



NGC™ Chromatography Systems
Multidimensional (Multi-D) Plumbing Guide
Version 1.0

BIO-RAD

Introduction

This guide is designed to help plumb your NGC System for multidimensional (Multi-D) chromatography applications. These techniques can help enhance sample recovery and improve productivity by minimizing the steps and time required for protein purification. In addition, it shows the optimal locations for module placement to minimize tubing length and swept volume.

Traditionally, multistep purifications have been labor intensive and time consuming, as fractions from a run are collected, pooled, and often dialyzed before being injected onto the next column. With the NGC System, well-characterized single-step purifications are combined to create tandem or automated multicolumn protocols, significantly decreasing sample loss and the time spent on the protein purification process. Typically, the columns in the combined methods have different chemistries or binding characteristics, enhancing selectivity, peak separation, and resolution.

In tandem chromatography, proteins of interest can be eluted from the first column and loaded directly onto a second column plumbed in series followed by analysis using the UV detector. For a tandem chromatography run to be successful, certain considerations must be taken into account, including the binding capacity of both columns, the optimal buffer composition (including pH and salt concentration), and the pressure ratings for both columns.

In two-step automated multicolumn (2-D) chromatography, proteins of interest are eluted from the first column (often an affinity column) and held in a sample loop before being injected directly onto a second column. With this technique, column pressure ratings and buffer conditions are not critical factors for a successful separation.

Using this plumbing guide in conjunction with the numerous tandem and 2-D templates in ChromLab™ Software should help you successfully set up and run your methods and achieve your protein purification goals more quickly and efficiently. Refer to the Multidimensional Chromatography Success Guide (bulletin 6701) for more information about Multi-D.

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* Similarly named systems differ in the additional modules present within the system. The illustrations on the respective pages show these additional modules in the optimal positions to minimize tubing length and swept volume.

2-TIER + 2 CSV for tandem chromatography applications

Simple system configuration for tandem affinity and desalting columns. Proteins are eluted from the affinity column directly onto the desalting column.

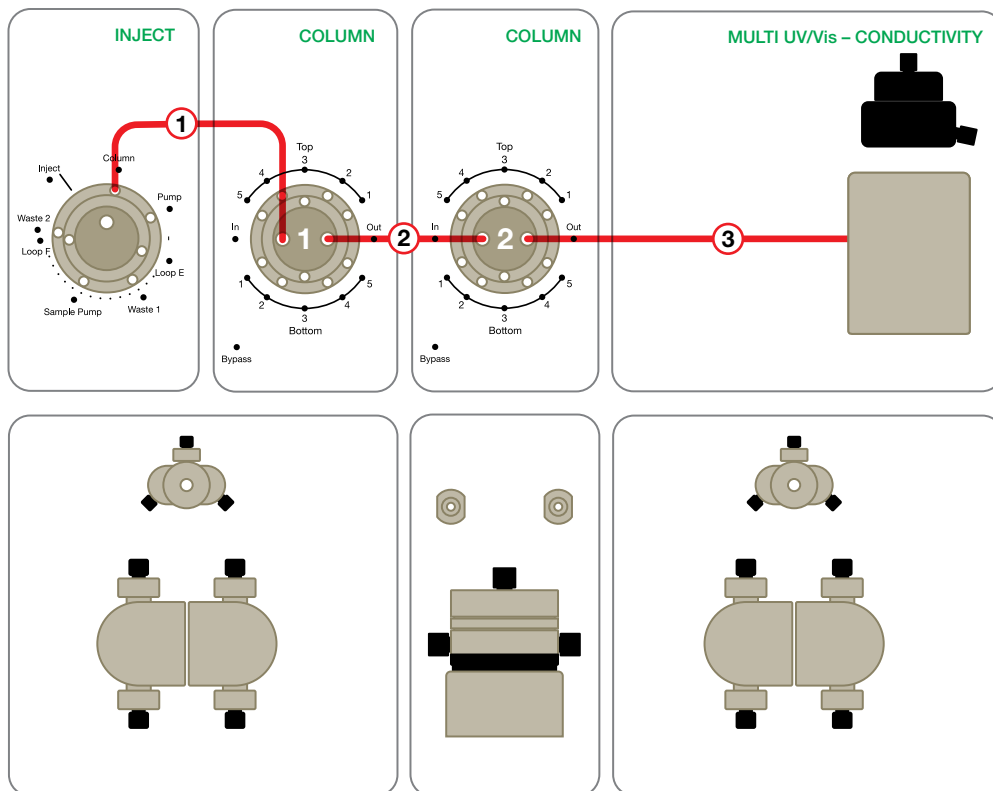
Example Templates

Affinity 1 ml — Desalting

Affinity 5 ml — Desalting

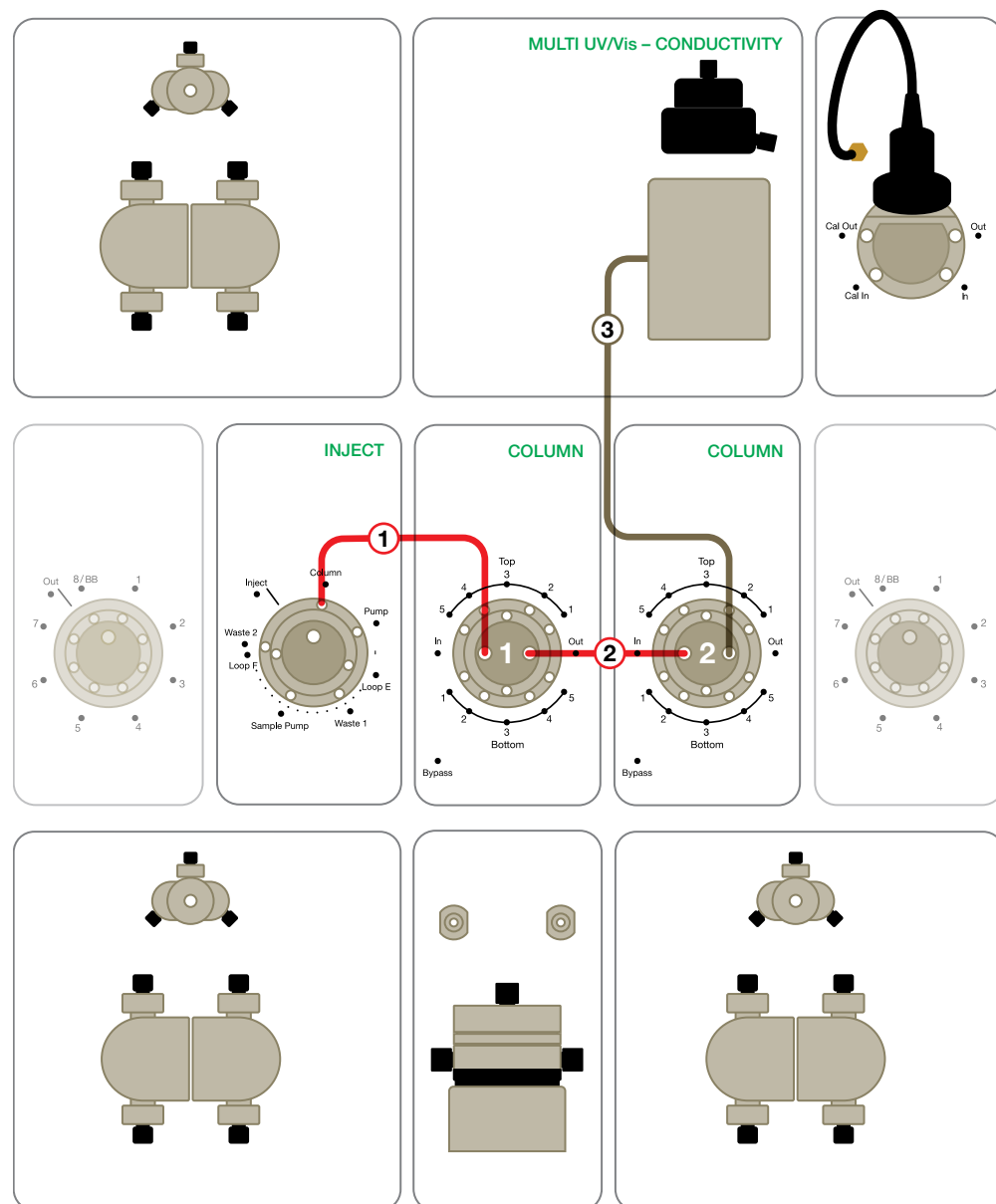
Tubing

- 1** Tube #2 — Length: 17 cm
Inject Valve Column to Column
Switching Valve 1 In
- 2** Tube #2 — Length: 17 cm
Column Switching Valve 1 Out
to Column Switching Valve 2 In
- 3** MWD:
Tube #2 — Length: 17 cm
Column Switching Valve 2 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 2 Out
to Single-Wavelength Detector In



3-TIER + 2 CSV for tandem chromatography applications

3-tier system for tandem affinity and desalting columns. Proteins are eluted from the affinity column directly onto the desalting column.



Example Templates

Affinity 1 ml – Desalting
 Affinity 5 ml – Desalting
 Affinity 1 ml – Linear Gradient
 Affinity 1 ml – Step Gradient
 Affinity 5 ml – Linear Gradient
 Affinity 5 ml – Step Gradient

Tubing

- 1** Tube #2 – Length: 17 cm
Inject Valve Column to
Column Switching Valve 1 In
- 2** Tube #2 – Length: 17 cm
Column Switching Valve 1 Out
to Column Switching Valve 2 In
- 3** MWD:
Tube #10 – Length: 33.5 cm
Column Switching Valve 2 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 – Length: 24.5 cm
Column Switching Valve 2 Out
to Single-Wavelength Detector In

Additional modules (grayed out) are shown in the optimal positions to minimize tubing length and swept volume.

3-TIER + 2 CSV + 1 OUTLET for 2-D chromatography applications

3-tier system for 2-D chromatography. The outlet valve is used to direct proteins to either the fraction collector or a static loop on the CSV before loading onto the second column.

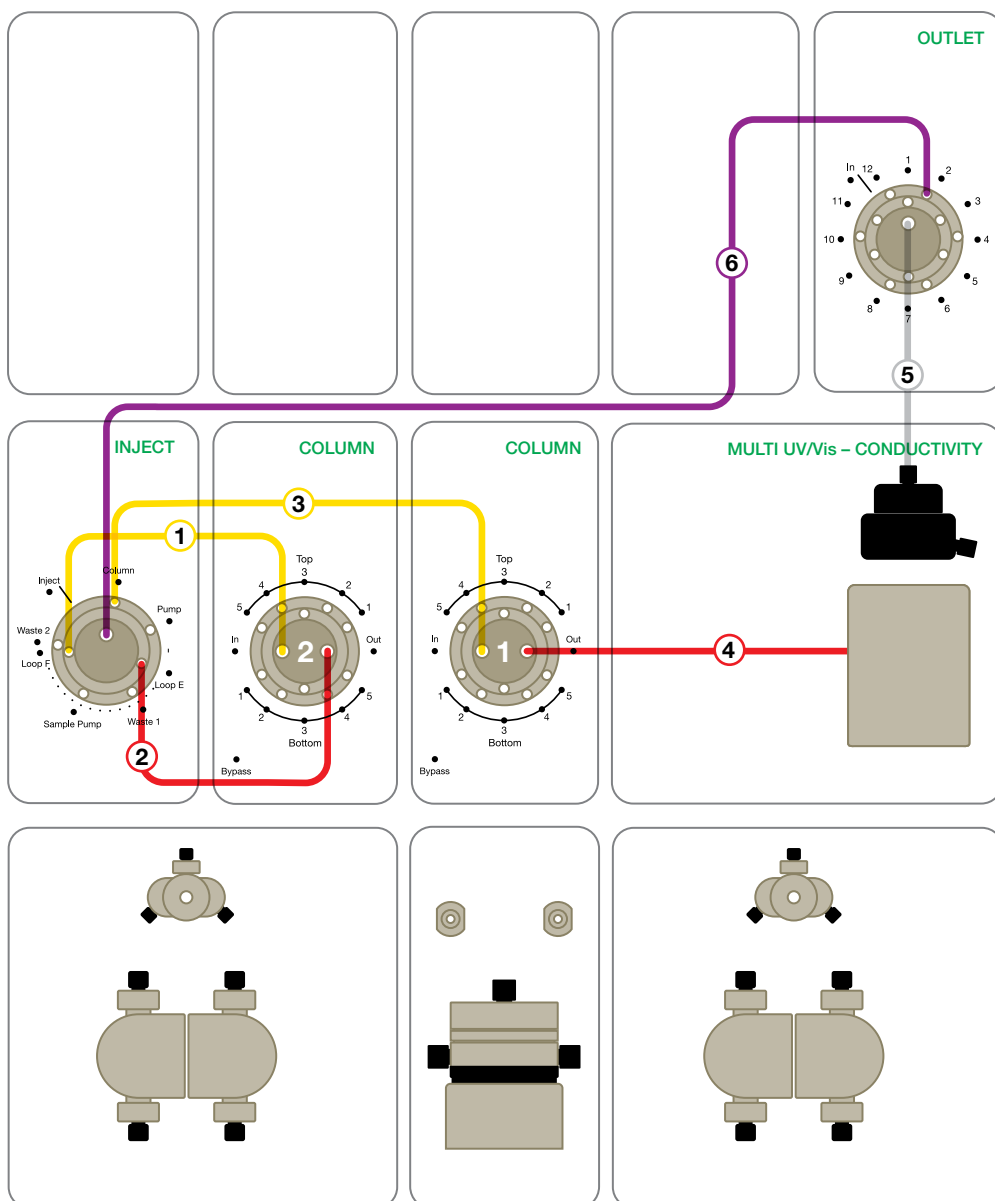
Example Templates

2D-Affinity 1 ml — SEC

2D-Affinity 5 ml — Desalting

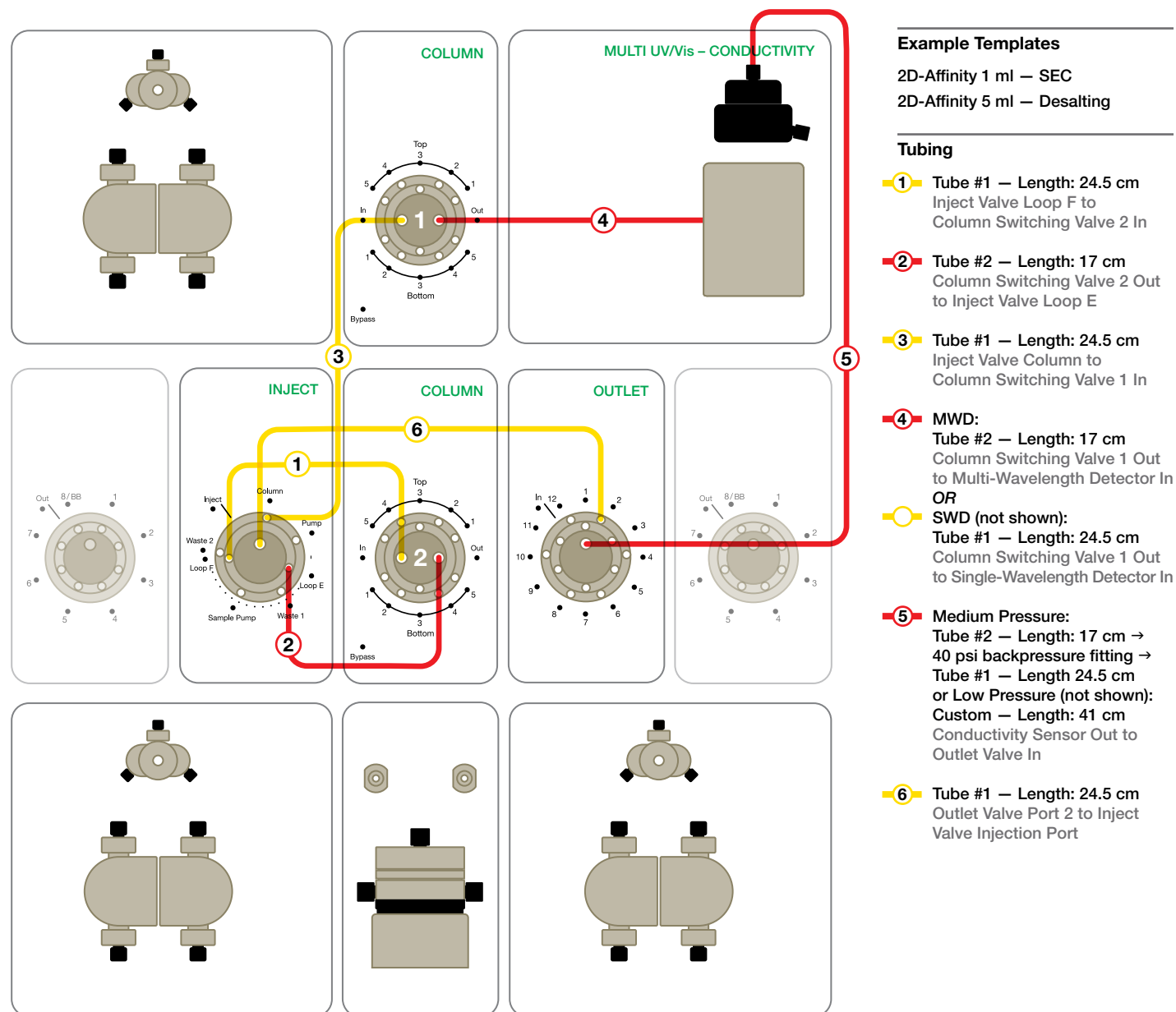
Tubing

- 1** Tube #1 — Length: 24.5 cm
Inject Valve Loop F to
Column Switching Valve 2 In
- 2** Tube #2 — Length: 17 cm
Column Switching Valve 2 Out
to Inject Valve Loop E
- 3** Tube #1 — Length: 24.5 cm
Inject Valve Column to
Column Switching Valve 1 In
- 4** MWD:
Tube #2 — Length: 17 cm
Column Switching Valve 1 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 1 Out
to Single-Wavelength Detector In
- 5** Medium Pressure:
Tube #3 — Length: 10 cm →
40 psi backpressure fitting
→ Tube #3 — Length: 10 cm or
Low Pressure (not shown):
Tube #2 — Length: 17 cm
Conductivity Sensor Out to
Outlet Valve In
- 6** Tube #4 — Length: 50 cm
Outlet Valve Port 2 to
Inject Valve Injection Port



3-TIER + 2 CSV + 1 OUTLET for 2-D chromatography applications (with additional buffer selection)

3-tier system for 2-D chromatography. The outlet valve is used to direct proteins to either the fraction collector or a static loop on the CSV before loading on to the second column.



Additional modules (grayed out) are shown in the optimal positions to minimize tubing length and swept volume.

3-TIER + 2 CSV + SAMPLE PUMP + 1 SAMPLE INLET for tandem chromatography applications

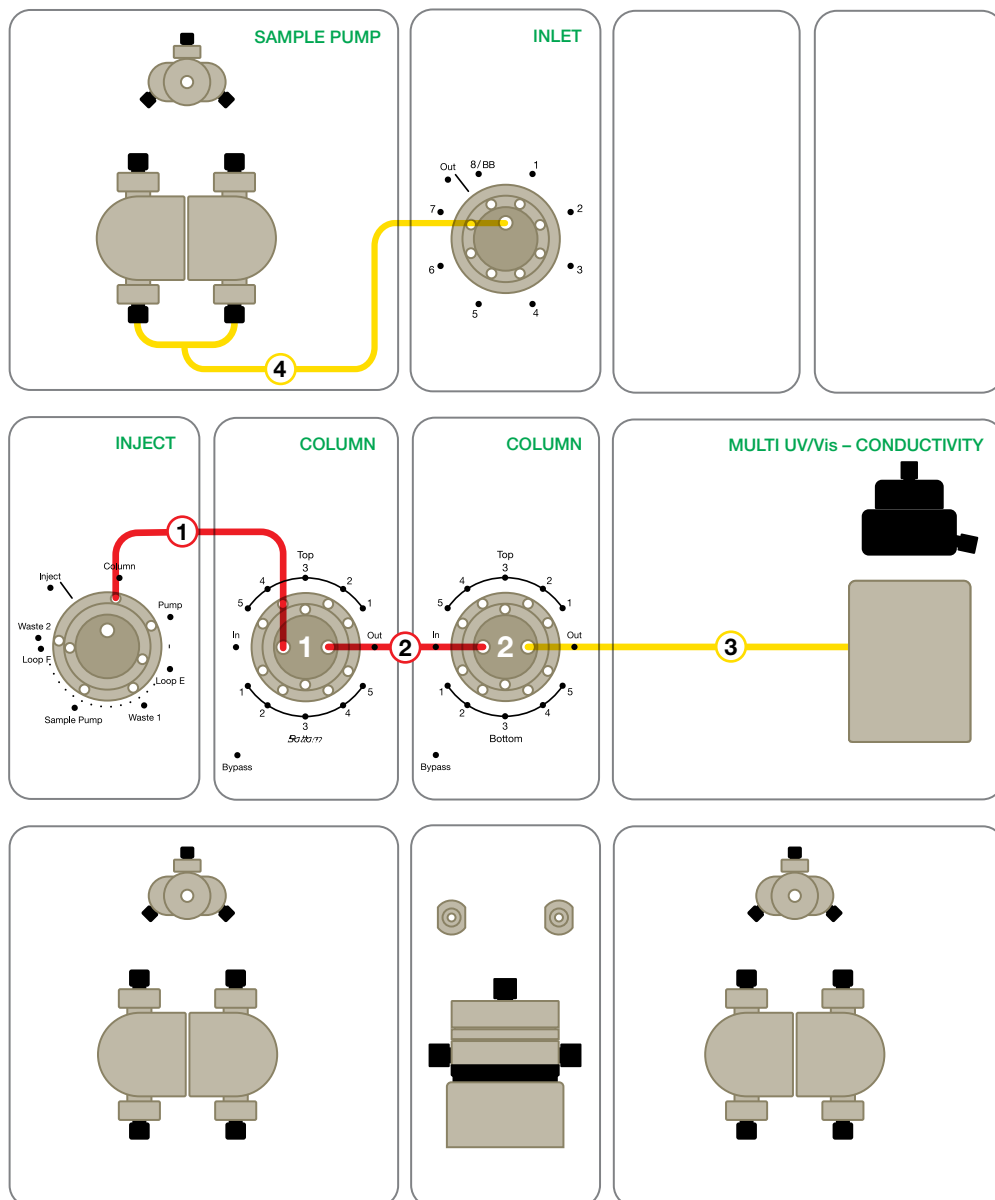
3-tier system that can be used for tandem applications. The inclusion of a sample pump and sample inlet valve means multiple samples can be processed in an automated sequential manner.

Example Templates

Affinity 1 ml – Desalting
Affinity 5 ml – Desalting
Affinity 1 ml – Linear Gradient
Affinity 1 ml – Step Gradient
Affinity 5 ml – Linear Gradient
Affinity 5 ml – Step Gradient

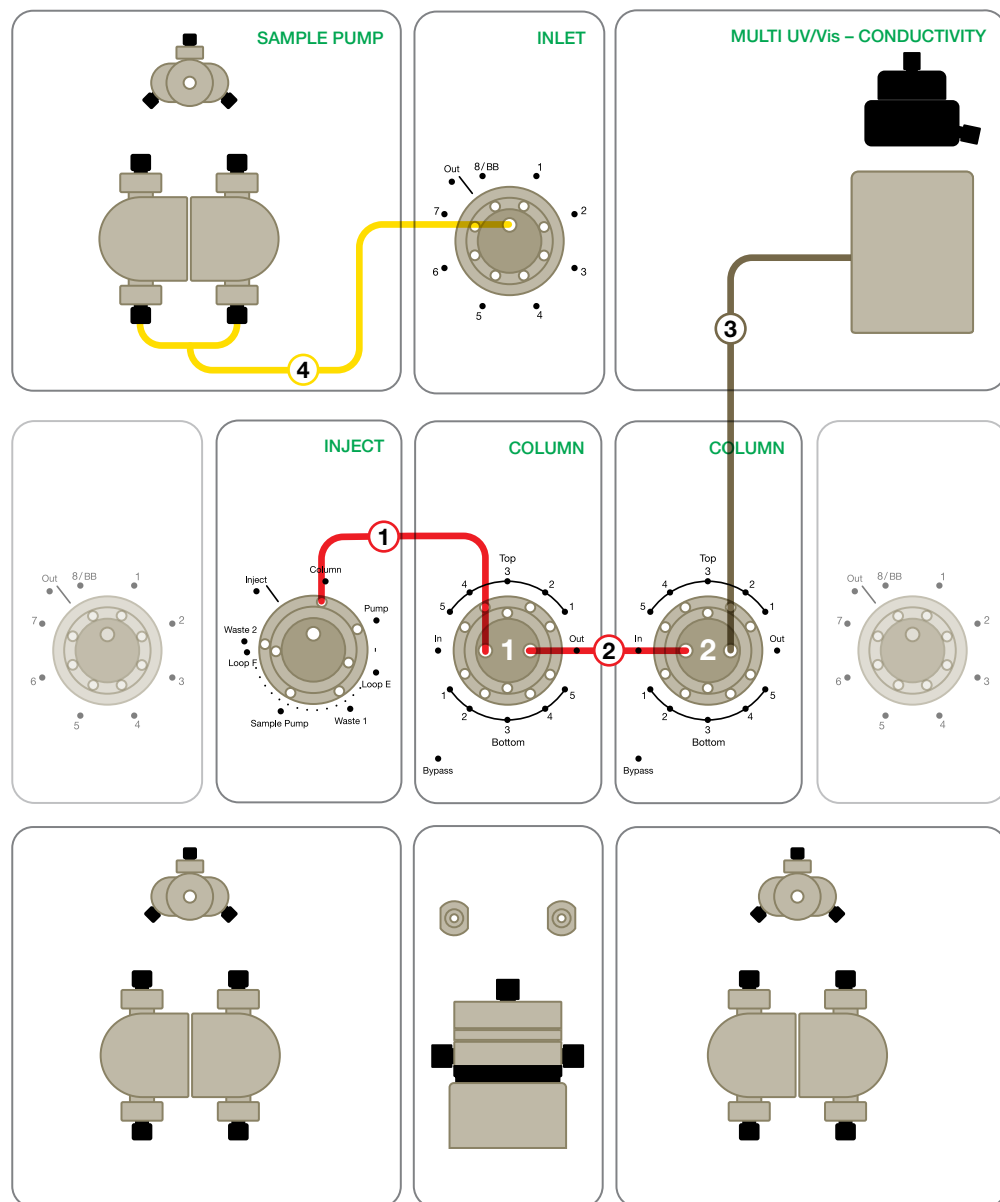
Tubing

- 1** Tube #2 – Length: 17 cm
Inject Valve Column to
Column Switching Valve 1 In
- 2** Tube #2 – Length: 17 cm
Column Switching Valve 1 Out
to Column Switching Valve 2 In
- 3** MWD:
Tube #1 – Length: 24.5 cm
Column Switching Valve 2 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #2 – Length: 17 cm
Column Switching Valve 2 Out
to Single-Wavelength Detector In
- 4** Tube #1 – Length: 24.5 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve Out to
Sample Pump In



3-TIER + 2 CSV + SAMPLE PUMP + 1 SAMPLE INLET for tandem chromatography applications (with additional buffer selection)

3-tier system with sample pump and sample inlet valve for multiple samples on tandem applications.



Example Templates

Affinity 1 ml – Desalting
 Affinity 5 ml – Desalting
 Affinity 1 ml – Linear Gradient
 Affinity 1 ml – Step Gradient
 Affinity 5 ml – Linear Gradient
 Affinity 5 ml – Step Gradient

Tubing

- ①** Tube #2 – Length: 17 cm
Inject Valve Column to Column Switching Valve 1 In
- ②** Tube #2 – Length: 17 cm
Column Switching Valve 1 Out to Column Switching Valve 2 In
- ③** MWD:
Tube #10 – Length: 33.5 cm or
Custom – Length: 26 cm
Column Switching Valve 2 Out to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 – Length: 24.5 cm
Column Switching Valve 2 Out to Single-Wavelength Detector In
- ④** Tube #1 – Length: 24.5 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve Out to Sample Pump In

Additional modules (grayed out) are shown in the optimal positions to minimize tubing length and swept volume.

3-TIER + 2 CSV + SAMPLE PUMP + 1 SAMPLE INLET for tandem chromatography applications (with additional buffer selection)

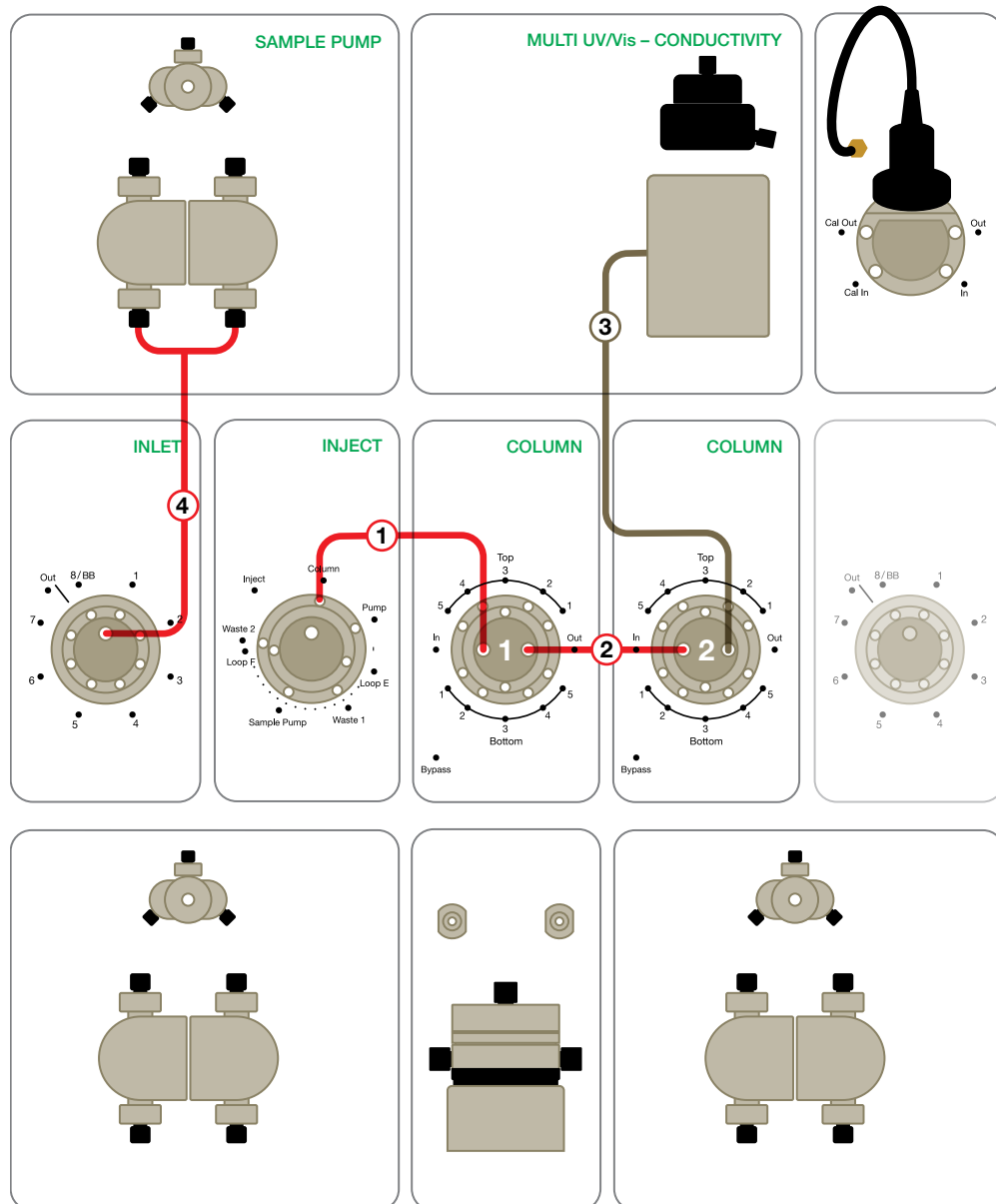
3-tier system with sample pump and sample inlet valve for multiple samples on tandem applications.

Example Templates

Affinity 1 ml – Desalting
Affinity 5 ml – Desalting
Affinity 1 ml – Linear Gradient
Affinity 1 ml – Step Gradient
Affinity 5 ml – Linear Gradient
Affinity 5 ml – Step Gradient

Tubing

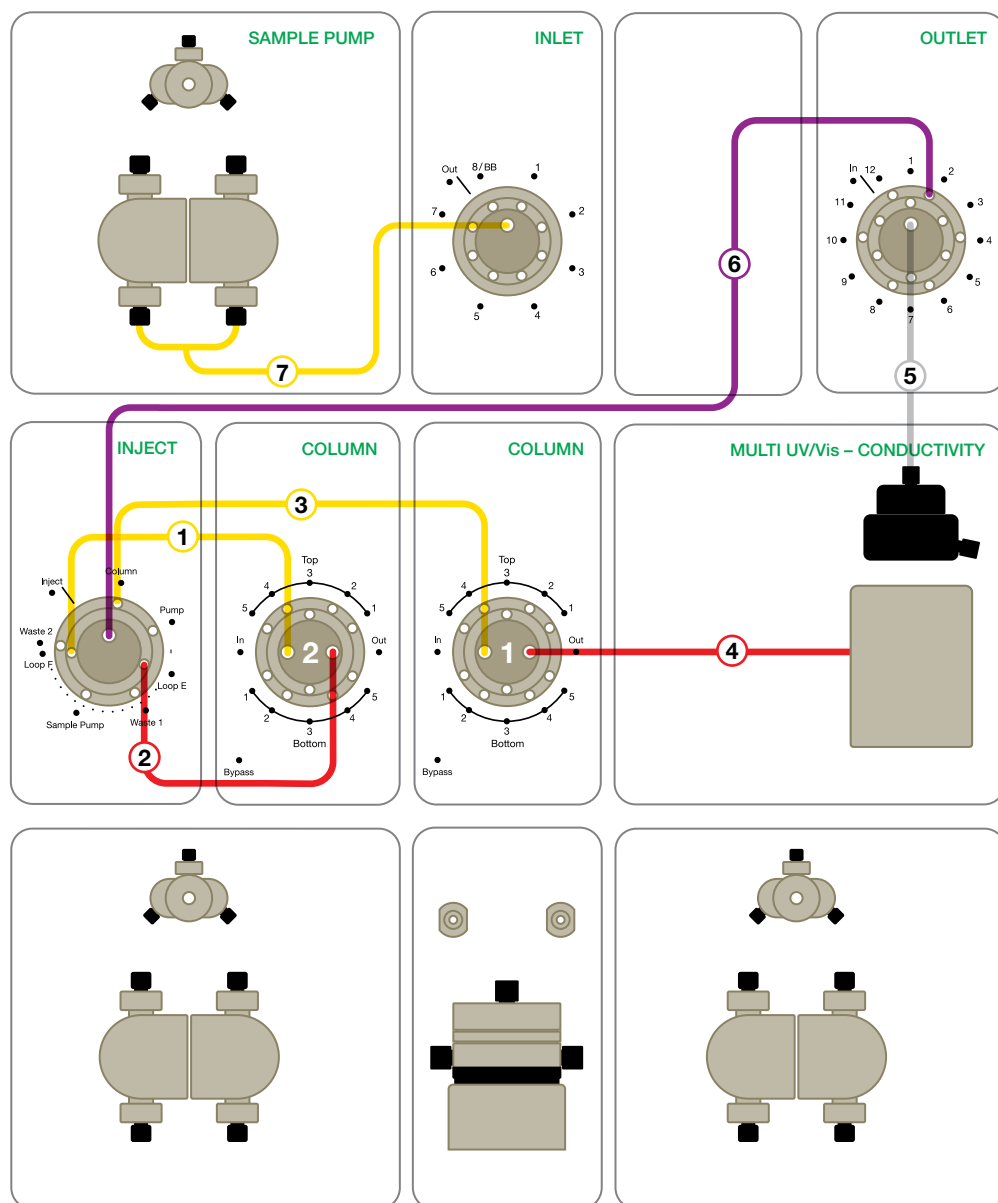
- ①** Tube #2 – Length: 17 cm
Inject Valve Column to
Column Switching Valve 1 In
- ②** Tube #2 – Length: 17 cm
Column Switching Valve 1 Out
to Column Switching Valve 2 In
- ③** MWD:
Tube #10 – Length: 33.5 cm
Column Switching Valve 2 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 – Length: 24.5 cm
Column Switching Valve 2 Out
to Single-Wavelength Detector In
- ④** Tube #2 – Length: 17 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve Out to
Sample Pump In



Additional modules (grayed out) are shown in the optimal positions to minimize tubing length and swept volume.

3-TIER + 2 CSV + SAMPLE PUMP + 1 SAMPLE INLET + 1 OUTLET for 2-D and tandem chromatography applications

3-tier system with sample pump and sample inlet valve for multiple samples on 2-D and tandem applications.



Example Templates

2D-Affinity 1 ml – SEC
 2D-Affinity 5 ml – Desalting
 Affinity 1 ml – Linear Gradient
 Affinity 1 ml – Step Gradient
 Affinity 5 ml – Linear Gradient
 Affinity 5 ml – Step Gradient

Tubing

- 1** Tube #1 – Length: 24.5 cm
Inject Valve Loop F to Column Switching Valve 2 In
- 2** Tube #2 – Length: 17 cm
Column Switching Valve 2 Out to Inject Valve Loop E
- 3** Tube #1 – Length: 24.5 cm
Inject Valve Column to Column Switching Valve 1 In
- 4** MWD:
Tube #2 – Length: 17 cm
Column Switching Valve 1 Out to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 – Length: 24.5 cm
Column Switching Valve 2 Out to Single-Wavelength Detector In
- 5** Medium Pressure:
Tube #3 – Length: 10 cm → 40 psi backpressure fitting → Tube #3 – Length: 10 cm or Low Pressure (not shown):
Tube #2 – Length: 17 cm
Conductivity Sensor Out to Outlet Valve In
- 6** Tube #4 – Length: 50 cm
Outlet Valve Port 2 to Inject Valve Injection Port
- 7** Tube #1 – Length: 24.5 cm (1/16" Green PEEK if <5 ml/min or 1/8" FEP if >5 ml/min)
Sample Inlet Valve Out to Sample Pump In

3-TIER + 2 CSV + SAMPLE PUMP + 1 SAMPLE INLET + 1 OUTLET for 2-D and tandem chromatography applications (with additional buffer selection)

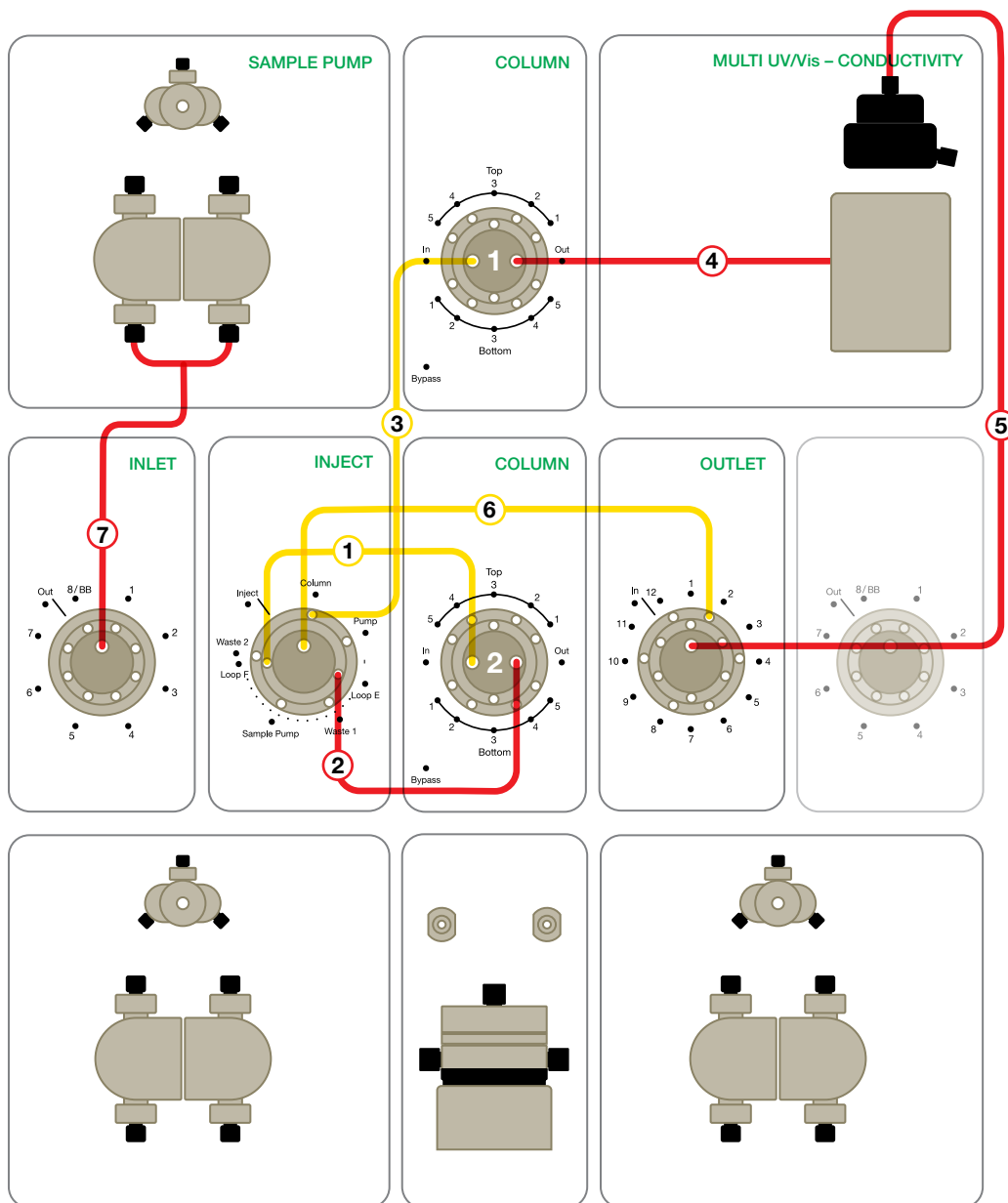
3-tier system with sample pump and sample inlet valve for multiple samples on 2-D and tandem applications.

Example Templates

2D-Affinity 1 ml — SEC
2D-Affinity 5 ml — Desalting
Affinity 1 ml — Linear Gradient
Affinity 1 ml — Step Gradient
Affinity 5 ml — Linear Gradient
Affinity 5 ml — Step Gradient

Tubing

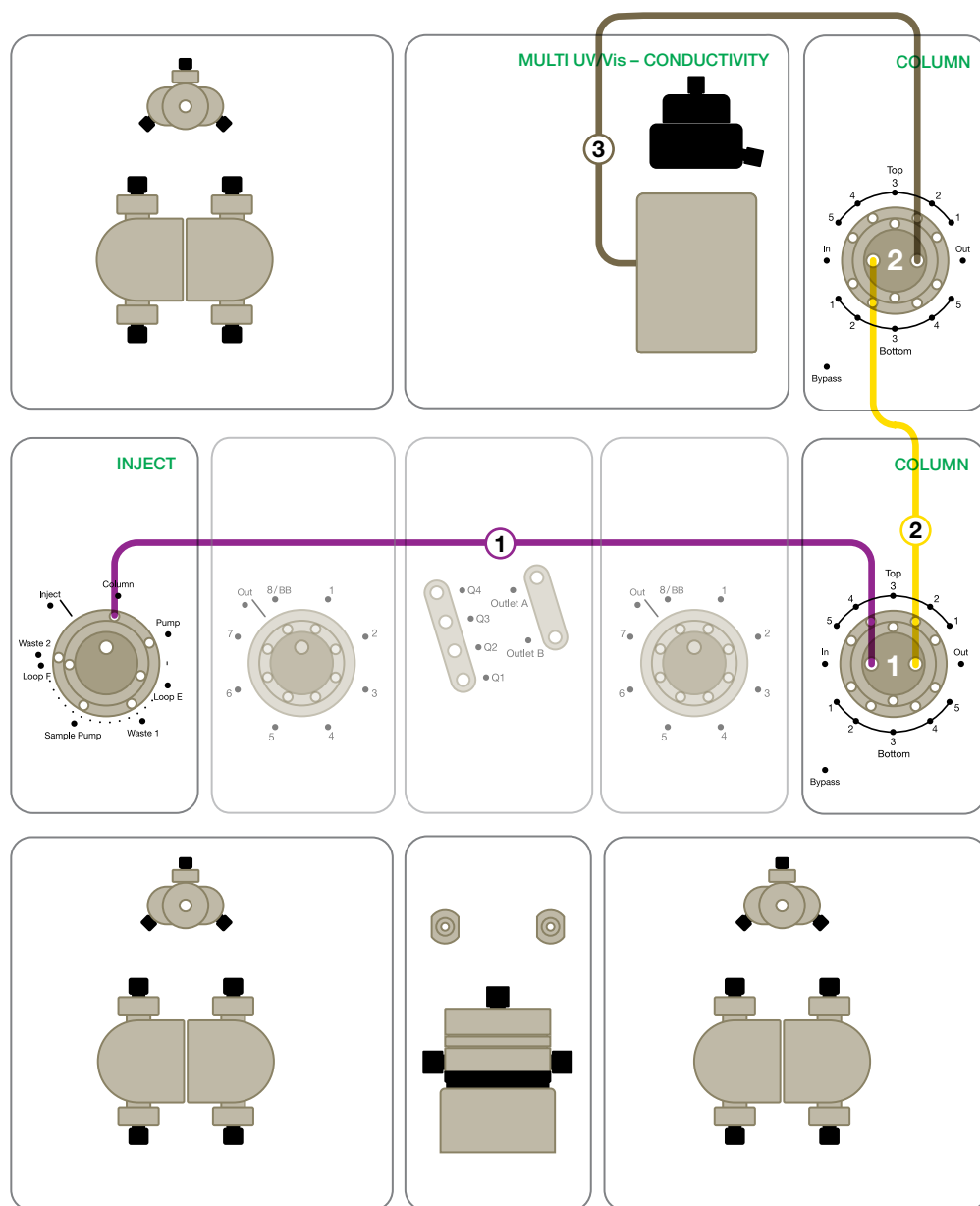
- 1 Tube #1 — Length: 24.5 cm
Inject Valve Loop F to
Column Switching Valve 2 In
- 2 Tube #2 — Length: 17 cm
Column Switching Valve 2 Out
to Inject Valve Loop E
- 3 Tube #1 — Length: 24.5 cm
Inject Valve Column to
Column Switching Valve 1 In
- 4 MWD:
Tube #2 — Length: 17 cm
Column Switching Valve 1 Out
to Multi-Wavelength Detector In
OR
5 SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 1 Out
to Single-Wavelength Detector In
- 5 Medium Pressure:
Tube #2 — Length: 17 cm →
40 psi backpressure fitting
→ Tube #1 — Length 24.5 cm
or Low Pressure (not shown):
Custom — Length: 41 cm
Conductivity Sensor Out to
Outlet Valve In
- 6 Tube #1 — Length: 24.5 cm
Outlet Valve Port 2 to
Inject Valve Injection Port
- 7 Tube #2 — Length: 17 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve Out to
Sample Pump In



Additional modules (grayed out) are shown in the optimal positions to minimize tubing length and swept volume.

3-TIER + 2 CSV + 2 BUFFER INLETS + BUFFER BLENDING VALVE for tandem chromatography applications

3-tier system for tandem affinity and desalting columns. Proteins are eluted from the affinity column directly onto the desalting column.



Example Templates

- Affinity 1 ml – Desalting
- Affinity 5 ml – Desalting
- Affinity 1 ml – Linear Gradient
- Affinity 1 ml – Step Gradient
- Affinity 5 ml – Linear Gradient
- Affinity 5 ml – Step Gradient

Tubing

- 1** Tube #4 – Length: 50 cm
Inject Valve Column to
Column Switching Valve 1 In
- 2** Tube #1 – Length: 24.5 cm
Column Switching Valve 1 Out
to Column Switching Valve 2 In
- 3** MWD:
Tube #10 – Length: 33.5 cm
Column Switching Valve 2 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 – Length: 24.5 cm
Column Switching Valve 2 Out
to Single-Wavelength Detector In

Additional modules (grayed out) are shown in the optimal positions to minimize tubing length and swept volume.

3-TIER + 3 CSV + SAMPLE PUMP + 1 SAMPLE INLET + 1 OUTLET for 2-D and tandem chromatography applications

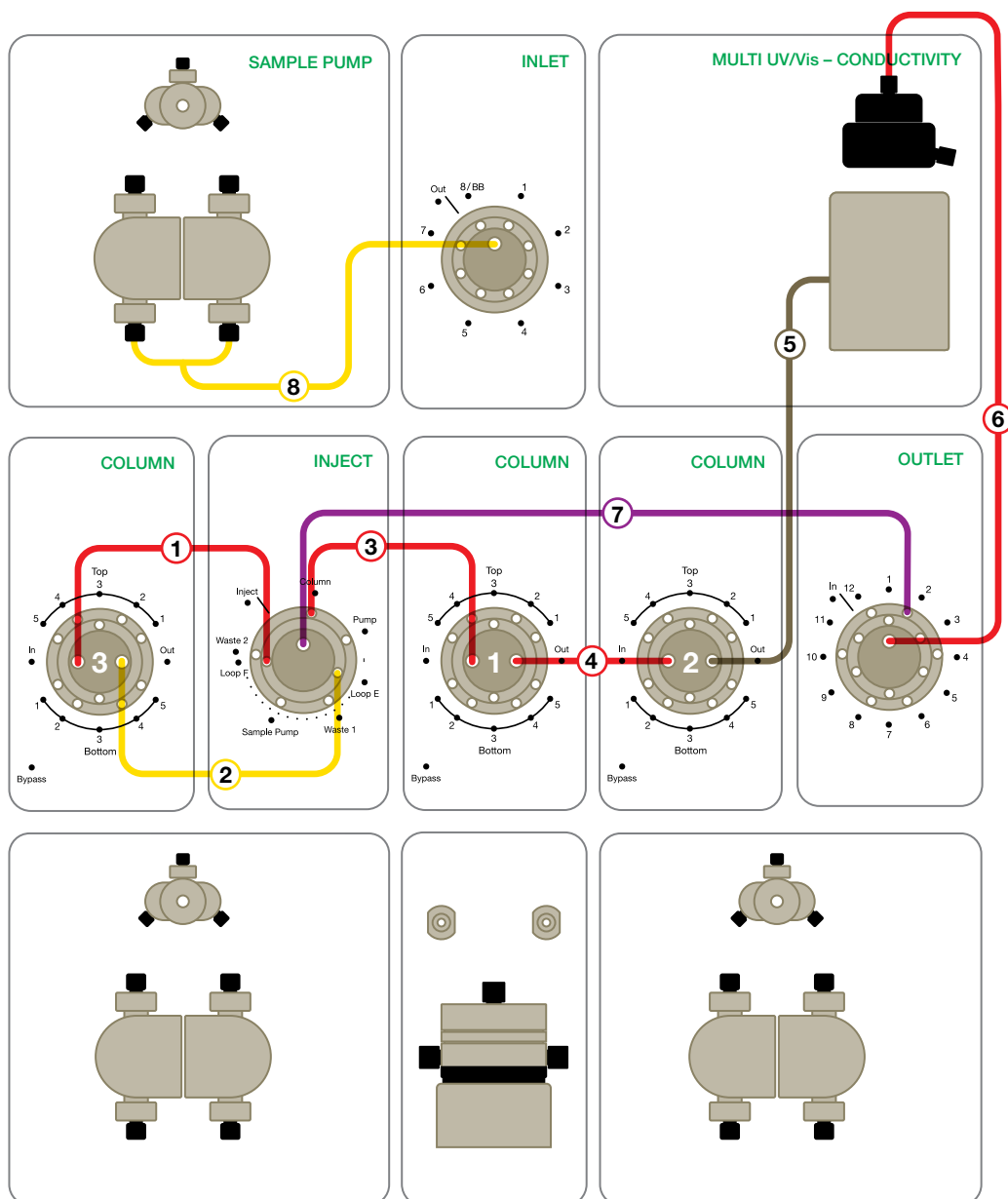
3-tier system with sample pump and sample inlet valve for multiple samples on 2-D and tandem applications.

Example Templates

2D-Affinity 1 ml — SEC
 2D-Affinity 5 ml — Desalting
 Affinity 1 ml — Linear Gradient
 Affinity 1 ml — Step Gradient
 Affinity 1 ml — Step Gradient (Manual)
 Affinity 5 ml — Linear Gradient
 Affinity 5 ml — Step Gradient
 Affinity 1 ml — Desalting
 Affinity 5 ml — Desalting

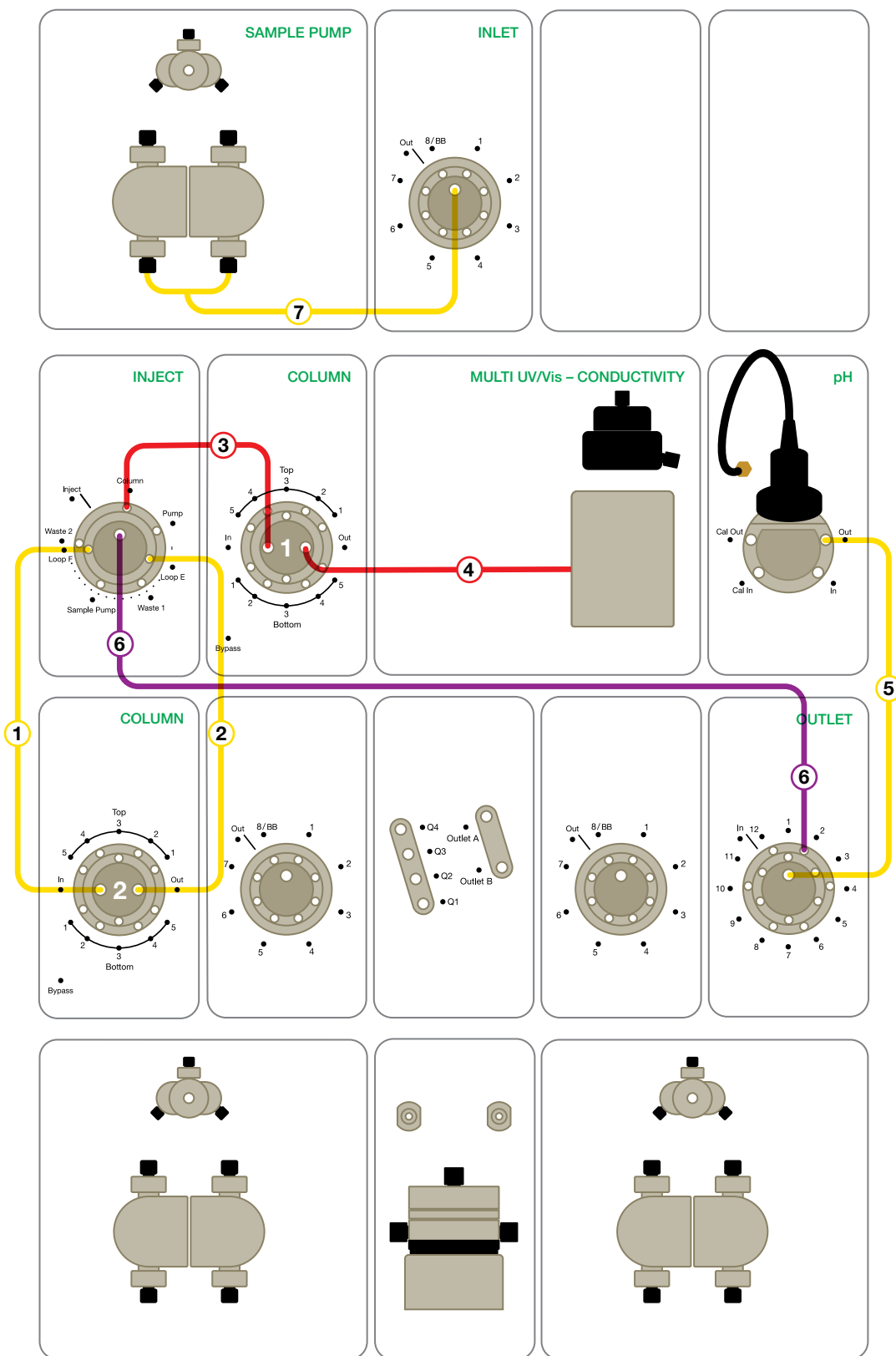
Tubing

- 1** Tube #2 — Length: 17 cm
Inject Valve Loop F to
Column Switching Valve 3 In
- 2** Tube #1 — Length: 24.5 cm
Column Switching Valve 3 Out
to Inject Valve Loop E
- 3** Tube #2 — Length: 17 cm
Inject Valve Column to
Column Switching Valve 1 In
- 4** Tube #2 — Length: 17 cm
Column Switching Valve 1 Out
to Column Switching Valve 2 In
- 5** MWD:
Tube #10 — Length: 33.5 cm or
Custom — Length: 26 cm
Column Switching Valve 2 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 2 Out
to Single-Wavelength Detector In
- 6** Medium Pressure:
Tube #2 — Length: 17 cm →
40 psi backpressure fitting
→ Tube #1 — Length 24.5 cm
or Low Pressure (not shown):
Custom — Length: 41 cm
Conductivity Sensor Out to
Outlet Valve In
- 7** Tube #4 — Length 50 cm or
Custom — Length: 45 cm
Outlet Valve Port 2 to
Inject Valve Injection Port
- 8** Tube #1 — Length 24.5 cm
(1/16" Green PEEK <5 ml/min
or 1/8" FEP >5 ml/min)
Sample Inlet Valve Out to
Sample Pump In



4-TIER (DISCOVER™ PRO*) + 1 CSV for 2-D chromatography applications

4-tier system with sample pump and sample inlet valve for multiple samples on 2-D applications.



Example Templates

2D-Affinity 1 ml — SEC
 2D-Affinity 5 ml — Desalting
 Affinity 1 ml — Linear Gradient
 Affinity 1 ml — Step Gradient
 Affinity 1 ml — Step Gradient (Manual)
 Affinity 5 ml — Linear Gradient
 Affinity 5 ml — Step Gradient

Tubing

- 1** Tube #1 — Length: 24.5 cm
Inject Valve Loop F to Column Switching Valve 2 In
- 2** Tube #1 — Length: 24.5 cm
Column Switching Valve 2 Out to Inject Valve Loop E
- 3** Tube #2 — Length: 17 cm
Inject Valve Column to Column Switching Valve 1 In
- 4** MWD:
Tube #2 — Length: 17 cm
Column Switching Valve 1 Out to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 1 Out to Single-Wavelength Detector In
- 5** Tube #1 — Length: 24.5 cm
pH Valve Out to Outlet Valve In
- 6** Tube #4 — Length: 50 cm
Outlet Valve Port 2 to Inject Valve Injection Port
- 7** Tube #1 — Length 24.5 cm
(1/16" Green PEEK <5 ml/min
or 1/8" FEP >5 ml/min)
Sample Inlet Valve Out to Sample Pump In

* The Discover Pro System includes
 1 CSV, sample pump, 1 sample inlet,
 2 buffer inlets, outlet valve, pH module,
 and buffer blending valve.

4-TIER (DISCOVER PRO*) + 1 CSV for tandem chromatography applications

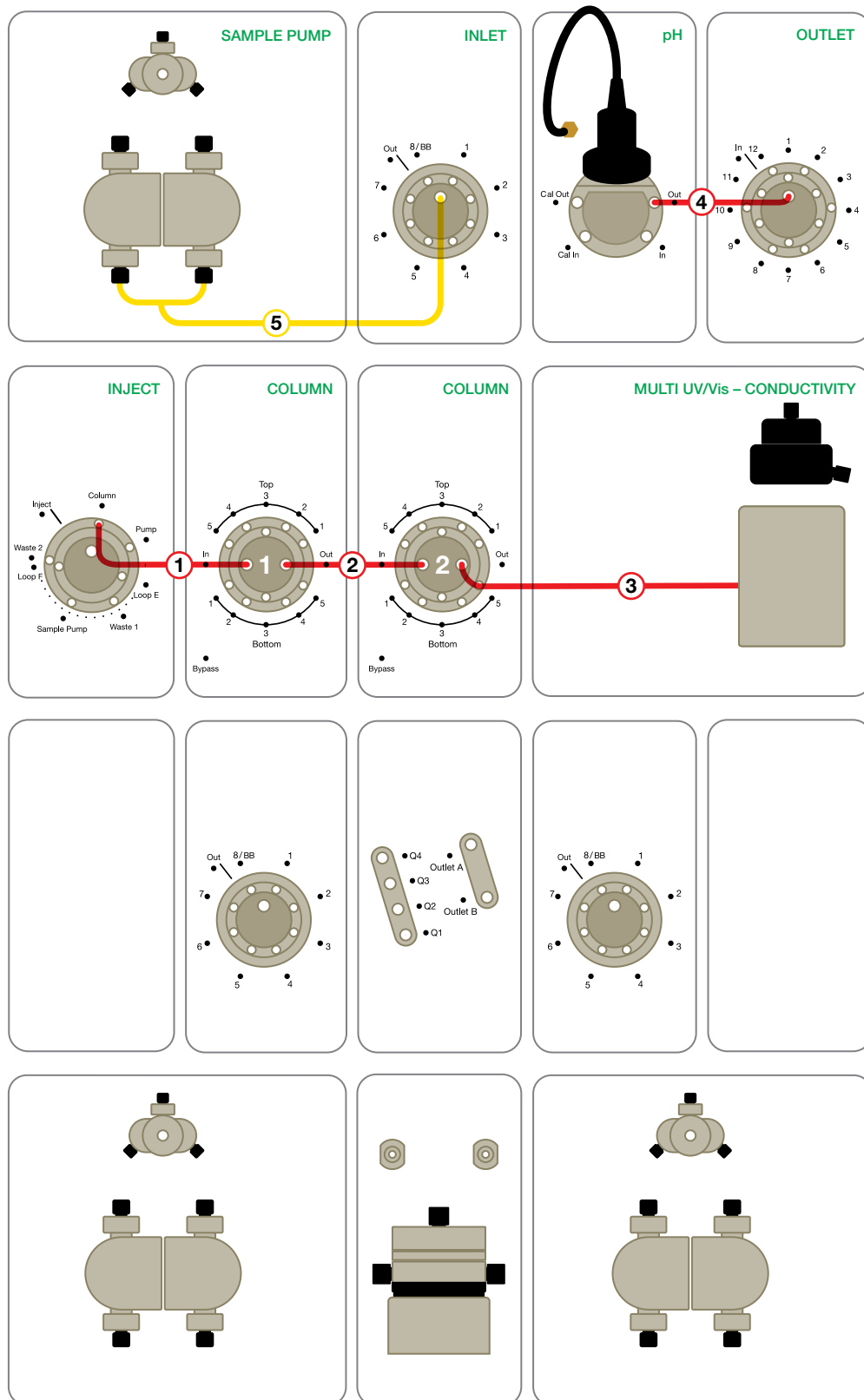
4-tier system with sample pump and sample inlet valve for multiple samples on tandem applications.

Example Templates

Affinity 1 ml — Linear Gradient
Affinity 1 ml — Step Gradient
Affinity 1 ml — Step Gradient (Manual)
Affinity 5 ml — Linear Gradient
Affinity 5 ml — Step Gradient
Affinity 1 ml — Desalting
Affinity 5 ml — Desalting

Tubing

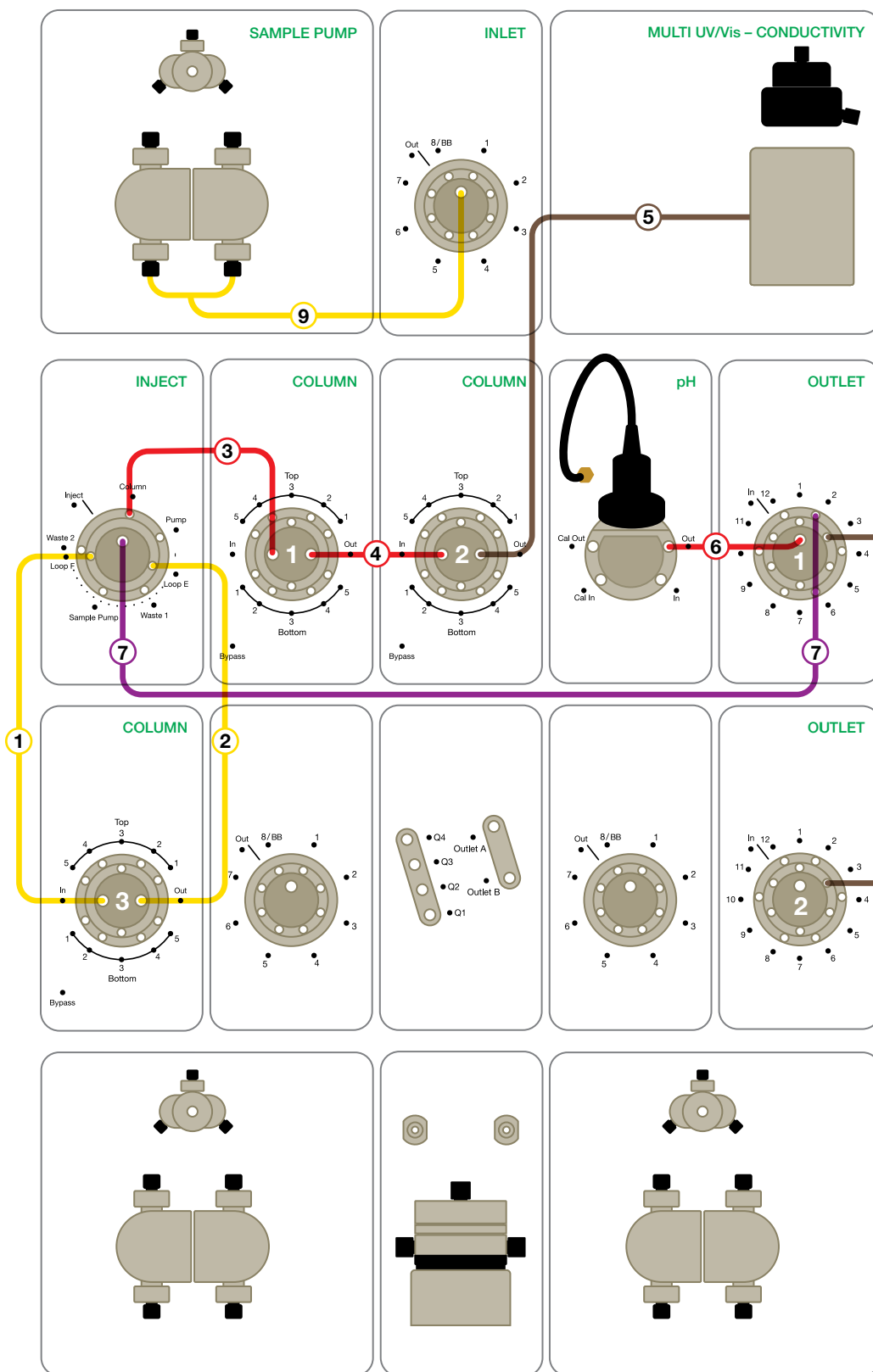
- ①** Tube #2 — Length: 17 cm
Inject Valve Column to
Column Switching Valve 1 In
- ②** Tube #2 — Length: 17 cm
Column Switching Valve 1 Out
to Column Switching Valve 2 In
- ③** MWD:
Tube #2 — Length: 17 cm
Column Switching Valve 2 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 2 Out
to Single-Wavelength Detector In
- ④** Tube #2 — Length: 17 cm
pH Valve Out to Outlet Valve In
- ⑤** Tube #1 — Length 24.5 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve Out to
Sample Pump In



* The Discover Pro System includes
1 CSV, sample pump, 1 sample inlet,
2 buffer inlets, outlet valve, pH module,
and buffer blending valve.

4-TIER (DISCOVER PRO*) + 2 CSV + 1 OUTLET for 2-D and tandem chromatography applications

4-tier system with sample pump and sample inlet valve for multiple samples on 2-D and tandem applications.



Example Templates

2D-Affinity 1 ml — SEC
 2D-Affinity 5 ml — Desalting
 Affinity 1 ml — Linear Gradient
 Affinity 1 ml — Step Gradient
 Affinity 1 ml — Step Gradient (Manual)
 Affinity 5 ml — Linear Gradient
 Affinity 5 ml — Step Gradient
 Affinity 1 ml — Desalting
 Affinity 5 ml — Desalting

Tubing

- 1** Tube #1 — Length: 24.5 cm
Inject Valve Loop F to
Column Switching Valve 3 In
- 2** Tube #1 — Length: 24.5 cm
Column Switching Valve 3 Out
to Inject Valve Loop E
- 3** Tube #2 — Length: 17 cm
Inject Valve Column to
Column Switching Valve 1 In
- 4** Tube #2 — Length: 17 cm
Column Switching Valve 1 Out
to Column Switching Valve 2 In
- 5** MWD:
Tube #10 — Length: 33.5 cm
Column Switching Valve 2 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 2 Out
to Single-Wavelength Detector In
- 6** Tube #2 — Length: 17 cm
pH Valve Out to
Outlet Valve 1 In
- 7** Tube #4 — Length: 50 cm
Outlet Valve 1 Port 2 to
Inject Valve Injection Port
- 8** Tube #10 — Length: 33.5 cm
Outlet Valve 1 Port 3 to
Outlet Valve 2 In
- 9** Tube #1 — Length 24.5 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve Out to
Sample Pump In

* The Discover Pro System includes
 1 CSV, sample pump, 1 sample inlet,
 2 buffer inlets, outlet valve, pH module,
 and buffer blending valve.

4-TIER (DISCOVER PRO*) + 2 CSV + 1 SAMPLE INLET for 2-D and tandem chromatography applications

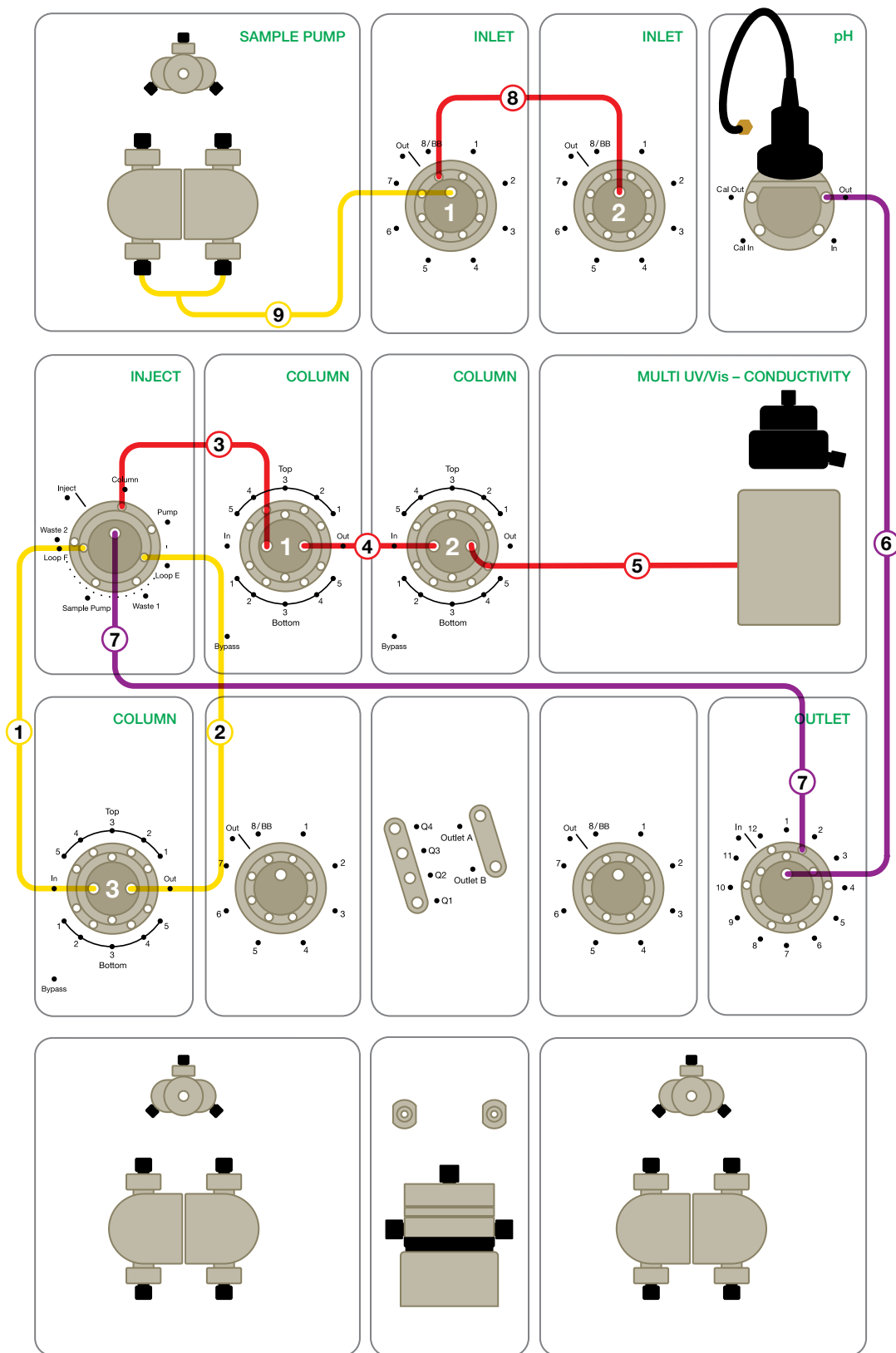
4-tier system with sample pump and sample inlet valves for multiple samples on 2-D and tandem applications.

Example Templates

2D-Affinity 1 ml — SEC
2D-Affinity 5 ml — Desalting
Affinity 1 ml — Linear Gradient
Affinity 1 ml — Step Gradient
Affinity 1 ml —
Step Gradient (Manual)
Affinity 5 ml — Linear Gradient
Affinity 5 ml — Step Gradient
Affinity 1 ml — Desalting
Affinity 5 ml — Desalting

Tubing

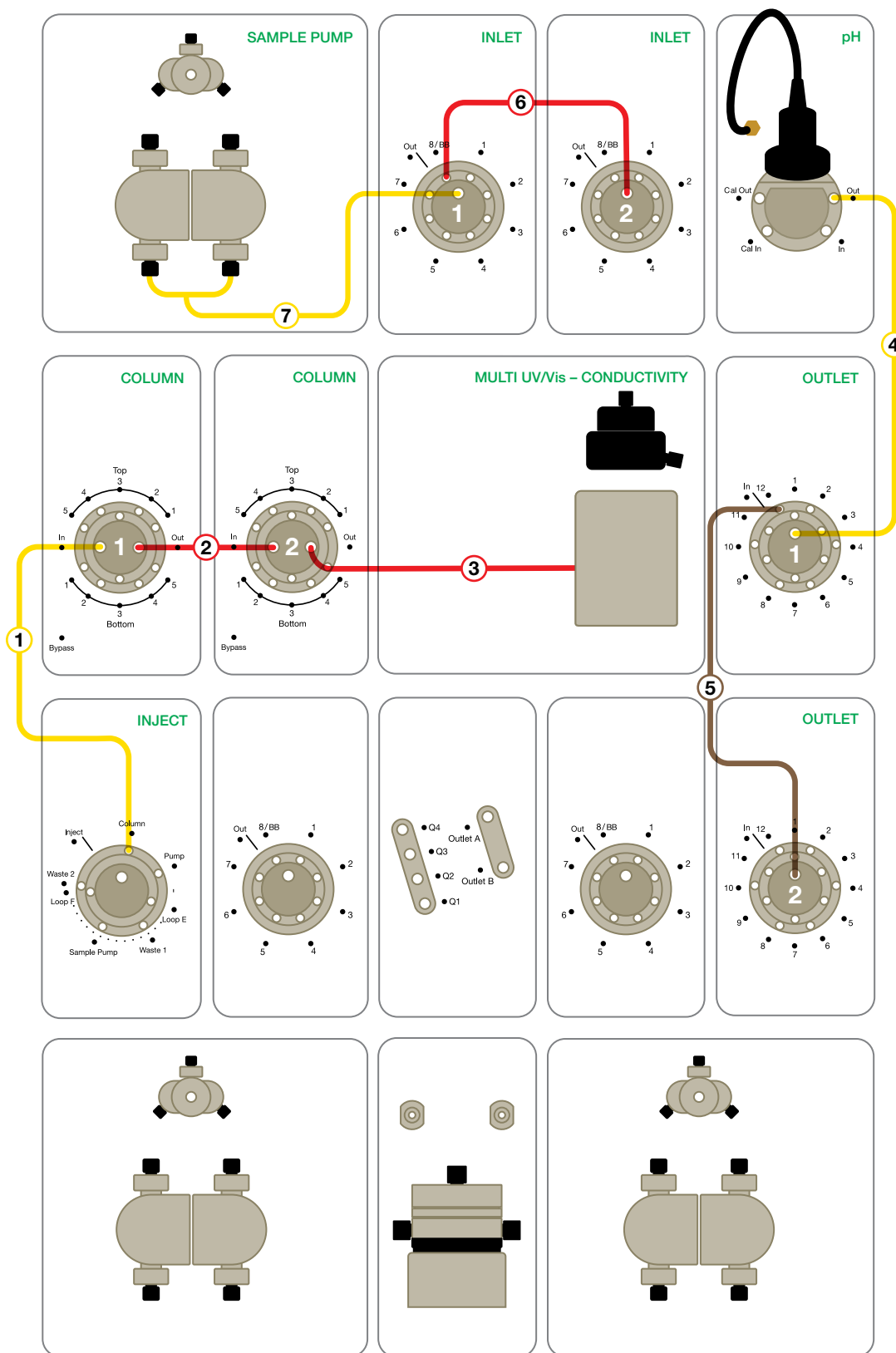
- 1** Tube #1 — Length: 24.5 cm
Inject Valve Loop F to
Column Switching Valve 3 In
- 2** Tube #1 — Length: 24.5 cm
Column Switching Valve 3 Out
to Inject Valve Loop E
- 3** Tube #2 — Length: 17 cm
Inject Valve Column to
Column Switching Valve 1 In
- 4** Tube #2 — Length: 17 cm
Column Switching Valve 1 Out
to Column Switching Valve 2 In
- 5** MWD:
Tube #2 — Length: 17 cm
Column Switching Valve 2 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 2 Out
to Single-Wavelength Detector In
- 6** Tube #4 — Length: 50 cm or
Custom — Length: 45 cm
pH Valve Out to Outlet Valve In
- 7** Tube #4 — Length: 50 cm
Outlet Valve Port 2 to
Inject Valve Injection Port
- 8** Tube #2 — Length: 17 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve 2 Out to
Sample Inlet Valve 1 Port 8
- 9** Tube #1 — Length: 24.5 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve 1 Out to
Sample Pump In



* The Discover Pro System includes
1 CSV, sample pump, 1 sample inlet,
2 buffer inlets, outlet valve, pH module,
and buffer blending valve.

4-TIER (DISCOVER PRO*) + 1 CSV + 1 SAMPLE INLET + 1 OUTLET for tandem chromatography applications

4-tier system with sample pump and sample inlet valves for multiple samples on tandem applications. Two outlet valves provide enhanced fraction collection flexibility.



Example Templates

Affinity 1 ml — Linear Gradient
 Affinity 1 ml — Step Gradient
 Affinity 1 ml — Step Gradient (Manual)
 Affinity 5 ml — Linear Gradient
 Affinity 5 ml — Step Gradient
 Affinity 1 ml — Desalting
 Affinity 5 ml — Desalting

Tubing

- 1** Tube #1 — Length: 24.5 cm
Inject Valve Column to Column Switching Valve 1 In
- 2** Tube #2 — Length: 17 cm
Column Switching Valve 1 Out to Column Switching Valve 2 In
- 3** MWD:
Tube #2 — Length: 17 cm
Column Switching Valve 2 Out to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 2 Out to Single-Wavelength Detector In
- 4** Tube #1 — Length: 24.5 cm
pH Valve Out to Outlet Valve 1 In
- 5** Tube #10 — Length: 33.5 cm
Outlet Valve 1 Port 12 to Outlet Valve 2 In
- 6** Tube #2 — Length: 17 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve 2 Out to Sample Inlet Valve 1 Port 8
- 7** Tube #1 — Length: 24.5 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve 1 Out to Sample Pump In

* The Discover Pro System includes 1 CSV, sample pump, 1 sample inlet, 2 buffer inlets, outlet valve, pH module, and buffer blending valve.

4-TIER (DISCOVER PRO*) + 1 CSV + 1 SAMPLE INLET + 1 OUTLET for 2-D and tandem chromatography applications

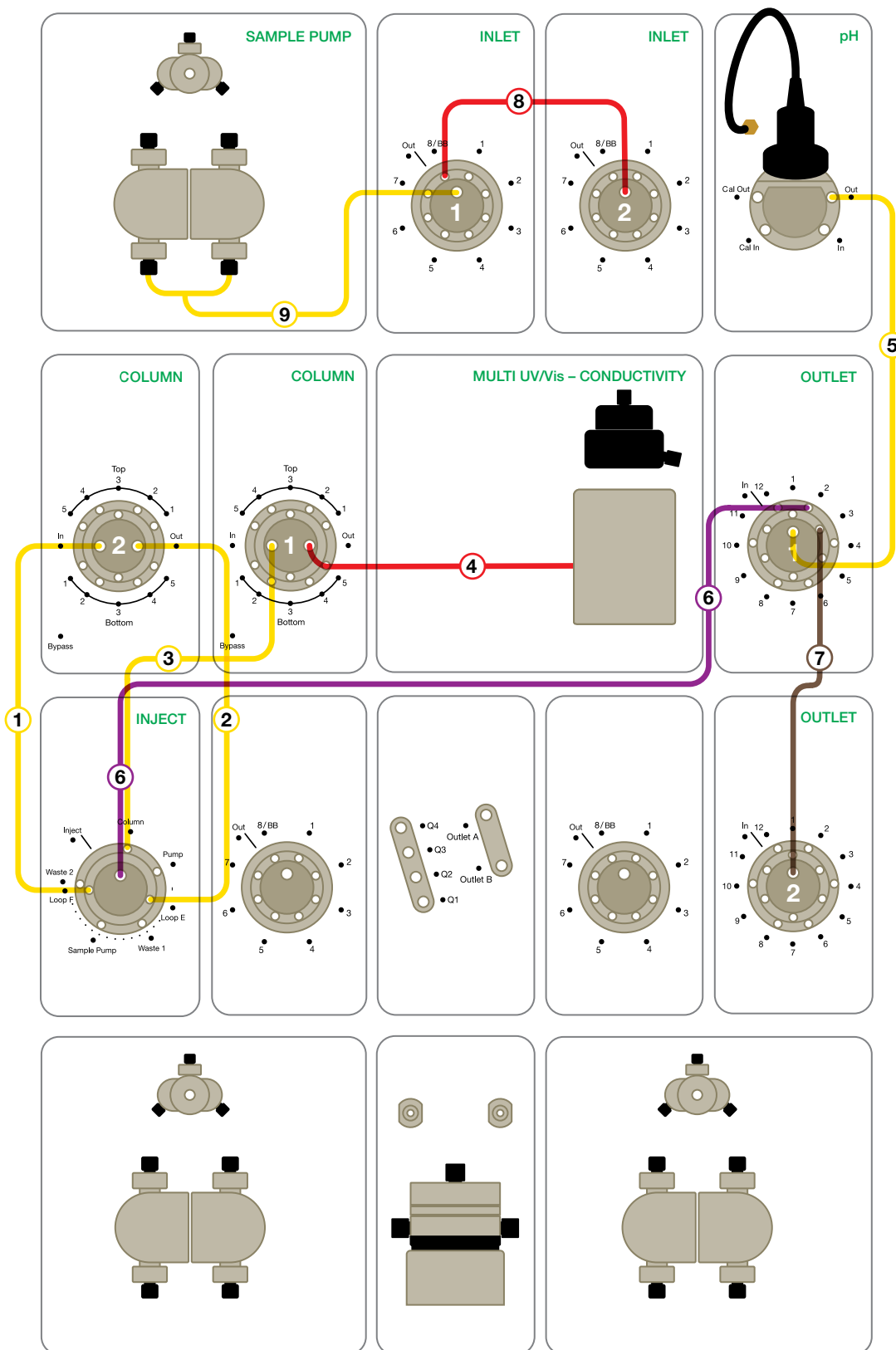
4-tier system with sample pump and sample inlet valves for multiple samples on 2-D and tandem applications. Two outlet valves provide enhanced fraction collection flexibility.

Example Templates

2D-Affinity 1 ml — SEC
2D-Affinity 5 ml — Desalting
Affinity 1 ml — Linear Gradient
Affinity 1 ml — Step Gradient
Affinity 1 ml —
Step Gradient (Manual)
Affinity 5 ml — Linear Gradient
Affinity 5 ml — Step Gradient

Tubing

- 1** Tube #1 — Length: 24.5 cm
Inject Valve Loop F to
Column Switching Valve 2 In
- 2** Tube #1 — Length: 24.5 cm
Column Switching Valve 2 Out
to Inject Valve Loop E
- 3** Tube #1 — Length: 24.5 cm
Inject Valve Column to
Column Switching Valve 1 In
- 4** MWD:
Tube #2 — Length: 17 cm
Column Switching Valve 1 Out
to Multi-Wavelength Detector In
OR
SWD (not shown):
Tube #1 — Length: 24.5 cm
Column Switching Valve 1 Out
to Single-Wavelength Detector In
- 5** Tube #1 — Length: 24.5 cm
pH Valve Out to
Outlet Valve 1 In
- 6** Tube #4 — Length: 50 cm
Outlet Valve 1 Port 2 to
Inject Valve Injection Port
- 7** Tube #10 — Length: 33.5 cm
Outlet Valve 1 Port 3 to
Outlet Valve 2 In
- 8** Tube #2 — Length: 17 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve 2 Out to
Sample Inlet Valve 1 Port 8
- 9** Tube #1 — Length: 24.5 cm
(1/16" Green PEEK if <5 ml/min
or 1/8" FEP if >5 ml/min)
Sample Inlet Valve 1 Out to
Sample Pump In



* The Discover Pro System includes
1 CSV, sample pump, 1 sample inlet,
2 buffer inlets, outlet valve, pH module,
and buffer blending valve.

Ordering Information

Catalog #	Description	Catalog #	Description
NGC Medium-Pressure Chromatography Systems		Valves	
NGC Quest™ Chromatography Systems		7884010	NGC Buffer Blending Valve Module , pkg of 1, kit includes necessary tubing and fittings, for inline buffer preparation and generating pH gradients for quick pH scouting
For all-purpose purification of biomolecules		7884006	NGC Inlet Valve Module , pkg of 1, kit includes necessary tubing and fittings, for automated switching between multiple buffers and samples during method development
7880001	NGC™ Quest 10 System	7884011	NGC pH Valve Module , pkg of 1, kit includes the pH valve kit, pH probe, tubing, and fittings for accurate inline pH measurement
7880003	NGC Quest 10 Plus System	7884012	NGC Column Switching Valve Module (10 ml) , kit includes the necessary tubing and fittings to accommodate the most common column types, holds 5 columns, for use with F10 systems and multiple columns for quick column scouting and reverse flow
7880002	NGC Quest 100 System	7884026	NGC Column Switching Valve Module (100 ml) , kit includes the necessary tubing and fittings to accommodate the most common column types, holds 5 columns, for use with F100 systems and multiple columns for quick column scouting and reverse flow
7880004	NGC Quest 100 Plus System	7884013	NGC Outlet Valve Module , pkg of 1, kit includes necessary tubing and fittings for automated fraction collection of large-volume fractions with up to 12 vessels
NGC Scout™ Chromatography Systems		Air Sensor	
For rapid scouting of biomolecules		7885017	NGC Air Sensor Module , pkg of 1, kit includes 2 large-bore air sensors to protect against air entering pumps and columns, supports up to 4 large- and small-bore air sensors, for detection of end of buffer and sample
7880005	NGC™ Scout 10 System	7885018	NGC Air Sensor Extension Module , pkg of 1, connects to the base air sensor module to support 4 additional air sensors, does not include any air sensors, optional part
7880006	NGC Scout 100 System	7885020	NGC Air Sensor (small) , pkg of 1, includes air sensor to exclude air from system and columns, detects air in small-diameter PEEK Tubing
For rapid scouting of proteins, peptides, and nucleic acids		7885021	NGC Air Sensor (large) , pkg of 1, includes air sensor to exclude air from system and columns, detects air in large-diameter tubing
7880007	NGC Scout 10 Plus System	7885019	NGC Air Sensor Extension Cable , pkg of 1, for placement of air sensors outside air sensor module
7880008	NGC Scout 100 Plus System	Fraction Collector and Autosampler	
NGC Discover™ Chromatography Systems		7410002	BioFrac™ Fraction Collector , 100/240 V, fraction collector compatible with all NGC Systems, includes power cord, rack set F1 (2 x flatpack, 13 mm), BioFrac Diverter Valve, fittings kit
For method development		7884025	NGC Communication Adaptor , pkg of 1, enables communication of Bio-Rad devices, such as the BioFrac Fraction Collector (#7410002), with the NGC System
7880009	NGC™ Discover 10 System	7885011	C-96 Autosampler , 110/240 V, includes standard 84+3 vial tray (1.5 and 10 ml), control cable set to connect with NGC System, 1 ml syringe, 2 ml sample loop, also includes #7605014, #7605026, #7600604, #7884016, and #7885013, compatible with all NGC Systems
7880010	NGC Discover 100 System	7885012	C-96 Autosampler with cooling , 110/240 V, with Peltier cooling, includes standard 84+3 vial tray (1.5 and 10 ml), control cable set to connect with NGC System, 1 ml syringe, 2 ml sample loop, also includes #7605014, #7605026, #7600604, #7884016, and #7885013, compatible with all NGC Systems
NGC System Modules and Accessories		PEEK is a trademark of Victrex PLC.	
System Pumps			
7884002	NGC F10 Pump Module , pkg of 1, includes 10 ml/min system pump kit with necessary tubing and fittings, for creating buffer gradients, for use with the buffer blending valve to generate flow rates of up to 20 ml/min		
7884003	NGC F100 Pump Module , pkg of 1, includes 100 ml/min system pump kit with necessary tubing and fittings, for creating buffer gradients, for use with the buffer blending valve to generate flow rates of up to 200 ml/min		
Sample Pump			
7884004	NGC Sample Pump 100 Module , pkg of 1, includes 100 ml/min sample pump kit with necessary tubing and fittings, for automated large-volume sample application via sample inject valve		
Detectors			
7884008	NGC Single-Wavelength Detector Module , pkg of 1, includes UV/conductivity detector with necessary tubing and fittings, for nucleotide and protein detection, salt gradient generation		
7884009	NGC Multi-Wavelength Detector Module , pkg of 1, includes UV/Vis and conductivity detector kit with necessary tubing and fittings, for simultaneous four-wavelength monitoring of elution fractions between 190–800 nm and salt gradient generation		
Mixer			
7884018	NGC Mixer Module , pkg of 1, can be extended with 2, 5, and 12 ml barrels for efficient gradient mixing at higher flow rates, for use with all NGC Systems, does not include mixer base or barrels		
7884019	NGC F100 Mixer , pkg of 1, 750 µl base and top assembly, included with all 100 ml/min NGC Systems		
7884020	NGC F10 Mixer , pkg of 1, 263 µl base and top assembly, included with all 10 ml/min NGC Systems		
7884021	NGC F10 Mixer Barrel Kit , pkg of 1, 750 µl extension barrel for F10 263 µl mixer, part of NGC Scout 10, NGC Discover 10 Systems		
7884022	NGC F10 Mixer Barrel Kit , pkg of 1, 2 ml extension barrel for F10 263 µl mixer, optional part		
7884028	NGC F100 Mixer Barrel Kit , pkg of 1, 2 ml extension barrel for F100 750 µl mixer, part of NGC Scout 100, NGC Discover 100 Systems		
7884023	NGC F100 Mixer Barrel Kit , pkg of 1, 5 ml extension barrel for F100 750 µl mixer, optional part		
7884024	NGC F100 Mixer Barrel Kit , pkg of 1, 12 ml extension barrel for 750 µl mixer, optional part		

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Life Science
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