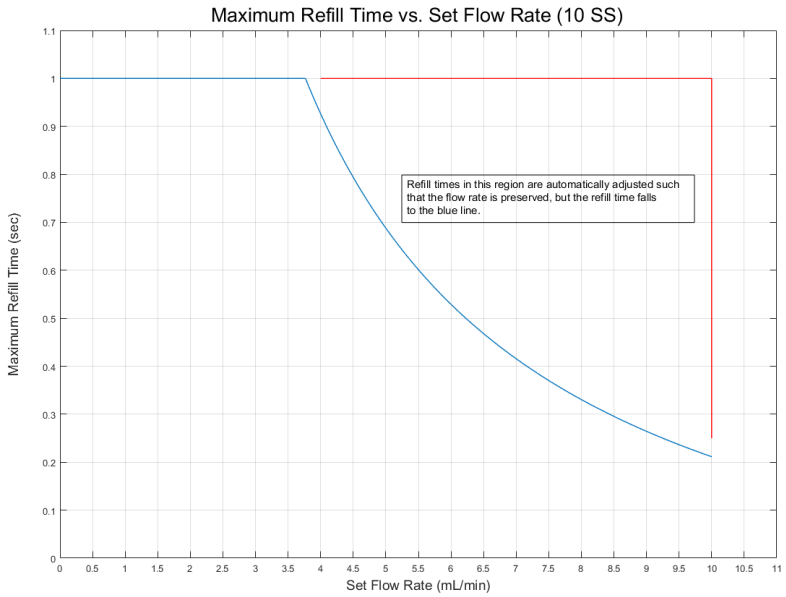

Figure 46
Maximum Refill Time vs. Set Flow Rate (10 SS Pump Head)

Liquid Contact Materials

The information provided in the following table is accurate to the best of our knowledge and belief, but it is intended for general information only (classified by alphabetical order).

Liquid Contact Materials

MATERIAL	DESCRIPTION
HDPE	HDPE (high density polyethylene) piston seals are yellow and provide longer service with water, aqueous solutions, alcohols and acetonitrile.
PCTFE	This material is a homopolymer of chlorotrifluoroethylene which has many of the properties similar to other fluoropolymers such as PTFE or FEP, but is mechanically superior in rigidity (does not deform easily), and has very low gas permeability. Its dimensional stability makes it attractive for use as a component of a structural part where the high temperature and chemical resistance of fluoropolymers is required. PCTFE shows high compressive strength and low deformation under load.
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. Use the black PTFE piston seals with organic solvents.
Ruby / Sapphire	Synthetic rubies and sapphires are single-crystal aluminum oxides, practically pure for the sapphire (+99,99% Al_2O_3). The color of the ruby is produced by adding a few ppm (parts per million) of chromium oxide (CrO_3). Synthetic rubies and sapphires have a hexagonal-rhombic crystal structure, density of 3.99 g/cm^3 and a water absorption coefficient of 0%. The principal properties of synthetic rubies and sapphires include a hardness and high mechanical strength, excellent resistance to wear, very low friction coefficient, chemically inert, good thermal conductivity, ideal electrical insulation.
Stainless Steel, Type 316L	Type 316L is an extra low carbon alloy that offer 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 deg. 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.

TRADEMARK DESCRIPTION REFERENCES

PTFE and Titanium descriptions provided by Valco Instruments Co. Inc. (**www.vici.com**)

PCTFE description provided by Fluorotherm (**www.fluorotherm.com**)

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

Ruby/Sapphire and Zirconium Oxide descriptions provided by Ceramaret SA (**www.ceramaret.ch**)