

QuickSplit™ Flow Splitters

Split between 2 or more detectors such as Mass Spectroscopy and evaporative light scattering, UV, or IR. This is especially important when one of the detectors is destructive, such as Mass Spec and ELS.

Reduce the flow rate from the column to a lower flow rate that the Mass Spec can work efficiently at. Chromatography methods are often using flow rates of 0.5 to 2 mL/min., which are too high for most Mass Spec. Flow splitting is a way to reduce the flow rate down to flow rates suitable for the Mass Spec.

Mass directed fraction collection. A small portion of the outlet flow from a preparative HPLC column can be split off and then combined and diluted with a makeup-flow. The resulting makeup-flow is used by a detector, typically a Mass Spectrometer, UV, or other detector to trigger fraction collection from the remaining preparative flow.



ASI

QuickSplit™ Flow Splitters

QuickSplit™ Flow Splitter Features:

- ❑ Available with Fixed or Adjustable split ratios
- ❑ Interchangeable fluid resistors allow quick and easy split ratio changes, eliminating tedious adjustments to capillary tubing
- ❑ Can be used for any application where a controlled, reproducible split ratio is required, including LC/MS, Flow Fractionation, Pre/Post Column flow splitting, Mass Directed Fraction Collection, and Capillary Chromatography
- ❑ Come in flow rate ranges compatible with Nano, Micro, Analytical, Semi-preparative and Preparative HPLC
- ❑ Available with Makeup inlet port and delay coil, ideal for Mass directed fraction collection and Preparative HPLC
- ❑ Replacement resistor sets are available for all models, in standard and custom split ratios
- ❑ Convenient replaceable inlet filters ensure long-term reliability

ASI QuickSplit technology can be applied to all applications where a controlled, reproducible split ratio is required including LC/MS, flow fractionation, pre/post column flow splitting, mass directed fraction collection, and capillary chromatography. ASI Flow Splitters come in flow rate ranges which make them compatible with nano, micro, analytical, and prep HPLC flow rates. Split ratios are stable and reproducible, and not affected by changes in viscosity or pressure in post column applications. For precolumn applications, please refer to the AS650 automated flow splitter.

Fixed Flow Splitters

ASI QuickSplit Fixed Flow Splitters are available in a factory preset split ratio. Split ratios are created by two or more fluid resistors that form a parallel flow path. Interchangeable fluid resistors make it easy to change split ratios quickly, eliminating tedious adjustment to capillary tubing.

Adjustable Flow Splitters

ASI Quick Split Adjustable Flow Splitters are also available in an adjustable design that allows direct real time control over split ratio optimization. An interchangeable fluid resistor is combined with an adjustable resistor on the high flow side to create a variable split ratio.

QuickSplit™ Flow Splitters

Post-Column Application

- Applies to single and multiple Detectors

While **Figure 1** does not cover all possible Post-Column Flow Splitter configurations, it depicts the most common application. Post-Column flow splitters specifications should be reviewed carefully in the subsequent product literature before selecting a splitter to order. If you have questions about which splitter is right for your application, please contact the technical support group at ASI.

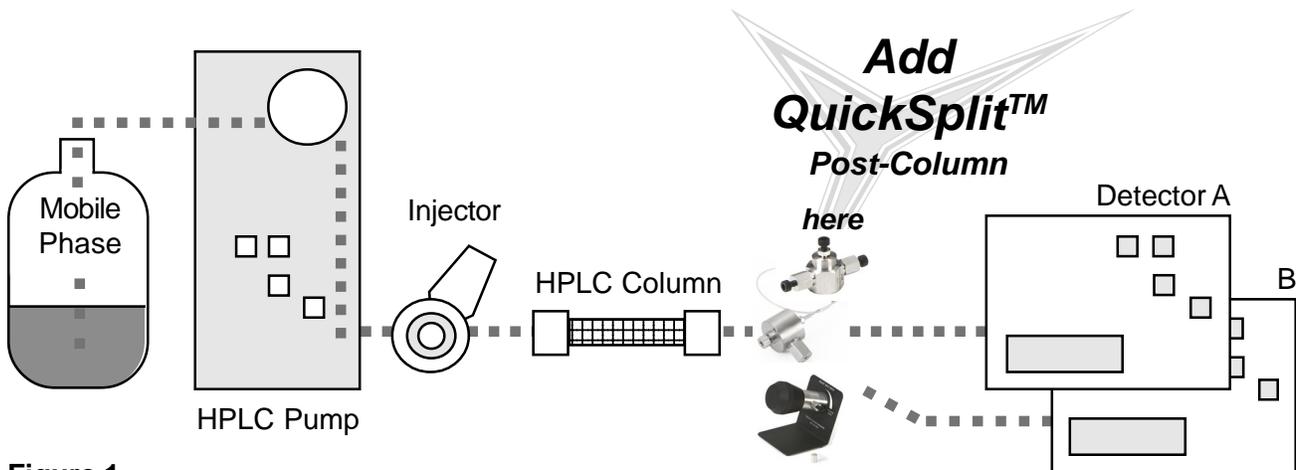


Figure 1

Pre-Column Application

- Applies to single and multiple Columns

While **Figure 2** does not cover all possible Pre-Column Flow Splitter configurations, it depicts the most common application. Pre-Column flow splitters specifications should be reviewed carefully in the subsequent product literature before selecting a splitter to order. If you have questions about which splitter is right for your application, please contact the technical support group at ASI.

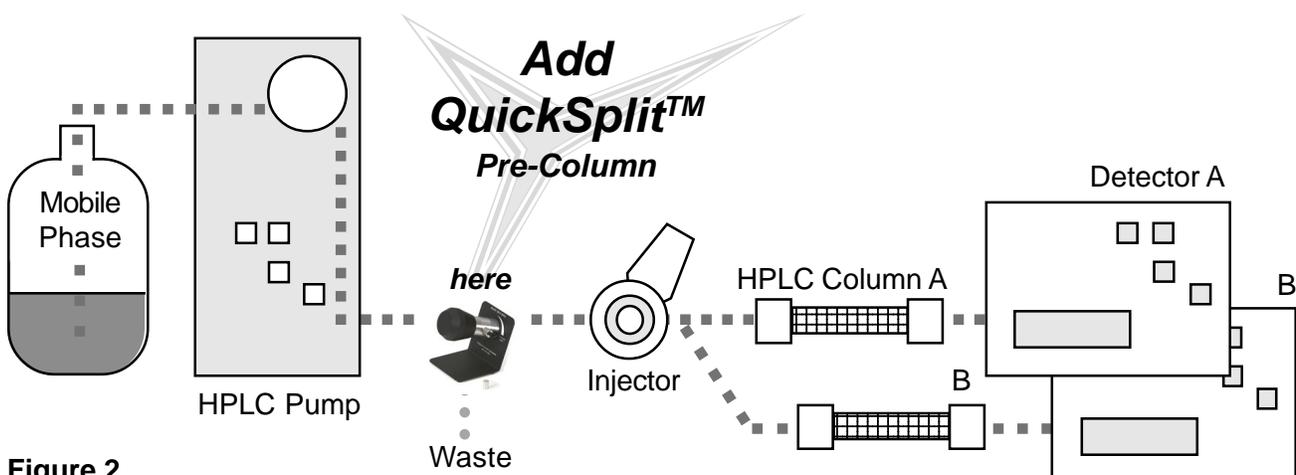


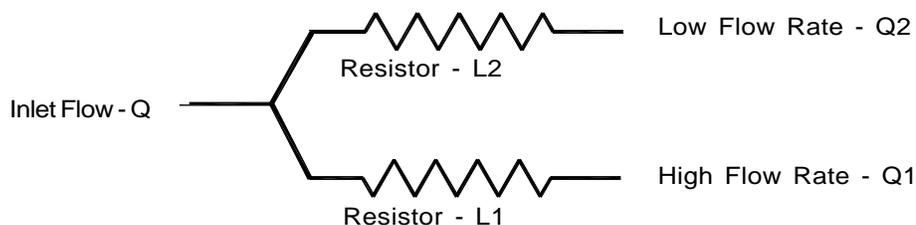
Figure 2

QuickSplit™ Fixed Flow Splitter

- ❑ The *ASI* Fixed Flow Splitter divides inlet flow into two, three or four channels
- ❑ Factory preset split ratios from 1:1 to 20,000:1
- ❑ Fluid resistor technology replaces long capillary tubing to create split ratio
- ❑ Simple low cost design that does not require any calibration or adjustment
- ❑ Small size allows closer placement to the detector
- ❑ Ultra low dead volume fluidic design for minimal dispersion
- ❑ Inlet flow rate from 0.1 mL/min. up to 1 L/min. (Higher flow rate are available by request)
- ❑ Stable and reproducible split flows are not affected by viscosity or pressure changes in post-column applications
- ❑ Maximum 350 bar operating pressure
- ❑ Available in binary, three and four port configurations

The flow path of the *QuickSplit* Fixed Flow Splitter contains two fluid resistors that form a parallel flow path. Both low and high flow rate streams pass through fixed resistor cartridges. The ratio of these two resistors creates the split ratio. To understand how the *QuickSplit* Fixed Flow Splitter works, it helps to look at a diagram of a fixed flow splitter, **Figure 3**. The diagram shows the relationship of the fixed fluid resistors relative to the flow paths and how a split ratio is calculated.

Schematic flow diagram of the *QuickSplit* Fixed Flow Splitter



L1 = Fixed fluid resistor (resistance value varies depending on cartridge rating)
 L2 = Fixed fluid resistor (resistance value varies depending on cartridge rating)
 R = Split ratio = Q1/Q2 = Resistance ratio = L2/L1

Figure 3

Fixed Flow Splitters

Post-Column Applications

The ratio of the fluid resistor values determines the split ratio. This ratio is calibrated within a +/- 10% tolerance range, assuming that there is no pressure drop down stream from the splitter. Input flow rate may be adjusted to compensate for variation within tolerance. For example, a 10% increase in input flow rate will yield a 10% flow increase at both high and low flow channels. The pressure drop specification for all input flow ranges is 500 PSI maximum with water at the calibration flow rate. When ordering, please specify the actual inlet flow rate if it is significantly different from the default calibration flow rate.

Typical uses for post-column flow splitting

Multiple detectors:

Split between 2 or more detectors such as mass spec and evaporative light scattering, UV, or IR. This is especially important when one of the detectors is destructive, such as Mass Spectroscopy and ELS.

LC/MS:

Reduce the flow rate from the column to a lower flow rate that the mass spec can work efficiently at. Chromatography methods are often using flow rates of 0.5 to 2 mL/min., which are too high for most mass spec. Flow splitting is a way to reduce the flow rate down to flow rates suitable for the mass spec. *Although there are pumps that can deliver flow rates low enough to be compatible with mass spec, many practical reasons prevent Chromatographers from changing methods that are already proven to work at higher flow rates: reluctance to change to a different column from one that is familiar and accepted; FDA regulations and S.O.P's that make any changes in methods burdensome; the ease of operation at higher mL/min. flow rates compared to μ L/min. flow rates. Flow splitting*

QuickSplit™ Binary Fixed Flow Splitter

Standard Fixed Flow Splitter



Interchangeable Resistor Set

Fixed Flow Splitter with Capillary Resistor



Custom Split Ratios

Split ratios and resistor cartridges other than those listed can be ordered to custom configure the QuickSplit Fixed Flow Splitter. Please contact ASI technical support for additional information about custom splitters. We will gladly assist you in determining the best splitter configuration for your application.

Post-Column Applications continued

QuickSplit™ Binary Fixed Flow Splitters

Analytical Splitters - Inlet flow range, 0.1 mL/min. to 5 mL/min.

These splitters will produce under 500 PSI backpressure with water at 1.0 mL/min, which is our default calibration flow 1.0 mL/min. The backpressure will decrease or increase in proportion to flow rate changes. **In order to assure <500 PSI pressure drop across the splitter, please specify the inlet flow when you order. Please see page 12 for optional mounting bracket.**

Description		ASI Part Number
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 2,000:1	620-PO10-03
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 1,000:1	620-PO10-04
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 500:1	620-PO10-05
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 200:1	620-PO10-06
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 100:1	620-PO10-07
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 50:1	620-PO10-08
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 20:1	620-PO10-09
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 10:1	620-PO10-10
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 5:1	620-PO10-11
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 3:1	620-PO10-12
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = 1:1	620-PO10-13
Analytical Fixed Flow Splitter, Post-Column	Split Ratio = Custom	620-PO10-CS
Analytical Fixed Flow Splitter, Post-Column, High Split Ratio 2,000:1 to 20,000:1	Split Ratio = Custom	620-PO10-HS

Analytical Replacement Resistor Sets - Binary

Description		ASI Part Number
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 2,000:1	620-1110-03
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 1,000:1	620-1110-04
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 500:1	620-1110-05
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 200:1	620-1110-06
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 100:1	620-1110-07
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 50:1	620-1110-08
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 20:1	620-1110-09
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 10:1	620-1110-10
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 5:1	620-1110-11
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 3:1	620-1110-12
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 1:1	620-1110-13
Analytical Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = Custom	620-1110-CS
Analytical Fixed Flow Splitter Resistor Set, Post-Column High Split Ratio 2,000:1 to 20,000:1	Split Ratio = Custom	620-1110-HS

Fixed Flow Splitters

Post-Column Applications continued

QuickSplit™ Binary Fixed Flow Splitters

Semi-Preparative Splitters - Inlet flow range, 5 mL/min. to 40 mL/min.

These splitters will produce under 500 PSI backpressure with water at 20.0 mL/min., which is our default calibration flow 20 mL/min. The backpressure will decrease or increase in proportion to flow rate changes. The Semi-prep Fixed Flow Splitter HS (High Split Ratio) incorporates a resistor set which includes an ASI fluid resistor on the high flow side and a capillary resistor on the low flow side. **In order to assure <500 PSI pressure drop across the splitter, please specify the inlet flow when you order. Please see page 12 for optional mounting bracket.**

Description		ASI Part Number
Semi-Preparative Fixed Flow Splitter, Post-Column	Split Ratio = 200:1	620-PO20-06
Semi-Preparative Fixed Flow Splitter, Post-Column	Split Ratio = 100:1	620-PO20-07
Semi-Preparative Fixed Flow Splitter, Post-Column	Split Ratio = 50:1	620-PO20-08
Semi-Preparative Fixed Flow Splitter, Post-Column	Split Ratio = 20:1	620-PO20-09
Semi-Preparative Fixed Flow Splitter, Post-Column	Split Ratio = 10:1	620-PO20-10
Semi-Preparative Fixed Flow Splitter, Post-Column	Split Ratio = 5:1	620-PO20-11
Semi-Preparative Fixed Flow Splitter, Post-Column	Split Ratio = Custom	620-PO20-CS
Semi-Preparative Fixed Flow Splitter, Post-Column, High Split Ratio 500:1 to 20,000:1	Split Ratio = Custom	620-PO20-HS

Semi-Preparative Replacement Resistor Sets - Binary

Description		ASI Part Number
Semi-Preparative Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 200:1	620-1120-06
Semi-Preparative Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 100:1	620-1120-07
Semi-Preparative Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 50:1	620-1120-08
Semi-Preparative Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 20:1	620-1120-09
Semi-Preparative Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 10:1	620-1120-10
Semi-Preparative Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = 5:1	620-1120-11
Semi-Preparative Fixed Flow Splitter Resistor Set, Post-Column	Split Ratio = Custom	620-1120-CS
Semi-Preparative Fixed Flow Splitter Resistor Set, Post-Column, High Split Ratio 500:1 to 20,000:1	Split Ratio = Custom	620-1120-HS

Post-Column Applications continued

Preparative Splitters - Inlet flow range, 30 mL/min. to 200 mL/min.

These splitters will produce under 500 PSI backpressure with water at the specified inlet flow rate. The backpressure will decrease or increase in proportion to flow rate changes. **In order to assure <500 PSI pressure drop across the splitter, the inlet flow rate must be specified when you order. Please see page 12 for optional mounting bracket.**

Description	ASI Part Number
Preparative Fixed Flow Splitter, Post-Column Inlet Flow Range: 30 - 200 mL/min.	Split Ratio = Custom 620-PO40-CS

Preparative Replacement Resistor Sets - Binary

Description	ASI Part Number
Preparative Fixed Flow Splitter, Resistor Set, Post-Column Inlet Flow Range: 30 - 200 mL/min.	Split Ratio = Custom 620-1140-CS

High-Preparative Splitters - Inlet flow range, 200 mL/min. to 1,000 mL/min.

These splitters will produce under 500 PSI backpressure with water at the specified inlet flow rate. The backpressure will decrease or increase in proportion to flow rate changes. **In order to assure <500 PSI pressure drop across the splitter, the inlet flow rate must be specified when you order. Please see page 12 for optional mounting bracket.**

Description	ASI Part Number
High-Preparative Fixed Flow Splitter, Post-Column InletFlow Range: 200 - 1,000 mL/min.	Split Ratio = Custom 620-PO60-CS

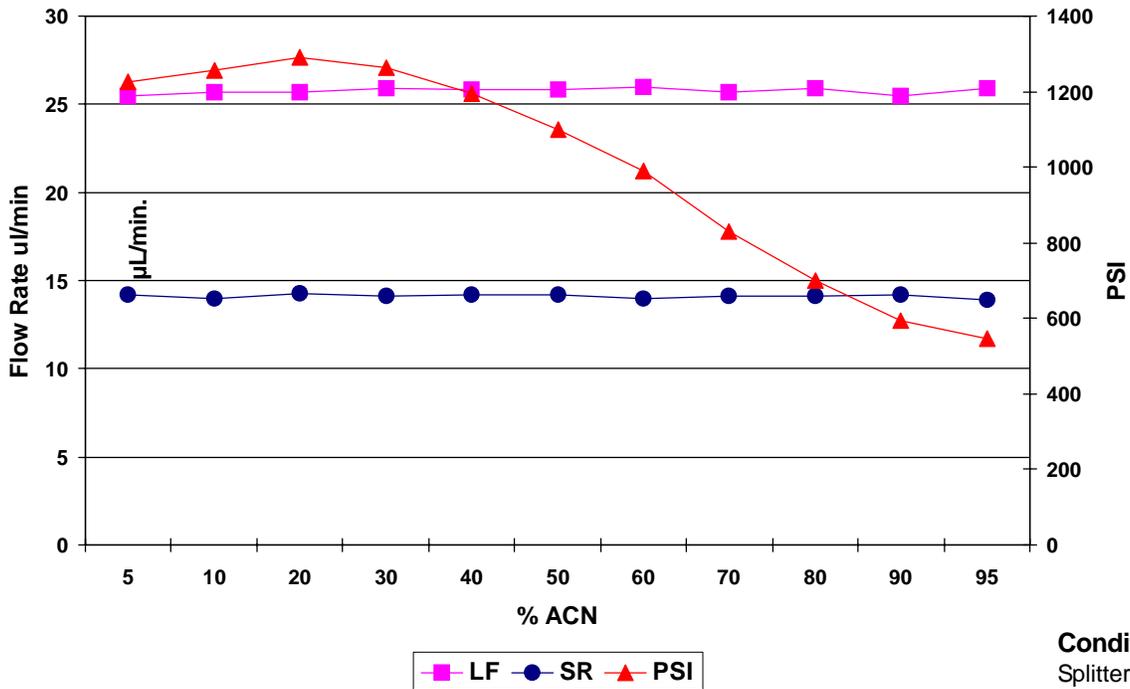
High-Preparative Replacement Resistor Sets - Binary

Description	ASI Part Number
High-Preparative Fixed Flow Splitter, Post-Column, Resistor Set Inlet Flow Range: 200 - 1,000 mL/min.	Split Ratio = Custom 620-1160-CS

Fixed Flow Splitters

Effect of Gradient on Flow Rate Stability

ACN Gradient 5-95% in 20 min.

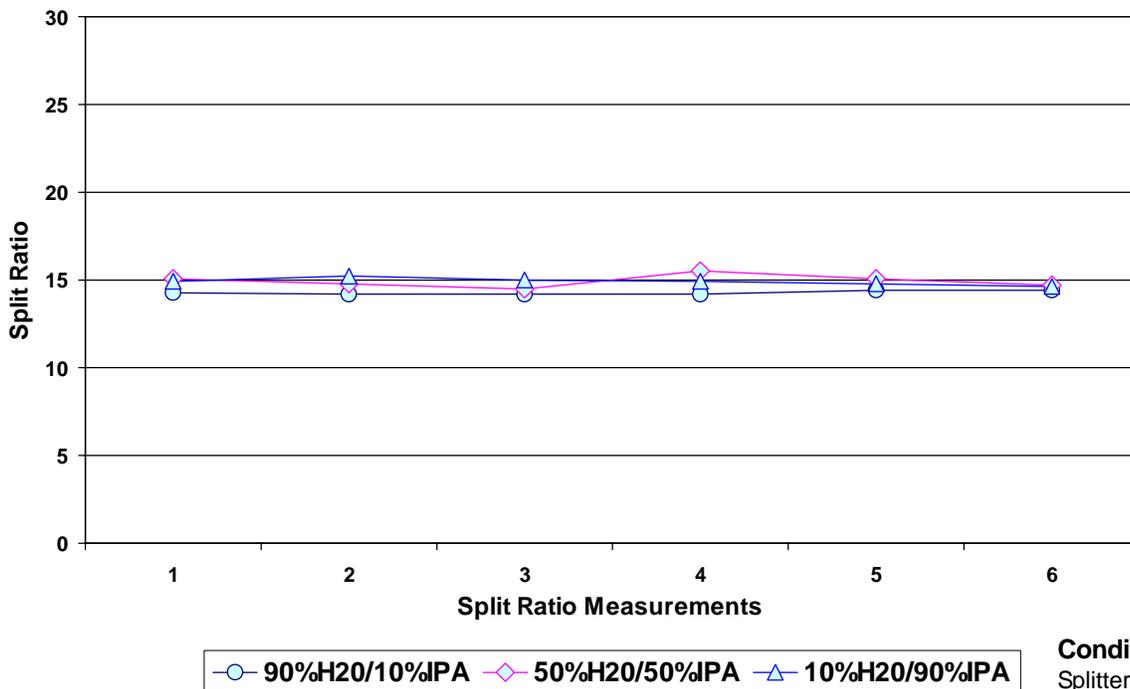


Conditions:
 Splitter 620-PO10-CS
 Split Ratio 15:1
 Inlet Flow 400 µL/min.

Figure 4

Effect of Viscosity on Split Ratio

Split Ratio vs %IPA



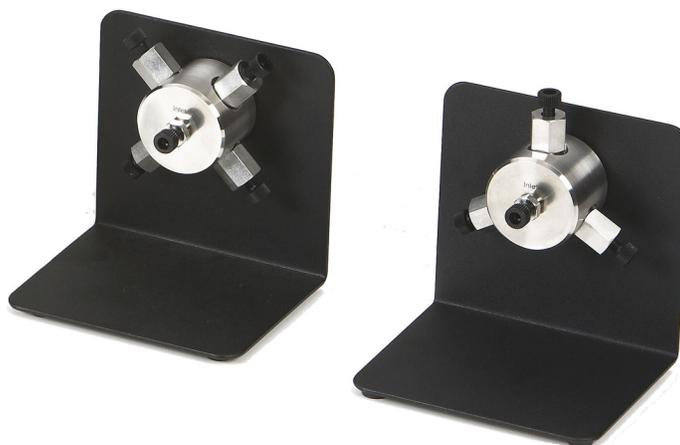
Conditions:
 Splitter 620-PO10-CS
 Split Ratio 15:1
 Inlet Flow 400 µL/min.

Figure 5

Post-Column Applications continued

QuickSplit™ Multiport Fixed Flow Splitters

Divides the incoming flow stream into 3 or 4 channels. The *QuickSplit* Multiport Flow Splitter is ideal for applications that use multiple detectors and/or a fraction collector. Split ratios can be configured to be identical in each channel or custom configured to accommodate specific flow rates at each channel. The low internal dead volume prevents excessive dispersion and the replaceable inlet filter insures robust operation. Available in models for analytical and semi-preparative inlet flow rates. **Please contact ASI for assistance in configuring your *QuickSplit* Multiport Fixed Splitter prior to ordering. Please specify inlet flow rate and desired outlet flow rate in each channel when you order.**



QuickSplit Multiport Fixed Flow Splitter

Analytical Splitters - Inlet flow range, 0.1 mL/min. to 5 mL/min.

These splitters will produce under 500 PSI backpressure with water at the inlet flow rate specified with the order. The backpressure will decrease or increase in proportion to flow rate changes.

Description	ASI Part Number
Analytical Three Port Fixed Flow Splitter, Post-Column Split Ratio = Custom	630-PO10-CS
Analytical Four Port Fixed Flow Splitter, Post-Column Split Ratio = Custom	640-PO10-CS

Semi-Preparative Splitters - Inlet flow range, 5 mL/min. to 40 mL/min.

These splitters will produce under 500 PSI backpressure with water at the inlet flow rate specified with the order.. The backpressure will decrease or increase in proportion to flow rate changes.

Description	ASI Part Number
Semi-Preparative Three Port Fixed Flow Splitter, Post-Column Split Ratio = Custom	630-PO20-CS
Semi-Preparative Four Port Fixed Flow Splitter, Post-Column Split Ratio = Custom	640-PO20-CS

Fixed Flow Splitters

Fixed Flow Splitter Accessories

Replacement Inlet Filters

Description	Applications	ASI Part Number
Inlet Filter Assembly, 2 micron .063" dia. 5/Pack, 1 µL Volume	Fixed FS - Analytical Range	620-0063-2
Inlet Filter & Housing Assembly, 10 micron .125" dia. each, 4 µL Volume	Fixed FS - Semi-Prep Range	620-23-0125-10
Inlet Filter & Housing Assembly, 10 micron .188" dia. each, 10 µL Volume	Fixed FS - Prep Range	620-23-0188-10
Inlet Filter & Housing Assembly, 20 micron .188" dia. each, 12 µL Volume	Fixed FS - Prep Range	620-23-0188-20
Straight Thru Hole, No Filter each, 0.1 µL Volume	Fixed FS - Analytical Range	620-001-2-2
Straight Thru Hole, No Filter 5/Pack, 1 µL Volume	Fixed FS - High-Prep Range	620-001-2-3

Mounting Bracket 620

Description	ASI Part Number
Mounting Bracket for Fixed Flow Splitter 620-PO10, 620-PO20, 620-PO40 and 620-PO60	620-1000

QuickSplit™ Adjustable Flow Splitter

- ❑ Adjustable Flow Splitter allows direct real time control over split ratio optimization
- ❑ Convenient for Chromatography methods development
- ❑ Split flow rates can be maintained constant while incoming flow rates vary
- ❑ Split flows are stable, reproducible, and are not affected by viscosity or pressure changes
- ❑ Split ratio ranges can be changed by replacing the fixed resistor element
- ❑ Input flow rate from 0.25 mL/min. to 1 L/min. available
- ❑ A graduated indicator rod tracks ratio settings, as documented in calibration data shipped with our splitters

Unlike conventional splitters that use long lengths of capillary tubing, the *ASI QuickSplit* Adjustable Flow Splitter uses fluid resistors to achieve a wide range of split ratios. The Adjustable Flow Splitter contains two fluid resistors that form parallel flow paths. The low flow rate stream passes through a fixed resistor cartridge, while the high flow rate stream passes through an adjustable fluid resistor (metering valve). The ratio of these two resistors creates the split flow ratio. Because the Adjustable Flow Splitter incorporates a metering valve, split ratios may be adjusted by a factor of 20 (i.e.: 1:1 to 20:1) by simply turning a knob. This variable split ratio can be used with a fixed inlet flow to adjust low split flow rate by a factor of 10 (i.e.: 10 µL to 100 µL/min.). If a fixed low split flow is desired, inlet flow range may be varied by a factor of 10 (i.e.: 0.5 mL to 5 mL/min.). Due to the rugged design, the split ratio repeatability is +/- 2% of setting, and unlike alternative splitter valves or tees, WILL NOT be affected by actions that effect inlet flow such as turning the pump off and on, or pressure spikes.

Typical uses for post-column flow splitting

Multiple detectors:

Split between 2 or more detectors such as mass spec and evaporative light scattering, UV, or IR. This is especially important when one of the detectors is destructive, such as Mass Spectroscopy and ELS.

LC/MS:

Reduce the flow rate from the column to a lower flow rate that the mass spec can work efficiently at. Chromatography methods are often using flow rates of 0.5 to 2 mL/min., which are too high for most mass spec. Flow splitting is a way to reduce the flow rate down to flow rates suitable for the mass spec. Although there are pumps that can deliver flow rates low enough to be compatible with mass spec, many practical reasons prevent Chromatographers from changing methods that are already proven to work at higher flow rates: reluctance to change to a different column from one that is familiar and accepted; FDA regulations and S.O.P's that make any changes in methods burdensome; the ease of operation at higher mL/min. flow rates compared to µL/min. flow rates. Flow splitting allows the chromatographer to take a proven method that works at higher flow rates and quickly integrate mass spec or multiple detectors without re-developing the method.

Adjustable Flow Splitters

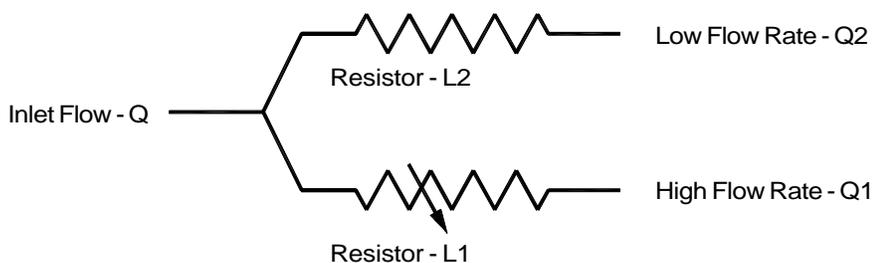
QuickSplit™ Adjustable Flow Splitter

QuickSplit Adjustable Flow Splitter



To understand how the QuickSplit Adjustable Flow Splitter works, it helps to look at a diagram of an Adjustable Flow Splitter, **Figure 6**. The diagram shows the relationship of the fixed and adjustable fluid resistors relative to the flow paths and how a split ratio is calculated.

Schematic flow diagram of the QuickSplit Adjustable Flow Splitter



- L1 = Adjustable fluid resistor (metering valve)
- L2 = Fixed fluid resistor (resistance value varies depending on cartridge rating)
- R = Split ratio = $Q1/Q2 = \text{Resistance ratio} = L2/L1$

Figure 6

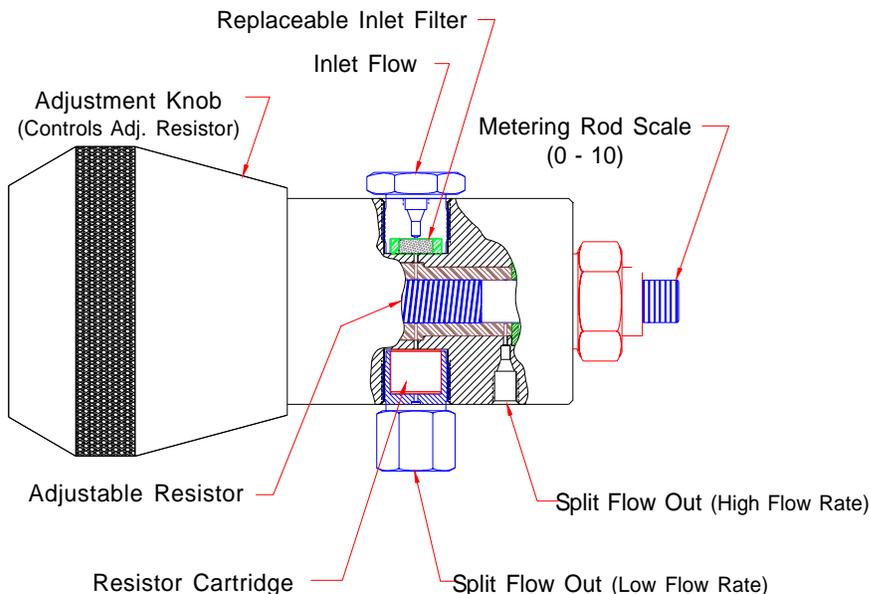


Figure 7

Post-Column Applications

Post-column splitting is fairly straight forward. Like pre-column flow splitting, any significant additional pressure (resistance) down stream from the splitter may affect the split ratio. Post-column devices also contribute to chromatographic dispersion so care must be given to connecting tubing and fittings, especially at low flow rates.

Use the back pressure vs split ratio chart on **page 17 and 18** to select a *QuickSplit* Adjustable Flow Splitter that will provide the desired split ratio range and back pressure. These charts correspond to several flow rates and solvent systems. The back pressure is directly proportional to flow rate and viscosity. The back pressure estimates on these charts only apply to post-column applications. Splitters are shipped complete with the resistor cartridge installed.

To assure optimum pressure drop across the splitter, please specify the actual inlet flow rate when the splitter is ordered if it is significantly different from the calibration flow rate.

Custom Split Ratios

Split ratios and resistor cartridges other than those listed below can be ordered from ASI to custom configure the *QuickSplit* Adjustable Flow Splitter. Please contact technical support for additional information about custom splitters. We will gladly assist you in determining the best splitter configuration for your application.

QuickSplit™ Adjustable Flow Splitters

Analytical Splitters

Analytical range, 0.25 mL/min. to 5 mL/min. inlet flow, calibration flow rate 1.0 mL/min.

Description	Split Ratio Range	ASI Part Number
Analytical Adjustable Flow Splitter, Post-Column	50:1 to 1,000:1	600-PO10-01
Analytical Adjustable Flow Splitter, Post-Column	15:1 to 300:1	600-PO10-03
Analytical Adjustable Flow Splitter, Post-Column	5:1 to 100:1	600-PO10-04
Analytical Adjustable Flow Splitter, Post-Column	1:1 to 20:1	600-PO10-06
Analytical Adjustable Flow Splitter, Post-Column	Custom	600-PO10-CS

Analytical Replacement Resistor Cartridges

Description	Split Ratio Range	ASI Part Number
Analytical Adjustable Flow Splitter Resistor Cartridge, Post-Column	50:1 to 1,000:1	600-1110-01
Analytical Adjustable Flow Splitter Resistor Cartridge, Post-Column	15:1 to 300:1	600-1110-03
Analytical Adjustable Flow Splitter Resistor Cartridge, Post-Column	5:1 to 100:1	600-1110-04
Analytical Adjustable Flow Splitter Resistor Cartridge, Post-Column	1:1 to 20:1	600-1110-06
Analytical Adjustable Flow Splitter Resistor Cartridge, Post-Column	Custom	600-1110-CS

Adjustable Flow Splitters

Post-Column Applications continued

Semi-Preparative Splitters

Semi-Prep range, 5 mL/min. to 40 mL/min. inlet flow, calibration flow rate 20.0 mL/min.

Description	Split Ratio Range	ASI Part Number
Semi-Preparative Adjustable Flow Splitter, Post-Column	1,000:1 to 20,000:1	600-PO20-00
Semi-Preparative Adjustable Flow Splitter, Post-Column	100:1 to 2,000:1	600-PO20-01
Semi-Preparative Adjustable Flow Splitter, Post-Column	15:1 to 300:1	600-PO20-02
Semi-Preparative Adjustable Flow Splitter, Post-Column	1:1 to 20:1	600-PO20-03
Semi-Preparative Adjustable Flow Splitter, Post-Column	Custom	600-PO20-CS

Semi-Preparative Replacement Resistor Cartridges

Description	Split Ratio Range	ASI Part Number
Semi-Preparative Adjustable Flow Splitter Resistor Cartridge, Post-Column	1,000:1 to 20,000:1	600-1120-00
Semi-Preparative Adjustable Flow Splitter Resistor Cartridge, Post-Column	100:1 to 2,000:1	600-1120-01
Semi-Preparative Adjustable Flow Splitter Resistor Cartridge, Post-Column	15:1 to 300:1	600-1120-02
Semi-Preparative Adjustable Flow Splitter Resistor Cartridge, Post-Column	1:1 to 20:1	600-1120-03
Semi-Preparative Adjustable Flow Splitter Resistor Cartridge, Post-Column	Custom	600-1120-CS

Preparative Splitters

Prep range, 40 mL/min. to 1,000 mL/min. inlet flow, custom calibration flow rate

Description	Split Ratio Range	ASI Part Number
Preparative Adjustable Flow Splitter, Post-Column, Inlet Flow Range: 40 - 125 mL/min.	Custom	600-PO30-CS
Preparative Adjustable Flow Splitter, Post-Column, Inlet Flow Range: 75 - 200 mL/min.	Custom	600-PO40-CS
Preparative Adjustable Flow Splitter, Post-Column, Inlet Flow Range: 100 - 1,000 mL/min.	Custom	600-PO60-CS

Preparative Replacement Resistor Cartridges

Description	Split Ratio Range	ASI Part Number
Preparative Adjustable Flow Splitter Resistor Cartridge, Post-Column, Inlet Flow Range: 40 - 125 mL/min.	Custom	600-1130-CS
Preparative Adjustable Flow Splitter Resistor Cartridge, Post-Column, Inlet Flow Range: 75 - 200 mL/min.	Custom	600-1140-CS
Preparative Adjustable Flow Splitter Resistor Cartridge, Post-Column, Inlet Flow Range: 100 - 1,000 mL/min.	Custom	600-1160-CS

Adjustable Flow Splitters

QuickSplit Adjustable Flow Splitter Selection Charts

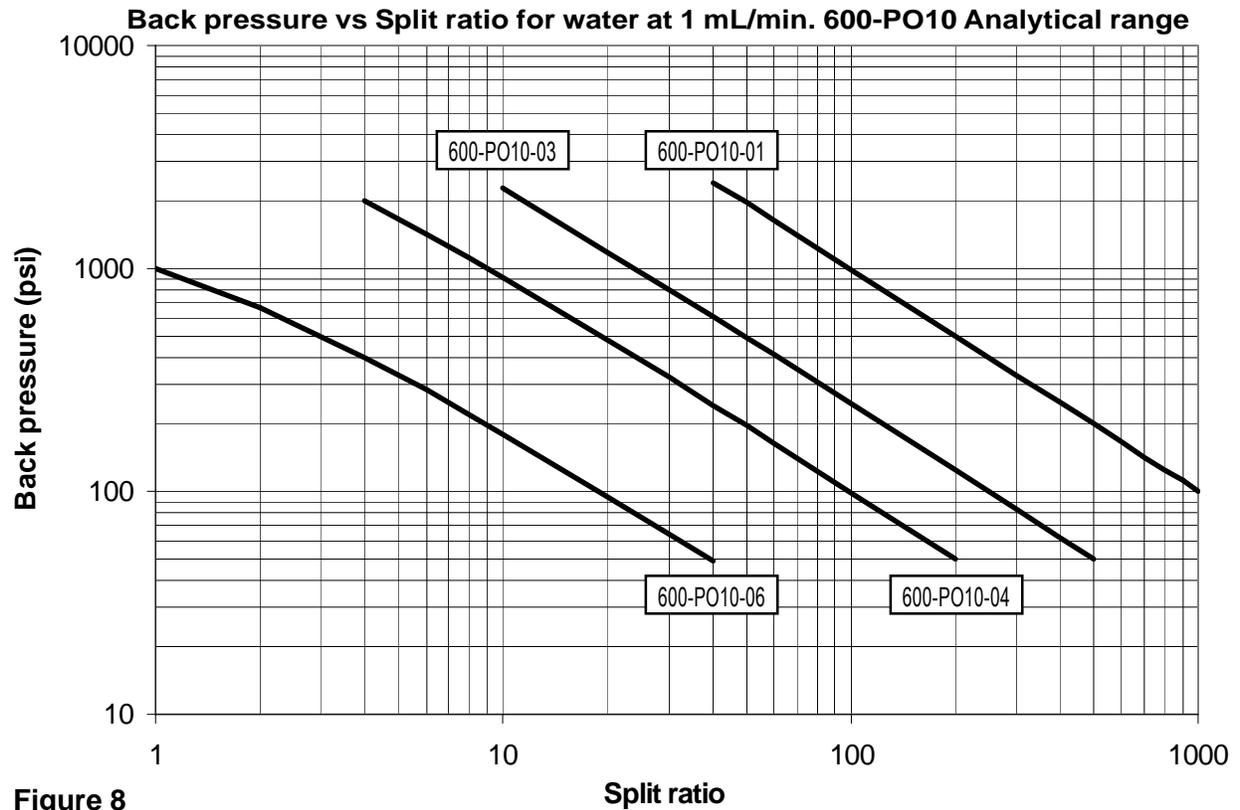


Figure 8

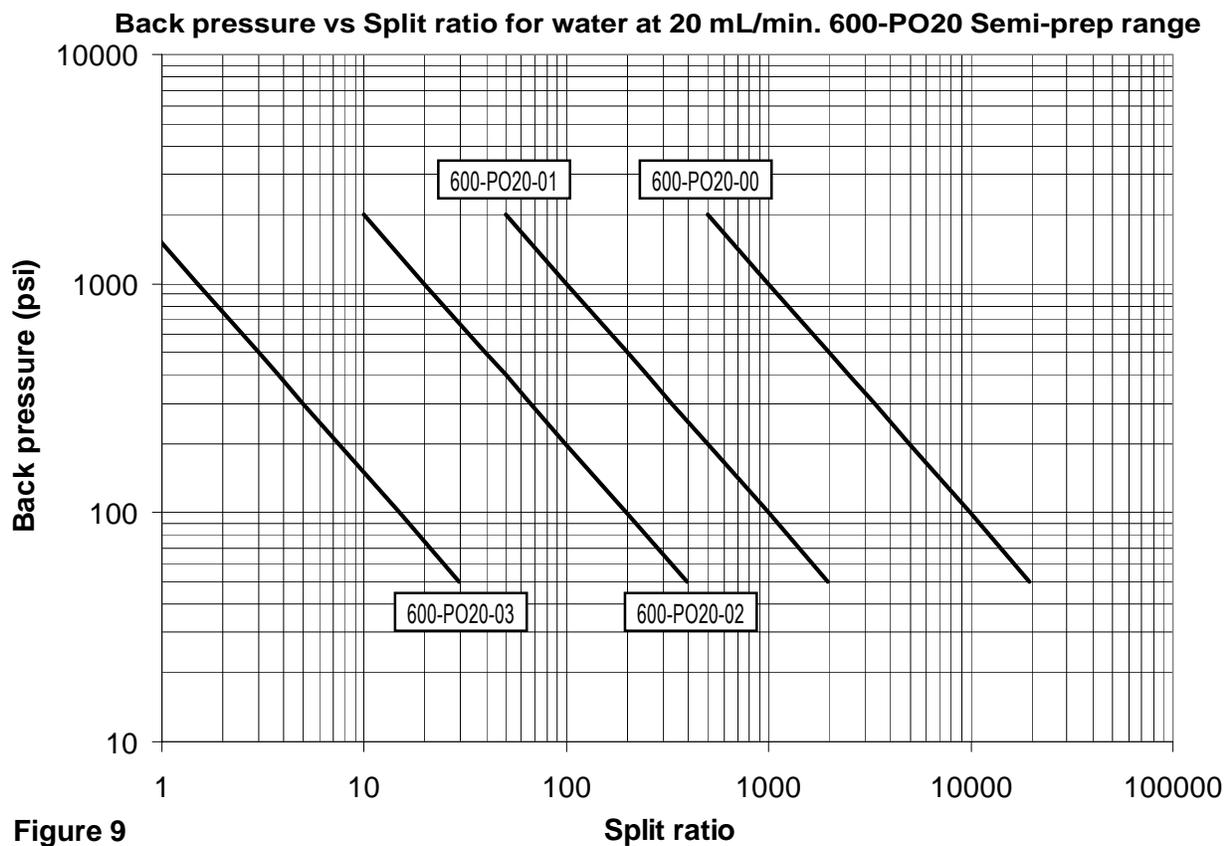


Figure 9

Adjustable Flow Splitters

QuickSplit Adjustable Flow Splitter Selection Charts

Back pressure vs Split ratio for 50/50 ACN/water at 1 mL/min. 600-PO10 Analytical range

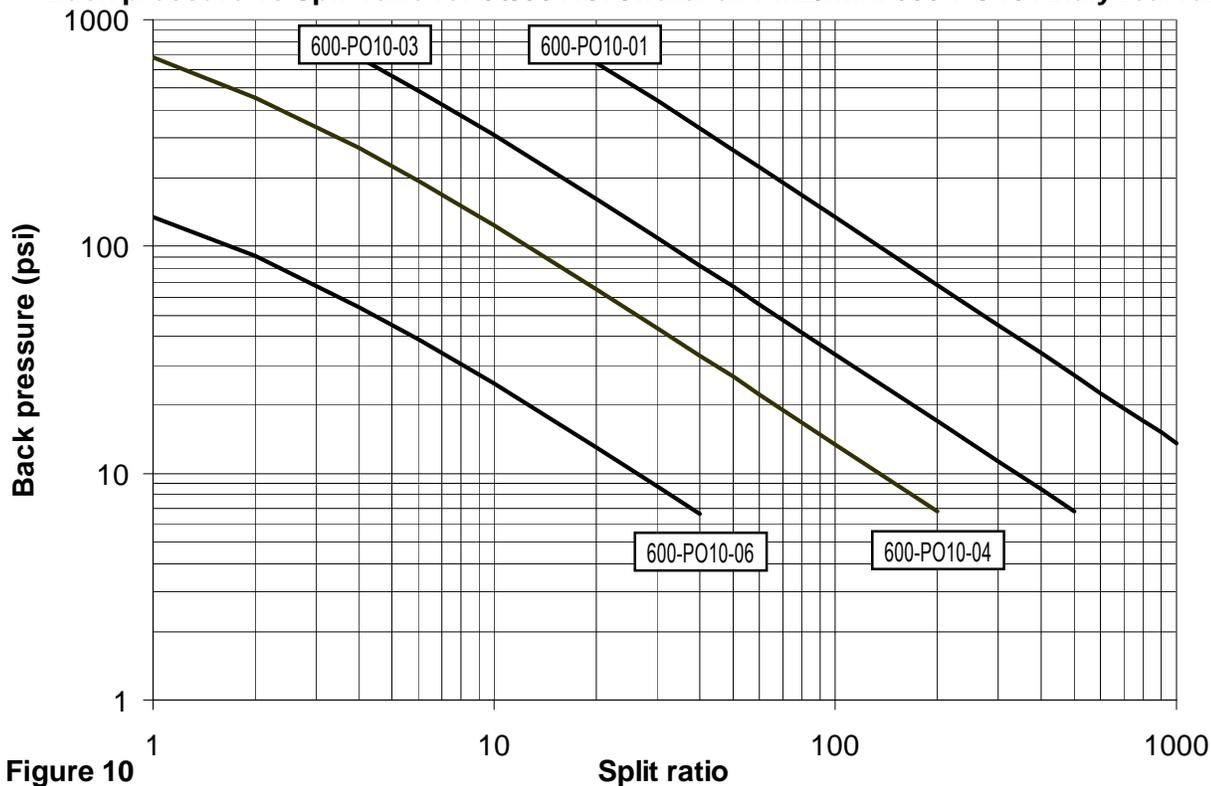


Figure 10

Back pressure vs Split ratio for 50/50 ACN/water at 0.5 mL/min. 600-PO10 Analytical range

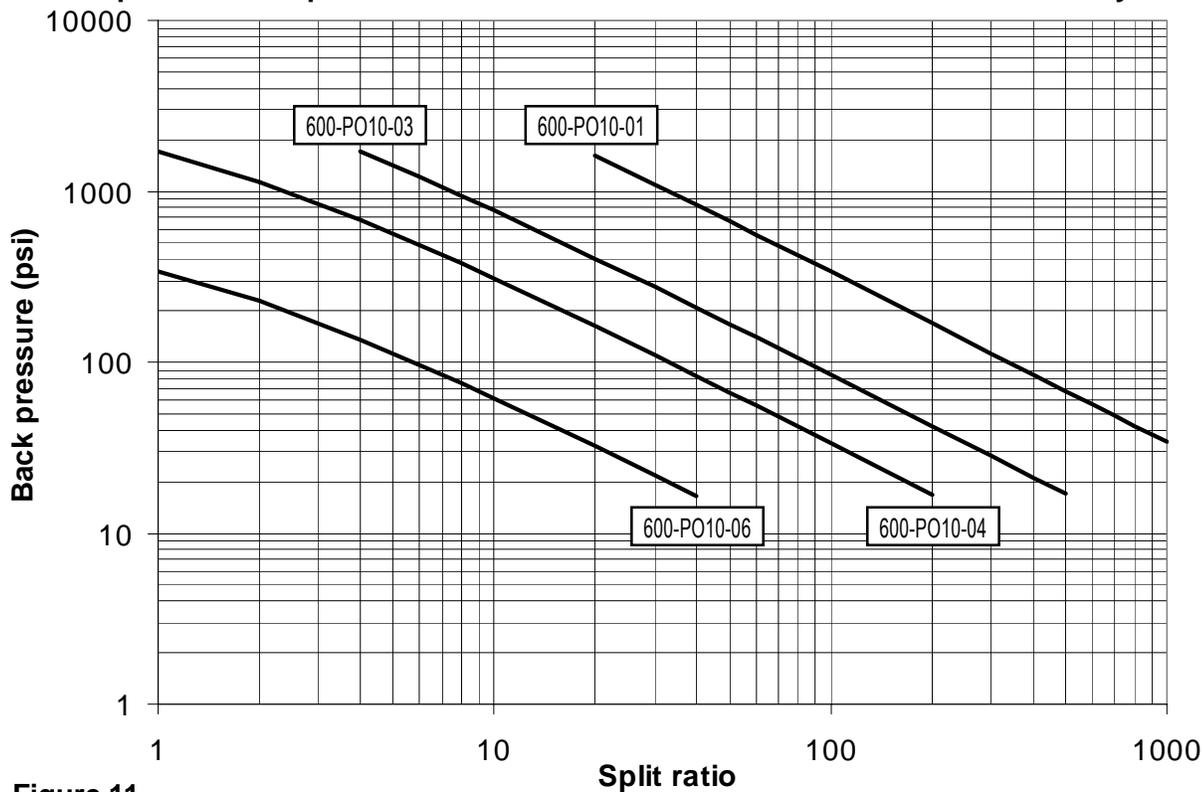


Figure 11

Pre-Column Applications

Pre-column splitting is used for micro, capillary, and nano HPLC applications, where the flow from the pump is split from analytical flow rates down to microliter or nanoliter flows. It is important to note that even though the split ratio created by the splitter valve will remain constant, the split ratio will change when a HPLC column is installed. This is due to the added resistance on the low flow rate channel from the HPLC column. This added resistance must be factored in to make sure the fluid resistor selected for the flow splitter provides the correct split ratio. Please contact *ASI* if you need assistance. The charts on **page 17 and 18** only estimate the pressure drop across the splitter for post column applications and do not include the HPLC column back pressure. Splitters are shipped complete with the resistor cartridge installed.

When ordering a pre-column flow splitter, please provide *ASI* with the column flow rate and back pressure. If the inlet flow rate or column pressure specification is not provided, *ASI* will configure pre-column flow splitters assuming a 0.5 mL/min. inlet flow rate and a pressure drop across the column of 1,500 PSI.

For accurate pre-column splitting, we recommend the A650 Automated Flow Splitter.

Custom Split Ratios

Split ratios and resistor cartridges other than those listed below can be ordered from *ASI* to custom configure the *QuickSplit* Adjustable Flow Splitter. Please contact technical support for additional information about custom splitters. We will gladly assist you in determining the best splitter configuration for your application.

QuickSplit™ Adjustable Flow Splitters

Analytical Splitters

Analytical range, 0.25 mL/min. to 1 mL/min. inlet flow, calibration flow rate 0.5 mL/min.

These splitters will produce under 3,500 PSI backpressure with water at 0.5 mL/min.

Description	Split Ratio Range	ASI Part Number
Analytical Adjustable Flow Splitter, Pre-Column	50:1 to 1,000:1	600-PR10-01
Analytical Adjustable Flow Splitter, Pre-Column	15:1 to 300:1	600-PR10-03
Analytical Adjustable Flow Splitter, Pre-Column	5:1 to 100:1	600-PR10-04
Analytical Adjustable Flow Splitter, Pre-Column	1:1 to 20:1	600-PR10-06
Analytical Adjustable Flow Splitter, Pre-Column	Custom	600-PR10-CS

Adjustable Flow Splitters

Adjustable Flow Splitter Accessories

Replacement Inlet Filters

Description	Flow Splitter	ASI Part Number
Inlet Filter, 2 micron .063" dia. 5/Pack, 1 µL Volume	Adjustable FS - Post/Pre-column Analytical Range	600-0063-2
Inlet Filter, 10 micron .125" dia. 5/Pack, 4 µL Volume	Adjustable FS - Semi-Prep Range & Prep Range for 600-PO30,40	600-0125-10
Straight Thru Hole, No Filter 5/Pack, 1 µL Volume	Adjustable FS - Prep Range for 600-PO60	600-028-2-0

QuickSplit™ Makeup-Flow Splitters

for Mass Directed Fraction Collection



Adjustable



Fixed

ASI QuickSplit™ Makeup-Flow Splitter Features:

- Ideal for prep HPLC and mass directed fraction collection
- Fixed and Adjustable configurations
- Adjustable splitter enables precise direct control over split ratios, capillary flow rates, and a wide range of inlet flows
- Split ratios are stable and reproducible, and not affected by changes in solvent viscosity associated with gradient HPLC
- All configurations include integral makeup port and delay coil
- Low dead volume fluidic design minimizes dispersion and band broadening
- Compatible with flow rates from 1 to 150 mL/min., custom versions available
- Installs in minutes
- Easy access to replacement filters and high and low flow resistors

Makeup-Flow Splitters

QuickSplit™ Makeup-Flow Splitters for Mass Directed Fraction Collection

Mass directed Fraction collection in HPLC/MS

The *ASI QuickSplit* Makeup-Flow Splitter is designed for post-column flow splitting applications where a small amount of flow from an HPLC column is efficiently combined with a makeup-flow before it reaches the detector. Although there are many variations of this type of application, one of the most common involves splitting a small portion of the outlet flow from a preparative HPLC column which is then combined and diluted with a makeup-flow (**Figure 12**). The combined makeup-flow is used by a detector, typically Mass Spectrometer, UV or other detectors to trigger fraction collection from the remaining preparative flow. A minimum delay time of 5 seconds (maximum inlet flow) is caused by the delay coil built into the splitter to insure proper sequencing between detection and fraction collection. Unique manifold design eliminates tees and fittings within the splitter resulting in extremely low dead volume and peak dispersion. An additional binary splitter can be added after the splitter to allow additional splitting of the makeup-flow stream prior to entering the detector. Open access to all components simplifies routine maintenance and minimizes down time. Split ratio accuracy is +/- 10% for all stated values. **Custom splitter configurations (CS) are available for both fixed and adjustable splitters to meet specific application requirements. If you have questions about which splitter is right for your application, please contact the technical support group at ASI.**

Diagram of HPLC/MS System with Makeup-Flow Splitter

While the diagram below does not cover all possible Makeup-Flow Splitter configurations, it depicts the most common application. *ASI QuickSplit* Makeup-Flow Splitter specifications should be reviewed carefully before making your splitter selection.

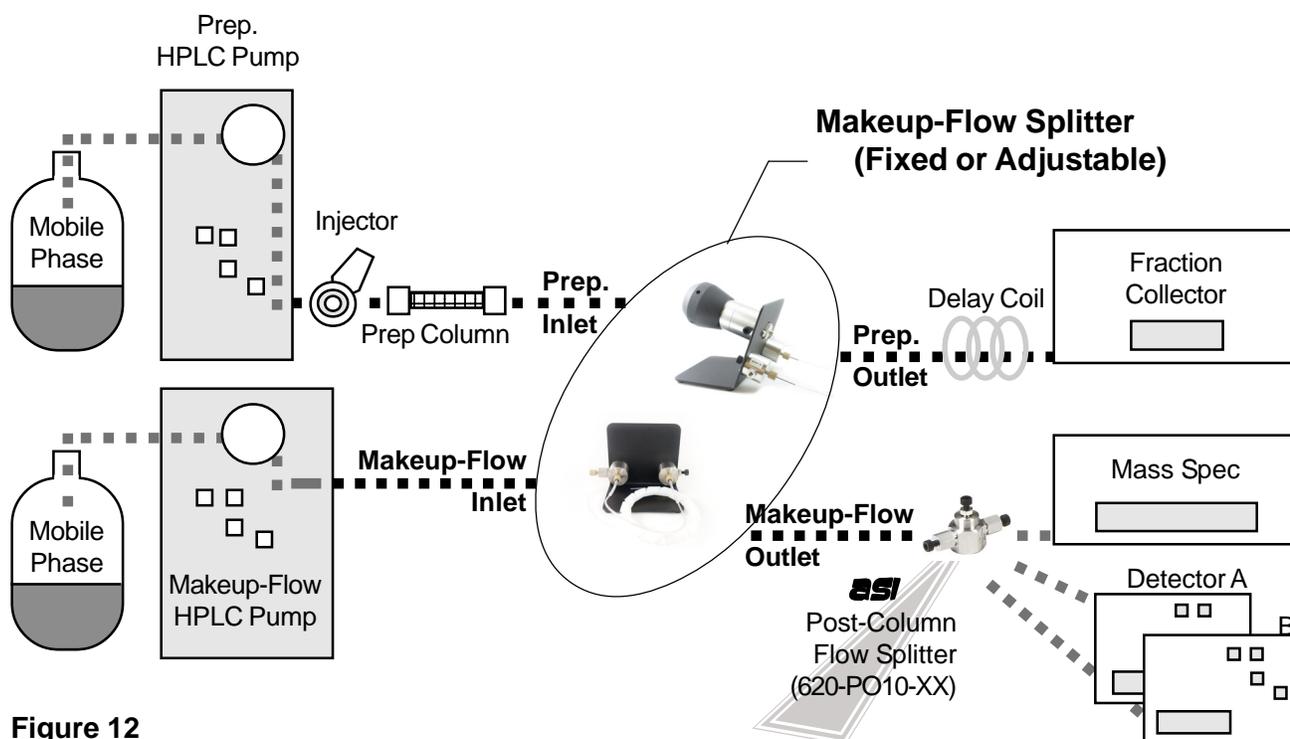


Figure 12

QuickSplit™ Makeup-Flow Splitters

for Mass Directed Fraction Collection

Fixed Makeup-Flow Splitter

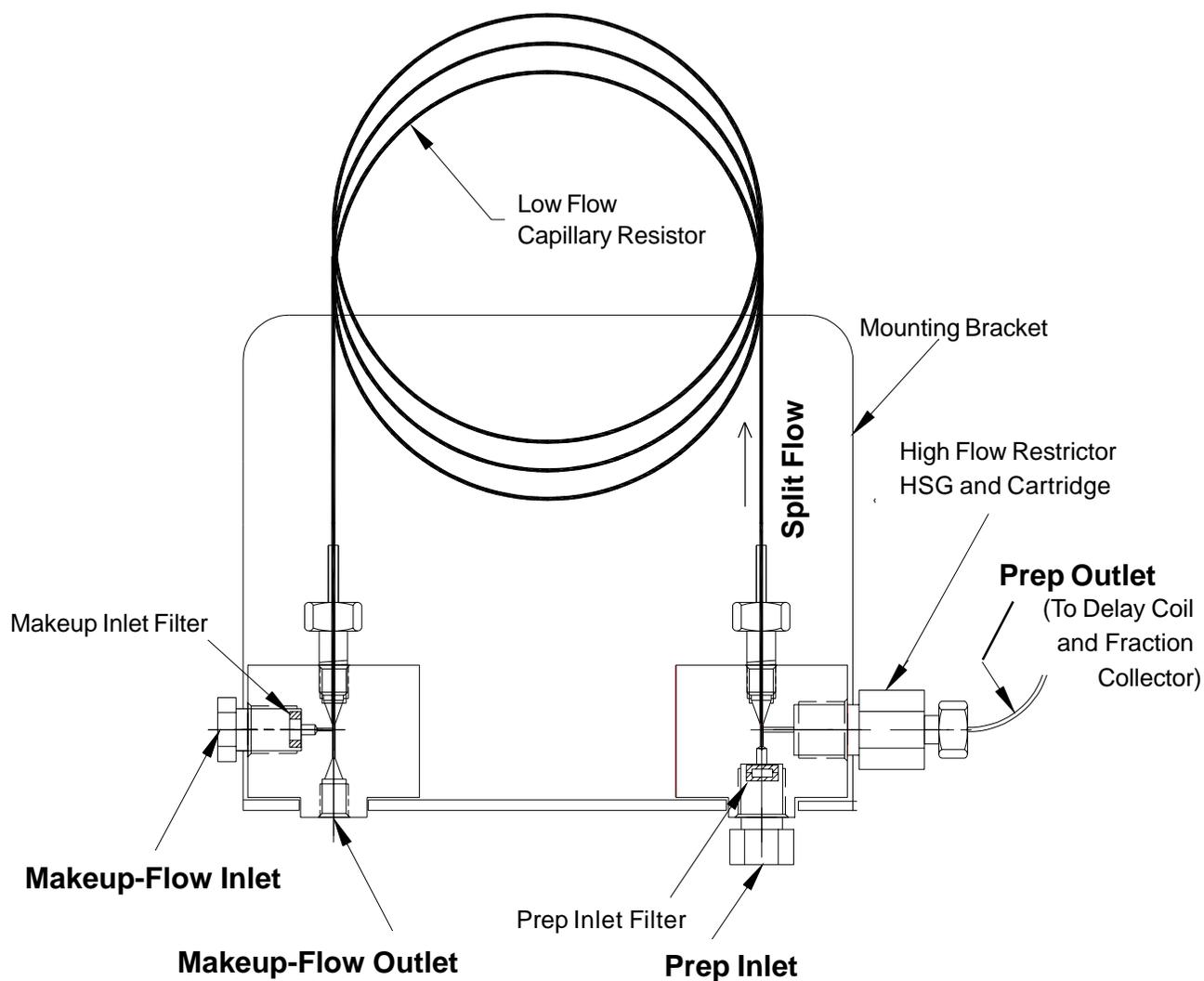


Figure 13

Makeup-Flow Splitters

QuickSplit™ Fixed Makeup-Flow Splitter

The Fixed Makeup-Flow Splitter is shown in **Figure 13, page 23**. Each Fixed Makeup-Flow Splitter is individually tested and calibrated at the inlet flow and split ratio specified. These splitters will produce under 500 PSI backpressure with water at their calibrated inlet flow rate. Backpressure and outlet flow rates will decrease or increase in proportion to inlet flow rate changes, the split ratio will remain constant. Split ratio accuracy is +/- 10% for all stated values. **In order to assure <500 PSI pressure drop across the splitter, please specify the actual inlet flow rate with your order if it deviates substantially from the calibration flow rate listed below.**

Fixed Makeup-Flow Splitters

Description	Inlet Flow Range	Split Ratio	Split Flow at Calibration Inlet Flow	ASI Part Number
Makeup-Flow Splitter	1 - 5 mL/min.	400:1	5µL/min. at 2 mL/min.	692-PO01-05
Makeup-Flow Splitter	1 - 5 mL/min.	200:1	10µL/min. at 2 mL/min.	692-PO01-10
Makeup-Flow Splitter	1 - 5 mL/min.	100:1	20µL/min. at 2 mL/min.	692-PO01-20
Makeup-Flow Splitter	1 - 5 mL/min.	40:1	50µL/min. at 2 mL/min.	692-PO01-50
Makeup-Flow Splitter	5 - 10 mL/min.	2,000:1	5µL/min. at 10 mL/min.	692-PO05-05
Makeup-Flow Splitter	5 - 10 mL/min.	1,000:1	10µL/min. at 10 mL/min.	692-PO05-10
Makeup-Flow Splitter	5 - 10 mL/min.	500:1	20µL/min. at 10 mL/min.	692-PO05-20
Makeup-Flow Splitter	5 - 10 mL/min.	200:1	50µL/min. at 10 mL/min.	692-PO05-50
Makeup-Flow Splitter	10 - 20 mL/min.	4,000:1	5µL/min. at 20 mL/min.	692-PO10-05
Makeup-Flow Splitter	10 - 20 mL/min.	2,000:1	10µL/min. at 20 mL/min.	692-PO10-10
Makeup-Flow Splitter	10 - 20 mL/min.	1,000:1	20µL/min. at 20 mL/min.	692-PO10-20
Makeup-Flow Splitter	10 - 20 mL/min.	400:1	50µL/min. at 20 mL/min.	692-PO10-50
Makeup-Flow Splitter	20 - 50 mL/min.	10,000:1	5µL/min. at 50 mL/min.	692-PO20-05
Makeup-Flow Splitter	20 - 50 mL/min.	5,000:1	10µL/min. at 50 mL/min.	692-PO20-10
Makeup-Flow Splitter	20 - 50 mL/min.	2,500:1	20µL/min. at 50 mL/min.	692-PO20-20
Makeup-Flow Splitter	20 - 50 mL/min.	1,000:1	50µL/min. at 50 mL/min.	692-PO20-50
Makeup-Flow Splitter	50 - 150 mL/min.	20,000:1	5µL/min. at 100 mL/min.	692-PO50-05
Makeup-Flow Splitter	50 - 150 mL/min.	10,000:1	10µL/min. at 100 mL/min.	692-PO50-10
Makeup-Flow Splitter	50 - 150 mL/min.	5,000:1	20µL/min. at 100 mL/min.	692-PO50-20
Makeup-Flow Splitter	50 - 150 mL/min.	2,000:1	50µL/min. at 100 mL/min.	692-PO50-50
Makeup-Flow Splitter	Custom	Custom		692-POCS-CS

QuickSplit™ Makeup-Flow Splitters

for Mass Directed Fraction Collection

Adjustable Makeup-Flow Splitter

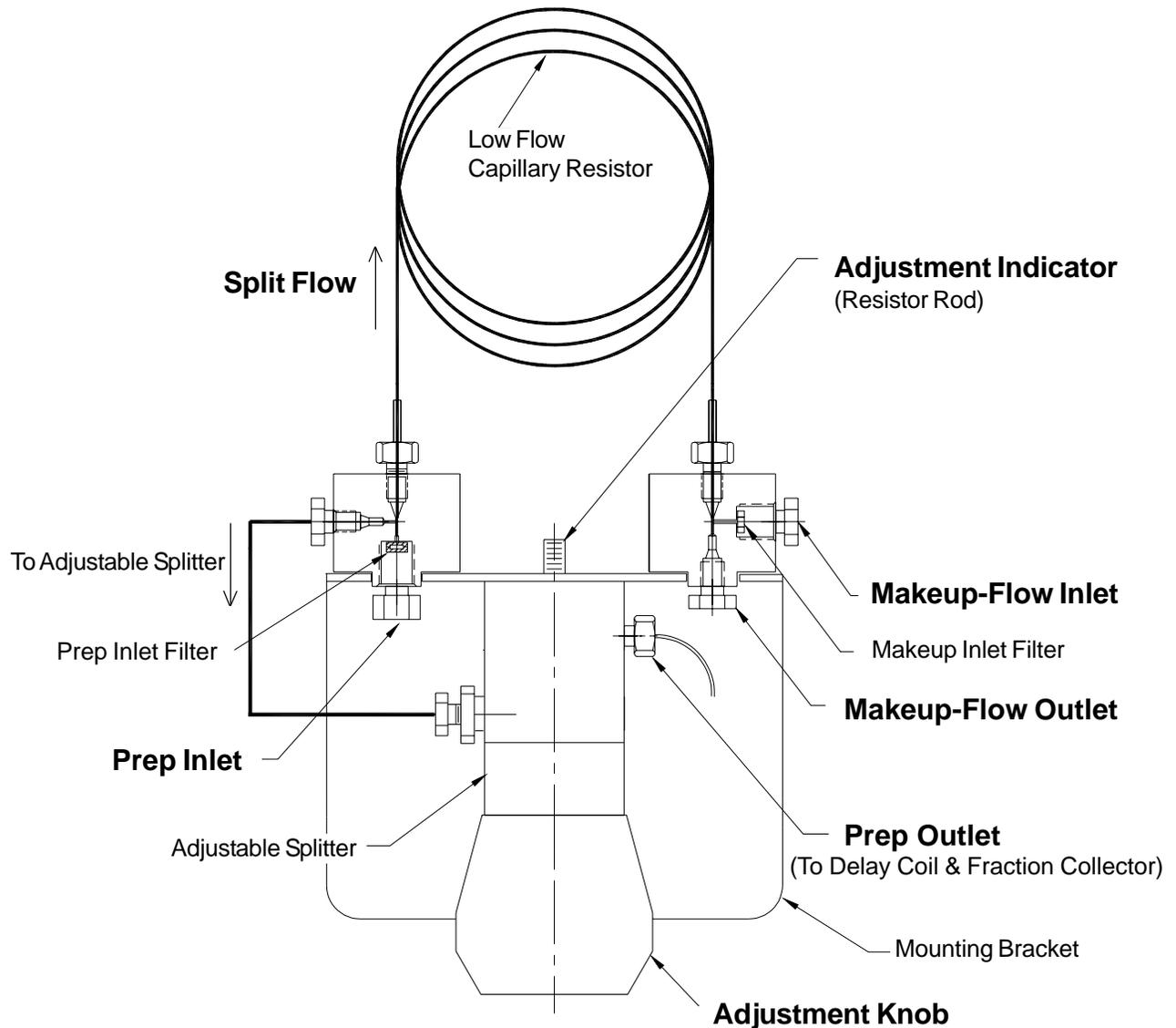


Figure 14

Makeup-Flow Splitters

QuickSplit™ Makeup-Flow Splitters for Mass Directed Fraction Collection

Adjustable Makeup-Flow Splitter Performance

The chromatographic data below compares the dispersion (band broadening), measured as variance, at 10 $\mu\text{L}/\text{min}$. between an ideal system with direct flow (**Figure 15**) and a split system incorporating the *ASI QuickSplit* Adjustable Makeup-Flow Splitter (**Figure 16**). Split flow variance is measured with and without the addition of a small amount of makeup flow. The data proves conclusively that ASI splitter dead volume does not contribute significantly to overall system dispersion. It also demonstrates the advantages of adding a makeup flow not only to improve peak shape but acts as an additional tool to optimize the timing sequence between Mass Spectrometer detector and the fraction collector.

Conditions:

HPLC System: Shimadzu LC10 AD VP
Detector: UV @254 on column
Solvent: Water
Injection vol: direct 600 nL, split 135 μL

Variance Calculation:

$$\text{Variance} = \text{Sigma}^2 = (\text{Wh} \times \text{F})^2 = \mu\text{L}^2$$

Wh = Peak width at half height

F = Flow rate

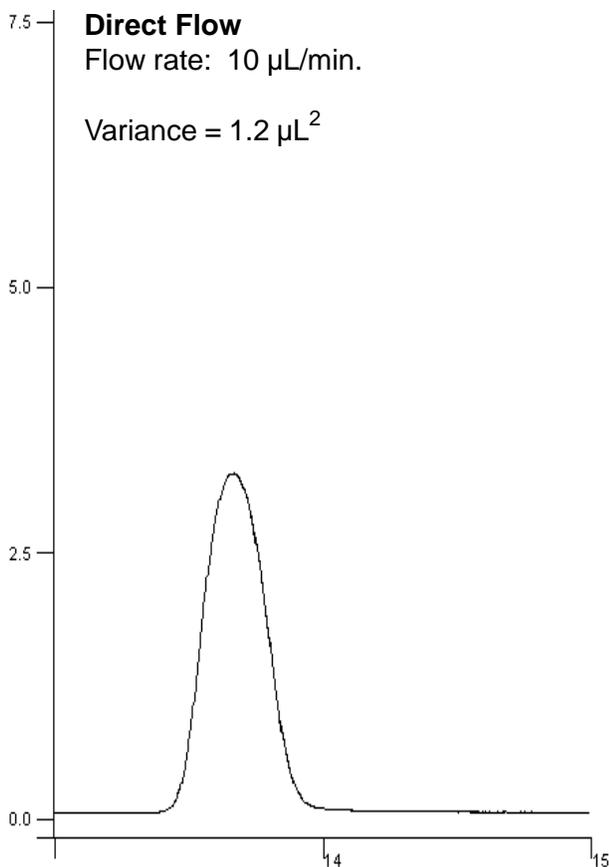


Figure 15

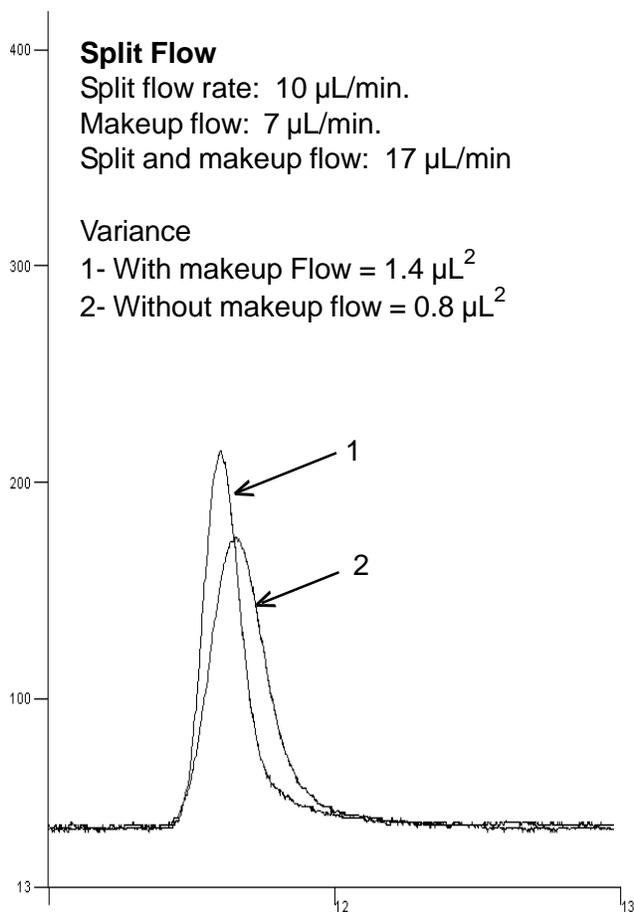


Figure 16

QuickSplit™ Adjustable Makeup-Flow Splitter

The Adjustable Makeup-Flow Splitter (**Figure 14, page 25**) can also be used with a constant inlet flow rate thereby allowing the user dynamic control over the split ratio and split flow rate. The Adjustable Makeup-Flow Splitters listed below are configured and calibrated assuming the Adjustable Makeup-Flow Splitter will be used to produce a wide split ratio range at the specified inlet flow rate. Each Adjustable Makeup-Flow Splitter ships with a calibration plot of inlet flow rate vs resistor rod setting required to produce the specified split flow within the defined range. Please contact ASI for ordering information if your application requires an inlet flow or split ratio range not included in the table below.

These splitters will generate a pressure range from approximately 100 to 800 PSI over the split flow range specified. Although the split ratio will remain constant, pressure drop and outlet flow rates will change in proportion to changes in the inlet flow rate. **In order to maintain the pressure profile in the calibration plot, it is important to use these splitters at the inlet flow specified. Please specify the actual inlet flow rate with your order if it deviates substantially from the calibration flow rate listed below.**

Adjustable Splitter: Fixed Inlet Flow, Variable Split Flow

Description	Inlet Flow	Split Flow Range	ASI Part Number
Makeup-Flow Splitter	5 mL/min.	1.2 - 10.0 µL/min.	690-PO01-05
Makeup-Flow Splitter	5 mL/min.	2.5 - 20.0 µL/min.	690-PO01-10
Makeup-Flow Splitter	5 mL/min.	5.0 - 40.0 µL/min.	690-PO01-20
Makeup-Flow Splitter	5 mL/min.	12.5 - 100.0 µL/min.	690-PO01-50
Makeup-Flow Splitter	30 mL/min.	1.2 - 10.0 µL/min.	690-PO10-05
Makeup-Flow Splitter	30 mL/min.	2.5 - 20.0 µL/min.	690-PO10-10
Makeup-Flow Splitter	30 mL/min.	5.0 - 40.0 µL/min.	690-PO10-20
Makeup-Flow Splitter	30 mL/min.	12.5 - 100.0 µL/min.	690-PO10-50
Makeup-Flow Splitter	100 mL/min.	1.2 - 10.0 µL/min.	690-PO50-05
Makeup-Flow Splitter	100 mL/min.	2.5 - 20.0 µL/min.	690-PO50-10
Makeup-Flow Splitter	100 mL/min.	5.0 - 40.0 µL/min.	690-PO50-20
Makeup-Flow Splitter	100 mL/min.	12.5 - 100.0 µL/min.	690-PO50-50
Makeup-Flow Splitter	Custom	Custom	690-POCS-CS

Makeup-Flow Splitters

QuickSplit™ Adjustable Makeup-Flow Splitter

The Adjustable Makeup-Flow Splitter (**Figure 14, page 25**) is used to maintain a constant split ratio over an inlet flow rate range specified below. Each Adjustable Makeup-Flow Splitter ships with a calibration plot of inlet flow rate vs. resistor rod setting required to maintain the specified split flow. The Adjustable Makeup-Flow Splitters listed below are configured and calibrated assuming the Adjustable Makeup-Flow Splitter will be used to maintain a constant split ratio over the specified inlet flow rate range. Please contact us for ordering information if your application requires a wider dynamic split ratio range and low flow.

These splitters will produce under 500 PSI backpressure with water at their calibrated inlet flow rate and split ratio specified below. **In order to assure <500 PSI pressure drop across the splitter, please specify the actual inlet flow rate with your order if it deviates substantially from the calibration flow rate listed below.**

Adjustable Splitter: Variable Inlet Flow, Fixed Split Flow

Description	Inlet Flow Range	Split Flow	Calibration Inlet Flow & Split Ratio	ASI Part Number
Makeup-Flow Splitter	1 - 10 mL/min.	5 µL/min.	5 mL/min. = 1,000:1	690-PO01-05
Makeup-Flow Splitter	1 - 10 mL/min.	10 µL/min.	5 mL/min. = 500:1	690-PO01-10
Makeup-Flow Splitter	1 - 10 mL/min.	20 µL/min.	5 mL/min. = 250:1	690-PO01-20
Makeup-Flow Splitter	1 - 10 mL/min.	50 µL/min.	5 mL/min. = 100:1	690-PO01-50
Makeup-Flow Splitter	10 - 50 mL/min.	5 µL/min.	30 mL/min. = 6,000:1	690-PO10-05
Makeup-Flow Splitter	10 - 50 mL/min.	10 µL/min.	30 mL/min. = 3,000:1	690-PO10-10
Makeup-Flow Splitter	10 - 50 mL/min.	20 µL/min.	30 mL/min. = 1,500:1	690-PO10-20
Makeup-Flow Splitter	10 - 50 mL/min.	50 µL/min.	30 mL/min. = 600:1	690-PO10-50
Makeup-Flow Splitter	50 - 150 mL/min.	5 µL/min.	100 mL/min. = 20,000:1	690-PO50-05
Makeup-Flow Splitter	50 - 150 mL/min.	10 µL/min.	100 mL/min. = 10,000:1	690-PO50-10
Makeup-Flow Splitter	50 - 150 mL/min.	20 µL/min.	100 mL/min. = 5,000:1	690-PO50-20
Makeup-Flow Splitter	50 - 150 mL/min.	50 µL/min.	100 mL/min. = 2,000:1	690-PO50-50
Makeup-Flow Splitter	Custom	Custom		690-POCS-CS

QuickSplit™ Makeup-Flow Splitter Accessories

Replacement Inlet Filters for both Fixed and Adjustable Splitters

Description	Applications	ASI Part Number
Inlet Filter Assembly, 2 micron .063" dia. 5/Pack, 1 µL Volume	Makeup-Flow Splitter inlet Port - Inlet flow range: 1 ~ 10 mL/min. Makeup-Flow Splitter, Makeup Inlet Port - All Ranges	690-0063-2
Inlet Filter & Housing Assembly, 10 micron .125" dia. each, 4 µL Volume	Makeup-Flow Splitter inlet Port - Inlet flow range: 10 ~ 50 mL/min.	690-23-0125-10
Inlet Filter & Housing Assembly, 10 micron .188" dia. each, 10 µL Volume	Makeup-Flow Splitter inlet Port - Inlet flow range: 50 ~ 100 mL/min.	690-23-0188-10
Inlet Filter & Housing Assembly, 20 micron .188" dia. each, 12 µL Volume	Makeup-Flow Splitter inlet Port - Inlet flow range: 75 ~ 150 mL/min.	690-23-0188-20
Straight Thru Hole, No Filter 5/Pack, 1 µL Volume	Makeup-Flow Splitter inlet Port	690-001-2-3



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