We Claim:

1. A method for operating a flowmeter comprising:

flowing a critical-phase fluid through the flowmeter;

measuring an uncorrected mass flow rate of the fluid;

measuring a temperature of the fluid;

measuring a density of the fluid;

calculating a velocity of sound (VoS) of the fluid, wherein calculating the VoS of the fluid comprises using the temperature, the density, and obviating the need for an external pressure measurement;

calculating a mass flow rate error;

calculating a corrected mass flow rate of the fluid.

2. The method for operating a flowmeter of claim 1, wherein the fluid comprises one of ethylene, ethane, and carbon dioxide.

3. The method for operating a flowmeter of claim 1, wherein the fluid comprises one of freon, sulfur hexafluoride, and uranium hexafluoride.

4. The method for operating a flowmeter of claim 1, wherein calculating the VoS of the fluid comprises cross-referencing and interpolating the VoS using a VoS table based on the temperature and the density.

5. The method for operating a flowmeter of claim 4, wherein the VoS table comprises extrapolated VoS values.

6. The method for operating a flowmeter of claim 1, wherein calculating mass flow rate error is calculated as: $mass\ flow\ rate\ error = \ m_e = \ C\left(\frac{2\pi f d}{2a}\right)^2 \%$

Wherein:

$C = meter\ constant\ (e.g., \frac{1}{2})$;

$f = meter\ operating\ frequency, hz$;

$d = meter\ tube\ diameter, meters;$

$a = acoustic\ velocity\ (a.k.a., VoS)\ of\ the\ fluid, m/s.$

7. The method for operating a flowmeter of claim 1, wherein the corrected mass flow rate is calculated as: $Corrected\ mass\ flow = \frac{mass\ flow\ measured}{1+\frac{m_e}{100}}$.

8. Meter electronics (20) for a flowmeter (5) configured to receive a critical-phase process fluid, the meter electronics (20) comprising an interface (201) configured to communicate with a flowmeter assembly of the flowmeter (5), and receive a vibrational response, and a processing system (203) coupled to the interface (201) comprising:

a mass flow correction routine (215) configured to:

measure a temperature (224) of the process fluid in the flowmeter (5);

measure a density (225) of the process fluid in the flowmeter (5);

calculate a velocity of sound (VoS) (244) of the process fluid in the flowmeter (5), wherein calculating the VoS of the fluid comprises using the temperature, the density, and obviating the need for an external pressure measurement;

calculate a mass flow rate error;

calculate a corrected mass flow rate of the process fluid in the flowmeter (5).

9. The meter electronics (20) of claim 8, wherein the fluid comprises one of ethylene, ethane, and carbon dioxide.

10. The meter electronics (20) of claim 8, wherein the fluid comprises one of freon, sulfur hexafluoride, and uranium hexafluoride.

11. The meter electronics (20) of claim 8, wherein calculating the VoS of the fluid comprises cross-referencing and interpolating the VoS using a VoS table based on the temperature and the density.

12. The meter electronics (20) of claim 11, wherein the VoS table comprises extrapolated VoS values.

13. The meter electronics (20) of claim 8, wherein mass flow rate error is calculated as: $mass\ flow\ rate\ error = m_e = C\left(\frac{2\pi fd}{2a}\right)^2\%$

Wherein:

$C = meter\ constant\ (e.g., \frac{1}{2})$;

$f = meter\ operating\ frequency, hz$;

$d = meter\ tube\ diameter, meters$;

$a = acoustic\ velocity\ (a.k.a., VoS)\ of\ the\ fluid, m/s$.

14. The meter electronics (20) of claim 8, wherein the corrected mass flow rate is calculated as: $Corrected\ mass\ flow = \frac{mass\ flow\ measured}{1+\frac{m_e}{100}}$.