CLAIMS

1. A flow rate measurement device for a flow rate controller for a gas supply device, comprising:

a branched pipe passage Lb having

an inlet side end portion detachably joined in a branched form to an upstream portion of an on-off valve V_0 provided on ~~the~~ an outlet end portion of a gas supply line L and

an outlet side end portion of the branched pipe passage Lb is detachably joined ~~Lb~~ to a gas flow-out side pipe passage that communicates with a vacuum pump VP;

an on-off valve V provided on~~the~~ an outlet side of the branched pipe passage Lb;

a pressure detector Pd and a temperature detector Td disposed to detect a gas pressure and a gas temperature of a gas flowing in the ~~on-off valve V~~branched pipe passage Lb; ~~and~~

an arithmetic operation control device CP into which detection signals from the pressure detector Pd and the temperature detector Td are input, and the arithmetic operation control device arithmetically calculates a flow rate of the gas flowing in the branched pipe passage Lb~~,~~;

an electromagnetic valve EV that supplies a drive fluid to the on-off valve V;

a drive fluid source DGS that supplies a drive fluid to the electromagnetic valve EV; an I/O board IO for the arithmetic operation control device CP; and a power source device ES~~wherein the flow rate measurement device is detachably joined in a branched arrangement to an upstream portion of the on-off valve V_0 provided on the outlet end portion of the gas supply line L of the gas supply device GF~~.

2. A flow rate measurement method for a flow rate controller for a gas

supply device wherein, in ~~a~~ the gas supply device that supplies a plurality of kinds of gases to a gas use portion in a switchable manner through each of the flow rate controllers, respectively, an inlet side end portion of a branched pipe passage Lb of a flow rate measurement device U is detachably joined in a branched form to an upstream portion of an on-off valve V_0 provided on an outlet end portion of a gas supply line L, wherein the ~~a~~ flow rate measurement device U includ~~inges a~~ the branched pipe passage Lb, an on-off valve V provided on ~~the~~ an outlet side of the branched pipe passage Lb, a gas pressure detector Pd and a gas temperature detector Td disposed to detect a gas pressure and a gas temperature of a gas flowing in the branched pipe passage Lb, and an arithmetic operation control device CP into which detection signals from the pressure detector Pd and the temperature detector Td are input, and the arithmetic operation control device arithmetically calculates a flow rate of the gas flowing in the branched pipe passage Lb, an electromagnetic valve EV that supplies a drive fluid to the on-off valve V, a drive fluid source DGS that supplies a drive fluid to the electromagnetic valve EV, an I/O board IO for the arithmetic operation control device CP, and a power source device ES, ~~that is joined in a branched arrangement to a gas supply line L of the gas supply device,~~ and wherein an outlet side end portion of the branched pipe passage Lb~~the on-off valve V of the flow rate measurement device U~~ is connected to a gas flow-out side, and first, outlet side on-off valves V_{01} to V_{0n} of each flow rate controller of the flow rate control device and ~~an~~ the on-off valve V_0 on the outlet end portion of the gas supply line L are closed and the on-off valve V provided on the outlet side of the branched pipe passage Lb of the flow rate measurement device U is opened, and then, only one of the outlet side on-off valves V_{01} to V_{0n} of a flow rate controller to be measured is opened to flow the gas into the branched pipe passage Lb of the flow rate measurement device U at a set flow rate, and the on-off valve V on the outlet side of the branched pipe passage Lb is closed after

the gas pressure and the gas temperature in the branched pipe passage Lb become stable, a first measurement of a gas temperature T_1 and a gas pressure P_1 is performed at a time t_1 at which the gas pressure reaches a set pressure P_1, second measurement of a gas temperature T_2 and a gas pressure P_2 is then performed at a time t_2 at which the gas pressure reaches a set pressure P_2, and from the respective measured values described above, a gas flow rate Q is arithmetically calculated based on $Q = (22.4V/R \cdot \Delta t) \times (P_2/T_2 - P_1/T_1)$ (provided that V is the total inner volume of the branched pipe passage Lb and the gas supply line L, R is a gas constant, and Δt is $t_2 - t_1$).

3. A flow rate measurement method for a flow rate controller for a gas supply device wherein, in ~~a~~ the gas supply device that supplies a plurality of kinds of gases to a gas use portion in a switchable manner through each of the flow rate controllers, respectively, an inlet side end portion of a branched pipe passage Lb of a flow rate measurement device U including ~~a~~ the branched pipe passage Lb, an on-off valve V provided on the outlet side of the branched pipe passage Lb, a gas pressure detector Pd and a gas temperature detector Td disposed to detect a gas pressure and a gas temperature of a gas flowing in the branched pipe passage Lb, and an arithmetic operation control device CP into which detection signals from the pressure detector Pd and the temperature detector Td are input, and the arithmetic operation control device arithmetically calculates a flow rate of the gas flowing in the branched pipe passage Lb, an electromagnetic valve EV that supplies a drive fluid to the on-off valve V, a drive fluid source DGS that supplies a drive fluid to the electromagnetic valve EV, an I/O board IO for the arithmetic operation control device CP, and a power source device ES is detachably joined in a branched ~~structure to~~ form to an upstream portion of an on-off valve V_0 provided on an outlet end portion of a gas supply line L of the gas supply device, and an outlet side end portion of the branched pipe passage Lb~~the on-off valve V of the flow rate measurement device U~~ is

connected to a gas flow-out side, and first, outlet side on-off valves V_{01} to V_{0n} of each flow rate controller of the flow rate control device and ~~an~~ the on-off valve V_0 on the outlet end portion of the gas supply line L are closed and the on-off valve V provided on the outlet side of the branched pipe passage Lb of the flow rate measurement device U is opened, and then, only one of the outlet side on-off valves V_{01} to V_{0n} of a flow rate controller to be measured is opened to flow the gas into the branched pipe passage Lb of the flow rate measurement device U at a set flow rate, the on-off valve V on the outlet side of the branched pipe passage Lb is closed after the gas pressure and the gas temperature in the branched pipe passage Lb become stable, a rate of gas pressure rise $\Delta P/\Delta t$ is measured, and a flow rate Q is arithmetically calculated based on $Q = \Delta P/\Delta t \times V/R \cdot T$ (provided that V is the total inner volume of the branched pipe passage Lb and the gas supply line L, R is a gas constant, Δt is a measurement time, and T is a gas temperature).

~~4. The flow rate measurement method for a flow rate controller for a gas supply device according to Claim 2 or Claim 3, wherein the flow rate measurement device U includes: a branched pipe passage Lb having an inlet side end portion to be joined to a gas supply line L and an outlet side end portion to be joined to a gas flow-out side, respectively; the on-off valve V provided on the outlet side of the branched pipe passage Lb, the pressure detector Pd and the temperature detector Td which detects a gas pressure and a gas temperature of a gas flowing in the on-off valve V; an arithmetic operation control device CP into which detection signals from the pressure detector Pd and the temperature detector Td are input and which arithmetically calculates a gas flow rate of the gas flowing in the branched pipe passage Lb; an electromagnetic valve EV that supplies a drive fluid to the on-off valve V, a drive fluid source DGS that supplies a drive fluid to the electromagnetic valve EV; an I/O board IO for the arithmetic operation control device CP; and a power source device ES.~~