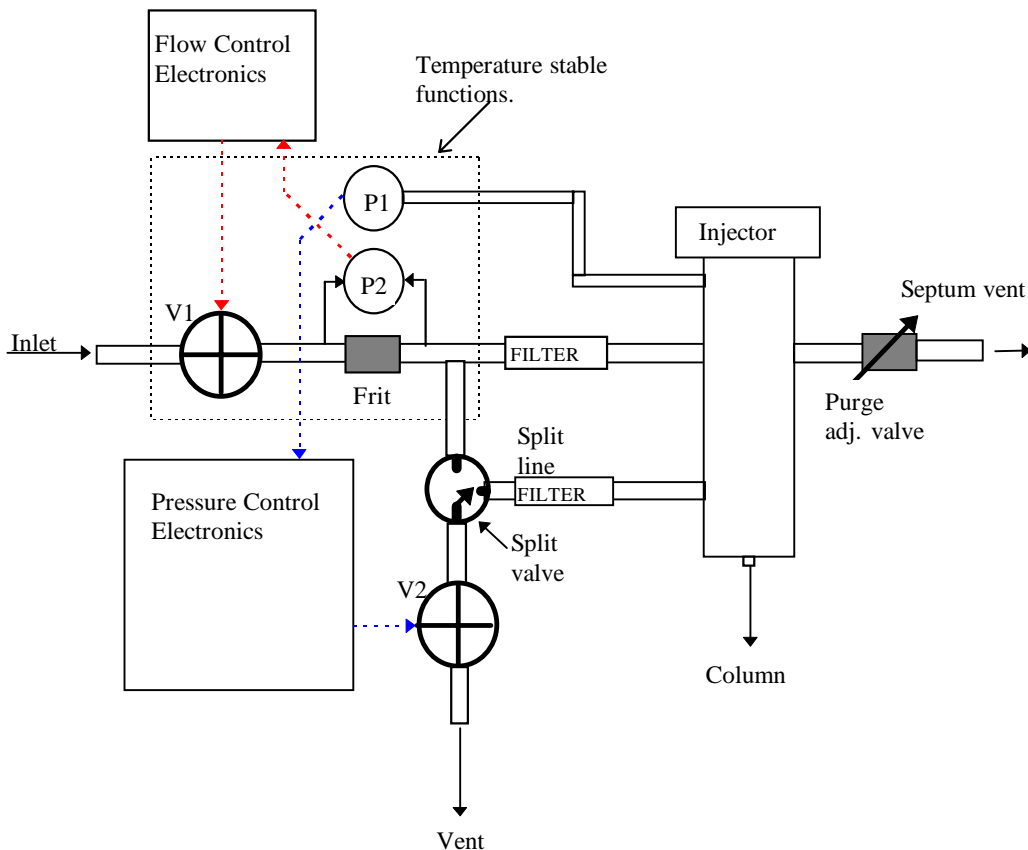


Type 1 Electronic Injector Controller



Functional description:

The Type 1 Electronic Injector Controller is designed to support a split/splitless type of injector such as the Varian 1079.

Total Gas flow into the injector is controlled using a closed loop mass flow controller. Inlet gas is connected to the input of linear control valve V1, and passes through V1 to the flow sensing restrictor element F1. A differential pressure transducer P2 senses the pressure drop across F1 and feeds back a flow rate signal to the control electronics. The desired flow rate is computed by the CPU in the GC which provides a control value to the control electronics. True mass flow rate control is achieved by software which utilizes the injector pressure measured by P1 in conjunction with data that is stored in computer memory during calibration. This calibration data relates values of P1 and P2 to standard milliliters per minute. P1, P2, V1 and the flow sensing frit are controlled at a fixed temperature.

Injector pressure is controlled using a PID closed loop electronic controller. The pressure controller is best described as an "up-stream" pressure control architecture. The "up-stream" pressure is sensed and controlled at the gas entry point of the injector. Control of the pressure is accomplished by adjustment of the linear control valve V2 in response to the pressure sensed by pressure transducer P1. This approach to controlling the injector pressure provides improved control response relative to a forward pressure control architecture but has the same quality of control. The Varian Type 1 controller requires 5 cc/min of gas to vent in excess of the gas flow needed by the column and the septum purge vent.

During periods when the injector is in "split mode" the Split valve switches so that the path of gas flow is via the injector split line and passes through V2 to vent. During this period the total flow rate is adjusted under software control to provide the desired split ratio. When not in the split mode of operation the total flow rate is reduced so that only 5 cc/min is vented. The split valve is switched so that gas flow no longer passes out of the injector split vent, but passes via the other port of the split valve through V2 to vent.

The injector pressure is controlled at all times to be exactly as required irrespective of changes in total flow rate. A filter is located in the injector split line to trap effluent from the injector, this aids in keeping the split valve and V2 clean.

Septum purge gas flow rate can be adjusted by the purge adjustment valve. (Some versions may not have adjustment, but will have a fixed restrictor.) It is important to calibrate the septum purge flow rate when it is adjusted so that the correct total flow rate is computed in software. If this procedure is not followed then the controller may not function correctly, due to insufficient total flow of gas.