

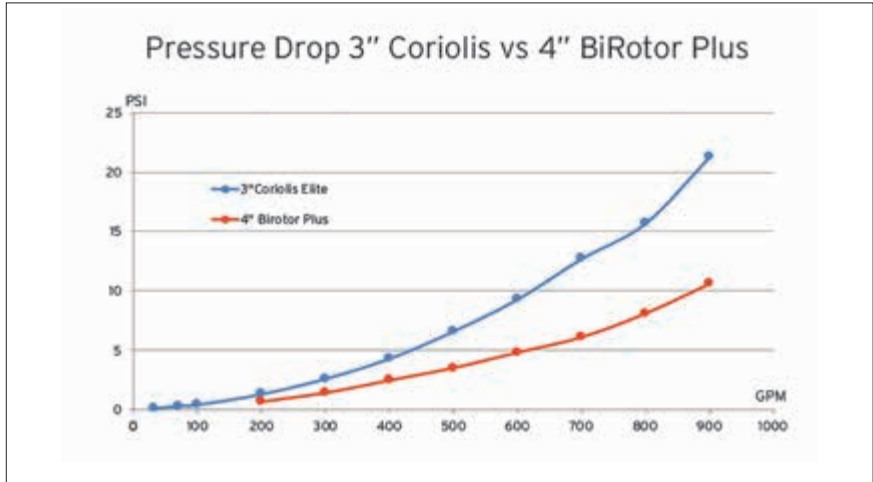
Positive displacement vs Coriolis meters

Coriolis meters are the meters of choice in many liquid measurement applications. But, what about custody transfer applications in the oil industry where every drop counts?

Positive displacement (PD) is a practical and accurate method to achieve volumetric measurement of refined hydrocarbons, according to tests undertaken by Brodie International in the USA. Brodie is a world-class manufacturer of positive displacement technology metering solutions for liquid transfer applications in the energy industry.

The tests revealed that Brodie's BiRotor Plus (BR+) meter can offer advantages over Coriolis meters for the highest accuracy and reliability. Here are the reasons:

- **Moving parts:** the measurement tubes of a Coriolis meter continuously vibrate at a high frequency, which can result in material fatigue and reduced life expectancy. The BR+ has two solid moving parts (the rotors) with no material contact, except for its hybrid ceramic bearings and timing gears, resulting in a field-proven life expectancy.
- **Pulse generation:** the relationship between the vibration of the tubes inside the Coriolis meter and its pulse output is complex with pulses calculated and generated by a microprocessor. This requires complex electronic filtering of the vibration signal and can cause a delay between flow and pulse output. The BR+ generates real pulses that originate directly from the rotor motion. The pulse output is uniform and works well with all proving methods including



Small Volume Provers using pulse interpolation.

- **Pressure drop and changes of pressure:** Coriolis meters experience a high pressure drop due to the splitting of the flow into two smaller vibrating tubes. Although it handles the same flow rates, the BR+ is less sensitive to pressure changes.

Meter performance

- **Linearity and repeatability:** with a published linearity of $\pm 0.075\%$ and a repeatability of 0.02% , the BR+ is a highly accurate custody transfer meter. As with other PD meters, the accuracy of the BR+ improves with increasing viscosity.

Internal product residue

Residue can cause instability in Coriolis tubes, which has implications on the accuracy.

Crude oils which contain paraffin wax often coat the inside tubes of the Coriolis meter. Likewise, viscous oil creates an internal layer on the tubes, the 'boundary layer'. There are correction procedures in the software to correct this, but these need to be monitored and turned on or off. This adds another level of complication because the operator needs to know when it is needed and when it is not. The BR+ meter is self-cleaning by design and does not require compensation for residue.

Maintenance and proving

- Coriolis meters need to be taken out and sent to the manufacturer for repair. The tubes can suffer from fatigue caused by its high frequency vibration and their replacement is costly. With periodic maintenance, BR+ meters can last for decades and be repaired on site.

