CLAIMS

We claim:

1. A flow rate sensor system (200), comprising:

a density or specific gravity meter (202) including a sensor assembly (204a) and a density or specific gravity meter electronics (204b) configured to generate a density or specific gravity measurement of a process fluid;

a mass flow meter (203) including a sensor assembly (205a) and a mass flow meter electronics (205b) configured to generate a mass flow rate of the process fluid and in electrical communication with the density or specific gravity meter electronics (204b); and

a remote processing system (207) in electrical communication with only one of the density or specific gravity meter electronics (204b) or the mass flow meter electronics (205b) and configured to receive measurements of the process fluid generated by the density or specific gravity meter electronics (204b) or the mass flow meter electronics (205b) based on the generated density or specific gravity measurement and the mass flow rate.

2. The flow rate sensor system (200) of claim 1, wherein the sensor assembly (204a) of the density or specific gravity meter (202) and the sensor assembly (205a) of the mass flow meter (203) are located in line with a fluid conduit (201) carrying the process fluid.

3. The flow rate sensor system (200) of claim 1, wherein the sensor assembly (205a) of the mass flow meter (203) is located in line with a fluid conduit (201) carrying the process fluid and the sensor assembly (204a) of the density or specific gravity meter (202) is located in a slip stream (401) coupled to the fluid conduit (201) to receive a portion of the process fluid.

4. The flow rate sensor system (200) of claim 1, wherein the density or specific gravity measurement and the mass flow rate are generated substantially simultaneously.

5. The flow rate sensor system (200) of claim 1, wherein the density or specific gravity measurement comprises an average density or specific gravity.

6. A method for generating a flow rate measurement of a process fluid in a fluid conduit, comprising steps of:

determining a density or specific gravity of the process fluid with a density or specific gravity meter including a sensor assembly in fluid communication with the process fluid and a density or specific gravity meter electronics;

determining a mass flow rate of the process fluid with a mass flow meter including a sensor assembly in fluid communication with the process fluid and a mass flow meter electronics;

providing electrical communication between the density or specific gravity meter electronics and the mass flow meter electronics;

using at least one of the density or specific gravity meter electronics or the mass flow meter electronics to determine a volume or energy flow of the process fluid based on the determined density or specific gravity and the determined mass flow rate; and

providing the volume or energy flow to a remote processing system in electrical communication with only one of the density or specific gravity meter electronics or the mass meter electronics.

7. The method of claim 6, wherein the sensor assembly of the density or specific gravity meter and the sensor assembly of the mass flow meter are located in line with the fluid conduit carrying the process fluid.

8. The method of claim 6, wherein the sensor assembly of the mass flow meter is located in line with the fluid conduit carrying the process fluid and the sensor assembly of the density or specific gravity meter is located in a slip stream coupled to the fluid conduit to receive a portion of the process fluid.

9. The method of claim 6, wherein the density or specific gravity measurement and the mass flow rate are determined substantially simultaneously.

10. The method of claim 6, wherein the density or specific gravity measurement comprises an average density or specific gravity.

CLAIMS

We claim:

1. A flow rate sensor system (200), comprising:

a density or specific gravity meter (202) including a sensor assembly (204a) and a density or specific gravity meter electronics (204b) configured to generate a density or specific gravity measurement of a process fluid;

a mass flow meter (203) including a sensor assembly (205a) and a mass flow meter electronics (205b) configured to generate a mass flow rate of the process fluid and in electrical communication with the density or specific gravity meter electronics (204b); and

a remote processing system (207) in direct electrical communication with only one of the density or specific gravity meter electronics (204b) or the mass flow meter electronics (205b) and configured to receive measurements of the process fluid generated by the density or specific gravity meter electronics (204b) or the mass flow meter electronics (205b) based on the generated density or specific gravity measurement and the mass flow rate.

2. The flow rate sensor system (200) of claim 1, wherein the sensor assembly (204a) of the density or specific gravity meter (202) and the sensor assembly (205a) of the mass flow meter (203) are located in line with a fluid conduit (201) carrying the process fluid.

3. The flow rate sensor system (200) of claim 1, wherein the sensor assembly (205a) of the mass flow meter (203) is located in line with a fluid conduit (201) carrying the process fluid and the sensor assembly (204a) of the density or specific gravity meter (202) is located in a slip stream (401) coupled to the fluid conduit (201) to receive a portion of the process fluid.

4. The flow rate sensor system (200) of claim 1, wherein the density or specific gravity measurement and the mass flow rate are generated substantially simultaneously.

5. The flow rate sensor system (200) of claim 1, wherein the density or specific gravity measurement comprises an average density or specific gravity.

6. A method for generating a flow rate measurement of a process fluid in a fluid conduit, comprising steps of:

determining a density or specific gravity of the process fluid with a density or specific gravity meter including a sensor assembly in fluid communication with the process fluid and a density or specific gravity meter electronics;

determining a mass flow rate of the process fluid with a mass flow meter including a sensor assembly in fluid communication with the process fluid and a mass flow meter electronics;

providing electrical communication between the density or specific gravity meter electronics and the mass flow meter electronics;

using at least one of the density or specific gravity meter electronics or the mass flow meter electronics to determine a volume or energy flow of the process fluid based on the determined density or specific gravity and the determined mass flow rate; and

providing the volume or energy flow to a remote processing system in direct electrical communication with only one of the density or specific gravity meter electronics or the mass meter electronics.

7. The method of claim 6, wherein the sensor assembly of the density or specific gravity meter and the sensor assembly of the mass flow meter are located in line with the fluid conduit carrying the process fluid.

8. The method of claim 6, wherein the sensor assembly of the mass flow meter is located in line with the fluid conduit carrying the process fluid and the sensor assembly of the density or specific gravity meter is located in a slip stream coupled to the fluid conduit to receive a portion of the process fluid.

9. The method of claim 6, wherein the density or specific gravity measurement and the mass flow rate are determined substantially simultaneously.

10. The method of claim 6, wherein the density or specific gravity measurement comprises an average density or specific gravity.