Combi*Flash* Torrent® Installation Guide

TELEDYNE ISCO
Everywhereyoulook™

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Section 1 Introduction

1.1 Documentation Overview

This Installation Guide provides:

- Safety Information
- Unpacking instructions
- Installation instructions, including placing the Combi*Flash* Torrent module on a network and direct connections with a computer or hand-held device
- Certification and warranty information.

Once you are operating the Torrent, you may refer to the Help menu for operating instructions and further assistance.

⚠WARNING

Avoid hazardous practices! If you use this instrument in any way not specified in this manual, the protection provided by the instrument may be impaired; this may increase your risk of injury.

1.2 Product Overview

The Teledyne ISCO Combi*Flash* Torrent and Torrent AQ flash chromatography systems give you high-productivity automation, programmable gradients, UV or UV-Vis detection and peak separation, and automatic detection of columns.

The Torrent can separate a sample in an unattended run under computer control at user selected flow rates between 50 and 1000 mL/min. The Torrent operates up to 100 psi (6.9 bar) and can use low- or medium-pressure Flash columns for either normal or reversed phase separations.

Braided stainless steel 2.75 meter (9 foot) supply lines are supplied with the Torrent. These supply lines support the solvent level detection features that prevent chromatography runs from running out of solvent.

Samples can be introduced to the Torrent by injecting a liquid sample into the injection port. Liquid samples can also be pumped into the injection port using the optional Sample Load Pump. Alternately, liquid samples can automatically be loaded on the Torrent AQ using the integrated sample load line on the solvent select valve. The Torrent can load low-solubility and liquid samples using solid load sample cartridges.

Column eluate passes through the UV or UV-Vis detector which can trigger collection of peak fluids. The system also accepts an input signal to cut peaks using an external detector such as an ELSD instrument.

The Torrent can control a Foxy R2 High Flow fraction collector or a Fractionation Valve to isolate the fluid in vessels.

1.3 Specifications

Table 1-1 Combi*Flash* Torrent Module Specifications[1]

Sample size:	0.5 to 300 grams
Redi*Sep* Rf column sizes:	80 gram to 3 kilogram
Flow rate:	50 – 1000 mL/min
Maximum pressure[2]:	6.89 bar (100 psi)
Detection:	200 – 400 nm (200 – 800 nm optional) with single, dual, or All-wavelength Collection. Accepts external detector input.
Gradient:	Binary, high pressure solvent mixing with linear, step, or isocratic capability. Two solvent inlets.
Gradient accuracy:	<2% full scale from 0.2 to 1.0 liter/min.
Sample injection:	Automated injection with options of solid load cartridges, liquid load, or direct injection.
Controller:	26.7 cm (10.4 inch) touch screen Supports remote control via Windows® PC.
Software:	On-screen method development and control with PeakTrak software
Fraction collection:	Up to four fraction collectors, fractionation valve, or manual collection
Solvent management:	Patented, active level sensing for inlet and waste containers
Module dimensions: (W x D x H)	47 x 43.5 x 71.4 cm 18.5 x 17.9 x 28.1 inches
Module weight:	65 lbs (29.5 kg)
Operating voltage:	100 VAC 50 Hz, 2 amperes 117 VAC 60 Hz, 2 amperes 234 VAC 50 Hz, 1 ampere (±10% of the region's nominal line voltage)
Safety and sample security:	Static-dissipative tubing throughout, Vapor sensor for internal leak detection, Overpressure sensor, Active solvent and waste level sensing, Audible alarm when user intervention is required.
Ambient Temperature	20 to 40°C (maximum temperature must be at least 15°C below the boiling point of the solvent)
Humidity (when connected to power)	95% relative humidity maximum at 20 to 40°C
Certification:	CE
Electrical Safety per EN 61010-1	
Installation Category	II
Maximum Altitude	2000 meters
Pollution Degree	2
Note 1. All specifications are subject to change. Note 2. For columns undetected by RFID, the max pressure is limited to 50 psi.	

1.4 Safety

Before installing, operating, or maintaining this equipment, it is imperative that all hazards and preventive measures are fully understood. While specific hazards may vary according to location and application, take heed in the following general warnings:

⚠WARNING

Avoid hazardous practices! If you use this instrument in any way not specified in this manual, the protection provided by the instrument may be impaired.Liquids associated with this instrument may be classified as carcinogenic, biohazard, flammable, or radioactive. Should these liquids be used, it is highly recommended that this application be accomplished in an isolated environment designed for these types of materials in accordance with federal, state, and local regulatory laws, and in compliance with your company's chemical/hygiene plan in the event of a spill.

⚠WARNING

If you are using flammable solvents or chemicals with this system, vapor concentration levels may exceed the maximum exposure levels as recommended by OSHA Guide 1910.1000. To reduce those levels to a safe exposure, Teledyne ISCO recommends that you place the system in a laboratory hood designed for the purpose of ventilation. This hood should be constructed and operated in accordance with federal state and local regulations. In the event of a solvent or chemical spill, your organization should have a plan to deal with these mishaps. In all cases, use good laboratory practices and standard safety procedures.

⚠WARNING

The Combi*Flash* Torrent has redundant safety devices to limit pressure to less than 100 psi (689 kPa). Redi*Sep* columns smaller than 100 g are CE certified using standard IEC61010-1 for use on the Combi*Flash* Torrent. Redi*Sep* columns larger than 100 g meet Pressure Vessel Directive 97/23/EC. Teledyne ISCO strongly recommends against the use of columns rated less than 100 psi (689 kPa).

1.4.1 Hazard Severity Levels

This manual applies *Hazard Severity Levels* to the safety alerts. These three levels are described in the sample alerts below.

⚠CAUTION

Cautions identify a potential hazard, which if not avoided, may result in minor or moderate injury. This category can also warn you of unsafe practices, or conditions that may cause property damage.

⚠WARNING

Warnings identify a potentially hazardous condition, which if not avoided, could result in death or serious injury.

⚠DANGER

DANGER – limited to the most extreme situations to identify an imminent hazard, which if not avoided, will result in death or serious injury.

1.4.2 Hazard Symbols

The equipment and this manual use symbols used to warn of hazards. The symbols are explained in Table 1-2.

Table 1-2 Hazard Symbols

Warnings and Cautions	
	The exclamation point within the triangle is a warning sign alerting you of important instructions in the instrument's technical reference manual.
	The lightning flash and arrowhead within the triangle is a warning sign alerting you of "dangerous voltage" inside the product.
	The pinch point symbol warns you that your fingers or hands will be seriously injured if you place them between the moving parts of the mechanism near these symbols.
Symboles de sécurité	
	Ce symbole signale l'existence d'instructions importantes relatives au produit dans ce manuel.
	Ce symbole signale la présence d'un danger d'électrocution.
	Risque de pincement. Ces symboles vous avertit que les mains ou les doigts seront blessés sérieusement si vous les mettez entre les éléments en mouvement du mécanisme près de ces symboles
Warnungen und Vorsichtshinweise	
	Das Ausrufezeichen in Dreieck ist ein Warnzeichen, das Sie darauf aufmerksam macht, daß wichtige Anleitungen zu diesem Handbuch gehören.
	Der gepfeilte Blitz im Dreieck ist ein Warnzeichen, das Sei vor "gefährlichen Spannungen" im Inneren des Produkts warnt.
	Vorsicht Quetschgefahr! Dieses Symbol warnt vor einer unmittelbar drohenden Verletzungsgefahr für Finger und Hände, wenn diese zwischen die beweglichen Teile des gekennzeichneten Gerätes geraten.

Table 1-2 Hazard Symbols (Continued)	
Advertencias y Precauciones	
	Esta señal le advierte sobre la importancia de las instrucciones del manual que acompañan a este producto.
	Esta señal alerta sobre la presencia de alto voltaje en el interior del producto.
	Punto del machacamiento. Sus dedos o manos seriusly serán dañados si usted los coloca entre las piezas móviles cerca de estos símbolos.

1.5 For Additional Information

Technical assistance for the Torrent can be obtained from:

Teledyne ISCO
4700 Superior St.
Lincoln NE 68504

Phone: (800) 228-4373 or (402) 464-0231
Fax: (402) 465-3001
E-mail: IscoService@teledyne.com

Combi*Flash* Torrent®
Installation Guide

Table of Contents

Combi*Flash* Torrent®
Installation Guide

Section 2 Preparation

This section provides instructions for unpacking and installing the Combi*Flash* Torrent system. To prepare the system for operation, sequentially follow all instructions in sections 2.1 through 2.18. Some of these sections provide instructions for installing optional equipment which should only be completed as required.

☑ *Note*

Section 2.20 contains an Installation Qualification checklist. If required, sign off the checklist entries as you successfully complete the following sections.

2.1 Optional Equipment Modules

The Torrent/Torrent AQ offer several different optional modules. Each module will require additional set-up steps as noted below. The optional modules are:

1. Solvent Selection Valve (Sections 2.4.1; 2.6.2 and 2.8)
2. Sample Load Pump (Sections 2.6.1 and 2.12.1)
3. Fractionation Valve (Sections 2.4.2; 2.6.3 and 2.12.3)
4. Foxy R2 High Flow Fraction Collector (Sections 2.6.4; 2.12.2 and/or 2.17)

2.2 Unpacking the Unit

The Torrent is shipped in a single carton. The optional equipment will be shipped in additional cartons. Carefully unpack the shipment and inspect the contents.

⚠WARNING

The Torrent is heavy. Use a two-person lift to prevent injury.

Lift the Torrent from the container using the lifting handles mounted on the side panels.

If there is damage to the shipping carton or any components, contact the shipping agent and Teledyne ISCO (or its authorized representative) immediately.

⚠WARNING

If there is any evidence that the Torrent has been damaged in shipping, do not plug it into AC power. Contact Teledyne ISCO or its authorized representative for advice.

Compare the contents of the boxes with the enclosed packing slips. If there are any shortages, contact Teledyne ISCO immediately.

2.3 Instrument Location

The Torrent has a relatively small footprint for a development-scale instrument, requiring about 2200 square centimeters (350 in^2) of level bench space. Ensure that the Torrent has at least 3 cm (1.25") of air space behind it for ventilation. Additional space may be required for solvent and waste containers, and fraction collection.

Refer to Table 1-1 for environmental conditions and power requirements.

⚠WARNING

The system is heavy. Use a two-person lift to prevent injury.

Before making any connections to the Torrent, place it on the bench or in the fume hood where it will be operated. Temporarily position the Torrent so you can access the back panel to complete the connections.

2.4 Mounting Optional Modules

If a Solvent Select Valve or Fractionation valve are not being installed you can skip this section and continue to Section 2.5.

2.4.1 Solvent Select Valve (if purchased)

Place the Solvent Select Valve on the left-hand side of the Torrent with the valve facing the side of the Torrent.

Use the supplied metal mounting plate and four (4) screws to secure the Solvent Select Valve to the Torrent.

2.4.2 Fractionation Valve (if purchased)

Place the Fractionation Valve on the right-hand side of the Torrent with the Valve facing the side of the Torrent.

Use the supplied metal mounting plate and four (4) screws to secure the Fractionation Valve to the Torrent.

Alternatively, the valve can be connected to a user supplied mast.

2.5 Connect Power

Ensure that the On/Standby switch above the touch screen panel is in the Standby position. Then, use the supplied IEC power cord to connect the Torrent to mains power.

⚠WARNING

Mains power must meet the voltage, frequency, and amperage requirements listed on the serial number label. Input voltage must be within ±10% of the region's nominal line voltage. In the USA, this is 117 volts ±11.7 volts.

⚠WARNING

As long as the AC mains power cord is connected to a live outlet, power is inside the unit. The mains power cord is the disconnect device. Position the Torrent so that the power cord can be unplugged, or use a power strip where the plug can quickly be removed from the outlet in the event of an emergency.

⚠CAUTION

Unless power must be removed due to an emergency, always wait at least one minute after placing the system in Standby before removing the AC mains power cord.

2.6 Connect Interface Cables

Rear panel connections support a variety of devices. Electrical connections to networks or optional equipment should be completed at this time.

Review the options below and complete as necessary. If any optional modules are not being installed you can continue to Section 2.7.

☑ Note

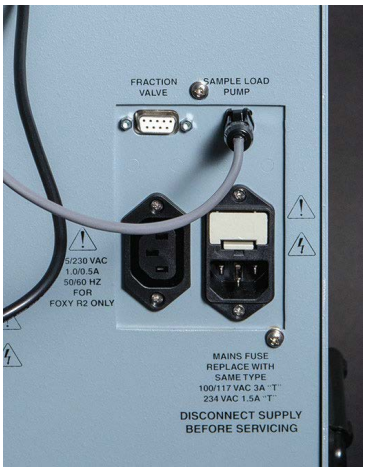
Detailed information about each of these optional devices is provided in Section 2.12 Plumbing Optional Modules To Torrent.

2.6.1 Cabling: Sample Load Pump

To connect a Sample Load Pump to the Torrent, attach the pump's power cable to the Torrent's back panel connector labeled "SAMPLE LOAD PUMP."

2.6.2 Cabling: Solvent Select Valve

To connect a Solvent Select Valve to the Torrent, attach the valves power cable to the back panel connector labeled "SAMPLE LOAD PUMP" and connect the USB cable to the USB port on the back panel.



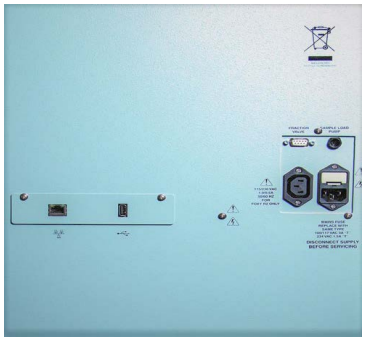
2.6.3 Cabling: Fractionation Valve

To connect a Fractionation Valve to the Torrent, attach the valve's 9-pin power/control cable between the port on the back of the Fractionation Valve to the Torrent's back panel connector labeled "FRACTION VALVE."

2.6.4 Cabling: Foxy R2 High Flow Fraction Collector

The Torrent can control up to four Foxy R2 High Flow fraction collectors via an Ethernet network.

To connect one, or the first of multiple Foxys, connect a standard straight-through network cable between the Ethernet ports on the Torrent and a Foxy. The second Ethernet port on the Foxy can be used to add the next Foxy. See section 2.11.2 for more details.



The Torrent can supply AC power to one Foxy. Connect one end of the cable to the female IEC connector on the Torrent. Connect the other end to the Foxy power connector.

2.6.5 Cabling: Network Connection

The Torrent can be added to a network or directly connected to a computer for remote control.

To add the Torrent to a network, connect a standard straight-through network cable between the Torrent's Ethernet port and your network.

To connect the Torrent directly to a computer, connect a "crossover" cable between the Ethernet ports on the Torrent and a stand-alone computer.

To connect to a network, you will need access to IP addresses and network information from your IT department. For more information on network guidelines, see TN28 Networking Guidelines for Combi*Flash* Products, available at www.isco.com.

☑ Note

When using the Foxy R2 High Flow fraction collector, the Torrent's rear panel Ethernet connector will be in use. Instead, connect the cable to the available Ethernet port on the last Foxy in the chain.

☑ Note

The Foxy R2 fraction collector does not support DHCP. If you are adding the Torrent with Foxy R2 fraction collectors to your organization's network, a static IP address must be assigned to each unit. Contact your IT department for assistance.

☑ Note

Detailed information about networking the Torrent with one or more Foxys is provided in Section 2.12.2 OPTIONAL FOXY R2 HIGH FLOW FRACTION COLLECTOR.

2.7 Position the Torrent

After completing the various back panel connections, the Torrent can be moved to its operating position. Turn the Torrent so that the operator can access all of the front view features and controls. Use care not to damage the connections, cables and equipment while moving the Torrent.

⚠ CAUTION

Ensure that the Combi*Flash* Torrent has at least 3 cm (1.25") of air space behind it for ventilation.

Determine where the solvent and waste containers will be located. Keep in mind that the valve wash waste is located on the Torrent's left side panel; diverter valve waste will come from the fraction collector or fractionation valve, usually positioned on the right side of the Torrent. If these will use a common waste container, determine the preferred location.

☑ Note

A common waste container is recommended for waste level monitoring to prevent overfilling.

2.8 Connect Solvent Select Valve Plumbing

If a Solvent Select Valve is not being installed you can skip this section and continue to Section 2.9. If a Solvent Select Valve is to be installed with the Torrent or Torrent AQ it should already be mounted.

1. Loosen (but don't remove) the nut and 2-piece ferrule connected to the Solvent Select Valve port "TO TORRENT B INLET".

2. Place the end of the black tubing (023050308) into the port as far as it will go and finger tighten the nut.

3. Use a wrench to tighten for an additional 1 and 1/4 turn.

4. a) Locate a nut (60-0923-015) and ferrule (60-0083-163) in the accessory package (60-5249-002).

b) Insert the ferrule, narrow end first, into the Torrent "B LEVEL".

c) Loosely thread the nut onto the "B LEVEL" port.

d) Insert the clear air supply line (supplied with Solvent Select Valve) into the "B LEVEL" port until it is fully seated.

e) Finger tighten the nut. If desired, tighten the nut an additional 1/2 turn using a wrench.

5. Loosen the nut (but do not remove) to the Solvent Select Valve Port "TO TORRENT B LEVEL".

6. Following step 4 above, connect the air supply from the B LEVEL on the Torrent to the Solvent Select Valve "TO TORRENT B LEVEL".

2.9 Connect Solvent Lines

⚠ CAUTION

To prevent damage or premature wear to the pump and internal valves, clean solvent should be used. The solvent should not contain any dissolved solids. In addition, the B solvent pump on the Torrent and both Solvent A and Solvent B pumps on the Torrent AQ are not compatible with alkanes such as hexane due to lack of lubricity.

⚠ CAUTION

If solvent containers are reused, particulate matter can accumulate in the container. Containers should be thoroughly cleaned before each refill. Failure to clean the containers may result in damage to the solvent selection valve and internal components.

☑ Note

The Torrent is shipped with protective caps on the solvent fittings. Remove these caps as you connect the solvent lines. The internal solvent lines contain isopropyl alcohol, some of which may drain when the caps are removed.

The Torrent may receive solvent from:

- User-supplied solvent containers at atmospheric pressure
- Pressurized or gravity-fed solvent delivery lines in the laboratory.

Refer to the appropriate installation section (2.9.1 through 2.9.2) according to your solvent source.

2.9.1 Solvent Containers at Atmospheric Pressure

The Torrent can form a binary gradient from two solvents, A and B. These solvents connect to the left side panel of the Torrent or Torrent AQ with optional Solvent Select Valve allows for a binary gradient between one A solvent and either of two different B solvents or liquid sample.

1. Locate the Solvent A inlet line. This assembly consists of two tubes fastened together—a solvent line and a smaller diameter air line to measure the solvent level.
2. Connect the large fitting to the Torrent's A INLET port:
   a. Position the end with the threaded fitting near the port.
   b. Rotate the fitting until the inlet line is routed the desired direction.
   c. Finger-tighten the pre-swaged fitting to the port.
   d. Use a wrench to tighten the fitting an additional 1/8 turn.
3. Connect the air line to the A LEVEL port (refer to Figure 2-1):

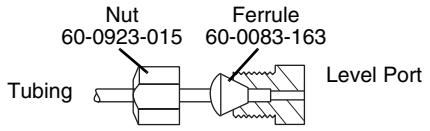


Figure 2-1 Level tubing connection with nut and ferrule

a. Locate a nut (60-0923-015) and ferrule (60-0083-163) in the accessory package (60-5249-002).

b. Insert the ferrule, narrow end first, into the A LEVEL port.

c. Loosely thread the nut onto the A LEVEL port.

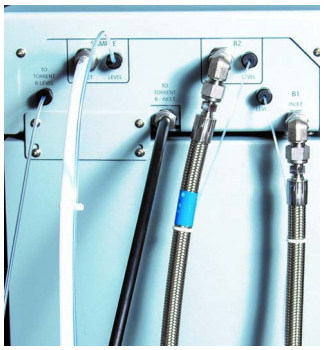
d. Insert the Solvent A air line into the A LEVEL port until it is fully seated.

e. Finger-tighten the nut. If desired, tighten the nut an additional 1/2 turn using a wrench.

☑ *Important*

For systems without Solvent Select Valve follow steps 4-7. For systems with Solvent Select Valve skip to steps 8-14.

4. Locate the Solvent B inlet line. This assembly consists of three tubes fastened together—a solvent line, a smaller diameter air line, and a solvent prime line.
5. Connect the large fitting on the Solvent B inlet line to the Torrent's B INLET port as described in step 2.
6. Connect the smallest tube of the Solvent B inlet line to the B LEVEL port as described in step 3.
7. Connect the remaining tube of the Solvent B inlet line to the B PRIME port:
   a. Finger-tighten the pre-swaged fitting to the port labeled B PRIME.
   b. Use a wrench to tighten the fitting an additional 1/8 turn.
8. The Solvent Select Valve should be plumbed to the B Inlet of the Torrent (Section 2.2.6).
9. Locate the Sample Inlet line. This assembly consists of two tubes fastened together--a white solvent line and a smaller diameter air line.
10. Connect the large fitting on the Solvent B1 inlet line to the Solvent Select Valve's B1 INLET port as described in step 2 above.
11. Connect the smalled tube of the Solvent B1 inlet line to the Solvent Select Valve's B Level port as described in step 3.
12. Locate the Solvent B1 inlet line. This assembly consists of two tubes fastened together--a solvent line and a smaller diameter air line.
13. Connect the large fitting on the Solvent B1 inlet line to the Solvent Select Valve's B1 INLET port as described in step 2 above.
14. Connect the smalled tube of the Solvent B1 inlet line to the Solvent Select Valve's B1 inlet line to the Solvent Select Valve's B Level port as described in step 3.
15. Locate the Solvent B2 inlet line and repeat Steps 9 and 10 for the B2 inlet line.



The other ends of the Solvent A and B lines should be placed in the respective solvent containers. If using the optional Solvent Inlet Cap sets (60-5394-510 for 83B closures, 60-5394-511 for 100 mm closures), proceed with the following steps:

16. Screw the cap onto the carboy.

17. Feed the solvent line assembly through the hole in the cap. The weighted inlet should rest at the bottom of the container.

2.9.2 Pressurized Solvent Lines in the Laboratory

When receiving solvent from pressurized lines on-site, the Torrent's solvent level sensing feature is unsupported (and unnecessary).

☑ *Note*

The solvent pressure should be regulated to not exceed 5 psi.

To complete the solvent connections:

1. Ensure that the solvent supply lines have shut-off valves. These valves must be accessible to the user.

☑ *Note*

The solvent supply should be shut-off when the system is not in use. Otherwise, pressurized solvent may be forced through the Combi*Flash* Torrent pump seals and leak from the waste port or other fluid path from the automated injection valve.

2. Locate the 1/8-inch plug, part number 209-0165-21, in accessory kit 60-5249-002. Install this plug on the B Prime port.
3. Connect user-supplied tubing with 3/8-inch fittings from the source to the A Inlet and B Inlet ports on the side panel.

☑ *Note*

Solvent Level Sensing and B Solvent Prime options should be disabled when completing the system configuration settings in *CombiFlash Torrent User Manual*, Section 3.1.1.

2.10 Connect Waste Lines

⚠ WARNING

Risk of fire or equipment damage. Failure to connect Waste Port tubing may allow organic solvents to pool in unsafe areas, possibly creating dangerous levels of flammable vapors.

⚠ CAUTION

Elevated flammable vapor levels are possible. Ensure that the waste container is adequately ventilated, preferably by placing it in a fume hood.

☑ *Note*

The Torrent is shipped with protective caps on the waste fittings. Remove these caps as you connect the waste lines. The internal solvent lines contain isopropyl alcohol, some of which may drain when the caps are removed.

☑ *Note*


Waste connections on the left side panel are labeled with a Waste icon.

The waste tube assembly is a bundle of two tubes that routes post-run valve wash fluid to a waste container. Instructions for diverter valve waste tubing is covered in the PLUMBING OPTIONAL MODULES TO TORRENT section (2.12).

To connect the waste tube assembly to the Torrent:

1. Select the tube with the pre-swaged nut and ferrule and connect this end to the port labeled VALVE. The connection should be finger-tight. Then, use a wrench to tighten the fitting an additional 1/8 turn.
2. Connect the other line to the LEVEL port:
   a. Locate a nut (60-0923-015) and ferrule (60-0083-163) in the accessory package (60-5249-002).
   b. Insert the ferrule, narrow end first, into the LEVEL port.
   c. Loosely thread the nut onto the LEVEL port.
   d. Insert the waste air line into the LEVEL port until it is fully seated.
   e. Finger-tighten the nut. If desired, tighten the nut an additional 1/2 turn using a wrench.

The other ends of the Waste line should be placed in the waste container.

If using the optional Waste Outlet Cap (60-5394-512 for 83B closures, 60-5394-513 for 100 mm closures), proceed with the following steps:

3. Place the metal plate inside the plastic cap (Figure 2-2). The plate should be oriented so that the small tube will extend into the carboy. The small tube should extend 5 ±0.5 cm long from nut. If the tube is missing, insert it now and finger-tighten the nut.

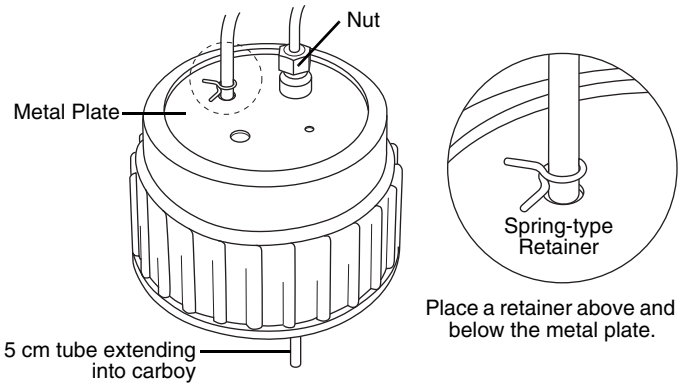


Figure 2-2 Optional Waste Cap (83B cap shown)

4. The tubing is secured using metal, spring-type retainers. A pair of conventional pliers will allow you to open the retainer enough to slide it onto the tubing. On the larger diameter waste tube, slide one retainer about 2 inches (5 cm) onto the tubing end.
5. Feed this tube into the top of the metal plate until the retainer is against the top of the plate.
6. Slide a retainer onto the tubing end until it is seated against the bottom of the metal plate.
7. Thread the cap onto the carboy.
8. The smaller diameter tube is the level sense tube. Push this tube about 2 cm into the top fitting and finger-tighten the nut.

If an optional waste cap is not used, ensure the waste lines are secured so they drain into the waste container. Secure the Waste Level Sense air tubing so its outlet is at least two inches (5 cm) below the container's maximum level. Seal the container opening to avoid solvent vapors.

2.11 Connect and Route Drain Line

⚠WARNING

Risk of fire or equipment damage. Failure to connect drain lines may allow organic solvents to pool in unsafe areas, creating a potential for dangerous levels of flammable vapors. Improper draining may damage the instrument's internal components.

The Torrent has a front-mounted drip tray. There is a drain connection under the left side of the tray. Connect user-supplied tubing to this drain and route it to a suitable waste fluid collection container.

2.12 Plumbing Optional Modules to Torrent

The installation of optional equipment that was electrically connected to the Torrent in section 2.6 should be completed now. Review the options below and complete as necessary. If any optional modules are not being installed you can skip this section and continue to Section 2.13.

2.12.1 Optional Sample Load Pump

1. Position the Sample Load Pump on top or near the Torrent.
2. Connect the tubing between the pump outlet (from the bottom of the pump head) and the Torrent's sample injection port (Refer to the *CombiFlash Torrent User Manual*, Figure 1-1, item 9).
3. Configure the Sample Load Pump by placing either the plastic cartridge reservoir or the tubing with the weighted end on the pump inlet (Figure 2-3).

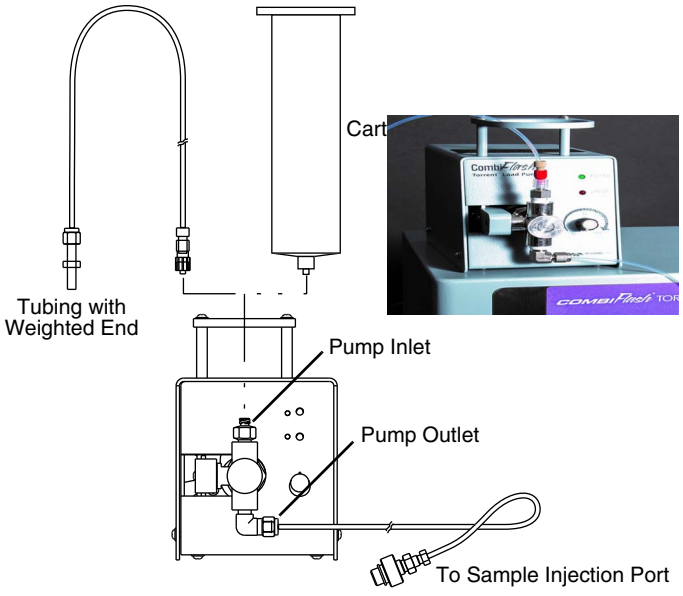


Figure 2-3 Sample load pump

2.12.2 Optional Foxy R2 High Flow Fraction Collector

The fraction collector(s) should be positioned to the right of the Torrent. Complete information about the Foxy R2 fraction collector is provided in its user manual, part #69-2133-667.

Plumbing Setup:

- Connect the 107 cm (42 inch) piece of supplied tubing between the Torrent's TO COLLECTOR port and the fraction collector's diverter valve IN port (Common). Use caution when tightening the hardware to prevent damage to the diverter valve.
- If there are multiple fraction collectors, connect the 107 cm (42 inch) piece of supplied tubing between the first fraction collector's diverter valve WASTE port (NO) and the next collector's diverter valve IN port (Common). Repeat this for each fraction collector in the chain.
- On the last fraction collector (or single), connect the 6 ft. piece of supplied tubing between the diverter valve WASTE port (NO) and a suitable waste collection container. Cut the tubing to the desired length.
- For waste level monitoring, the valve wash waste container (section 2.10) is recommended for collecting diverter valve waste.
- Install racks or funnels as described in the Installation Guide.

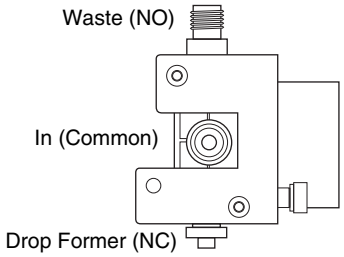


Figure 2-4 Foxy R2 high flow diverter valve ports (front view)

- Use the supplied cable ties to secure the tubing as desired. Before turning on any fraction collector, manually move each fraction collector's arm and drop former through its full range of movement to ensure that the arm mechanisms move freely without obstruction. The Foxy R2 will need to be configured once the system is powered on (Section 2.15 or 2.16).

2.12.3 Optional Fractionation Valve

The fractionation valve is an alternative to the typical Foxy fraction collector setup, allowing the effluent from the Torrent to be collected in any of six user-supplied containers. The fractionation valve module includes a diverter valve to allow the effluent to be diverted to waste.

1. Connect the supplied tubing between the Torrent's TO COLLECTOR port and the Fractionation Valve's diverter valve IN port (Common). (The diverter valve is an externally mounted solenoid valve on the side of the Fractionation Valve.)
2. Connect the supplied tubing between the Fractionation Valve Common Port to the Fractionation Valve's diverter valve top port.

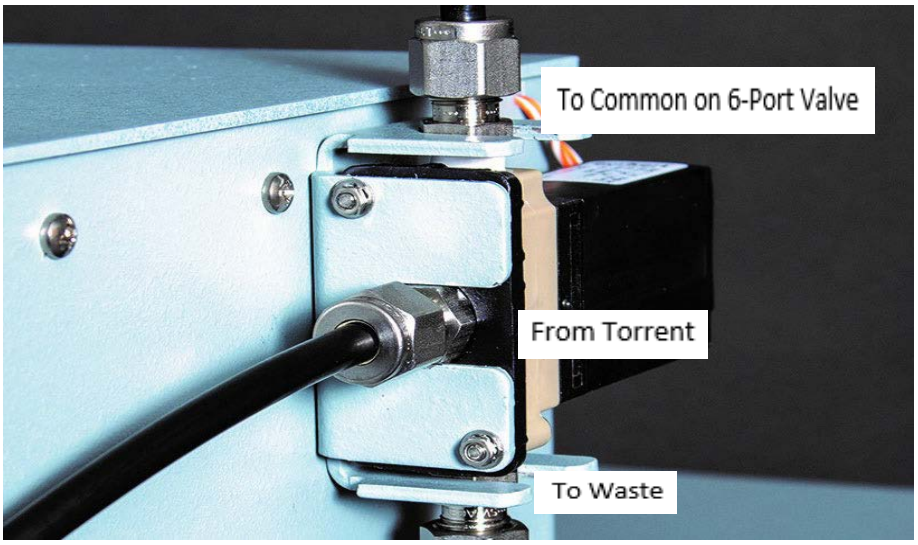
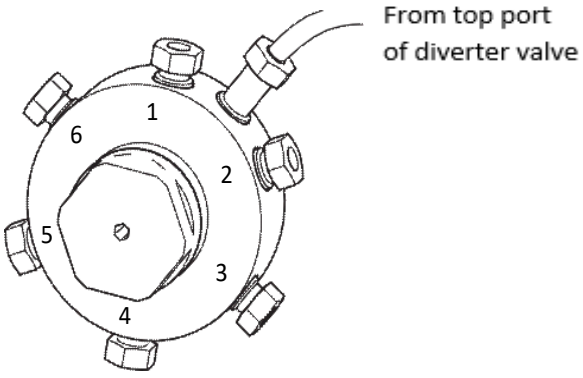


Figure 2-5 Fractionation valve: Diverter to waste valve connections

3. Cut lengths of tubing and connect the pieces to the six numbered outlet ports on the front valve (Figure 2-6).
4. For your convenience, the Fractionation Valve was shipped with pairs of numbered clips to simplify tube and container identification. If desired, attach the clips to the each end of the six outlet tubes.
5. Secure the six outlet tubing ends in the waste containers.

☑ Note

Tubing may be secured in the collection containers using optional bottle caps with spring-type retainers. For GL38 threads, use 60-5394-516; for GL45 threads, use 60-5394-517.



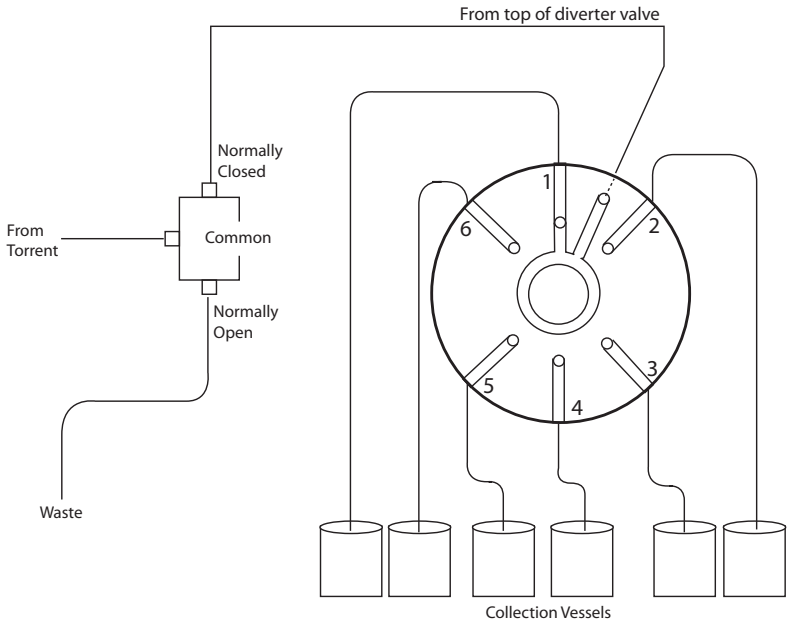


Figure 2-6 Six-port valve connections

2.13 Model 340CF Evaporative Light Scattering Detector (ELSD)

The Torrent can be configured for use with Teledyne ISCO's 340CF ELSD.

If a 340CF ELSD is no being installed you can skip this section and continue to

Section 2.14. The data connection between the Torrent and the ELSD requires either a Foxy R2 fraction collector (Section 2.12.2) or the fractionation valve (Section 2.6.3).

Connect the ELSD to the DETECTOR port on the rear panel of the Foxy R2 or the fractionation valve with signal cable (250000020) from the 340CF Accessory Package (4-200203).

☑ Note

If your system has more than one fraction collector, connect the ELSD to the first unit plumbed to the Torrent.

Figure 2-7 Detector port on fractionation valve (left) and Foxy R2 fraction collector (right)

Plumbing the Torrent to the ELSD requires the connection package, part #60-5247-021. The package contains the following:

- Metal Tee fitting with reducer
- Two 0.25” mounting spacers for tee
- Two #6x1” pan head screws/flat washers/lock washers
- 1 pc 1/16 OD x 0.02” ID x 6” long tubing
- 1 pc 0.25 OD x 0.188” ID x 100cm long black PTFE tubing w/nut and ferrule swaged on each end
- 1 pc 0.25 OD x 0.188” ID x 100cm long black PTFE tubing w/nut and ferrule swaged one end and a metal union on the other end

To plumb the ELSD to the Torrent:

1. With a 3/32” Allen wrench, remove the PEEK tee fitting and metal tubing from the rear panel of the ELSD unit (refer to Figure 2-9). This will expose both mounting holes for the metal tee fitting.

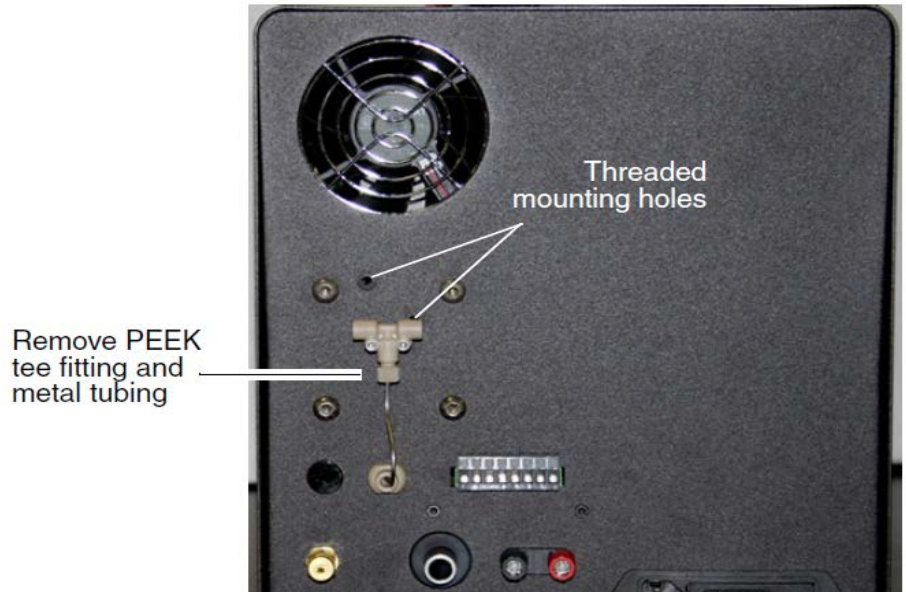


Figure 2-8 ELSD rear panel

2. Using the two long screws with lock and flat washers, mount the metal tee fitting on the rear panel, aligning the two standoffs over the ELSD’s threaded mounting holes, and the mounting holes in the tee over the two standoffs.

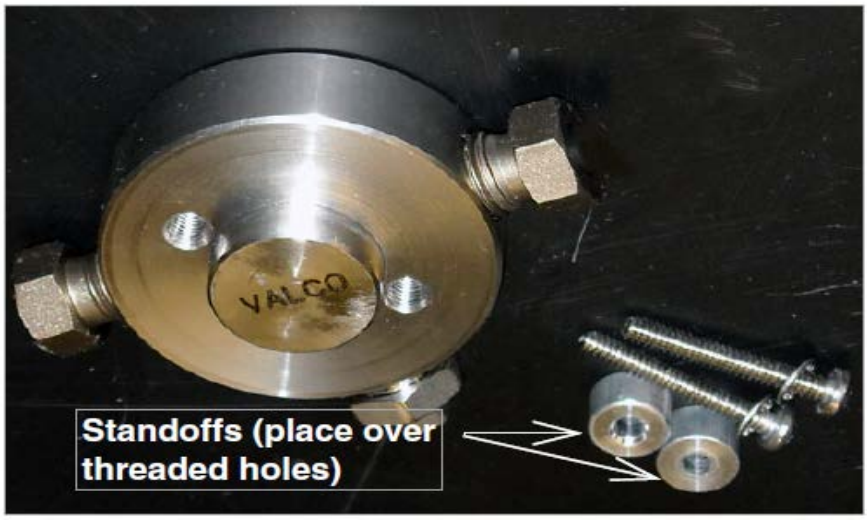


Figure 2-9 Replace the PEEK tee with the metal tee fitting

3. Locate the 6” piece of tubing. Attach one end to the bottom of the metal tee fitting and the other end to the ELSD liquid inlet (refer to Figure 2-11). Tighten fittings to finger, tight.

4. On the Torrent, disconnect the black PTFE tubing end from the bottom column connection (Figure 2-10).

Figure 2-10 Torrent: Disconnect tubing from bottom column connection

5. Locate the black PTFE tubing that is swaged on both ends. Connect one end to the Torrent bottom column connection. Connect the other end to the metal tee fitting on the back of the ELSD.

6. Locate the other piece of black PTFE tubing from the kit. Connect the metal union to the swaged tubing on the front of the Torrent. Connect the swaged end of the tubing to the metal tee fitting on the back of the ELSD.

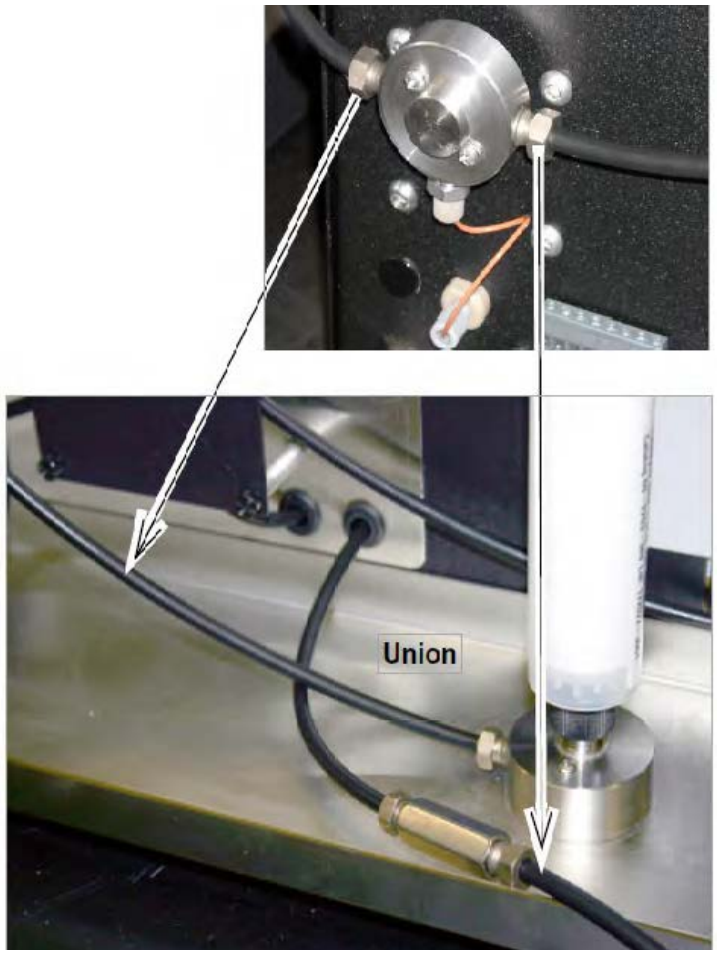


Figure 2-11 Tee fitting for Torrent ELSD

2.14 Grounding

⚠WARNING

Risk of fire or explosion. Nonconductive, nonpolar liquids at linear velocities greater than 40 cm/sec will develop an electrostatic charge. If this applies to your application, all components along the fluid path must be electrically grounded. An electrical ground is necessary to dissipate electrostatic charges that may build while collecting fluids such as organic solvents.

Refer to your local health and safety directives and ground the solvent delivery lines, Torrent, optional equipment, and collection and waste containers according to these governing directives.

☑ *Note*

The entire fluid path of the Torrent is electrically grounded. The black tubing is conductive. Never substitute the black tubing.

2.15 Turn on Power

The Torrent's power switch is located above the touch screen panel. Turn the switch to the ON positions. Peripheral equipment should also be turned on at this time. The Torrent will begin its startup routine which includes self diagnostics. The Torrent is ready for operation when the PeakTrak screen is displayed.

2.16 Torrent/Multiple Foxy R2 Network Configurations

Before connecting the Torrent and fraction collector(s) to the network, verify that the Torrent is properly booted up with no errors.

Examples of system connections are provided at the end of this section.

☑ Note

The Foxy R2 fraction collector does not support DHCP. If you are adding the Torrent with Foxy R2 fraction collectors to your organization's network, a static IP address must be assigned to each unit. Contact your IT department for assistance.

☑ Note

This section is dedicated to network configurations including the Foxy R2 fraction collector. For comprehensive Torrent networking details, refer to Tech Note TN28, Networking Guidelins for CombiFlash products

TCP/IP Settings in the Foxy R2

The IP address and netmask are entered from the fraction collector front panel.

1. Select Configuration Tools.
2. Enter the IP address and netmask obtained from your network administrator.

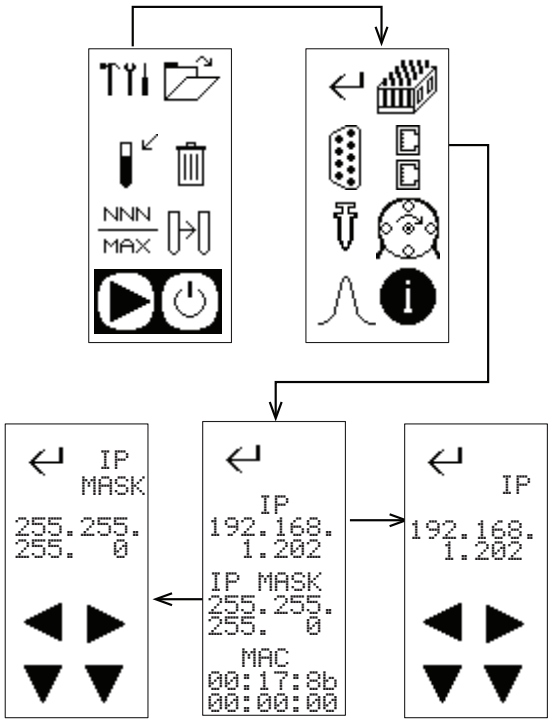


Figure 2-12 TCP/IP Settings for Foxy R2 Fraction Collector

3. Press Enter ↵ to save settings and exit.

TCP/IP Settings in the Torrent

The network information for the Torrent is entered from the front panel.

1. Select Tools -> Configuration, and click the Network Configuration tab.
2. Enter the IP address, netmask, and gateway address assigned to the Torrent by your network administrator.

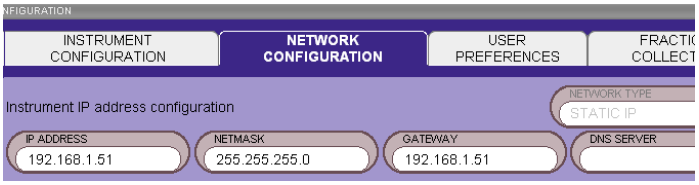


Figure 2-13 TCP/IP settings for Torrent

Note

The bottom two panels on the Network Configuration tab are not used for connection to networked instruments.

3. Select the Fraction Collector tab.
4. Enter the IP address(es) of the Foxy R2 fraction collector(s).

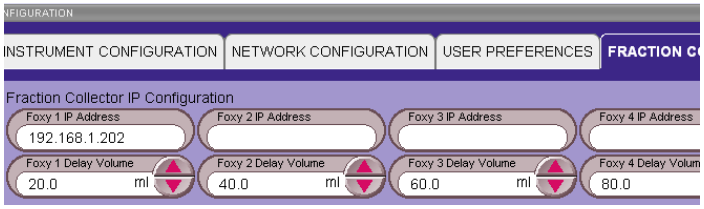


Figure 2-14 Enter Fraction Collector IP information into Torrent (up to four units)

Torrent/Foxy R2 Network Configuration: Examples

Typical examples of Torrent/Foxy R2 network connection are provided in this section. When configuring your network, observe the following important guidelines:

- All network connections are made with **straight-through** network cables. If purchased from Teledyne ISCO, straight-through cables are tan in color.
- Do not use crossover cables in networked systems. This type of cable is only for direct connection to a stand-alone computer. If purchased from Teledyne ISCO, crossover cables are blue in color.
- A unique static IP address must be assigned to each unit.

In Example 1, the system runs on your network, using the fraction collector as an Ethernet hub.

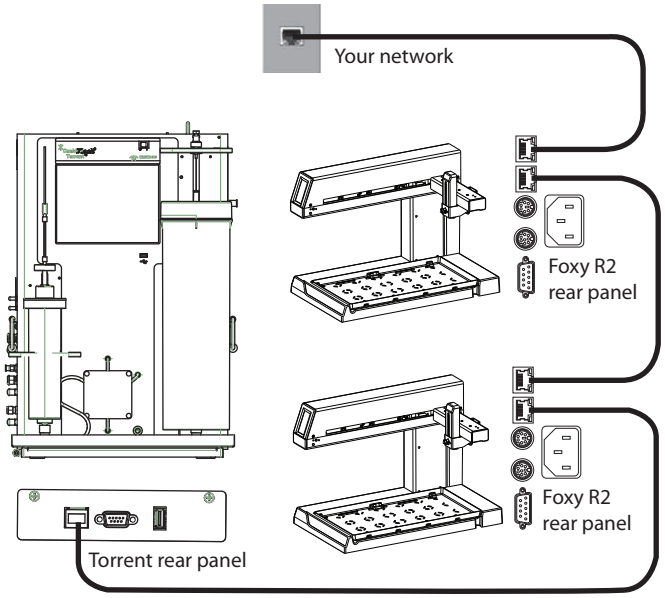


Figure 2-15 Network configurations: Example 1

In Example 2, the system runs on your network with each unit directly connected to your network.

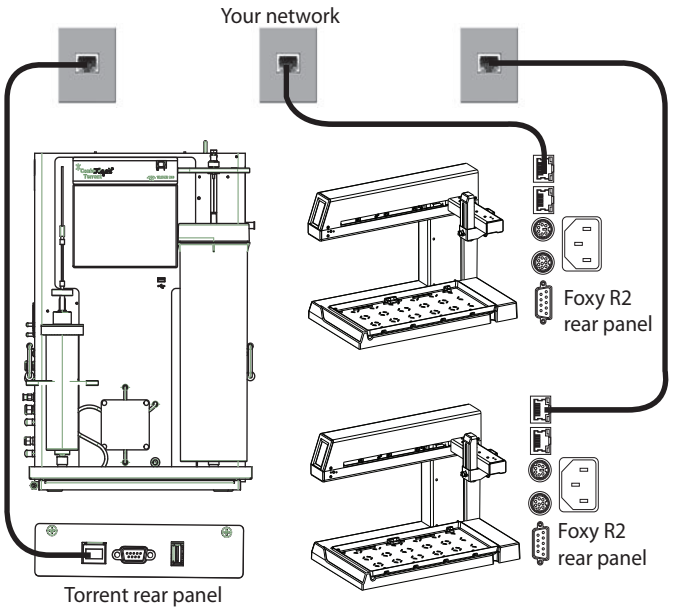


Figure 2-16 Network configurations: Example 2

In Example 3, the system runs on your network with each unit connected to an Ethernet hub, and then to your network.

The pass-through function of a true Ethernet hub is required for this setup, meaning all ports are sent the same signals.

Some switches can be set to mimic a hub. If you use a switch, ensure that it is set to mimic the functionality of a hub, and does not apply logic filtering.

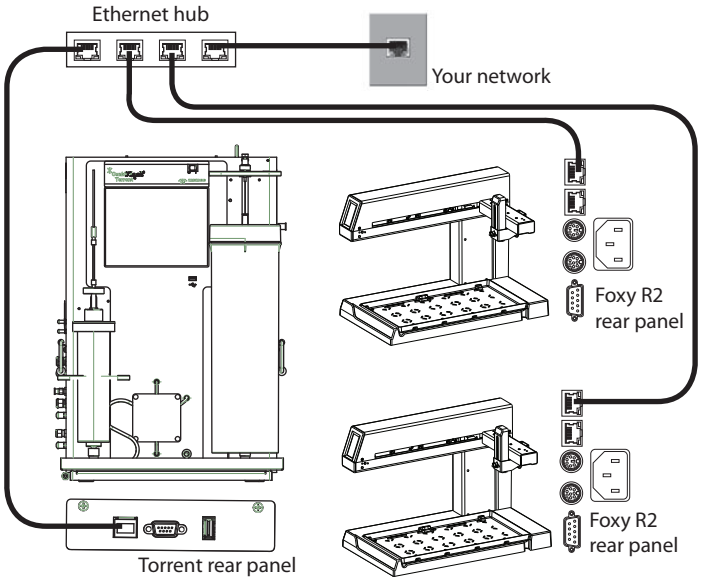


Figure 2-17 Network configurations: Example 3

2.17 Purge the Internal Solvent Lines (Torrent)

If setting up the Torrent AQ skip to section 2. The Torrent is shipped from the factory with isopropyl alcohol in the internal lines. Before the first use, the lines should be purged. To do so:

1. Connect the solid load cartridge tubing to the sample injection port (Refer to the *CombiFlash Torrent User Manual*, Figure 1-1, item 9).

⚠ CAUTION

Pinch point. Your fingers or hands can be seriously injured if you place them between the moving parts of the Solid Load Cartridge Cap Mount or the Upper Column Mount. Use care when installing solid load cartridges or columns.

2. Insert the column bypass tube (part number 209-0165-76 from accessory kit 60-5249-002).
3. Ensure that the Solvent A inlet line is receiving hexane, and the Solvent B inlet is receiving ethyl acetate.
4. Select the "Tools>Manual Control" menu command to open the Manual Control window.
5. Select the THROUGH COLUMN & CARTRIDGE Valve Position setting.
6. Touch the PRIME B button. The solvent pump will start.

☑ *Note*

When pumping solvents the first time, inspect the solvent and waste connections to the system. If any leaks are observed, click the STOP button. Correct the leak by tightening the fitting an additional 1/4 turn, and then restart the pump by touching the PRIME B button.

7. After at least 400 mL of solvent has been pumped, touch the STOP button.
8. Touch the PRIME A button. The solvent pump will start. Inspect the solvent and waste lines and correct leaks if necessary.
9. After at least 400 mL of solvent has been pumped, touch the STOP button.

10. Close the Manual Control window.
11. After the pressure gauge on the touch screen has returned to 0 psi, remove the column bypass tube and disconnect the solid load cartridge tubing from the Sample Injection Port. The column bypass tube should be drained and returned to the accessory kit.

☑ Note

If using the optional Sample Load Pump, purge the pump with at least 20 mL of Solvent A and run the pump dry.

After purging the lines, the system is ready for the optional system verification (Section 2.20) or operation.

2.18 Purge the Internal Solvent Lines (Torrent AQ)

The Torrent is shipped from the factory with isopropyl alcohol in the internal lines. Before the first use, the lines should be purged. To do so:

1. Connect the solid load cartridge tubing to the sample injection port (Refer to the *CombiFlash Torrent User Manual*, Figure 1-1, item 9.)

⚠ CAUTION

Pinch point. Your fingers or hands can be seriously injured if you place them between the moving parts of the Solid Load Cartridge Cap Mount or the Upper Column Mount. Use care when installing solid load cartridges or columns.

2. Insert the column bypass tube (part number 209-0165-76 from accessory kit 60-5249-002).
3. Ensure that the Solvent A inlet line is receiving water, and the Solvent B inlet is receiving methanol or another suitable organic modifier. If using the optional Solvent Selection Valve, choose methanol (or another suitable organic solvent) as the B1 solvent and an additional organic solvent as the B2 solvent.
4. Select the "Tools>Manual Control" menu command to open the Manual Control window.
5. Select the THROUGH COLUMN & CARTRIDGE Valve Position setting.
6. Touch the PRIME B1 button. The solvent pump will start.

☑ Note

When pumping solvents the first time, inspect the solvent and waste connections to the system. If any leaks are observed, click the STOP button. Correct the leak by tightening the fitting an additional 1/4 turn, and then restart the pump by touching the PRIME B button.

7. After at least 400 mL of solvent has been pumped, touch the STOP button.
8. Repeat steps 6 and 7 for the B2 solvent. Touch the PRIME A button. The solvent pump will start. Inspect the solvent and waste lines and correct leaks if necessary.
9. After at least 400 mL of solvent has been pumped, touch the STOP button.
10. Close the Manual Control window.
11. After the pressure gauge on the touch screen has returned to 0 psi, remove the column bypass tube and disconnect the solid load cartridge tubing from the Sample Injection Port. The column bypass tube should be drained and returned to the accessory kit.

☑ Note

If using the optional Sample Load Pump, purge the pump with at least 20 mL of Solvent A and run the pump dry.After purging the lines, the system is ready for the optional system verification (Section 2.20) or operation.

2.19 System Verification

It is recommended that the system operation be verified. To do so, follow the directions supplied with the Torrent Verification Kit. Be sure to follow the correct instructions depending if the system is set up for normal or reverse phase solvent operation.

2.20 Installation Qualification Checklist

Table 2-1 can be completed to verify and document the installation procedures contained in Section 2 of this guide.

Table 2-1 Installation Qualification Checklist

Step	Description	Installer Initials	Operator Initials
2.1	OPTIONAL EQUIPMENT MODULES		
2.3	INSTRUMENT LOCATION		
2.5	CONNECT POWER		
2.6	CONNECT INTERFACE CABLES		
2.7	POSITION THE TORRENT		
2.8	CONNECT SOLVENT SELECT VALVE PLUMBING		
2.10	CONNECT WASTE LINES		
	IF AN OPTIONAL WASTE CAP IS NOT USED, ENSURE THE WASTE LINES ARE SECURED SO THEY DRAIN INTO THE WASTE CONTAINER. SECURE THE WASTE LEVEL SENSE AIR TUBING SO ITS OUTLET IS AT LEAST TWO INCHES (5 CM) BELOW THE CONTAINER'S MAXIMUM LEVEL. SEAL THE CONTAINER OPENING TO AVOID SOLVENT VAPORS.		
2.11	CONNECT AND ROUTE DRAIN LINE		
2.12	PLUMBING OPTIONAL MODULES TO TORRENT		
2.14	GROUNDING		
2.15	TURN ON POWER		
	CONFIGURE THE TORRENT (Refer to the *CombiFlash Torrent User Manual*, Section 3.1)		
2.17	PURGE THE INTERNAL SOLVENT LINES (TORRENT)		
2.18 (step 7)	AFTER AT LEAST 400 mL OF SOLVENT HAS BEEN PUMPED, TOUCH THE STOP BUTTON.		
Certification of Section 2 Completion			
	Installer Name (print):		
	Installer Signature:		
	Date:		
	Operator Name (print):		
	Operator Signature:		
	Date:		
Comments:			

EU DECLARATION OF CONFORMITY

We the manufacturer:

Manufacturer's Name: **Manufacturer's Address:**	Teledyne ISCO 4700 Superior Street, Lincoln, NE 68504 USA

Declare, under our sole responsibility that the following equipment:

Product Model:	**COMBIFLASH TORRENT** **COMBIFLASH TORRENT AQ**
Object of Declaration:	Large Scale Flash Chromatography System

Is designed and manufactured in compliance with the following applicable Directives and Standards:

Directive - Union Legislation	Standard
2014/35/EU - Low Voltage	EN 61010-1:2010/A1:2019
2014/30/EU - EMC	EN 61326-1:2013 EN 55011:2016/A1:2016/A11:2020 EN 61000-3-3:2013 EN 61000-3-2:2014
2011/65/EU - RoHS, with amendments	EN IEC 63000:2018

I, the undersigned, hereby declare, by sole responsibility of the manufacturer that the design of the equipment specified above conforms to the above Directives and Standards, and the fulfilment of essential safety requirements and essential requirements set out in the Directives have been demonstrated.

Authorized Signatory

Signature: Samuel Ramey

Name: Samuel Ramey

Title: Director of Engineering

Date: 7/12/2023

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Lincoln, NE 68504 USA
+1 402-464-0231
www.teledyneisco.com

UK DECLARATION OF CONFORMITY

We the manufacturer:

Manufacturer's Name: **Manufacturer's Address:**	Teledyne ISCO 4700 Superior Street, Lincoln, NE 68504 USA

Declare, under our sole responsibility that the following equipment:

Product Model:	**COMBIFLASH TORRENT** **COMBIFLASH TORRENT AQ**
Object of Declaration:	Large Scale Flash Chromatography System

Is designed and manufactured in compliance with the following applicable Regulations and Standards:

Statutory Instrument (Regulation)	Standard
UKSI 2016 /1101 Electrical Equipment (Safety)	EN 61010-1:2010/A1:2019
UKSI 2016/1091 EMC	EN 61326-1:2013 EN 55011:2016/A11:2020 EN 61000-3-2:2013 EN 61000-3-3:2014
UKSI 2012/3032 RoHS	EN IEC 63000:2018

I, the undersigned, hereby declare, by sole responsibility of the manufacturer that the design of the equipment specified above conforms to the above Directives and Standards, and the fulfilment of essential safety requirements and essential requirements set out in the Directives have been demonstrated.

Authorized Signatory

Signature: Samuel Ramey

Name: Samuel Ramey

Title: Director of Engineering

Date: 7/12/2023

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产品中有毒有害物质或元素的名称及含量

Name and amount of Hazardous Substances or Elements in the product

部件名称 Component Name	有毒有害物质或元素 Hazardous Substances or Elements					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二联苯 (PBDE)
液晶显示 LCD Display (none on RF4X)	O	O	O	O	O	O
线路板 Circuit boards	X	O	O	O	O	O
接线 Wiring	O	O	O	O	X	O
内部电缆 Internal Cables	O	O	O	O	X	O
主电源线 Line Cord	O	O	O	O	X	O
步进电机 Stepper Motor	X	O	O	O	X	O
氘气灯 Deuterium lamp	O	O	X	O	O	O
阀体 Valve Body	O	O	O	O	X	O

产品中有毒有害物质或元素的名称及含量：Name and amount of Hazardous Substances or Elements in the product

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在ST/ 标准规定的限量要求以下。

O: Represent the concentration of the hazardous substance in this component is any homogeneous pieces is lower than the ST/ standard limitation.

X：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出ST/ 标准规定的限量要求。

(企业可在此处，根据实际情况对上表中打"X"的技术原因进行进一步说明。)

X: Represent the concentration of the hazardous substance in this component is at least one homogeneous piece is higher than the ST/ standard limitation.

(Manufacturer may give technical reasons to the "X" marks)

环保使用期由经验确定。

The Environmentally Friendly Use Period (EFUP) was determined through experience.

生产日期被编码在系列号码中。前三位数字为生产年(207 代表2007年) 。随后的一个字母代表月份：A为一月，B为二月，等等。

The date of Manufacture is in code within the serial number. The first three numbers are the year of manufacture (207 is year 2007) followed by a letter for the month. "A" is January, "B" is February and so on.