What is claimed is:

1. A mass flow controller comprising:

a pressure-based flow meter constructed and arranged to measure the flow rate of mass through the mass flow controller;

a thermal-based flow meter constructed and arranged to measure flow rate of mass through the mass flow controller;

a control valve constructed and arranged so as to control the flow rate of mass through the mass flow controller in response to a control signal generated as a function of the flow rate as measured by one of the flow meters;

an inlet for receiving a gas; and

a system controller constructed and arranged to (a) generate the control signal as a function of the flow rate as measured by the thermal-based mass flow meter when the measured flow rate is relatively low and there are no pressure disturbances at the inlet, (b) change so as to generate the control signal as a function of the flow rate as measured by the pressure-based flow meter when the measured flow rate is relatively low and there is a pressure disturbance, and (c) generate the control signal as a function of the flow rate as measured by the pressure-based flow meter when the flow rate is relatively high, so that the mass flow controller is relatively insensitive to inlet pressure perturbations.

2. The mass flow controller according to claim 1, wherein the system controller is configured with a cross-over value, wherein the system controller generates the control signal as a function of the flow rate measured by the thermal-based flow meter when the measured flow rate is below the cross-over value, and generates the control signal as a function of the flow rate measured by the pressure-based flow meter when the measured flow rate is greater than the cross-over valve.

3. The mass flow controller according to claim 2, wherein the cross-over value is selected as a function of the range of flow to which the mass flow controller controls.

4. The mass flow controller according to claim 2, wherein the cross-over value is manually entered.

5. The mass flow controller according to claim 2, wherein the cross-over value is factory installed.

6. The mass flow controller according to claim 2, wherein the mass flow controller includes an inlet for receiving a gas; and the system controller is also constructed and arranged to generate the control signal as a function of the flow rate as measured by the thermal-based mass flow meter when the measured flow rate is relatively low and there are no pressure disturbances at the inlet, and change so as to generate the control signal as a function of the flow rate as measured by the pressure-based flow meter when the measured flow rate is relatively low and there is a pressure disturbance.

7. The mass flow controller according to claim 6, wherein the pressure disturbance is indicated by a sudden big flow deviation between the thermal-based flow meter and the pressure-based flow meter.

8. The mass flow controller according to claim 2, the outputs of the thermal-based flow meter and pressure-based flow meter are compared to determine whether the thermal flow meter has fallen out of calibration.

9. The mass flow controller according to claim 8, wherein a zero offset adjust signal is provided to the thermal flow meter when the output reading of the thermal flow meter varies from the output reading of the pressure flow meter by a predetermined amount.

10. A method of controlling the mass flow rate of a gas with a mass flow controller, comprising;

measuring the flow rate of mass through the mass flow controller with a thermal-based flow meter;

measuring the flow rate of mass through the mass flow controller with a pressure-based flow meter;

controlling the flow rate of mass through the mass flow controller with a control valve in response to a control signal generated as a function of the flow rate as measured by one of the flow meters; and

wherein controlling the flow rate of mass includes generating the control signal as a function of (a) the flow rate as measured by the thermal-based mass flow meter when the

measured flow rate is relatively low and there are no pressure disturbances at the inlet, (b) the flow rate as measured by the pressure-based flow meter when the measured flow rate is relatively low and there is a pressure disturbance, and (c) the flow rate as measured by the pressure-based flow meter when the flow rate is relatively high so that the mass flow meter is relatively insensitive to inlet pressure perturbations.

11. The method according to claim 10, wherein controlling the flow rate of mass includes generating the control signal as a function of (a) the flow rate as measured by the thermal-based mass flow meter when the measured flow rate is below a cross over value, and (b) the flow rate as measured by the pressure-based flow meter when the flow rate is above the cross-over value, so that the control of the flow rate is relatively insensitive to pressure perturbations.

12. The method according to claim 11, wherein the cross-over value is selected as a function of the range of flow to be controlled.

13. The method according to claim 11, wherein the cross-over value is manually entered.

14. The method according to claim 11, wherein the cross-over value is factory installed.

15. The method according to claim 11, wherein controlling the flow rate of mass includes generating the control signal as a function of (a) the flow rate as measured by the thermal-based mass flow meter when the measured flow rate is relatively low and there are no pressure disturbances at the inlet of the mass flow controller, (b) the flow rate as measured by the pressure-based flow meter when the flow rate is relatively low and there are pressure disturbances at the inlet so that the mass flow meter is relatively insensitive to inlet pressure perturbations.

16. The method according to claim 15, wherein a pressure disturbance is indicated by a sudden big flow measurement deviation between the thermal-based flow meter and the pressure-based flow meter.

17. The method according to claim 16, wherein the sudden big flow deviation occurs when the deviation exceeds a threshold.

18. The method according to claim 10, further including comparing the outputs of the thermal flow meter and pressure flow meter to determine whether the thermal flow meter has fallen out of calibration.

19. The method according to claim 18, further including providing a zero offset adjust signal to the thermal flow meter when the output reading of the thermal flow meter varies from the output reading of the pressure flow meter by a predetermined amount.