

Modifier Addition Systems

For Teledyne Isco Syringe Pumps

Overview

Pumping systems using a modifier (usually a solvent) may have different configurations, depending on the application, including:

- Two separate pumps delivering a mixture of supercritical fluid and modifier to one or more user-provided extractors.
- A dual pump system in constant pressure mode pumping supercritical fluid, with a third pump delivering the modifier.

In both configurations, the purpose is to dispense a mixture with a programmable v/v ratio. Modifier concentrations of up to 100% can be programmed. Both fluids pass through one-way check valves before they meet and are blended in a static mixing tee (refer to Figures 1 and 2).

! DANGER

Risk of injury. The pressure produced could be up to 700 bar. Please utilize appropriate tubing and connections as noted.

Modifier with Single Pumps

The modifier addition system with extractor utilizes two D Series syringe pumps regulated by one controller to deliver a mixture of supercritical fluid and modifier to one or more user-supplied extractors.

The mixing tee union fitting, check valves, and SST tubing are pre-assembled. The only connections you have to make are to the pump outlet ports and outlet tubing from the tee (tubing not provided).

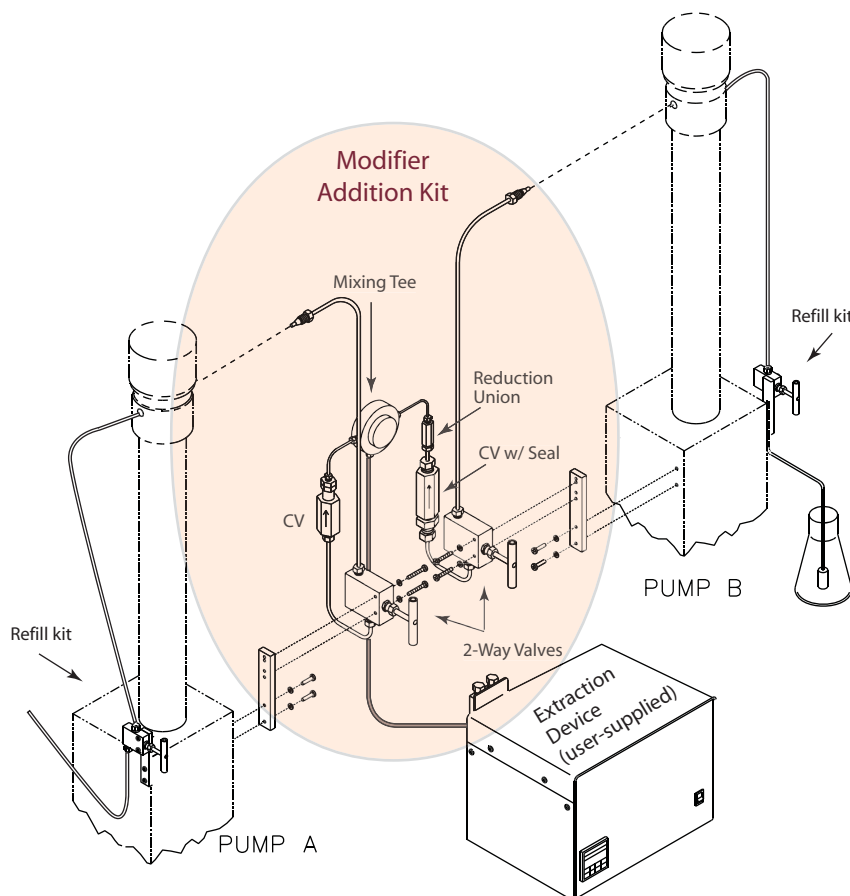
Installing the Kit

The following installation steps refer to Figure 1 below.

Note

Tighten fittings just enough to hold tubing in place. Final tightening will be done after all tubing and fittings are connected.

The PTFE tubing (part #023-0504-02) and filter (part #209-9012-10) from the syringe pump refill kit should be connected to the inlet valve of pump B.



1. Attach a 2-way valve to each pump housing, using the spacer block and screws.
2. Attach the pump outlet tubing/two-way valve assembly to each pump outlet.
3. Attach the 10.2cm pre-bent SST tubing from the check valve inlet to the two-way valve outlet.
4. Connect your tubing from the tee outlet to your equipment.
5. Tighten all fittings.

Tubing for connection to user equipment is not provided. Optional 1/16" and 1/8" OD SST tubing may be ordered from Teledyne Isco.

Figure 1: Modifier addition kit installation

Two-pump configuration

Table 1 contains modifier addition kit components for connecting the outlets of two pumps, using a Valco $\frac{1}{16}$ " tee as a mixer.

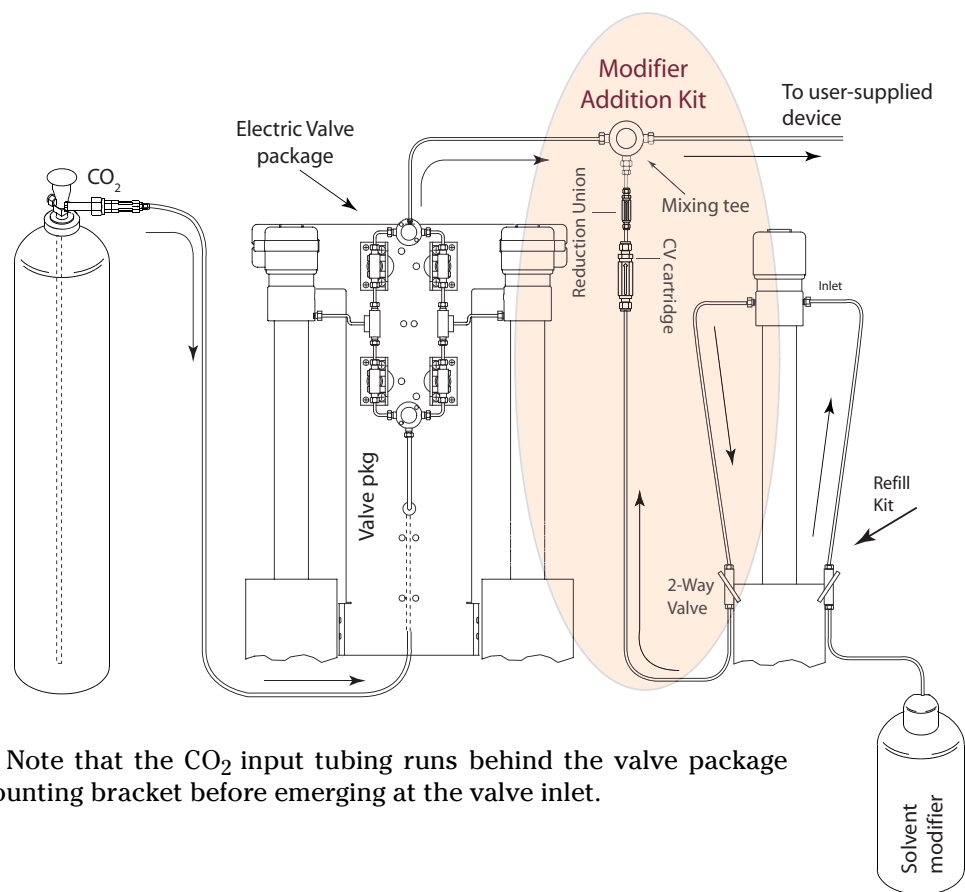
Table 1: Modifier Addition Kit for Two Pumps (part #68-1247-079)

Description	Part Number	Description	Part Number	Description	Part Number
Tee union fitting $\frac{1}{16}$ "	209-0169-47	$\frac{1}{8}$ " nut (4)	209-0169-27	Check valve cartridge $\frac{1}{8}$ "	209-0161-80
$\frac{1}{16}$ " OD \times 12 cm tubing	60-1243-540	$\frac{1}{16}$ " OD \times 1.5 m tubing	60-1243-539	Check valve/mixer tubing	60-1243-691
$\frac{1}{16}$ " Ferrule	209-0169-34	Valve spacer (2)	60-1243-659	Appropriate screws and washers also included.	
$\frac{1}{16}$ " Gland nut	209-0169-35	2-way valve - $\frac{1}{8}$ " OD (2)	209-0098-05		
Standard check valve housing	60-2253-209	Tubing, valve inlet (2)	60-1243-658		
Check valve cartridge	60-3864-010	Tubing, check valve (2)	60-1243-644		
Single check valve housing	60-1243-516	Reduction union	209-0162-10		
$\frac{1}{8}$ " Ferrule, zero vol (4)	209-0169-41	$\frac{1}{8}$ " OD \times 2.57 SST tubing	60-1243-570		

Modifier and Continuous Flow System

A continuous flow system consists of two syringe pumps and a valve package regulated by one

controller. This allows you to continuously deliver liquefied gas in constant pressure mode while a separate single pump delivers a modifier.



Note that the CO₂ input tubing runs behind the valve package mounting bracket before emerging at the valve inlet.

Figure 2: Modifier addition kit installation With continuous flow

Note
The modifier pump is a single pump; when its cylinder is empty, the system stops. The cylinder must be manually refilled before the system can run again.

Table 2 contains modifier addition components for connecting to a continuous flow system.

Table 2: Modifier Addition Components for Continuous Flow System

Description	Part Number
Tee union fitting 1/16"	209-0169-47
Check valve cartridge	60-3864-010
Single check valve housing	60-1243-516
Tubing, check valve	60-1243-644
2-way valve - 1/8" OD	209-0098-05
Tubing, valve inlet	60-1243-658
Reduction union 1/8" to 1/16"	209-0162-10
Valve spacer	60-1243-659
1/16" OD x 12 cm tubing	60-1243-540
1/8" OD x 2.57 SST tubing	60-1243-570
Check valve cartridge 1/8"	209-0161-80
Check valve/mixer tubing	60-1243-691

Programming for Modifier Mode

Note
For detailed information about setup and operation of systems using the modifier addition, consult Section 9 of your D Series user manual.

Before operation in modifier mode, zero and fill the pumps under independent control/constant pressure mode.

Once the pumps are ready, place them in modifier mode:

Press MENU (**MENU**) > MORE (**A**) > MULTI-PUMP (**4**), and select CONTIN MODIFIER (**5**).

Minimum Modifier Pressure Setting

The default setting for the minimum modifier pump pressure is 50PSI. This can be changed to a value appropriate for the type of modifier being used.

If there is no need to change minimum pressure, press PREVIOUS (**D**) three times to return to the main menu. The screen will display the words PRES-SURE MODIFIER.

To change the minimum pressure:

Press MIN MOD PRESS (**B**).

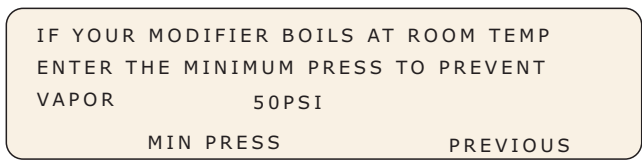


Figure 3: Minimum modifier pressure screen

Select MIN PRESS (**B**). "ENTER MIN PRES" will flash. Type the desired pressure value and then press ENTER.

Press PREVIOUS (**D**) four times to return to the main menu. The screen will display the words PRES-SURE MODIFIER.

Modifier Concentration

To set the modifier concentration, press % PUMP (**C**), or %PUMP B or C. Use the numeric keys to enter the desired percentage of modifier and press ENTER to save the value.

Valve Packages and Refill Kits

Table 3: Valve Packages

Valve Package	Part #
Dual Electric	
1000D	68-1247-109
5000D	68-1247-091
260D/100DM/DX	68-1247-090
Controller for electric valves	68-1240-062
Single Manual	
1000D Refill	68-1247-117
1000D Outlet	68-1247-118
5000D Refill	68-1247-083
1000D Outlet	68-1247-082
260D/100DM/DX Refill	68-1247-077
1000D Outlet	68-1247-078
Auto-Refill Kit	68-1247-071
CO ₂ Cylinder Connect Package	68-1247-043

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