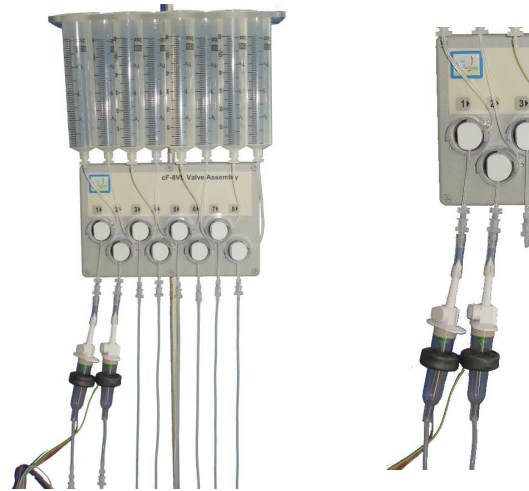


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cFlow V2.x 8-Channel Switch/Flow Control System



cF8Vs Set up for switching 6ch & flow 2ch

Drop sensors on Ch1, Ch2

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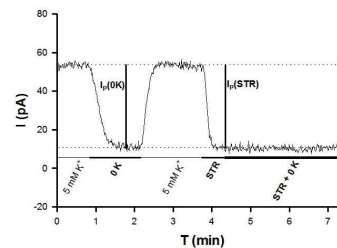
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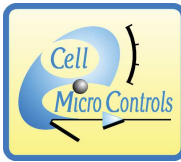
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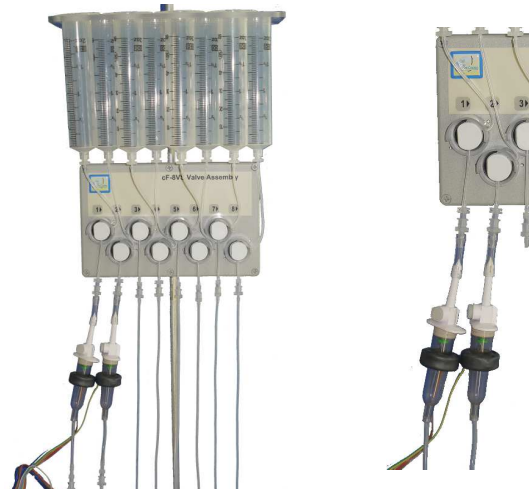
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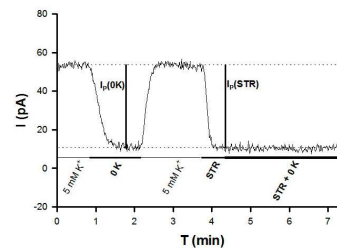
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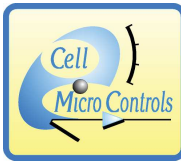
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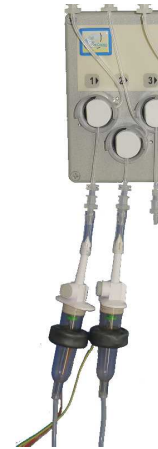


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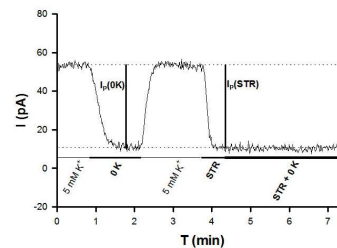
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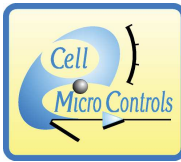
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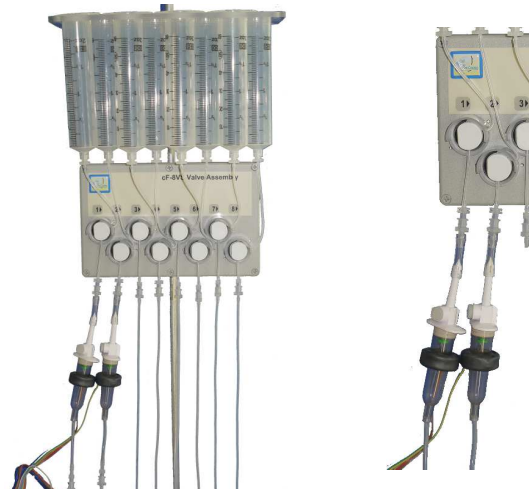
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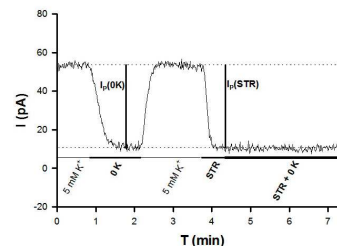
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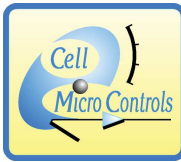
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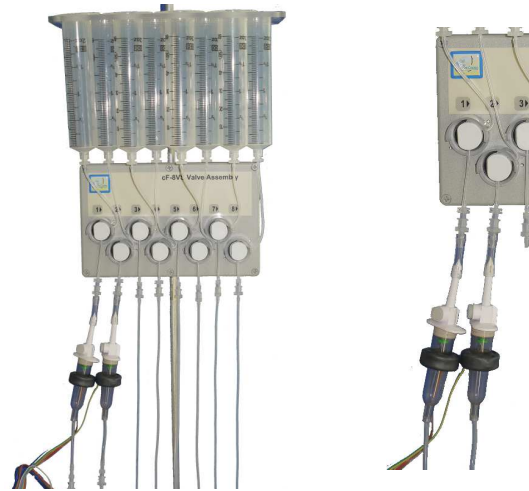
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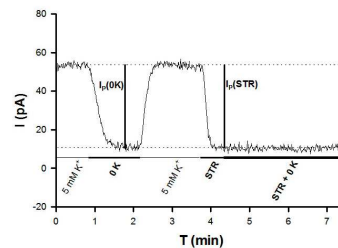
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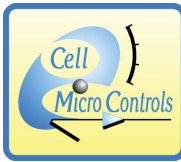
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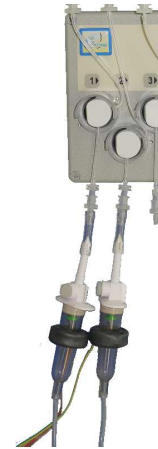


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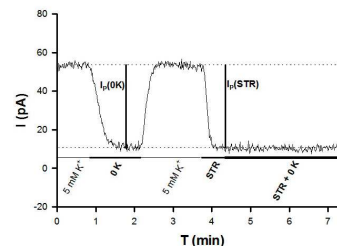
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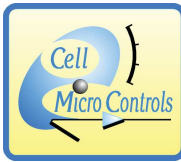
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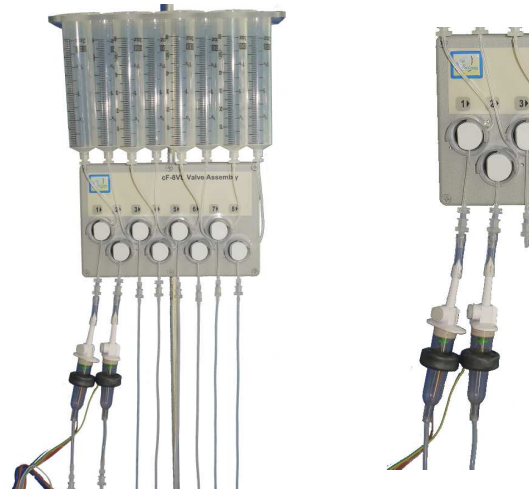
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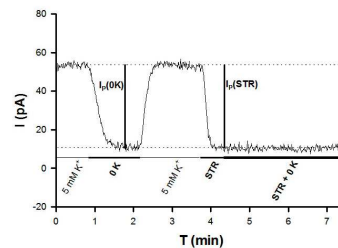
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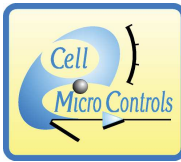
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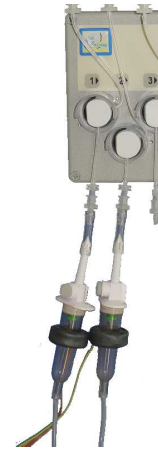


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 WWW: <http://www.cellmc.com>; Email: info@cellmc.com
Equipment for cellular & electrophysiology research

cFlow V2.x 8-Channel Switch/Flow Control System



cF8Vs Set up for switching 6ch & flow 2ch



Drop sensors on Ch1, Ch2

- **cFlow 8 Ch Flow/Switch System versions:**
CFPKG8H - for **switching (8Ch)**
CF4PKG8H- for **flow (up to 4Ch) and switch (8Ch)**
CF8PKG8H- for **flow (up to 8Ch) and switch (8Ch)**
- **8 Channel perfusion control**
- **Rapid pinch valve switching (typ. 50ms)**
- **Simultaneous flow control (0.1-10ml/min)**
- **Detects if solution stops flowing**
- **RS232, Digital (eg. CLAMPEX) & Analog input for computer control**
- **Upgrade microcontroller firmware via RS232 for addition of new features**

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In addition to switching solutions the **cFlow** 8 Channel Flow controller can regulate the flow rate on user selected channels using an optical drop sensor that fits around standard dripsets. For example you could have 2 channels for background solutions with flow sensors and the other 6 channels switched via a superfusion device (eg. **MPRE8**) where you only want to switch solutions. One instrument functions as two separate devices. In other modes the flow can be regulated (at different rates) on all 8 channels (eg. to feed multiple chambers).

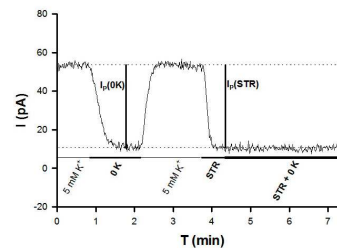
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There is a single Flow rate control so that flow rates can be stored (using the Read Rate switch) and consistently set to the same value. The backlit LCD display shows the channel, flow rate and other useful information depending on the mode of operation.

Application notes

■ Flow control vs switching

The **cFlow** 8 Ch Flow controller has the capability to monitor and control the flow rate in each channel but in many applications only a single or several drop sensors are required. eg. for perfusing a 0.25-1ml chamber you might have flow control of one or several background perfusates but switch the other solutions rapidly via the **MPRE8** pre-heater or other miniature manifold. For these channels the drop sensors are not used. For small volume (eg. <0.1ml) chambers an 8 to 1 manifold (**MAN81**) can be used before the inflow and simple switching used (see figure below).



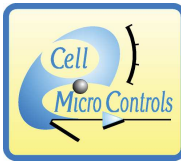
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 Courtesy J. Gao SUNY @ Stony Brook, NY

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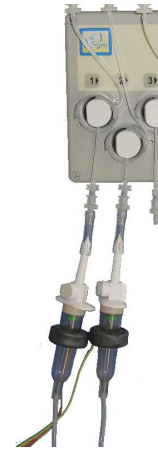


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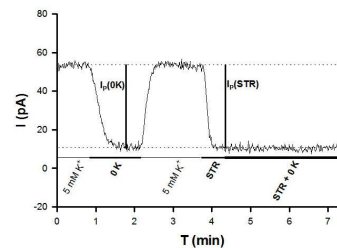
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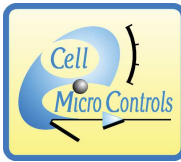
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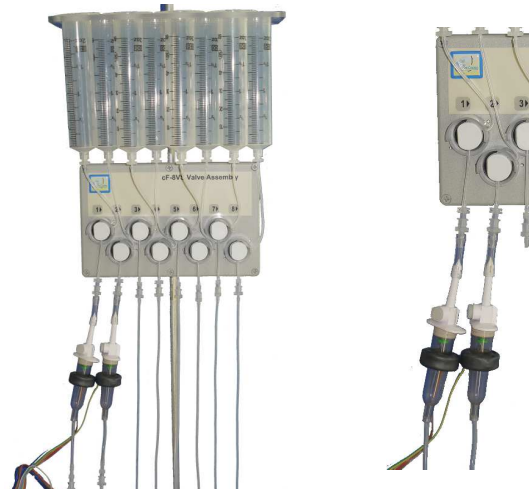
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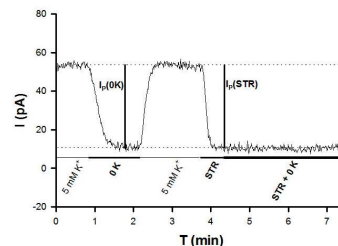
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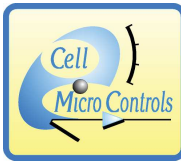
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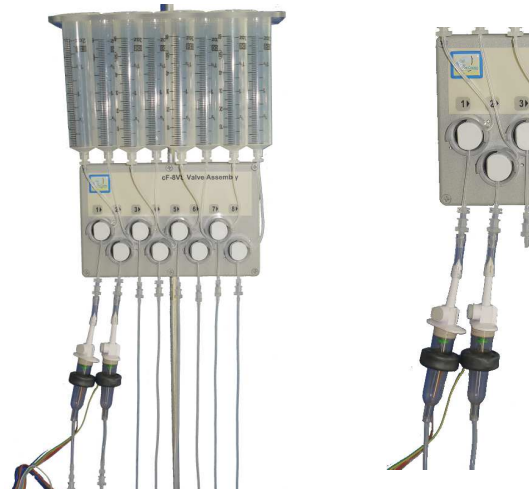
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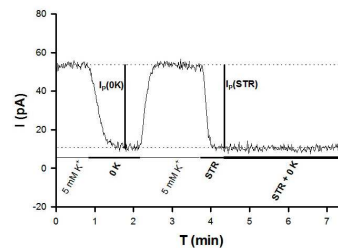
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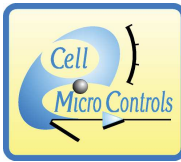
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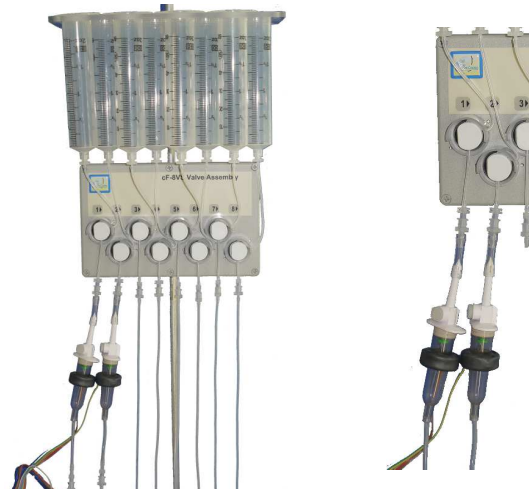
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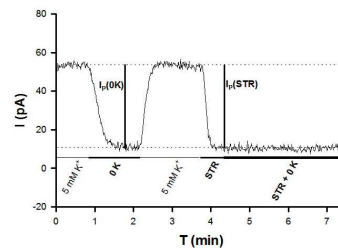
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■ Upgrading

The **cFlow** is a microcontroller based instrument with built in firmware. It isn't a simple valve driver. Updated firmware can be simply download via the RS232 port to upgrade or customize the performance of the **cFlow** for a particular application.

■ Other valves

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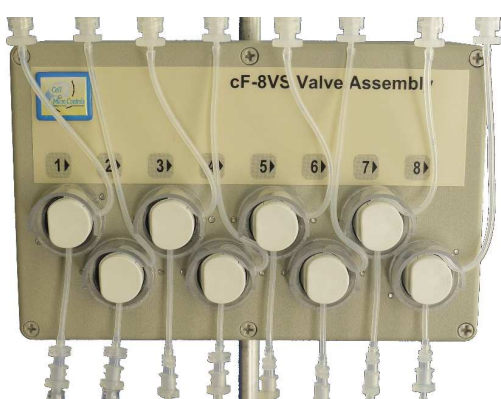
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System components/Accessories

cF-8VS 8 ch shielded valve assembly

Shielded for use in electrophysiology setups where low noise levels are important. 8 valves are contained in a metal housing. Attaches to 3/8" diameter retort rod. Includes plumbing kit for flow and switch (8 sets).



cF-4SEN drop sensor assembly

The drop sensor fits around the dripset and is used to sense a drop as it passes in an IR beam. The **cF-4SEN** are designed to fit the **IV60D8** IV sets but can be used with other dripsets with an O.D. less than 0.6". Attaches to 3/8" diameter retort rod.



SYRHLD8 Syringe holder

The **SYRHLD8** holds 8 60cc syringe barrels. The holders can be adapted to smaller syringe barrels with collars. Attaches to 3/8" diameter retort rod.



IV60D8 IV infusion sets

These infusion sets (8 pieces) have drippers designed for 60 drops/ml. They can be used with the **cFlow** for flow rates up to 3ml/min.

SYR608 60cc syringes

60cc (8 pieces) are provided with the Flow/switch control systems.

cFlow Specifications and Controls

Flow rate range: 60/15 drop/ml dripset => 0 - 3/0-10 ml/min
60 drop/ml dripset will give smoother flow at low flow rates.

Drop sensor: infra-red source/detector

Valve control modes: a) 1 of 8 valves b) 1 of 1-4, 1 of 5-8 c) 1 of 1-6 1 of 7-8 d) n of 8

Control modes: Analog control (0-5V), RS232 input and Digital input (4 wire)

Reporting: RS232 output, digital output gives state of channel

Push-button functions: Purge valves, close Bank0, close Bank1, drain valves.

Read rate: Reads rate from potentiometer.

Flow thru: Used to halt flow when fluid runs out to prevent bubble entry.

LCD display: Displays channel/rate depending on mode.

Supply Voltage: 24V at 1.1A max. Typ. 100mA per valve open.

Dimensions (controller): 6.5 x 5.0 x 2.7 inches (LxWxH)

Optional accessories

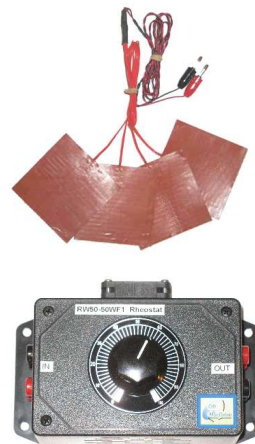
CAB-I0R/BNC Interface cable

The **CAB-IOR/BNC** cable connects to the I/O port on the rear of the **cFlow**. For CLAMPEX you can use digital input mode and set a bit pattern using 4 lines (see examples on website). For Analog control you can use I/O line and just connect a single BNC cable.



Syringe barrel heater kit (SYRHT8K)

For situations where solutions need to be pre-heated either to dissolved gasses to prevent bubbles forming in tubing, you should use the Syringe barrel heater kit. This contains 8 silicon heaters (2 of **SYRHT4**) that wrap around a 60cc syringe barrel (leaving a gap to observe the solution level). The heater is sleeved with a clear heatshrink or velcro so that it makes good thermal contact. A rheostat (**RH50-50WF**) is used to control the current to the heaters. Thermostating is not necessary since the heat losses are largely independent of the heated volume. The heaters run from an inexpensive DC power supply (**PS12V3**).



MAN81 8 to 1 manifold

For merging solutions before entering a chamber (flow <5ml/min). Easy to clean with polyimide inlet and outlet suiting 1/32" ID silicon tubing. Dead volume approx 5µl.



MPRE8 Multi-tube Pre-heater

For supertusion of cells or small tissue pieces. The **MPRE8** has 8 fine glass tubes which are heated and converge in a very small mixing volume. The temperature is sensed near the solution outflow by a miniature thermistor sensor. Normally the **MPRE8** connects with the **TC2BIP** Bipolar Temperature Controller or **mTCII** 2Ch micro-Temperature controller.
Dims. 10 x 0.4cm (LxDiam); heater resistance ≈11Ω
Thermistor sensor: 10kΩ NTC
Dead space: Tubes-approx 5µl; Tip-approx. 1-2µl.
Outflow tube: 360µm inside diameter
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Thermistor sensor: 10kΩ NTC
Dead space: Tubes-approx 5µl; Tip-approx. 1-2µl.
Outflow tube: 360µm inside diameter
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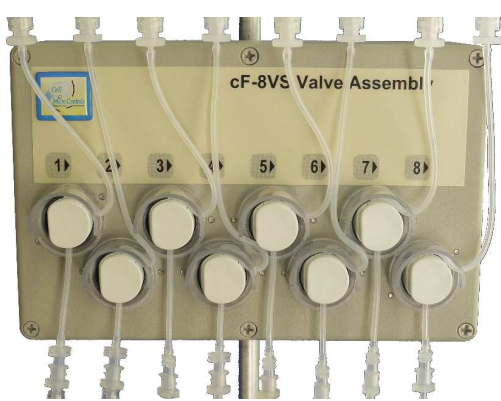
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System components/Accessories

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Drop sensor: infra-red source/detector

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Dimensions (controller): 6.5 x 5.0 x 2.7 inches (LxWxH)

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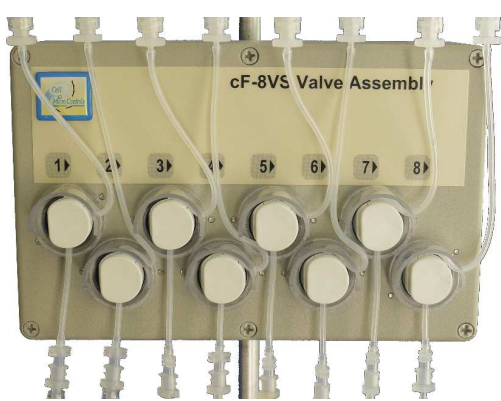
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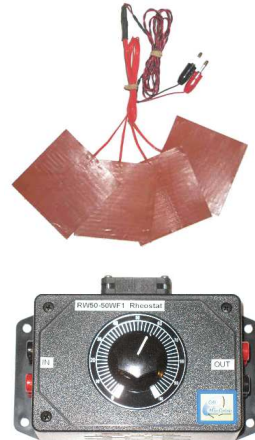
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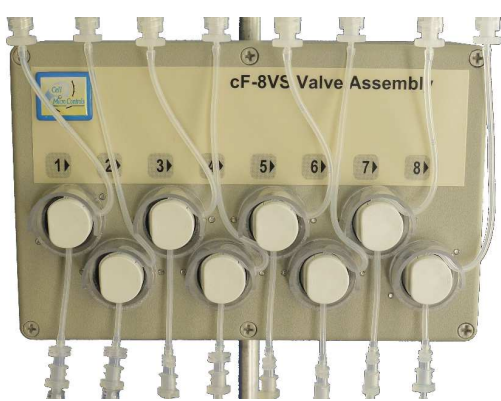
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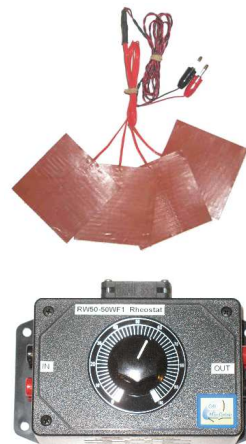
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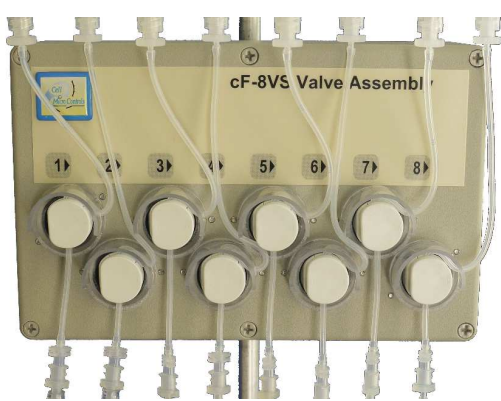
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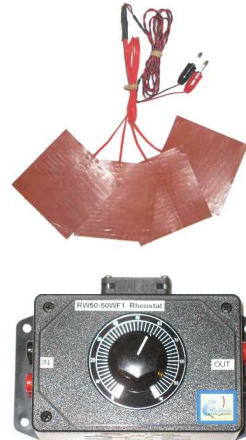
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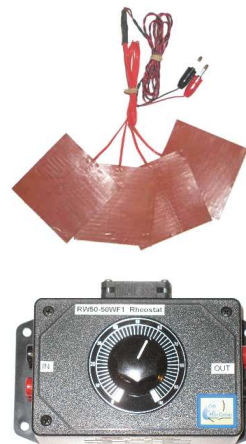
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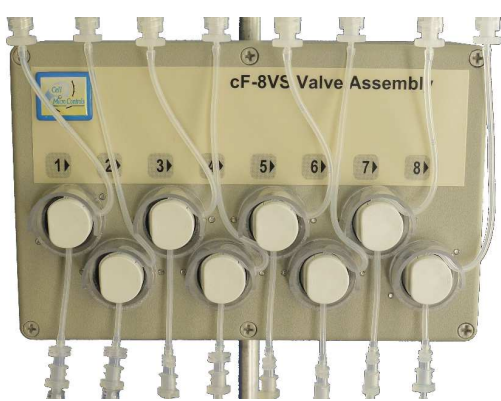
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System components/Accessories

cF-8VS 8 ch shielded valve assembly

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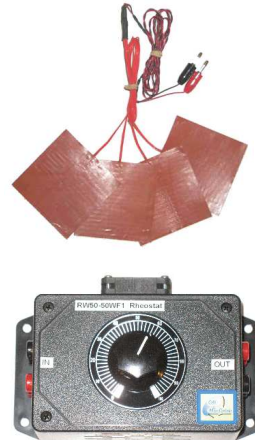
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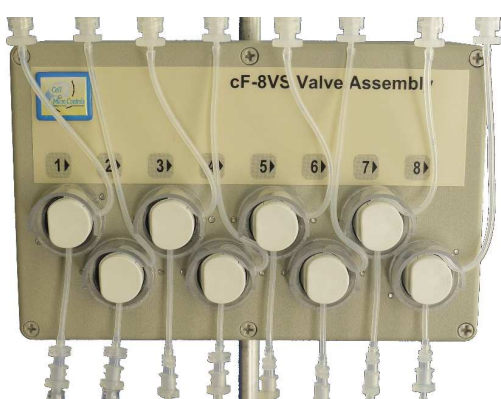
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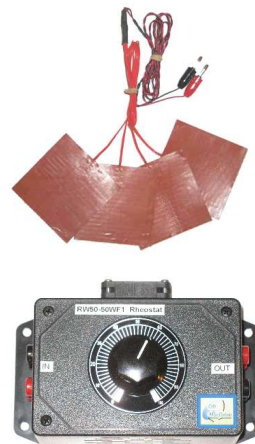
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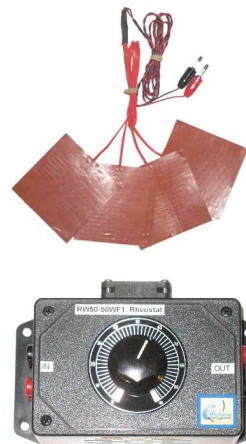
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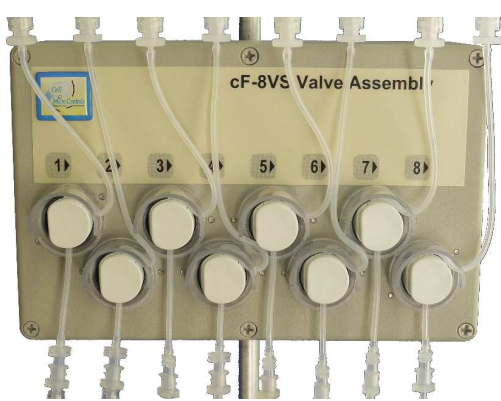
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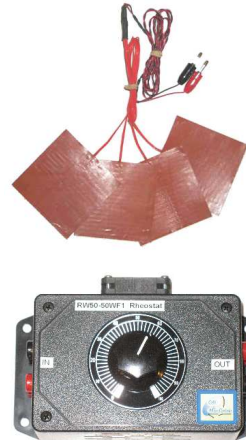
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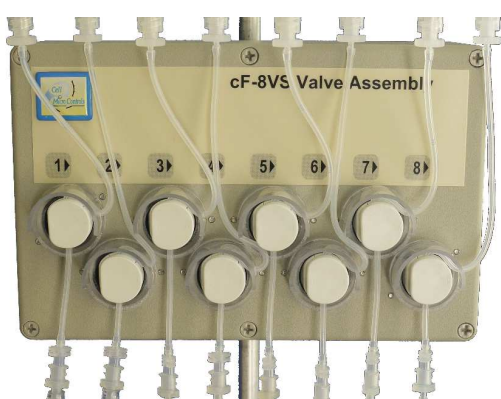
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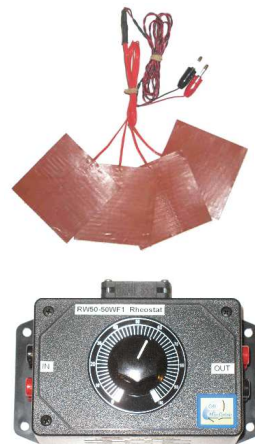
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Dead space: Tubes-approx 5µl; Tip-approx. 1-2µl.
Outflow tube: 360µm inside diameter
Inflow tubes: Tube outside diam. 0.7mm. Connects to 0.06" OD, 0.02" ID Tygon tubing.

