# Agilent InfinityLab 2D-LC Solutions

## Quick Installation Guide

## Contents




Agilent Technologies

# Introduction

One of the strengths of the Agilent InfinityLab 2D-LC Solutions is its possibility to build systems choosing from a large set of LC modules. Many different modules can be used and even existing systems can be upgraded. The only requirement is a 1290 Infinity Binary Pump G4220A or 1290 Infinity II High Speed Pump G7120A as second dimension pump and a unit containing an Agilent 1290 Valve Drive (G1170A) plus a valve suitable for 2D-LC. The final stack configurations and necessary parts depend on the 2D-LC-Method. Further details are provided in the 2D-LC Solution Manual (G2198-90501)

# Delivery checklist

The Capillary Kit 2D-LC, 1290 Infinity II (5067-6585) contains the following parts:

| # | p/n | Description |
|---|---|---|
| 2 | 5043-0269 | Adapter-profile<br>for Agilent 1290 Valve Drive (G1170A) |
| 1 | 5067-4608 | Capillary ST 0.17 mm x 280 mm SX/S |
| 2 | 5067-4651 | Capillary ST 0.12 mm x 280 mm SL/SX |
| 1 | 5067-4669 | Capillary ST 0.12 mm x 600 mm S/SL |
| 1 | 5067-4670 | Capillary ST 0.17 mm ID 600 mm pre-swaged |
| 1 | 5500-1217 | Capillary ST 0.17 mm x 900 mm SI/SX ps-ps |
| 1 | 5500-1227 | Capillary ST 0.17 mm x 150 mm SL-SL |
| 1 | 5500-1240 | Capillary ST 0.17 mm x 105 mm SL/SL |
| 2 | 5500-1245 | Capillary ST 0.17 mm x 400 mm SI/SI |
| 2 | 5500-1251 | Capillary ST 0.12 mmX 400 mm SL/SL |

**NOTE** Depending on the set up of you instrument, extra parts and capillaries might be required for instrument set up. Those parts are ordered separately or are shipped with other components, for example the 2D-LC or MHC valves. Their origin as well as their function is described in the instrument setup section below.

# Options

**NOTE**

The Agilent InfinityLab 2D-LC Solutions must contain an Agilent 1290 Infinity Binary Pump G4220A or Agilent Infinity II High Speed Pump G7120A as 2nd dimension pump.

This is necessary to achieve the following:

- Synchronize valve switches
- Run fast gradients on the 2nd dimension column

**Table 1** Overview of recommended hardware configurations

| Function in $^2$D | Functional Element | Part Number | Module | Comment |
|---|---|---|---|---|
| | Pump | G7120A | 1290 Infinity II High Speed Pump | |
| | | G7112B | 1260 Infinity II Binary Pump | |
| | | G7111B | 1290 Infinity II Quaternary Pump | |
| | | G7104A | 1290 Infinity II Flexible Pump | |
| | | G7104C | 1260 Infinity II Flexible Pump | |
| | | G4220A/B | 1290 Infinity Binary Pump | |
| | | G4204A | 1290 Infinity Quarternary Pump | |
| | | G1312B | 1260 Infinity Binary Pump | |
| | Sampler | G7129B | 1290 Infinity II Vialsampler | |
| | | G7167B | 1290 Infinity II Multisampler | |
| | Column Compartment | G7116B | 1290 Infinity II Multicolumn Thermostat | |
| | | G1316C | 1290 Infinity Thermostatted Column Compartment | |
| | Detector | G7117A/B/C | 1260/1290 Infinity II Diode Array Detector | Recommended for multiple heart-cutting and high-resolution sampling as a peak trigger or for monitoring. Optional for comprehensive 2D-LC. $^1$D flow cells require a minimum pressure stability of 60 bar (which excludes FLD and RID detectors). |
| | | G7114A/B | 1260/1290 Infinity II Variable Wavelength Detector | |
| | | G7115A | 1260 Infinity II Diode Array Detector WR | |
| | | G7165A | 1260 Infinity II Multiple Wavelength Detector | |

**Table 1** Overview of recommended hardware configurations

| Function in $^{2}$D | Functional Element | Part Number | Module | Comment |
|---|---|---|---|---|
| Interface | Valve drive | G1170A | 1290 Infinity Valve Drive | 1x for SHC, LCxLC<br>3x for MHC, HighRes Sampling |
| | 2D-LC Valve | G4236A | 2D-LC valve kit, Standard | Contains the 2D-LC valve head |
| | | G4243A | 2D-LC valve kit, ASM | Contains the 2D-LC valve head with Active Solvent Modulation (ASM) functionality |
| | MHC Valves | G4236A#007<br>G4243A#007 | Multiple Heart-Cutting Kit | Contains two MHC valve heads |
| | | G4242A | 2D-LC Multiple Heart-Cutting Upgrade Kit | Kit to upgrade MHC valves to an existing 2D-LC system |
| | Pressure Relief Kit (PRK) | G4236-60010 | Pressure Relief Kit | Mandatory if a $^{1}$D detector is used. The kit prevents pressure pulses and protects detector flow cells! |
| $2^{nd}$ dimension | Pump | G7120A | 1290 Infinity II High Speed Pump | 1290 Infinity or Infinity II Binary Pump required. |
| | | G4220A/B | Infinity 1290 Binary Pump | |
| | Column Compartment | G7116B | 1290 Infinity II Multicolumn Thermostat | Optional: A second column compartment is optional for large temperature differences between $1^{st}$ and $2^{nd}$ dimension. Any of these are supported as well as others or older modules. |
| | | G1316C | 1290 Infinity Thermostatted Column Compartment | |
| | Detector | G7117A/B/C | 1260/1290 Infinity II Diode Array Detector | |
| | | G7114A/B | 1260/1290 Infinity II Variable Wavelength Detector | |
| | | G7115A | 1260 Infinity II Diode Array Detector WR | |
| | | G7165A | 1260 Infinity II Multiple Wavelength Detector | |
| | | G1321B | 1260 Infinity FLD | |
| | | G4260A | 1260 Infinity ELSD | |

# Recommendations for instrument setup

## General Information

InfinityLab 2D-LC Solutions come in several flavors, still allowing flexible combination of InfinityLab Series and 1200 Series Infinity modules. For 2D-LC, a two-stack configuration is necessary. On the left stack, the order of the modules from bottom to top is: pumps for both dimensions, then Vial- or Multisampler. The sampler must be placed on top of the pumps. The right stack consists of one or two column compartments and one or two detectors. When using multiple detectors at different positions of the system, it is recommended to use the same detector type. Depending on the number of solvents used, both stacks offer the possibility to place a solvent cabinet on top.

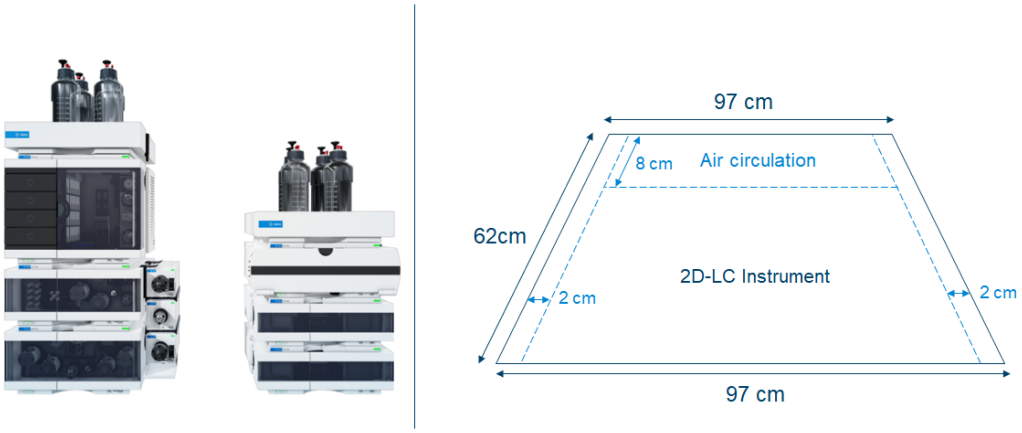



**Figure 1** Left: Recommended stack configuration for the 1290 Infinity II 2D-LC System. Right: Bench space requirements of the 1290 Infinity II 2D-LC System.

**NOTE** The dual stack configuration for 2D-LC requires at least 97 x 62 cm (24.4 x 38.2 inches) free, vertical bench space. 2.5 cm (1.0 inches) of space on either side and approximately 8 cm (3.1 inches) in the rear is reserved for air circulation and electric connections.

Agilent InfinityLab 2D-LC Solutions offer two general valve configurations that decide that decide which of the 2D-LC modes that can be used with the instrument. While the Single Heart-Cutting (SHC) configuration offers access to Single Heart-Cutting and Comprehensive 2D-LC, the Multiple Heart-Cutting (MHC) configurations additionally gives access to Multiple Heart-Cutting and High-Resolution Sampling 2D-LC. In addition, the Active Solvent Modulation valve (G4243A) is only available for the MHC configuration. An overview of all available 2D-LC modes can be found in Optional hardware configurations (Table 1 on page 3).

Stack setups of all other LC modules (reference) remain valid since those setups are independent of the valve configuration.

**Table 2** Overview of 2D-LC modes dependent on valve configuration of the 2D-LC system

| Valves | SHC Configuration | MHC Configuration |
|---|---|---|
| |  |  |
| 2D-LC Valve, Standard | ✓ | ✓ |
| 2D-LC Valve, Active Solvent Modulation (ASM) | X | ✓ |
| **Operation Modes** | **SHC Configuration** | **MHC Configuration** |
| Comprehensive (LCxLC) | ✓ | ✓ |
| Single Heart-Cutting | ✓ | ✓ |
| Multiple Heart-Cutting | X | ✓ |
| High Resolution Sampling | X | ✓ |

## Single Heart-Cutting Configuration

2D-LC instruments that are exclusively used for Single Heart-Cutting and Comprehensive 2D-LC experiments only require the standard 2D-LC valve (G4236A). The valve can be conveniently attached to any Infinity II pump that is installed. For a SHC configuration, transfer capillaries (6a/6b) are not necessary since MHC decks are not installed.

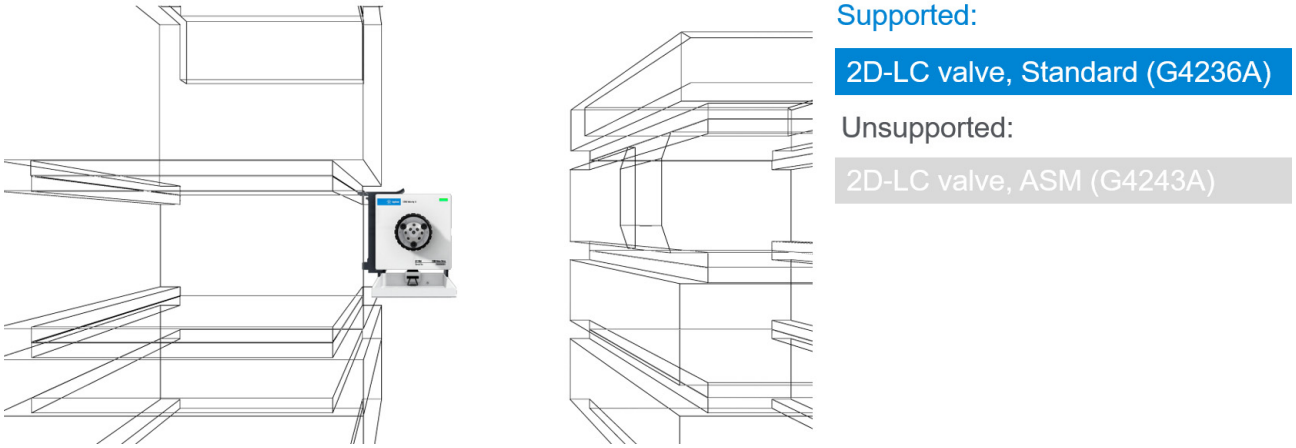



**Figure 2** Schematics of a Single Heart-Cutting (SHC) Configuration with supported valves. For technical reasons, the ASM valve (G4243A) is not supported in Single Heart-Cutting setups.

## Multiple Heart-Cutting Configuration

2D-LC instruments that are used for Multiple Heart-Cutting or High-Resolution Sampling 2D-LC require additional MHC decks. For MHC configurations, both the standard 2D-LC valve (G4236A) and the ASM valve head (G4243A) are supported. The valves can be conveniently attached to any Infinity II pump in the stack. Depending on the valve head that is used, different transfer capillaries (6a/6b) must be installed. For installation, please follow the guidance below.

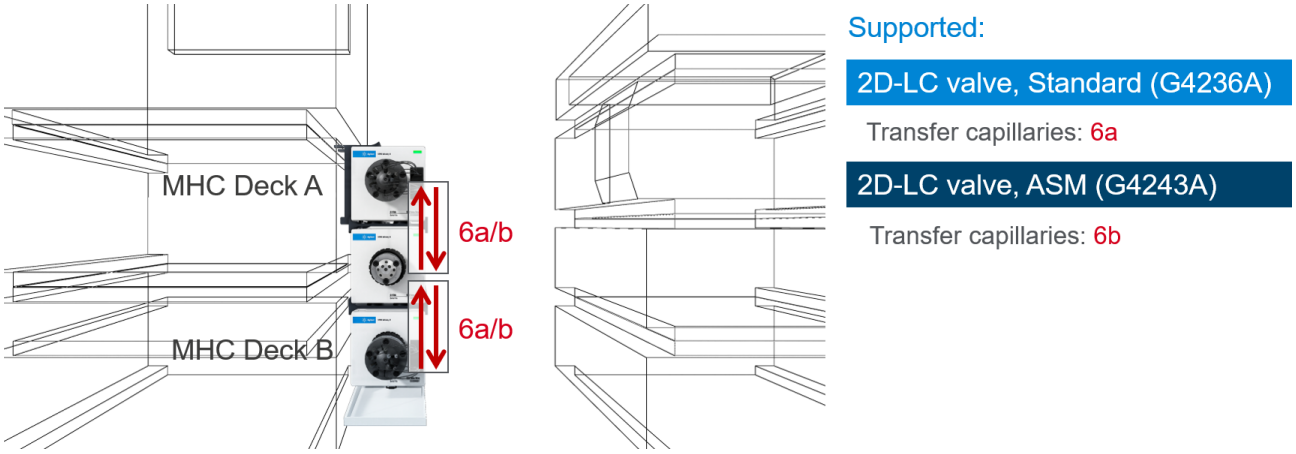



**Figure 3** Schematics of a Multiple Heart-Cutting (MHC) Configuration with supported valves and transfer capillaries.

# Recommended stack setups

InfinityLab 2D-LC Solutions allow three basic stack setups in three variations depending on the column compartment concept that is used. The basic stack configurations are distinguished by the pump used for the first and second dimension. In the second dimension a 1290 Infinity or 1290 Infinity II High-Speed Pump is mandatory. Agilent 1290 Infinity pumps are always based on the bottom. The capillary kit covers all recommended configurations. The following configurations optimize the system flow path, ensuring minimum delay and dispersion volumes:

**Table 3** Supported instrument configurations with a list of supported LC pumps. Numbers refer to the stack setup that is recommended.

| # | $^{1}$D pump | supported $^{2}$D pumps |
|---|---|---|
| 1 | **1290 Infinity II / 1260 Infinity II Prime LC**<br>1260 Infinity II Flexible Pump (G7104C)<br>1290 Infinity II Flexible Pump (G7104A)<br>1290 Infinity II High-Speed Pump (G7120A) | **1290 Infinity / 1290 Infinity II**<br>1290 Infinity II High-Speed Pump (G7120A)<br>1290 Infinity Binary Pump (G4220A) |
| 2 | **1290 Infinity**<br>1290 Infinity Quaternary Pump (G4204A)<br>1290 Infinity Binary Pump (G4220A) | **1290 Infinity II**<br>1290 Infinity II High-Speed Pump (G7120A) |
| 3 | **1260 Infinity Binary / 1260 Infinity II Binary**<br>1260 Infinity II Binary Pump (G7112B)<br>1260 Infinity Binary Pump (G1312B) | **1290 Infinity II**<br>1290 Infinity II High-Speed Pump (G7120A) |

**NOTE**

This guide only covers setups that contain at least one Infinity II pump module! Setups that contain exclusively 1200 Infinity Series modules must be installed with the corresponding capillary kit. Connections mentioned in this setup are con-current direction for the Standard 2D-LC Valve (G4236A) and countercurrent for the ASM 2D-LC Valve (G4243A). To connect the 2D-LC Valve, Standard in countercurrent direction, please follow the schematics shown in the 2D-LC Software Configuration screen. For more information, please read the 2D-LC Software Configuration section below. Connection to valve port are mentioned in brackets, for example. ASM Valve (2) = ASM Valve, Port 2.

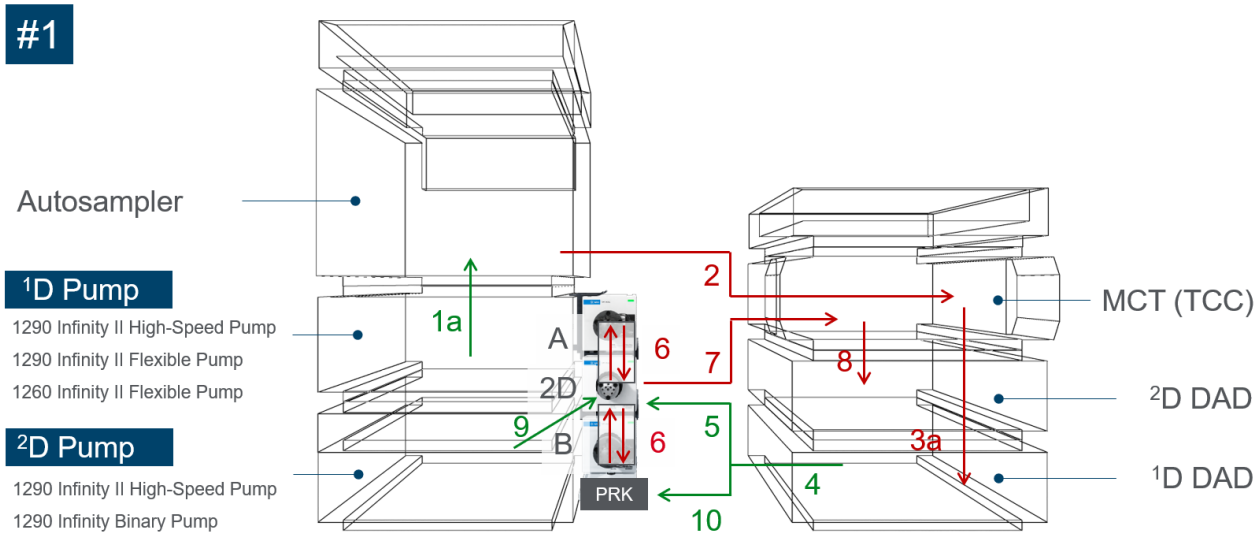



**Figure 4** Stack Setup #1. Recommended setup if both pumps are Infinity II modules or the $^{2}$D pump is a 1290 Infinity Binary pump.

| Number of Capillary | # | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| 1a | 1 | $^{1}$D pump (top) to autosampler | 400 x 0.17 | 5500-1245 | Capillary ST 0.17x400 SI/SI |
| 2 | 1 | Autosampler to $^{1}$D column (in MCT) | 600 x 0.12 | 5067-4669 | Capillary ST 0.12x600 S/SL |
| 3a | 1 | $^{1}$D column to $^{1}$D DAD | 400 x 0.12 | 5500-1251 | Capillary ST 0.12x400 SL/SL |
| 4 | 1 | $^{1}$D DAD to T-piece of PRK | 400 x 0.17 | 5500-1245 | Capillary ST 0.17x400 SI/SI |
| 5 | 1 | T-piece of PRK to Standard 2D-LC Valve (Port 3) / ASM Valve (Port 4) | 105 x 0.17 | 5500-1240 | Capillary ST 0.17x105 SL/SL |
| 6a | 4 | 2D-LC Valve (1) - Deck (IN) – Deck (Out) - 2D-LC Valve (8) 2D-LC Valve (5) - Deck (IN) – Deck (Out) - 2D-LC Valve (4) | 170 x 0.12 | 5500-1270 | Capillary ST 0.12x170 S/M |
| 6b | 4 | ASM Valve (7) - Deck (IN) – Deck (Out) - ASM Valve (3) ASM Valve (2) - Deck (IN) – Deck (Out) - ASM Valve (8) | 170 x 0.12 | 5500-1376 | Capillary ST 0.12x170 M/M (delivered with 2D-LC Valve Kit, ASM) |
| 7 | 1 | 2D-LC valve (6) / ASM valve (10) to $^{2}$D column (in MCT) | 400 x 0.12 | 5500-1251 | Capillary ST 0.12x400 SL/SL |
| 8 | 1 | $^{2}$D column (in MCT) to $^{2}$D DAD | 280 x 0.12 | 5067-4651 | Capillary ST 0.12x280 SL/SX |
| 9 | 1 | $^{2}$D pump to 2D-LC Valve (7) / ASM Valve (5) | 280 x 0.17 | 5067-4608 | Capillary ST 0.17x280 SX/S |
| 10 | 1 | T-piece of PRK to damper capillary | 150 x 0.17 | 5500-1227 | Capillary ST 0.17x150 SL/SL |
| 11 | 1 | waste line | self-cut x 0.7 | 0890-1713 | Tubing-flexible 0.8/1.61mm PTFE WT (delivered with UV detector) |

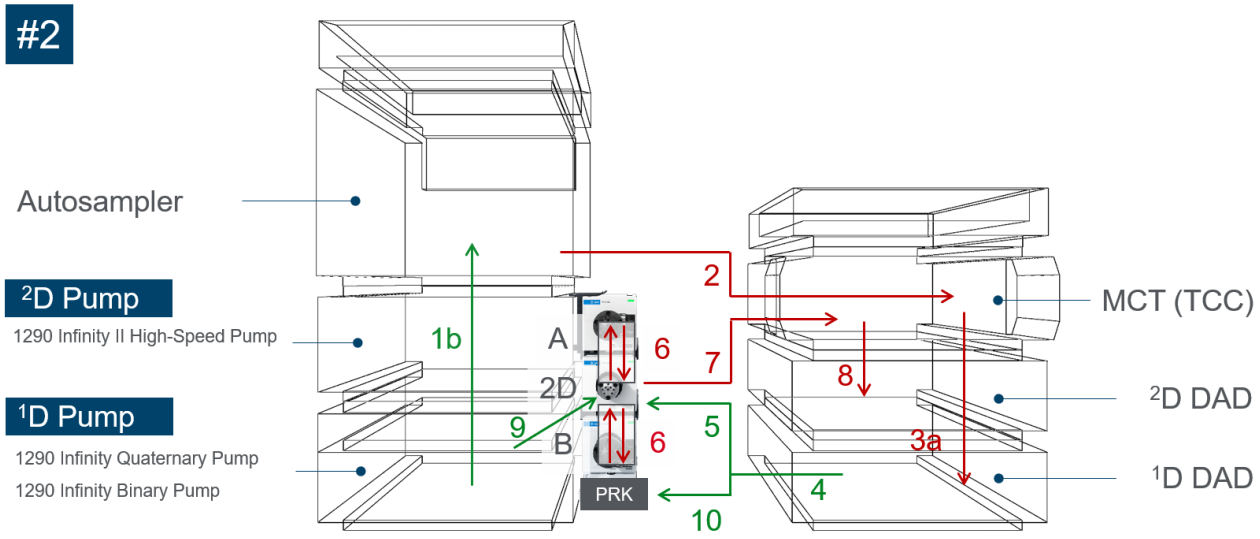



**Figure 5** Stack Setup #2. Recommended setup if the $^{1}$D pump is a 1290 Infinity Binary Pump or a 1290 Infinity Quaternary Pump.

| Number of Capillary | # | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| 1b | 1 | $^{1}$D pump (bottom) to sampler | 600 x 0.17 | 5067-4670 | Capillary ST 0.17x600 S/SH |
| 2 | 1 | Autosampler to $^{1}$D column (in MCT) | 600 x 0.12 | 5067-4669 | Capillary ST 0.12x600 S/SL |
| 3a | 1 | $^{1}$D column to $^{1}$D DAD | 400 x 0.12 | 5500-1251 | Capillary ST 0.12x400 SL/SL |
| 4 | 1 | $^{1}$D DAD to T-piece of PRK | 400 x 0.17 | 5500-1245 | Capillary ST 0.17x400 SI/SI |
| 5 | 1 | T-piece of PRK to Standard 2D-LC Valve (Port 3) / ASM Valve (Port 4) | 105 x 0.17 | 5500-1240 | Capillary ST 0.17x105 SL/SL |
| 6a | 4 | 2D-LC Valve (1) - Deck (IN) – Deck (Out) - 2D-LC Valve (8) 2D-LC Valve (5) - Deck (IN) – Deck (Out) - 2D-LC Valve (4) | 170 x 0.12 | 5500-1270 | Capillary ST 0.12x170 S/M |
| 6b | 4 | ASM Valve (7) - Deck (IN) – Deck (Out) - ASM Valve (3) ASM Valve (2) - Deck (IN) – Deck (Out) - ASM Valve (8) | 170 x 0.12 | 5500-1376 | Capillary ST 0.12x170 M/M (delivered with 2D-LC Valve Kit, ASM) |
| 7 | 1 | 2D-LC valve (6) / ASM valve (10) to $^{2}$D column (in MCT) | 400 x 0.12 | 5500-1251 | Capillary ST 0.12x400 SL/SL |
| 8 | 1 | $^{2}$D column (in MCT) to $^{2}$D DAD | 280 x 0.12 | 5067-4651 | Capillary ST 0.12x280 SL/SX |
| 9 | 1 | $^{2}$D pump to 2D-LC Valve (7) / ASM Valve (5) | 280 x 0.17 | 5067-4608 | Capillary ST 0.17x280 SX/S |
| 10 | 1 | T-piece of PRK to damper capillary | 150 x 0.17 | 5500-1227 | Capillary ST 0.17x150 SL/SL |
| 11 | 1 | waste line | self-cut x 0.7 | 0890-1713 | Tubing-flexible 0.8/1.61mm PTFE WT (delivered with UV detector) |

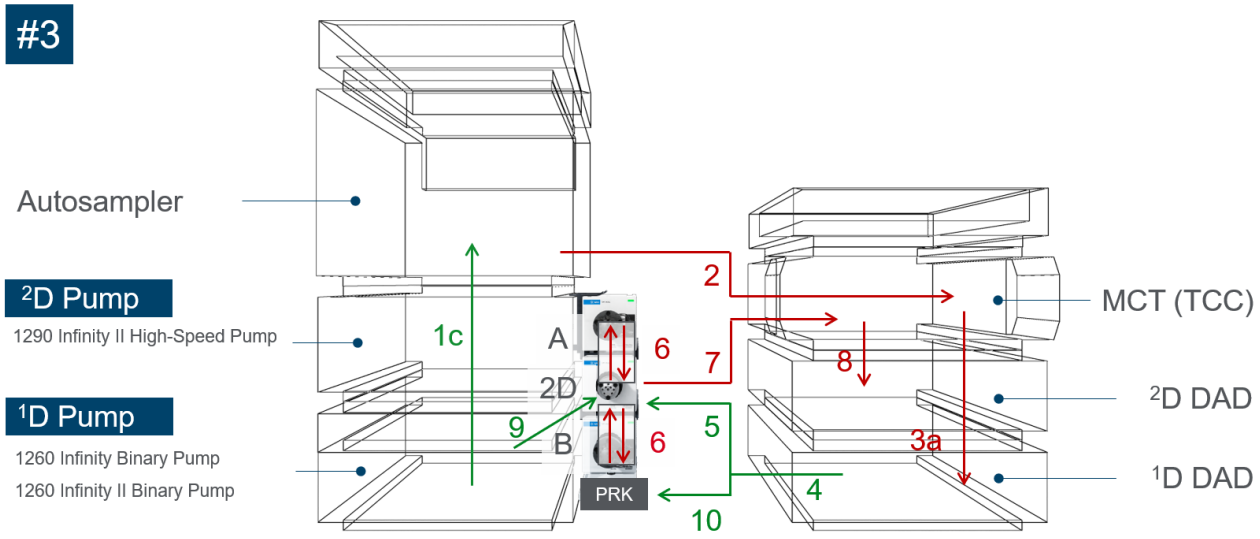



**Figure 6** Stack Setup #3. Recommended setup if the $^{1}$D pump is a 1260 Infinity or 1260 Infinity II Binary Pump.

| Number of Capillary | # | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| 1c | 1 | $^{1}$D pump (bottom) to sampler | 900 x 0.17 | 5500-1217 | Capillary ST 0.17x900 SI/SX |
| 2 | 1 | Autosampler to $^{1}$D column (in MCT) | 600 x 0.12 | 5067-4669 | Capillary ST 0.12x600 S/SL |
| 3a | 1 | $^{1}$D column to $^{1}$D DAD | 400 x 0.12 | 5500-1251 | Capillary ST 0.12x400 SL/SL |
| 4 | 1 | $^{1}$D DAD to T-piece of PRK | 400 x 0.17 | 5500-1245 | Capillary ST 0.17x400 SI/SI |
| 5 | 1 | T-piece of PRK to Standard 2D-LC Valve (Port 3) / ASM Valve (Port 4) | 105 x 0.17 | 5500-1240 | Capillary ST 0.17x105 SL/SL |
| 6a | 4 | 2D-LC Valve (1) - Deck (IN) – Deck (Out) - 2D-LC Valve (8) 2D-LC Valve (5) - Deck (IN) – Deck (Out) - 2D-LC Valve (4) | 170 x 0.12 | 5500-1270 | Capillary ST 0.12x170 S/M |
| 6b | 4 | ASM Valve (7) - Deck (IN) – Deck (Out) - ASM Valve (3) ASM Valve (2) - Deck (IN) – Deck (Out) - ASM Valve (8) | 170 x 0.12 | 5500-1376 | Capillary ST 0.12x170 M/M (delivered with 2D-LC Valve Kit, ASM) |
| 7 | 1 | 2D-LC valve (6) / ASM valve (10) to $^{2}$D column (in MCT) | 400 x 0.12 | 5500-1251 | Capillary ST 0.12x400 SL/SL |
| 8 | 1 | $^{2}$D column (in MCT) to $^{2}$D DAD | 280 x 0.12 | 5067-4651 | Capillary ST 0.12x280 SL/SX |
| 9 | 1 | $^{2}$D pump to 2D-LC Valve (7) / ASM Valve (5) | 280 x 0.17 | 5067-4608 | Capillary ST 0.17x280 SX/S |
| 10 | 1 | T-piece of PRK to damper capillary | 150 x 0.17 | 5500-1227 | Capillary ST 0.17x150 SL/SL |
| 11 | 1 | waste line | self-cut x 0.7 | 0890-1713 | Tubing-flexible 0.8/1.61mm PTFE WT (delivered with UV detector) |

# Alternative instrument setups for additional functionality

The standard stack setups can be upgraded with additional valves to add additional functionality. Table 2 gives an overview of all supported modifications of a standard 2D-LC instrument. At a time, only one modification is recommended to ensure correct operation of the instrument. The standard stack setup uses one column compartment that hosts both the $^{1}$D and $^{2}$D column.

**Table 4** List up supported modifications of a standard 2D-LC instrument configuration.

| Alternative column compartment concepts | | Comment | Page |
|---|---|---|---|
| A | $^{1}$D MCT/TCC hosts column switching valve | If a 6-position/14-port or 8-position/18-port InfinityLab Quick Change Valve is used, additional two adapters necessary (2xG1316-87326, must be purchased separately) | See Figure 7 on page 13 |
| B | Setups that contain separate $^{1}$D and $^{2}$D MCTs/TCCs | | See Figure 8 on page 14 |
| C | Setups in which the $^{1}$D column is hosted in an Integrated Column Compartment (ICC) | Longer capillary (5500-1170) for Quick Connect Fitting at column inlet or new 0.12x280mm Quick Connect Fitting assembly (5067-5960) necessary (must be purchased separately). | See Figure 9 on page 15 |
| D | Setup with a MS diverter valve | | See Figure 10 on page 16 |
| E | Setup of a $^{1}$D/$^{2}$D Switching Valve | If a $^{1}$D and $^{2}$D detector is used; not supported with modifications A-C | See Figure 11 on page 17 |
| F | $^{1}$D/$^{2}$D Switching Valve w/o $^{1}$D detector | For setups that do not have a $^{1}$D detector, e.g. for certain LCxLC setups or setups with a QQQ mass spectrometer as a $^{2}$D detector; not supported with modifications A-C | See Figure 12 on page 18 |

A

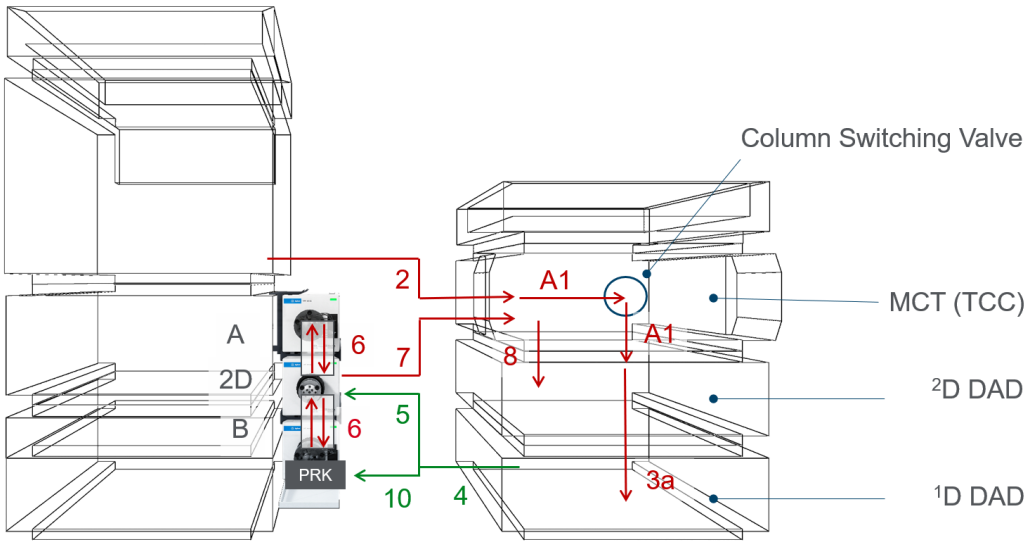



**Figure 7** Setup A. Recommended setup if a column switching valve (for example 6-position/14-port InfinityLab Quick-Change Valve) is used. For a InfinityLab 2-position/6-port Quick-Change Valve, adapters A1 are not necessary.

| Number of Capillary | # | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| A1 | 2 | Adapter: capillary 2 to column switching valve, (Port IN) / Adapter column switching valve (Port OUT) to capillary 3a | 75x0.12mm | G1316-87326 | SST Capillary 75x0.12mm, f/m, ns 0.8 (must be purchased separately) |
| For all other capillaries / connections, please refer to Figure 4 on page 9, Figure 5 on page 10, and Figure 6 on page 11. | | | | | |

**NOTE** Adapters to and from the column switching valve are only necessary if a 6-position/14-port InfinityLab Quick-Change Valve or a for example 8-position/18-port InfinityLab Quick-Change Valve is used.

B

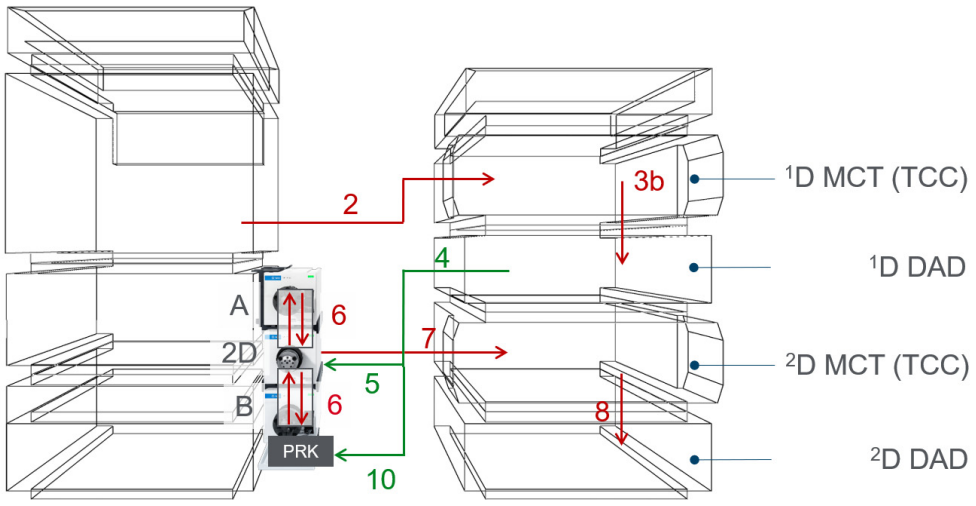



**Figure 8** Setup B. Recommended setup if the instrument contains separate MCTs/ TCCs for $^{1}$D and $^{2}$D columns.

| Number of Capillary | # | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| 3b | 1 | $^{1}$D column to $^{1}$D DAD | 280 x 0.12 | 5067-4651 | Capillary ST 0.12x280 SL/SX |
| 8 | 1 | $^{2}$D column (in $^{2}$D MCT) to $^{2}$D DAD | 280 x 0.12 | 5067-4651 | Capillary ST 0.12x280 SL/SX (part of 2D-LC capillary kit) |
| For all other capillaries / connections, please refer to Figure 4 on page 9, Figure 5 on page 10, and Figure 6 on page 11. | | | | | |

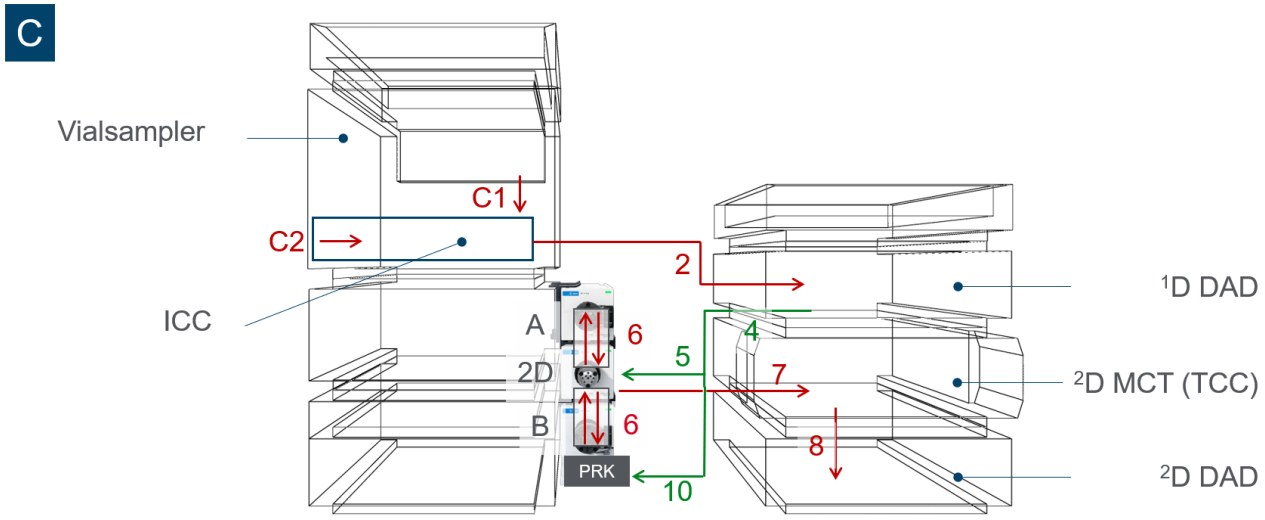



**Figure 9** Setup C. Recommended setup if $^{1}$D column is hosted in an Integrated Column Compartment (ICC).

| Number of Capillary | # | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| C1 | 1 | Injection Valve to ICC | 0.12x105mm | 5500-1238 | Capillary ST 0.12x105 SL/SL (provided with ICC) |
| C2 | 1 | Heat exchanger out to column (InfinityLab Quick Connect Fitting) | 0.12x280mm | 5500-1170 | Capillary ST 0.12x280 (must be purchased separately) |
| 8 | 1 | $^{2}$D column (in $^{2}$D MCT) to $^{2}$D DAD | 280 x 0.12 | 5067-4651 | Capillary ST 0.12x280 SL/SX (part of 2D-LC capillary kit) |

For all other capillaries / connections, please refer to Figure 4 on page 9, Figure 5 on page 10, and Figure 6 on page 11.

The 2D-LC Software allows only certain valves to be configured as diverter valves. A list of supported valves can be found in Table 3 on page 8. More information is available in the Agilent Technical Note *Agilent InfinityLab 2D-LC Solution with mass spectrometric detection and diverter valve* (G4236-90100).

| p/n | Description |
|---|---|
| G4231A | 2pos/6port valve head, 800 bar |
| G4231C | 2pos/6port valve head, 1300 bar |
| G4232C | 2pos/10port valve head, 800 bar |
| G4232D | 2pos/10port valve head, 1300 bar |

D

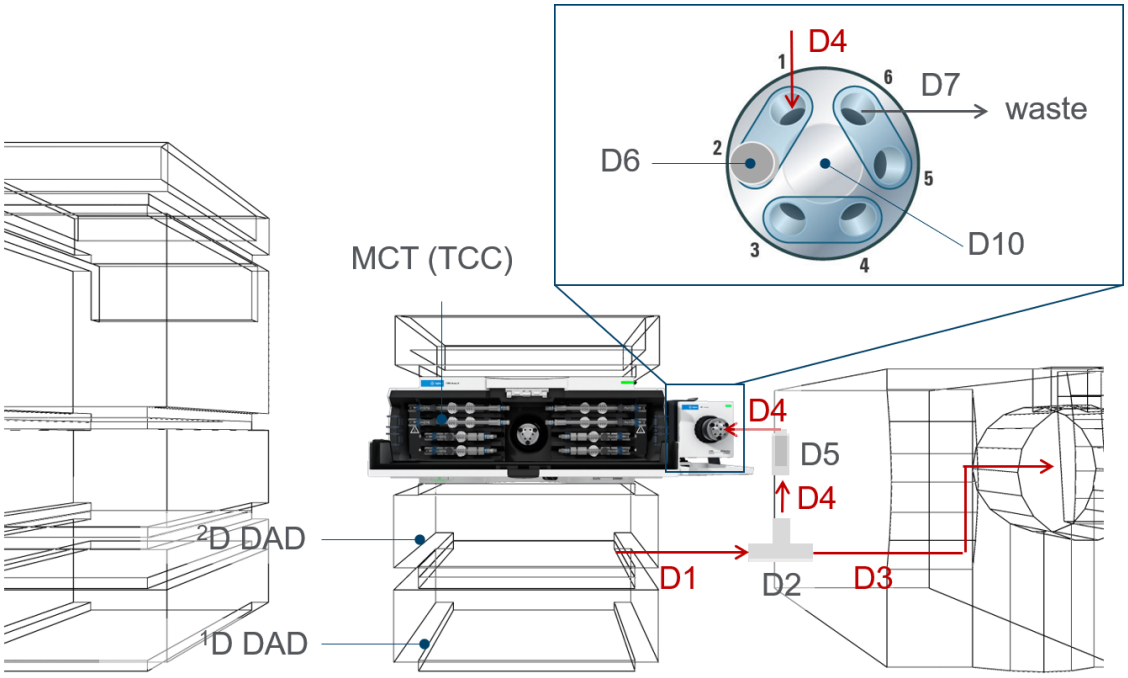



**Figure 10** Setup D. Recommended setup of a MS diverter valve.

| Number of Capillary | # | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| D1 | 1 | Capillary from $^{2}$D detector to T-piece | 0.12 x 400 | 5067-4606 | Capillary ST 400x0.12 S/SH |
| D2 | 1 | T-piece | | 0100-0969 | 1/16in Tee, SST, Low Dead Volume |
| D3 | 1 | Capillary from MS to T-piece (self cut) | 0.12 x 400 | 0890-1915 | Capillary PEEK, 0.12x1250 |
| D4 | 2 | T-piece to pressure relief valve; pressure relief valve to diverter valve | 0.3 x 80 | 5500-1228 | Capillary ST 0.3x80 SL/SL |
| D5 | 1 | Pressure relief valve | | G4212-60022 | Pressure relief valve |
| D6 | 1 | blank nut | | 01080-83202 | Blanking Nut 1/16 in SST |
| D7 | 1 | diverter valve to waste | | 5062-2462 | Tubing PTFE 0.7 mm x 5m |
| D8 | 1 | peak fittings | | 5063-6591 | Fitting-Fingertight PEEK for 1/16-in |
| D9 | 1 | Valve holder for Valve drive to attach to MCT | | 5067-6138 | Valve Holder Kit Right-IF-II-G |
| D10 | 1 | Diverter Valve | | G4231A<br>G4231C<br>G4232A<br>G4232C | 2pos/6port, 800bar<br>2pos/6port, 1300bar<br>2pos/10port, 800bar<br>2pos/10port, 1300bar |

For all other capillaries / connections, please refer to Figure 4 on page 9, Figure 5 on page 10, and Figure 6 on page 11.

The $^{1}D/^{2}D$ switching valve offers the possibility to exclude the $^{2}D$ flow path of the instrument to run both $^{1}D$ and $^{2}D$ experiments which is useful for example if one mass spectrometer is used for both $^{1}D$ and $^{2}D$ experiments. Two basic setups are supported (setup E and F). The recommended setups for a $^{1}D/^{2}D$ Switching valves do not support the use of ICC column compartments, column switching valves or the use of separate $^{1}D$ and $^{2}D$ MCTs/TCCs! To run 1D experiments, the $^{2}D$ mode must be disabled in the 2D-LC Software Configuration Tab.

E

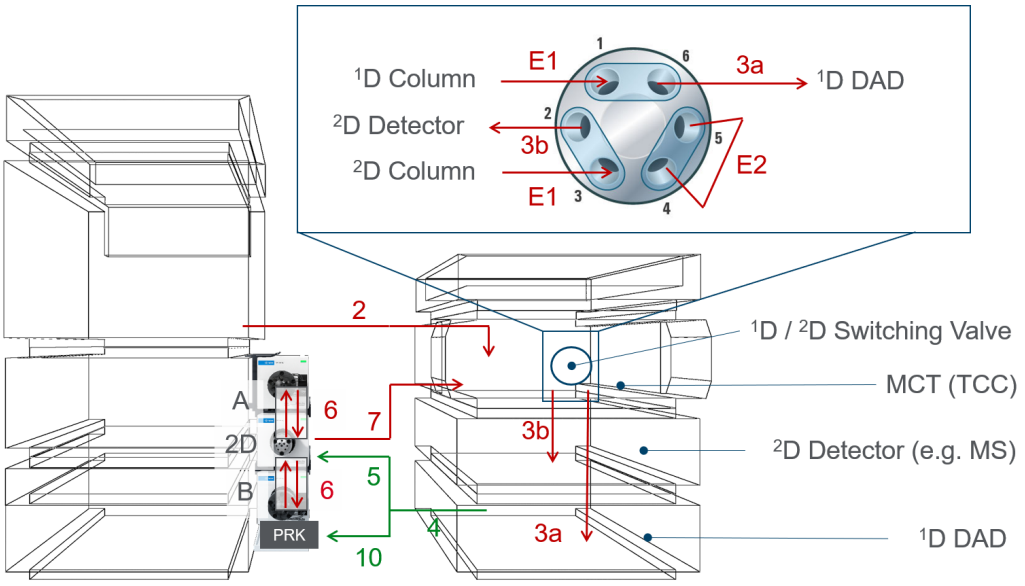



**Figure 11** Setup E. Recommended setup for the $^{1}D/^{2}D$ switching valve.

| Number of Capillary | # | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| 3a | 1 | MCT / TCC to $^{1}D$ DAD | 400 x 0.12 | 5500-1251 | Capillary ST 0.12x400 SL/SL |
| 8 | 1 | $^{1}D$ MCT / TCC to $^{1}D$ DAD | 280 x 0.12 | 5067-4651 | Capillary ST 0.12x280 SL/SX |
| E1 | 2 | $^{1}D$ column to $^{1}D/^{2}D$ Switching Valve (1); $^{2}D$ column to $^{1}D/^{2}D$ Switching Valve (3) | 120 x 0.12 | 5067-4652 | Capillary ST 0.12x 120 SX/SX |
| E2 | 1 | Connection capillary $^{1}D/^{2}D$ Switching Valve (4) to (5) | 90 x 0.12 | 5067-4649 | Capillary ST 0.12x90 SX/S |

For all other capillaries / connections, please refer to Figure 4 on page 9, Figure 5 on page 10, and Figure 6 on page 11.

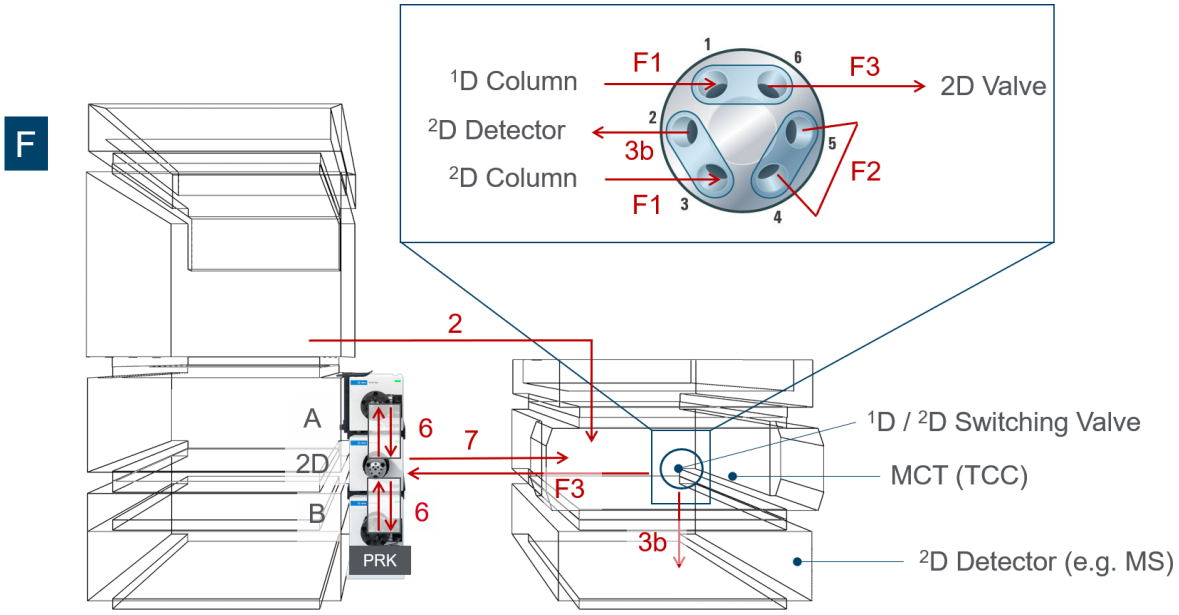



**Figure 12** Setup F. Recommended setup for the $^{1}D/^{2}D$ switching valve without $^{1}D$ detector.

| Number of Capillary | # | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| 3b | 1 | $^{1}D/^{2}D$ Switching Valve (2) to $^{2}D$ DAD | 280 x 0.12 | 5067-4651 | Capillary ST 0.12x280 SL/SX |
| F1 | 2 | $^{1}D$ column to $^{1}D/^{2}D$ Switching Valve (1); $^{2}D$ column to $^{1}D/^{2}D$ switching valve (3) | 120 x 0.12 | 5067-4652 | Capillary ST 0.12x 120 SX/SX |
| F2 | 1 | Connection $^{1}D/^{2}D$ switching valve ports (4) to (5) | 90 x 0.12 | 5067-4649 | Capillary ST 0.12x90 SX/S |
| F3 | 1 | MCT/TCC to 2D-LC valve (6) / ASM valve (4) | 500 x 0.12 | 5500-1157 | Capillary ST 0.12x500 SL/S |
| For all other capillaries / connections, please refer to Figure 4 on page 9, Figure 5 on page 10, and Figure 6 on page 11. | | | | | |

# Installation of the 2D-Valves

## Attaching the external valve drives

For InfinityLab 2D-LC instruments that comprise at least one 1260 Infinity II or 1290 Infinity II pump, valve drives are attached to this pump with the Valve Clamp Kit IF II (5067-5685), while the valve drives are interconnected by the Adapter profile (5043-0269). The 2D-LC valve and if selected the MHC decks are mounted on external valve drives (G1170A).

| # | Holders / connectors | Connection | P/N |
|---|---|---|---|
| 3 | 1290 Infinity Valve Drive (must be purchased separately) | Mooting of Valves | G1170A |
| 1 | Clamp Guide Kit IF II (delivered with G1170A) | Top valve to pump | 5067-5685 |
| 2 | Adapter-profile (delivered with MHC Decks) | between G1170A drives | 5043-0269 |

For a SHC configuration, the 2D-LC valve (G4236A) is attached to the upper pump of the stack. In case of a MHC configuration, the upper MHC deck is attached to the upper pump.

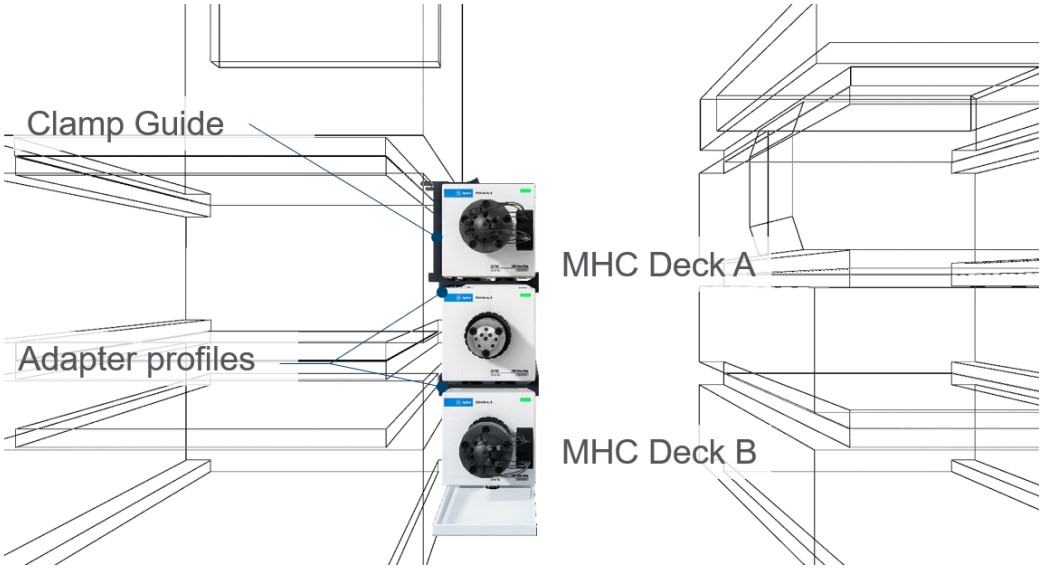



**Figure 13** Schematic of the installation and attachments of the 2D-LC valve and optionally the MHC decks.

1. Mount the clamp guide on the right side of the Infinity II Pump: Markings in the form of round dips are on the body housing. Make a small hole with a peaked screw driver and tighten the clamp guide with the 3 self-cutting tapping screws.
2. Mount the valve heads on the G1170A external valve drives.
3. Clamp the first external valve drive with the MHC valve on top.
4. Attach the adapter-profile on each of the other external valve drives and mount them according to the positions shown in Figure 13 on page 19.
5. Mount the leak tray with sensor underneath the lowest external valve drive.
6. Install the Pressure release kit, see “Installing the Pressure Release Kit” on page 24.

# Connecting the 2D-LC Valve, Standard (G4236A)

The capillary connections of the 2D-LC valves depend on whether a con- or countercurrent configuration achieved. For the standard 2D-LC Valve, both concurrent and countercurrent operation is possible. Schematics in this chapter will reflect a concurrent direction. For the countercurrent setup, please refer to Countercurrent configuration of the Standard 2D-LC Valve in the 2D-LC Software. You find the “Valve topology” configuration screen in OpenLab CDS ChemStation Edition under Instrument>2D-LC Configuration.

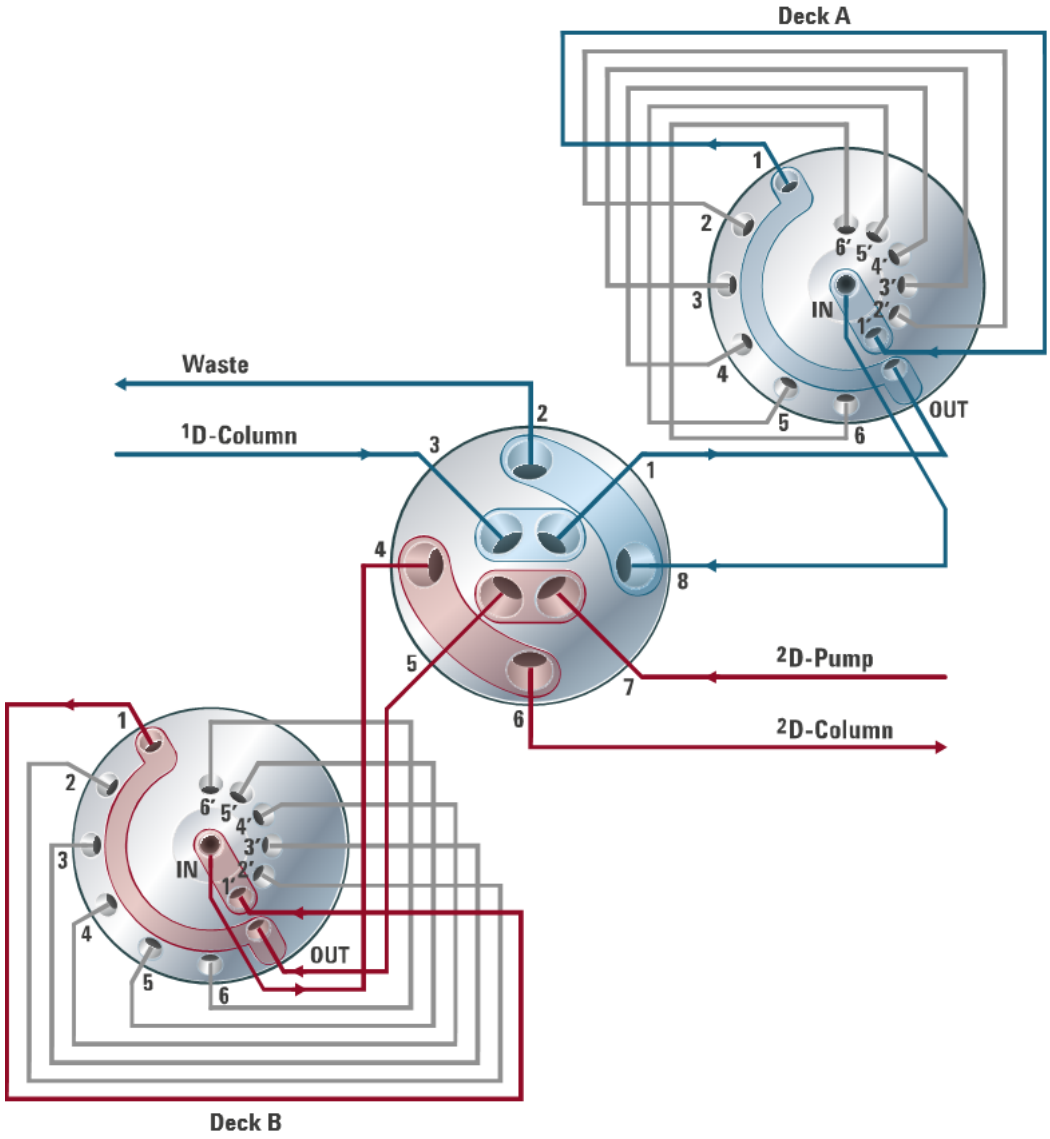



**Figure 14** Schematic representation of the Standard 2D-LC Valve (G4236A) in concurrent flow.

| Port | Number of Capillary | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| 1 | 6a | transfer capillary to MHC Valve (OUT), deck A | 170 x 0.12 | 5500-1270 | Capillary ST 0.12x170 S/M |
| 2 | 11 | waste line | self-cut x 0.7 | 0890-1713 | Tubing-flexible 0.8/1.61mm PTFE WT (delivered with UV detector) |
| 3 | 5 F3 | from pressure release kit; from $^{1}$D column, $^{1}$D detector | 105 x 0.17 500 x 0.12 | 5500-1240 5500-1157 | Capillary ST 0.17x105 SL/SL Capillary ST 0.12x500 SL/S |
| 4 | 6a | transfer capillary to MHC Valve (IN), deck B | 170 x 0.12 | 5500-1270 | Capillary ST 0.12x170 S/M |
| 5 | 6a | transfer capillary to MHC Valve (OUT), deck B | 170 x 0.12 | 5500-1270 | Capillary ST 0.12x170 S/M |
| 6 | 7 | to $^{2}$D column | 400 x 0.12 | 5500-1251 | Capillary ST 0.12x400 SL/SL |
| 7 | 9 | from $^{2}$D pump | 280 x 0.17 | 5067-4608 | Capillary ST 0.17x280 SX/S |
| 8 | 6a | transfer capillary to MHC Valve (IN), deck A | 170 x 0.12 | 5500-1270 | Capillary ST 0.12x170 S/M |

# Connecting the 2D-LC Valve, ASM (G4243A)

In contrast to the standard 2D-LC Valve (G4236A) Agilent recommends using a counter-current configuration for the ASM 2D-LC Valve (G4243A) when working in ASM mode. This section describes the setup for a counter-current configuration of the ASM Valve. For the concurrent setup, please refer to concurrent configuration of the ASM 2D-LC Valve in the 2D-LC Software. You find the **Valve topology** configuration screen in OpenLab CDS ChemStation Edition under **Instrument > 2D-LC Configuration**.

The installation of a 2D-LC system depends on which modules you are using for which 2D-LC mode and is described above. The connection scheme is displayed in the graphical user interface of the 2D-LC Configuration as **Valve Topology**:

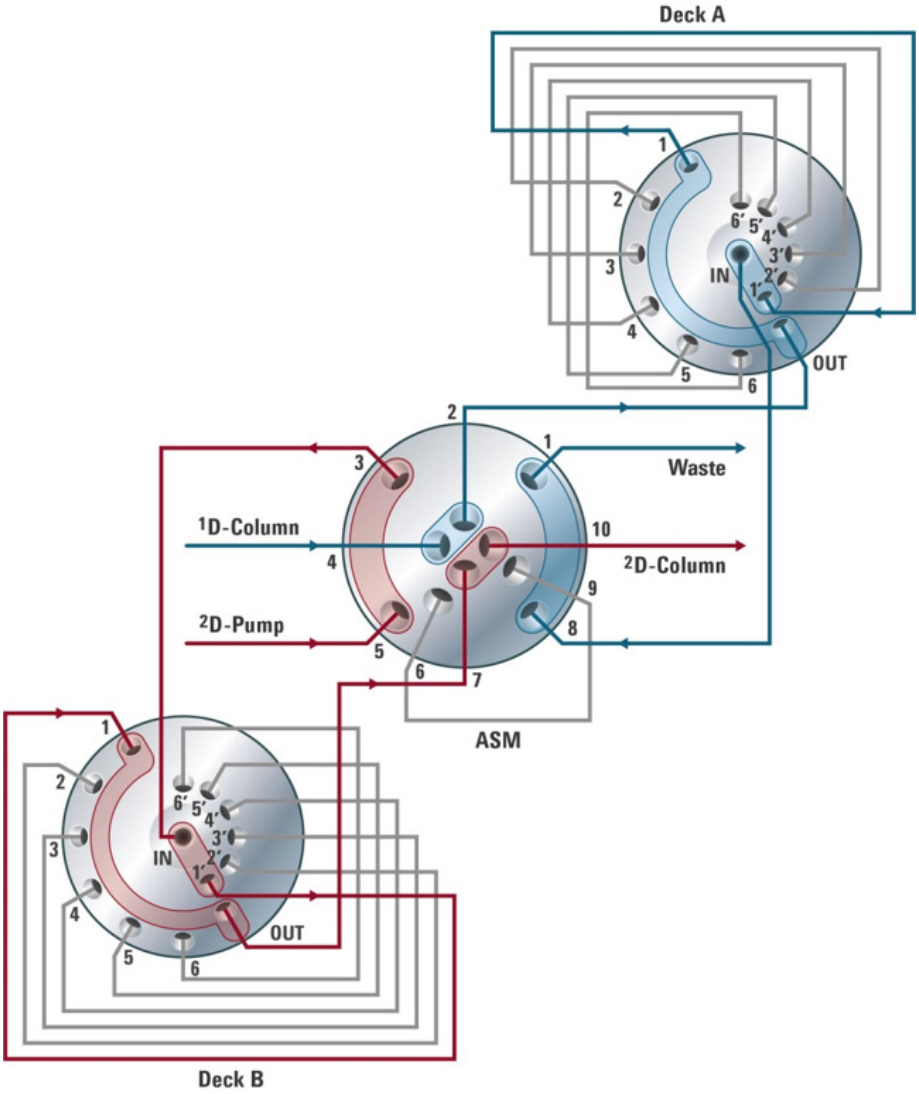



**Figure 15** Schematic representation of the ASM 2D-LC Valve (G4243A) in countercurrent flow.

| Port | Number of Capillary | Connection | L x ID [mm] | P/N | Description |
|---|---|---|---|---|---|
| 1 | 11 | waste line | self-cut x 0.7 | 0890-1713 | Tubing-flexible 0.8/1.61mm PTFE WT (delivered with UV detector) |
| 2 | 6b | transfer capillary to MHC Valve (IN), deck A | 170 x 0.12 | 5500-1376 | Capillary ST 0.12x170 M/M |
| 3 | 6b | transfer capillary from MHC Valve (OUT), deck B | 170 x 0.12 | 5500-1376 | Capillary ST 0.12x170 M/M |
| 4 | 5 F3 | from pressure release kit; from $^{1}$D column, $^{1}$D detector | 105 x 0.17 500 x 0.12 | 5500-1240<br>5500-1157 | Capillary ST 0.17x105 SL/SL<br>Capillary ST 0.12x500 SL/S |
| 5 | 9 | from $^{2}$D pump | 280 x 0.17 | 5067-4608 | Capillary ST 0.17x280 SX/S |
| 6 | ASM1-4 | outlet to ASM capillary | L x 0.12 | | see list below |
| 7 | 6b | transfer capillary to MHC Valve (IN), deck B | 170 x 0.12 | 5500-1376 | Capillary ST 0.12x170 M/M |
| 8 | 6b | transfer capillary from MHC Valve (OUT), deck A | 170 x 0.12 | 5500-1376 | Capillary ST 0.12x170 M/M |
| 9 | ASM1-4 | inlet from ASM capillary | L x 0.12 | | see list below |
| 10 | 7 | to $^{2}$D column | 400 x 0.12 | 5500-1251 | Capillary ST 0.12x400 SL/SL |

Which ASM capillary shall be used depends on the ASM factor, which is optimum for your application. You may choose from following capillaries:

| Capillary p/n | Length (mm) | Inner diameter (mm) | Volume (µl) | ASM factor | Split ratio (loop:ASM) |
|---|---|---|---|---|---|
| 5500-1300 | 85 | 0.12 | 0.96 | 5 | 1:4 |
| 5500-1301 | 170 | 0.12 | 1.9 | 3 | 1:2 |
| 5500-1302 | 340 | 0.12 | 3.8 | 2 | 1:1 |
| 5500-1303 | 680 | 0.12 | 7.7 | 1.5 | 1:0.5 |

# Installing the Pressure Release Kit

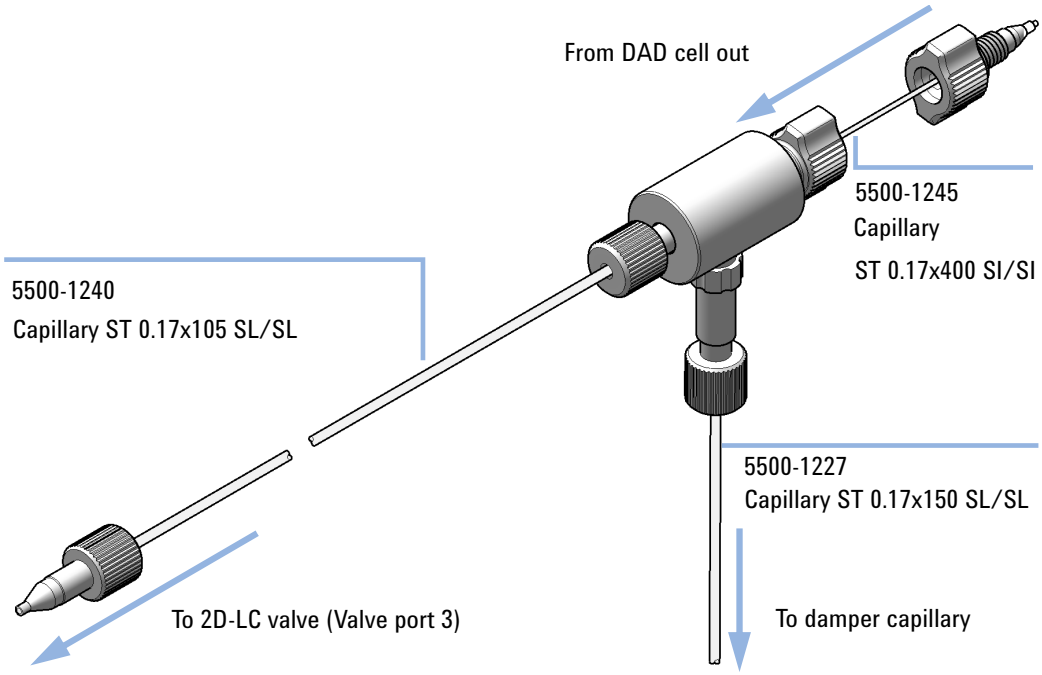
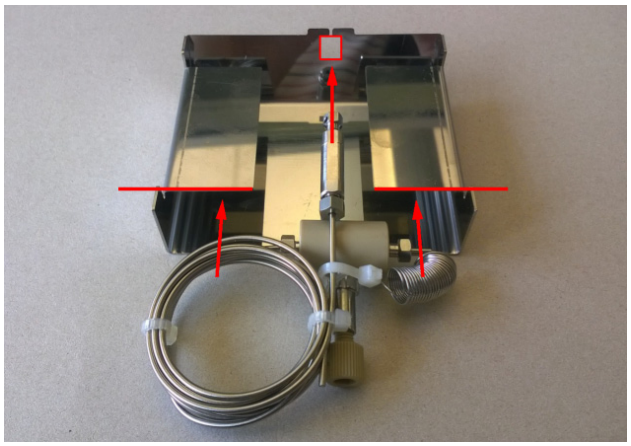


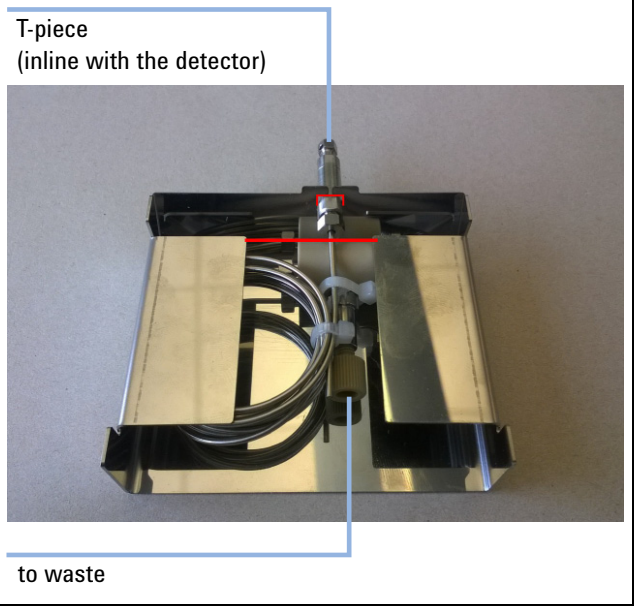

**Figure 16** Connections to the pressure release kit

| Parts required | # | p/n | Description |
|---|---|---|---|
| | 1 | G4236-60010 | 2D-LC Pressure Release Kit |

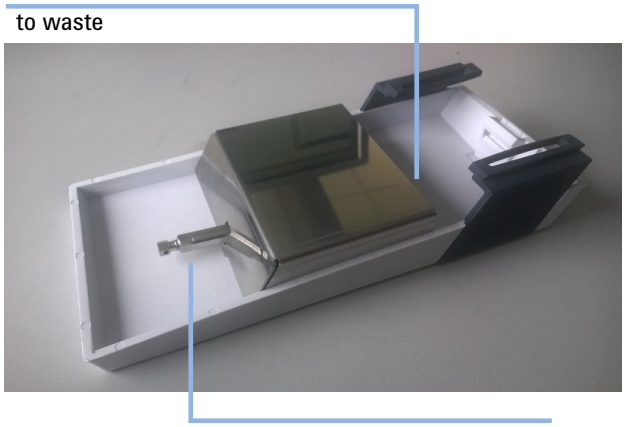
**1** Push the pressure release valve assembly in the frame.



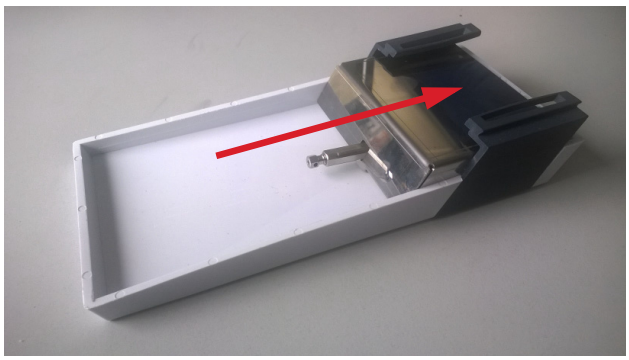
**2** Take care for the correct orientation.



**3** Insert the pressure release assembly to the leak tray, orientation as shown.




**4** Push the pressure release assembly in the correct position.



# 2D-LC Software Configuration

All 2D-LC specific configurations are defined in the “Configure 2D-LC...” screen. This screen allows you to:

- Select your $^{1}$D and $^{2}$D pump
- Valve topology
- 2D-LC valve head (if multiple Valve heads are available)
- Select the connections of MHC decks (if installed)
- Capillary connections

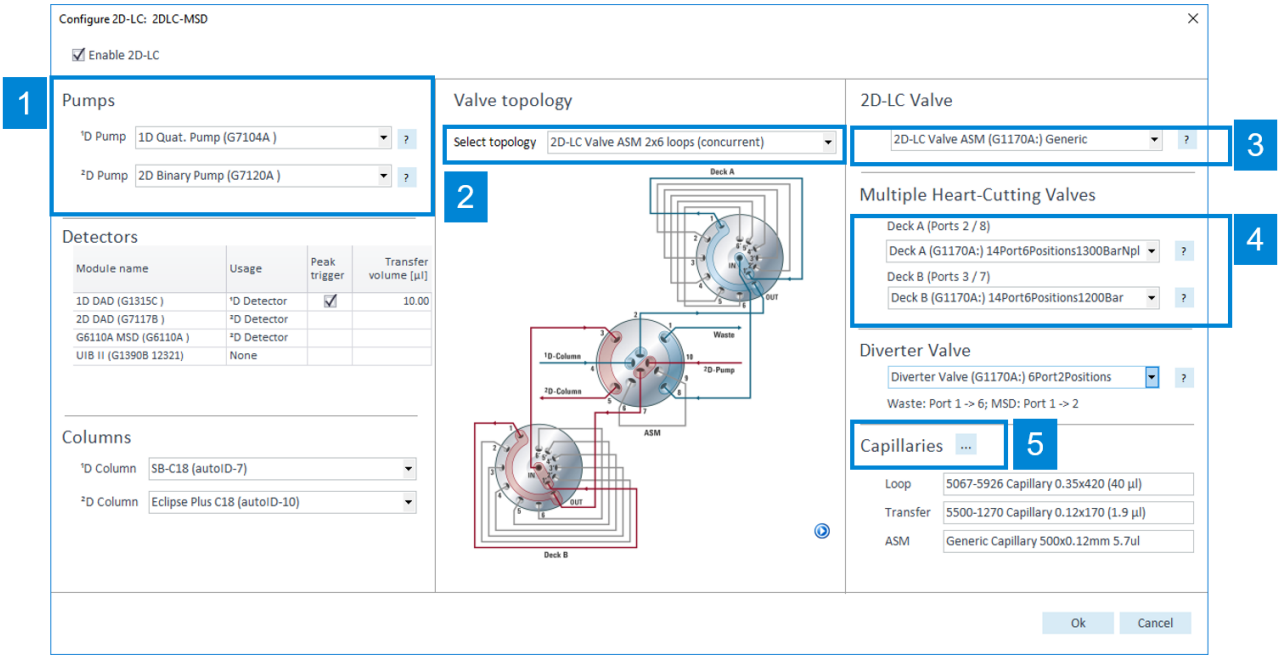



**Figure 17** The **Configure 2D-LC** screen. All basic configurations of the 2D-LC systems, viz. $^{1}$D and $^{2}$D pump, valve topology, capillary connections as well as all 2D-LC valves are defined here.

| | |
|---|---|
| 1 | Pump configuration |
| 2 | Valve topology |
| 3 | 2D-LC Valve |
| 4 | Multiple Heart-Cutting Valves |
| 5 | Capillaries |

1 In OpenLab ChemStation under **Method and Run Control**, click on **Instrument**, then **2D-LC Configuration...**

2 Select your your $^{1}$D and your $^{2}$D pump. Please note that this will not rename your pumps. A descriptive naming should be also entered during initial instrument setup in the instrument configuration.

3 Select your valve topology. Depending on the 2D-LC valve that you have installed, viz. the Standard 2D-LC (G4236A) or the ASM 2D-LC Valve (G4243A), your valve will automatically appear here. Please specify whether you connected your valve in concurrent or countercurrent mode

4 Optional: if the system contains multiple 2D-LC valves, please specify which valve head is to be used.

5 Optional: if your system contains Multiple Heart-Cutting decks, specify which valve head is corresponds to Deck A or B respectively.

6 Select your installed capillaries. Check for correct loop size and correct length of the transfer capillaries. If an ASM 2D-LC valve is used, define the ASM capillary which defines your split ratio (see Table  on page 23).

   **a** To define a ASM capillary, click on **Capillaries...**.

   **b** Choose a pre-defined ASM capillary

   OR

   Define a generic capillary by choosing **Generic Capillary**.

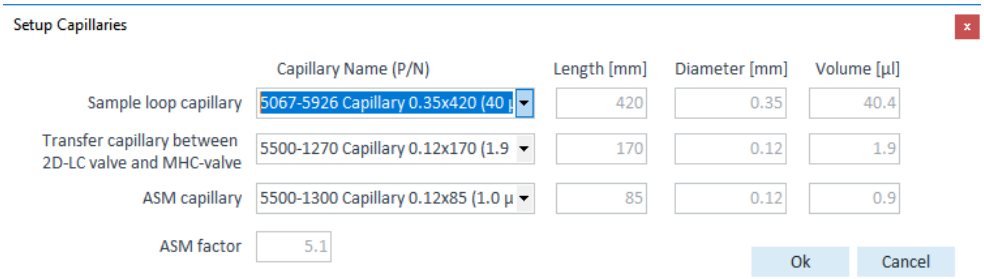



**Figure 18** The **Setup Capillaries** screen. Here, you can define ASM and transfer capillaries as well as define other loop sizes.

The settings for the transfer volumes are 13.4 µL between $^{1}$D detector and sample loop, and 1.9 µL between 2D-LC valve and MHC valve for a set-up with a MaxLight Cartridge Cell.

For additional information, please refer to the 2D-LC Solution Manual (G2198-90501).

G4236-90021
Edition: 11/2018

Printed in Germany



Agilent Technologies, Inc
Hewlett-Packard-Strasse 8
76337 Waldbronn
Germany