

LabSmith Two-Position Valves

Part of an Automated Microfluidics System

- ▶ Automated routing and switching
- ▶ Innovative software for coordinated control
- ▶ Three port AND four port two-position valves
- ▶ Nanoliter swept and valve volumes

Figure 1. uProcess™ hardware, including: AV series automated selector valves, SPS01 programmable syringe pumps, 4VM01 valve manifold, and IBB integrated breadboard. LabSmith's CapTite™ fluid routing components and a microfluidic chip complete this easy-to-use system for delivering micro- and nano-fluidic volumes.



Coordinated, Automated Fluid Control

LabSmith's uProcess™ system (Figure 1) is a platform comprised of hardware and software products that simplify construction and control of microfluidic systems.

Automated uDevices

uDevices connect to CapTite™ microfluidic interconnect products to make it easy to build and rebuild micro- and nano-fluidic circuits. This results in zero dead volumes and compatible, quick-to-assemble fluid interfaces, taking the hassle out of fluid routing.

SPS01 Programmable Syringe Pumps

come in sizes from 5 to 100 μ l total volume, with step sizes from 8 to 100 nL. The pump body design allows syringes to be easily removed and replaced, providing a wide range of volumes with a single pump.

AV201 Automated Selector Valves 2-position, 3-port valves, with zero dead volumes and low swept volumes.

NEW! AV202 Automated Selector Valves 2-position, 4-port valves with zero dead volumes and low swept volumes.

Programmable Automated Operation

uProcess Software (Figure 2) provides a simple interface for configuring and controlling uDevices via a laptop or PC, to simplify programming of automated processes for coordinated control of uDevices.

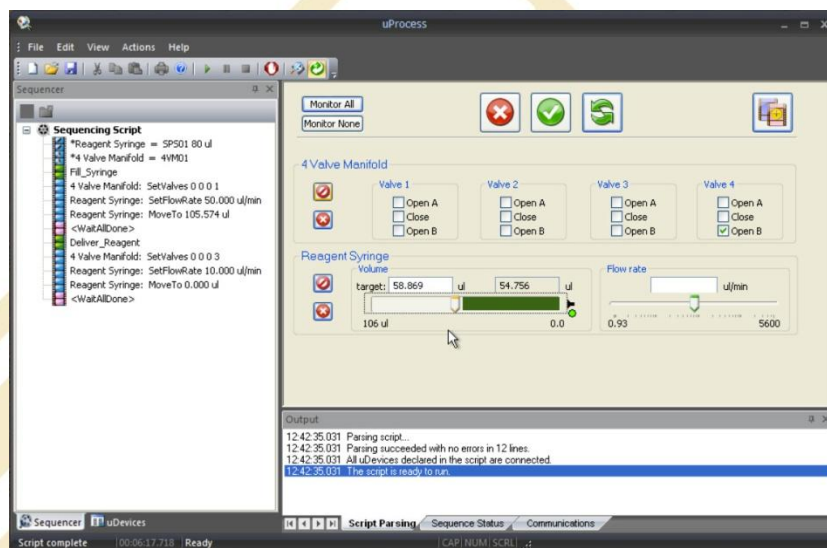


Figure 2. uProcess™ software provides a simple interface to control automated uDevices and create automated processes.

uDevices: AV200 Series Automated Valves



Figure 3. A CapTite™ AV201* automated four port valve shown with three CapTite™ one-piece fittings.

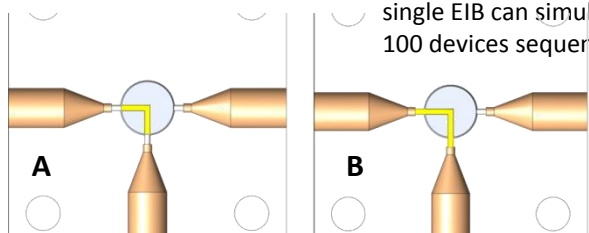


Figure 4. (A) Swept volume (B) Valve volume illustrated using AV201 example.

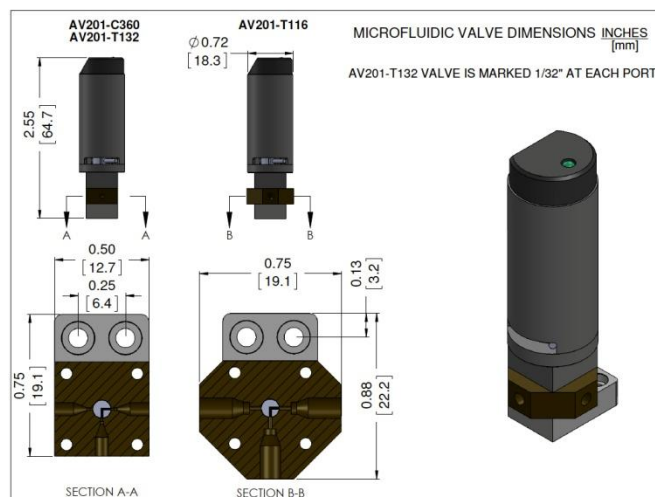


Figure 5. AV201 series and AV202-C360 valve dimensions.*

Programmable Automated Valves

LabSmith's CapTite™ AV201 automated, three port, two-position valves (Figure 3) deliver programmable, "L" pattern flow routing (Figure 4) in a fraction of the footprint required with most valves (Figure 5). AV201 valves operate at pressures up to 10 kpsi for use with 360 μ m, 1/32" or 1/16" tubing.

LabSmith's AV202 automated four port, two-position valves (same footprint (Figure 5) and packaging (Figure 3) as the AV201-C360 three port valves. The four port valves allow for simultaneous operation of two syringe pumps, one in fill mode and one in dispense, for the uninterrupted delivery of solution during low flow rate, long term, 1-10 milliliter total volume experiments. Figures 6 and 7 show the AV201 and AV202 valve positions and corresponding fluid flow, respectively. All valve models feature zero dead volume connections, nanoliter swept volumes (Table 1), rapid flow response time, low carryover, and inert, durable wetted materials. All valves include holes for breadboard mounting. Both AV201 and AV202 valves have a switch time of 0.4 seconds from position A to B and vice versa.

Easy Integration with Syringe Pumps via uProcess

A 4VM Valve Manifold is required to electronically control the automated valves (one 4VM01 manifold can control up to 4 valves). An Electronic Interface Board (EIB) is also required; a single EIB can simultaneously operate up to 10 uDevices (valves and syringe pumps), or over 100 devices sequentially. uProcess™ software controls all pumps and valves.

TABLE 1. AV200 Series Automated Valve Specifications

| VALVE | THROUGH HOLE DIAMETER | SWEPT VOLUME (FIG. 4A) | VALVE VOLUME (FIG. 4B) |
|------------|-----------------------|------------------------|------------------------|
| AV201-C360 | 0.01" [250 μ m] | 130 nL | 170 nL |
| AV201-T132 | 0.01" [250 μ m] | 130 nL | 170 nL |
| AV201-T116 | 0.02" [510 μ m] | 520 nL | 1.1 μ L |
| AV202-C360 | 0.01" [250 μ m] | 90 nL | 130 nL |

4VM01 Valve Manifold is required. One manifold controls up to 4 valves.

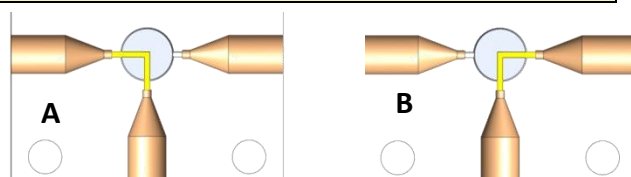


Figure 6. Fluid flow through AV201 valve when valve is switched between (A) Position A and (B) Position B.

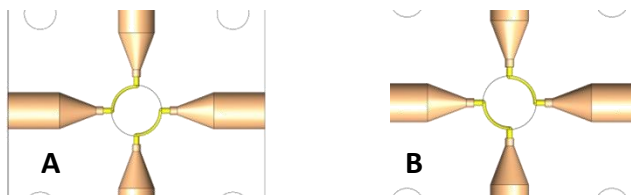


Figure 7. Fluid flow through AV202 valve when valve is switched between (A) Position A and (B) Position B.

*AV202 and AV201 valves have identical housing and footprint. Labeling and wettable geometries differ and are shown in Figures 4, 6-7 above.

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