Hoffman Controls
Principles of Operation

200-3 Series
Electronic VAV Flow Controller

Principle of Operation

The 200-3 Series Flow Controllers require differential pressure averaging velocity pressure pickups. The pickup design should incorporate a total pressure and static pressure signal. The pickup is connected by tubing to the self-contained velocity sensor which is mounted on the flow controller. The differential pressure generated by static pressure signals will cause an airflow through the velocity sensor which is proportional to the flow in the air distribution system. An electronic signal is generated from the flow sensor; this electronic flow signal, along with the signal from the 207 electronic thermostat is evaluated by the logic.

The Flow Controller receives the flow and thermostat signals and generates two DC voltages called VT and VV. The VT voltage represents the voltage caused by the temperature difference between space temperature and space setpoint as sensed by the 207 thermostat. Typically, the Vt voltage will vary from 11.1 to 16.5 volts DC for a temperature change from setpoint to +2.3°F above setpoint for direct acting (cooling) or 2.3°F below setpoint for reverse acting (heating). The VV voltage represents the velocity as sensed by the electronic velocity sensor. Typically, the VV voltage will vary from 11.1 to 16.5V DC for an air velocity change of 0 to 4000 FPM. A flow curve depicting Vv voltage versus FPM, is available from the VAV box manufacturer based on their flow pickup design. HCC will furnish a velocity (FPM) flow curve when the P/N 520-85 pickup is used.

The VT and VV voltages are continually compared by the flow controller. If there is a deviation difference between the two signals the flow controller positions the air damper with the electronic actuator to change the airflow, driving the VV voltage to the VT voltage. If the VV voltage changes (increases or decreases in flow) due to a static pressure change, the logic will reposition the air damper with the actuator to reset the air to its original flow rate as required by VT. The VV voltage will, therefore, again be equal to the VT voltage. The resulting control is described as a stand alone, electronic, pressure independent VAV controller.

Since the VT (space temperature) determines VV rate duct velocity), it is possible to set the Min. and Max. flow limits by adjusting the high and low limits of VT.

Referring to a VV (DC volts) versus Velocity Curve, the VV voltages can be determined for the Min./Max. limits. Flow limits are standard on the 200-3 flow controller. As an option, flow limits are incorporated into the 207FL Series thermostat and adjusted from the thermostat rather than the flow controller. Minimum and Maximum Flow Limit voltage values are set to the flow values as determined by the flow curve.

The flow controller can drive the air damper full open or closed on command from external contact closures. This feature is called the damper “override open” or damper “override closed”, and can be used for morning warm-up, fire and smoke control.

Function Description

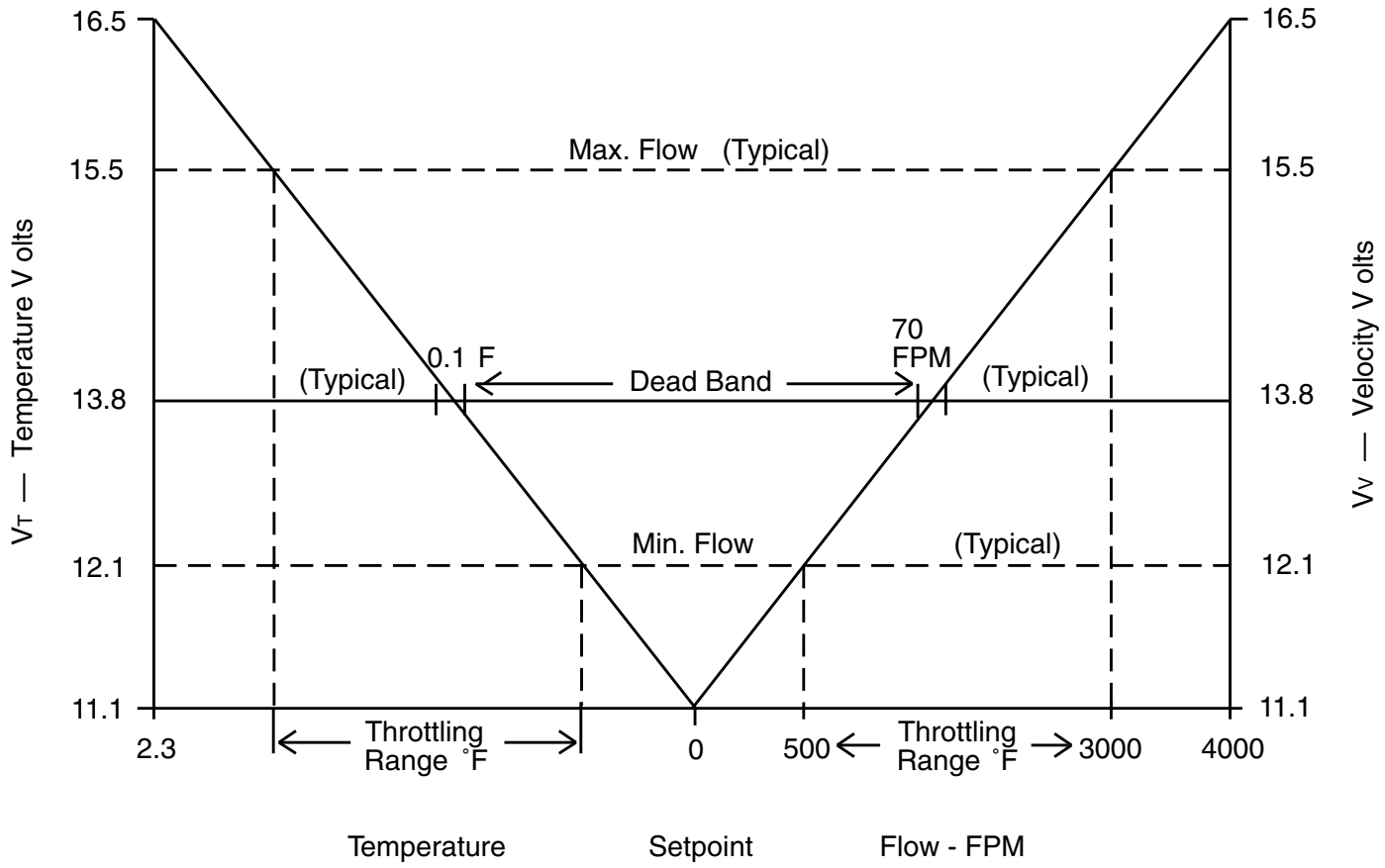
The flow controller can be field programmed to operate as a direct acting (cooling) or reverse acting (heating) controller. The action is determined by jumpers on the PC board. All flow controllers are programmed direct acting unless specified otherwise at the time of manufacture.

The 202 Series plug-in interface boards can be supplied for the following functions:

- Three stages of heat or fan and two stages of heat, dual flow, offset or any combination of functions.
- Automatic changeover by duct temperature.
- Computer interface.
- One stage of heat and one stage of time base proportioning control, for hot water or electric reheat control, with or without dual flow.
- Fan control and proportional heat (0 – 10V DC output) for hot water or SCR electronic reheat control, with or without dual flow.
- Return air tracking for room pressurization.
- Proportional terminal fan speed control.

All interface boards can be installed (plugged into) on the 200-3 by the VAV box manufacturer or at the job site as required.

The 200-3(CV) Series can be used as a constant volume (velocity) regulator. In this application, the 207 Series thermostat is not used. As a constant volume regulator, the velocity sensor is connected the same way as the VAV control. The VV voltage is determined from the VV versus velocity curve for the desired velocity. The Max. flow limit pot is set at Max. flow and Min. flow limit pot is adjusted until the VT voltage, as indicated by the DVM, equals the VV voltage as required from the flow curve. Constant volume is regulated at the Min. pot setting. The logic will thus control as a constant velocity regulator.



Flow Temperature Diagram