

## Technical Data

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### 4" BiRotor, APL

|            |      |
|------------|------|
| Model B181 | [4"] |
| Model B183 | [4"] |
| Model B184 | [4"] |
| Model B185 | [4"] |



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#### General

The BiRotor Meter is a positive displacement meter utilized in the most demanding applications requiring accuracy, long life and ruggedness.

The electronic "P" Series meter configuration features a sealed measuring chamber with one reluctance type electronic sensor. The sealed electronic sensor transmits amplified signals to local or remote instruments. A second optional sensor is available to allow dual channel pulses that are 90 degrees electrically out of phase.

#### Accuracy

The Mechanical BiRotor's accuracy is attained by the unique BiRotor design which features two finely balanced rotors. An adjuster, incorporated on the meter, is used to assure maximum accuracy within the meter's flow range (Mechanical Only).

#### Principle of Operation

The two spiral fluted rotors within the measuring unit are dynamically balanced to minimize bearing wear. (Refer to Figure 1). As the product enters the intake of the measuring unit, the two rotors divide the product into precise segments of volume momentarily and then return these segments to the outlet of the measuring unit. During this "liquid transition", the rotation of the two rotors is directly proportional to the flow rate of the liquid thruput. A gear train located outside the measuring unit chamber conveys mechanical rotation of the rotors to a mechanical or electronic register for totalization of liquid thruput. For P-Style units, a pulse verification gear located outside the measuring unit chamber conveys mechanical rotation of the rotors to the sensor and to the electronic register for totalization of liquid thruput.

#### Dependability

There is no metal to metal contact between the rotors and the measurement chamber. The meter is therefore extremely durable. The rotors, bearings and timing gears are the only moving parts. Maintenance requirements are the lowest in the industry. In addition, materials incorporated within the meter assembly are selected specifically for a wide range of petroleum and industrial liquid applications.

#### Affordability

In spite of its superior performance, Brodie can offer the Mechanical BiRotor at a very competitive price.

#### Electrical Classification (P-Style)

Class 1, Groups C & D, Division 1, Explosion proof; Recommended connecting cables Belden 8770, 3 Conductor Shielded, 18 gauge stranded. Maximum recommended cable length 3000 feet (914 meters). Input power: 6-28 Vdc at 20 mA, Output Signal: TTL (0-5V) or voltage dependent.

#### Design Features

- Extremely long service life
- Economical low maintenance
- Two simple rotors with no metal-to-metal contact are the only moving parts in the measuring chamber.
- No oscillating, reciprocating or sliding parts or cranks to wear or disturb the balanced rotary.
- Conforms with International standards of flowmeter accuracy.

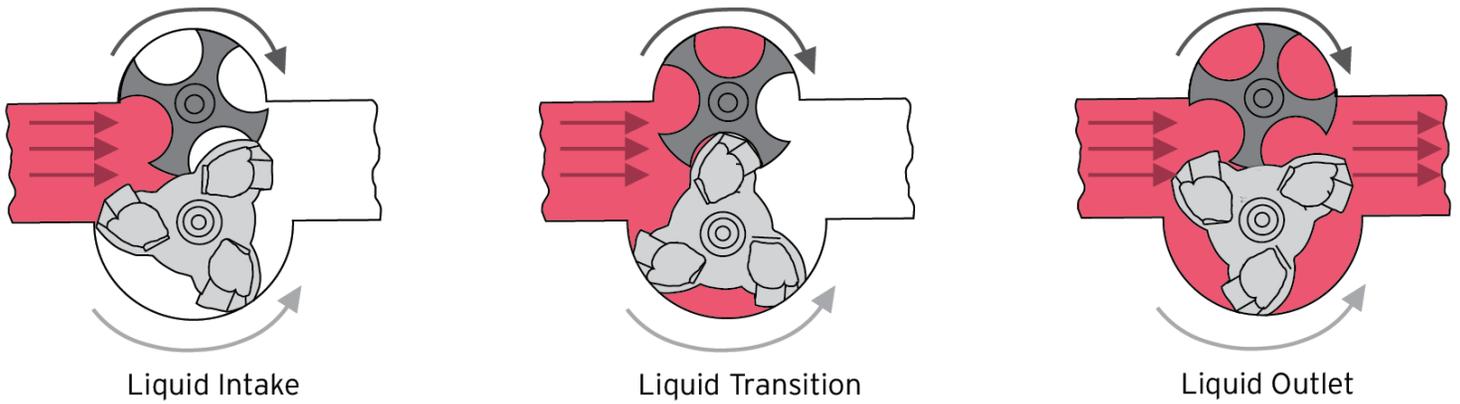


Figure 1 - BiRotor Meter Principle of Operation Diagram

### Accessories

#### Mechanical:

- Preset Counters
- Control Valves
- Large Numerical Registers
- Pulse Transmitters
- Ticket Printers
- Strainers

#### P-Style:

- Electronic Register
- Dual Pickoffs for "B" Level Pulse Security
- Preamp

### Ordering Information

In order to accurately process an order, such information as product to be metered, product viscosity, product temperature range, ambient temperature range, rate of flow, operating pressure, units of registration, accessories required, and optional features needed must be specified by the customer.

### Materials of Construction

#### Housing:

Welded Steel Construction Combining Steel Castings and Drawn Steel Plate

#### Measuring Unit:

#### Rotors:

Three Lobe Rotor - Cast Iron  
Four Fluted Rotor- Aluminum

#### Rotor Shafts:

E.T.D 150

#### Rotor Bearings:

Stainless Steel

#### Body and End Covers:

Cast Iron

#### Counter Base Plate:

#### Body:

Steel

#### O-Ring:

Viton (Standard)

#### Drive Shafts:

Stainless Steel

#### Drive Gears:

Stainless Steel

#### Ball Bearings:

Stainless Steel

### Flow Ranges

| Meter Models:<br>B181, B183,<br>B184, B185 |      | Viscosity |           |           |           |           |           |           |           |
|--|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|  |      | 1.25 cSt. |           | 6.25 cSt. |           | 25 cSt.   |           | 125 cSt.  |           |
|  |      | Accuracy  |           | Accuracy  |           | Accuracy  |           | Accuracy  |           |
|  |      | +/- 0.25% | +/- 0.50% | +/- 0.25% | +/- 0.50% | +/- 0.25% | +/- 0.50% | +/- 0.25% | +/- 0.50% |
| GPM  | 700  | 140       | C/F       |
| LPM  | 2649 | 530       | C/F       |
| BPH  | 1000 | 200       | C/F       |

### Max Working Pressure [at 100 F, 38 C]

| Model | Connections     | Max PSI | DIN Connections | Max Bar |
|-------|-----------------|---------|-----------------|---------|
| B181  | 4" 150 lb. ANSI | 285     | DN 100 PN 16    | 16      |
|       |                 |         | DN 100 PN 40    | 19.6    |
| B183  | 4" 300 lb. ANSI | 300     | DN 100 PN 40    | 20.7    |
| B184  | 4" 300 lb. ASI  | 740     | DN 100 PN 40    | 40      |
|       |                 |         | DN 100 PN 64    | 51      |
| B185  | 4" 600 lb. ANSI | 1480    | DN 100 PN 64    | 64      |
|       |                 |         | DN 100 PN 100   | 100     |

Temperature Range: -20F to 150F (-29C to 66C) Optional 325F (163C)

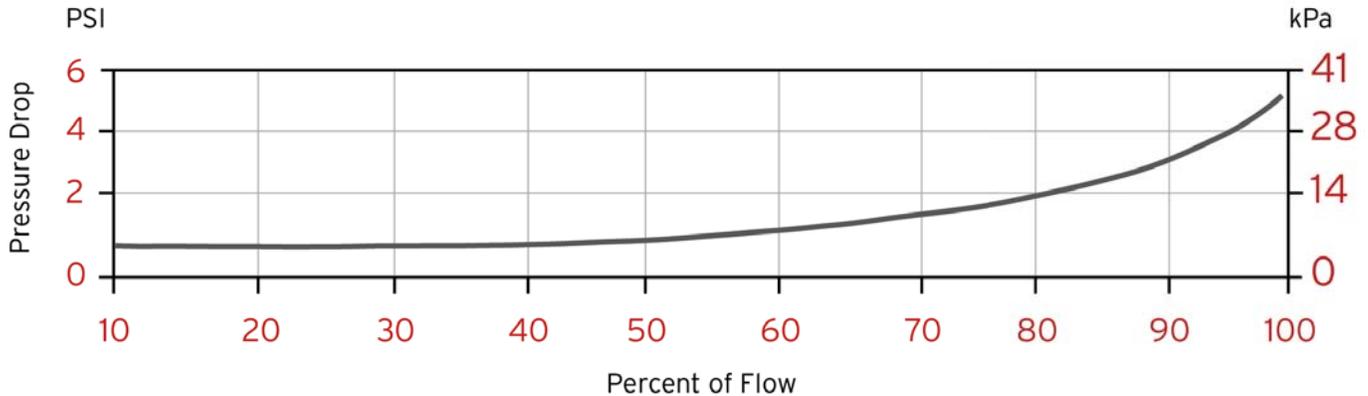
To convert pressure drop value to the actual process fluid, use the following equation:

$$\Delta PA = (cPA)^{0.25} * (SGA)^{0.75} * \Delta Pm$$

Delta PA = Pressure Drop on Actual Fluid in PSI  
 cPA = Viscosity of Actual Fluid in cP  
 SGA = Density of Actual Fluid in SG  
 Delta Pm = Pressure Drop on Mineral Spirits  
 (See Graphs below for Reference)

### Pressure Drop

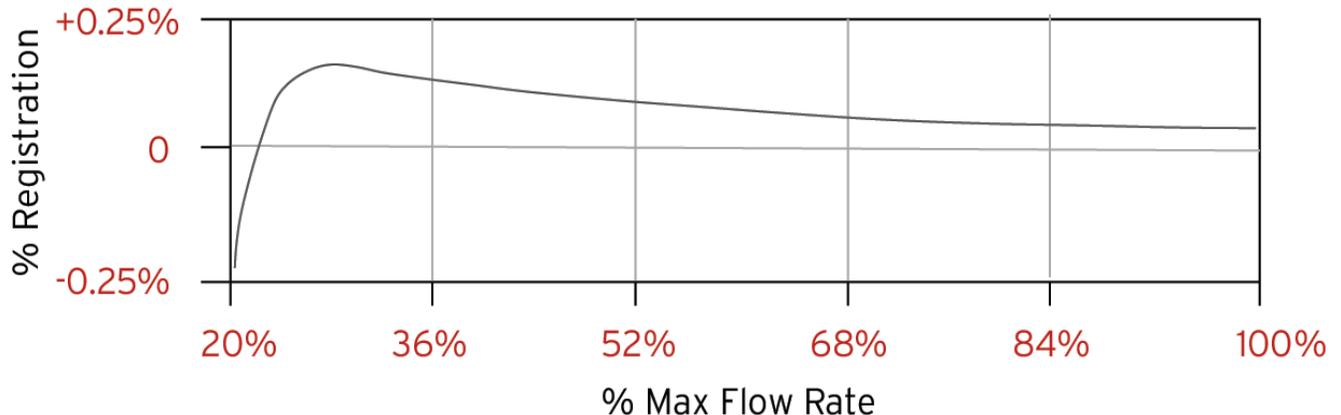
Test Solution: Mineral Spirits



### Accuracy

Capable of +/- 0.15%; Contact Factory for viscosity corrections.

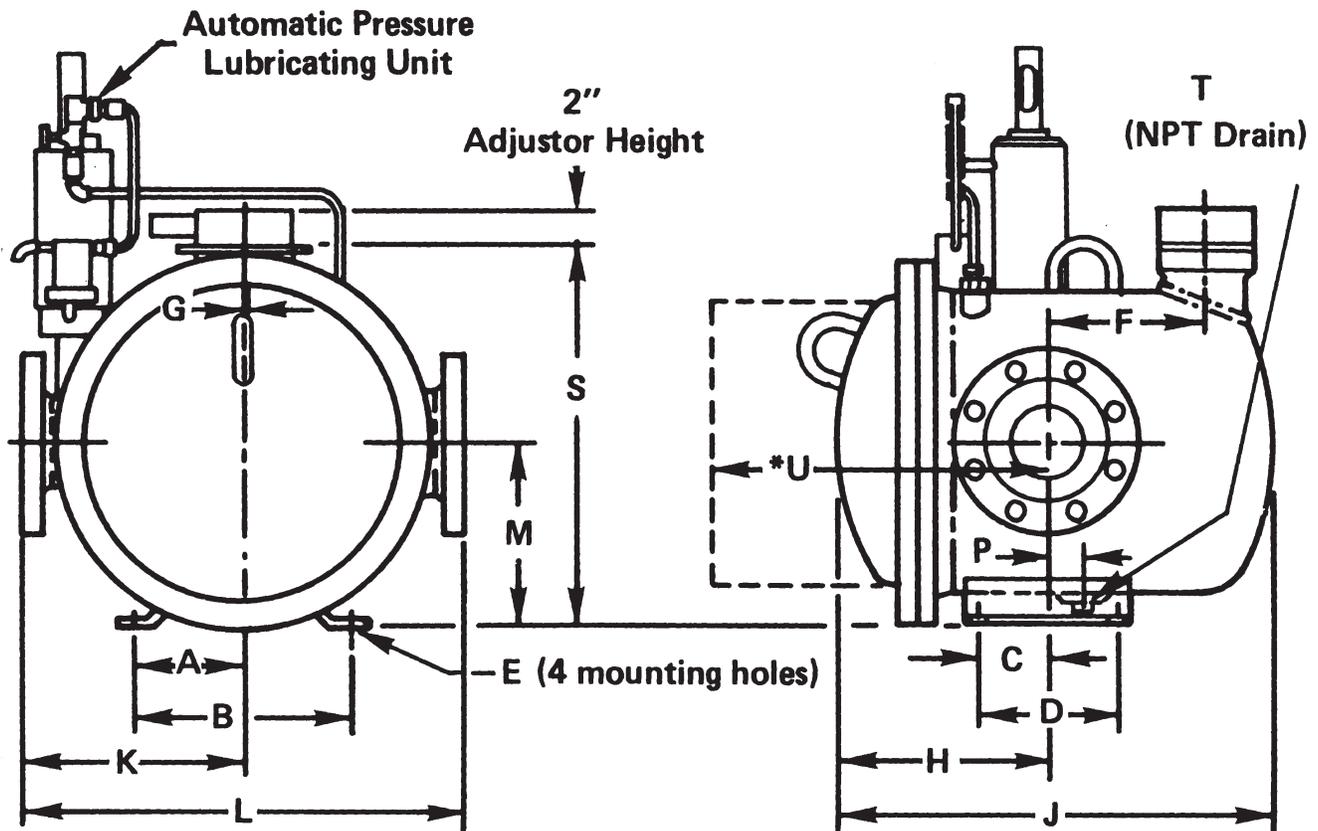
Test Solution: Mineral Spirits



| Electronic Pulses<br>(K-Factor) | Gallons | Liters | BBL   |
|---------------------------------|---------|--------|-------|
|                                 | 50      | 13.2   | 2,100 |

## Dimensions

| Model         | mm     | Dimensions |        |     |       |     |           |   |            |            |             |           |             |           |            |       |           |
|---------------|--------|------------|--------|-----|-------|-----|-----------|---|------------|------------|-------------|-----------|-------------|-----------|------------|-------|-----------|
|               | Size   | A          | B      | C   | D     | E   | F         | G | H          | J          | K           | L         | M           | P         | S          | T     | U         |
| B181,<br>B183 | mm     | 148        | 295    | 863 | 191   | 16  | 214       | - | 284        | 589        | 300         | 600       | 251         | 38        | 524        | -     | 472       |
|               | Inches | 5<br>13/16 | 11 5/8 | 3/4 | 7 1/2 | 5/8 | 8<br>7/16 | - | 11<br>3/16 | 23<br>3/16 | 11<br>13/16 | 23<br>5/8 | 9 7/8       | 1 1/2     | 20<br>5/8  | 1 1/2 | 22<br>1/2 |
| B184          | mm     | 191        | 381    | 102 | 203   | 22  | 216       | - | 367        | 668        | 368         | 737       | 300         | 106       | 567        | -     | 610       |
|               | Inches | 7 1/2      | 15     | 4   | 8     | 7/8 | 8 1/2     | - | 14<br>7/16 | 26<br>5/16 | 14 1/2      | 29        | 11<br>13/16 | 4<br>3/16 | 22<br>5/16 | 1 1/2 | 24        |
| B185          | mm     | 191        | 381    | 102 | 203   | 22  | 216       | - | 408        | 711        | 381         | 762       | 300         | 106       | 567        | -     | 622       |
|               | Inches | 7 1/2      | 15     | 4   | 8     | 7/8 | 8 1/2     | - | 16<br>1/16 | 28         | 15          | 30        | 11<br>13/16 | 4<br>3/16 | 22<br>5/16 | 1 1/2 | 24<br>1/2 |



## Shipping Weights and Volume

\*For Certified Dimensional Prints - Consult Factory

| Model | Weight | Volume              |
|-------|--------|---------------------|
| B181  | 514 lb | 20 ft <sup>3</sup>  |
|       | 233 kg | 0.57 m <sup>3</sup> |
| B183  | 535 lb | 20 ft <sup>3</sup>  |
|       | 243 kg | 0.57 m <sup>3</sup> |
| B184  | 825 lb | 22 ft <sup>3</sup>  |
|       | 374 kg | 0.62 m <sup>3</sup> |
| B185  | 915 lb | 22 ft <sup>3</sup>  |
|       | 415 kg | 0.62 m <sup>3</sup> |

### NOTE:

Do NOT operate this instrument in excess of the specifications listed. Failure to heed this warning could result in serious injury and/or damage to the equipment.

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