

## M4100 PERMEABILITY PLUGGING APPARATUS (PPA)



- High-pressure, high-temperature downhole static filtration testing.
- Pressurization up to 5,000 psig (~34,474 kPa) at a maximum operating temperature of 500°F (260°C).
- Upward filtration mechanism prevents solids from settling due to gravity, ensuring the most accurate test results are achieved.
- Airtight piston and O-ring seal inside cell separates hydraulic oil from mud on the top of the cell, ensuring they never make contact.
- Pressurized using carbon dioxide, but can use nitrogen with nitrogen manifold (sold separately).
- 750 psi maximum backpressure receiver pressure.
- Operator safety mechanism—cell contains rupture discs that release pressure when max pressure is exceeded.
- Wide range of filter disc porosities available to match your formation.
- Stainless-steel construction, making cleanup after tests fast and easy.
- Intuitive, easy-to-use operation.
- Complimentary 1-year warranty included with each device. Optional extended warranties are also available.
- *Grace Instrument is an ISO 9001:2015 certified company.*

## PRODUCT DESCRIPTION

### *High-Pressure, High-Temperature Downhole Static Filtration Testing*

The *Grace Instrument M4100 HP/HT Permeability Plugging Apparatus (PPA)* is engineered to simulate downhole static filtration. The *M4100* allows researchers to minimize differential sticking by analyzing drilling fluid caking properties and their potential to isolate reservoir depletions or underpressures.

The high-pressure, high-temperature *M4100* cell included with each unit can be pressurized up to 5,000 psig (~34,474 kPa) at a maximum operating temperature of 500°F (260°C).

### *Dependable Measurement and Intuitive, Easy-to-Use Operation*

A ceramic filter disc is placed on top of the cell. Using a hand pump, pressure is exerted at the bottom. This upward filtration mechanism prevents solids from settling due to gravity, ensuring the most accurate test results are achieved. As pressure continues to be applied, the piston in the cell moves upwards, forcing mud through the filter. A filter cake starts to accumulate on the disc. The airtight piston and O-ring seal inside the cell is engineered to separate hydraulic oil in the bottom of the cell from the mud in the top of the cell, ensuring they **never** make contact.

The *M4100* is pressurized using carbon dioxide. Pressurization methods include carbon dioxide cartridges or an in-house (user-provided) carbon dioxide source using backpressure receiver. The maximum pressure for the the backpressure receiver is 750 psi. If desired, a nitrogen manifold with in-house (user-provided) nitrogen may be used to pressurize instead.

To change the temperature of the heating jacket, which simulates reservoir temperature, simply turn the thermostat knob on the front of the metal plate. The thermostat cover is marked from 1 to 10. Each whole number represents a separate temperature. The temperature of the heating jacket is measured with a dial thermometer and then placed into the cell body. The measured temperature is recorded for future reference.

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## INSTRUMENT

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### *Overpressure Safety Mechanism*

The pressure cell contains rupture discs for operator safety. When the pressure exceeds the maximum, these discs will rupture, releasing pressure until reaching atmospheric pressure.

### *Customize Filter Media to Formation—Wide Range of Porosities Available*

Ceramic filter discs come in a wide range of porosities to match the porosity of your actual formation.

### *Rugged Stainless-Steel Construction*

The M4100 features a stainless-steel construction, making cleanup after tests fast and easy. This rugged device can be used in the field and laboratory.

### *The Grace Instrument Quality Promise*

The Grace Instrument M4100 HP/HT Permeability Plugging Apparatus is a powerful testing tool.

A complimentary 1-year warranty is included with each device. Optional extended warranties are also available.

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## SPECIFICATIONS

<b>Condition</b>	New
<b>Cell Maximum Operating Pressure</b>	5,000 psig (~34,474 kPa)
<b>Maximum Cell Temperature</b>	500°F (260°C)
<b>Maximum Sample Volume</b>	275 ml
<b>Back Pressure Receiver Volume</b>	100 ml
<b>Heater Power</b>	800 W
<b>Voltage</b>	Varies per unit. 110-120V AC or 220-240V AC (not both). Check electrical label to see which configuration applies. Single-phase.
<b>Frequency</b>	50-60 Hz
<b>Material</b>	Stainless-Steel Construction
<b>Dimensions</b>	8"W x 11.75 "D x 25"H
<b>Weight</b>	66 lbs. (~30 kg)
<b>Warranty</b>	1-Year Warranty (Optional extended warranties also available.)
<b>What's Included</b>	<ul style="list-style-type: none"><li>• M4100 Unit with Heating Jacket and Thermostat</li><li>• 5,000 psig Stainless-Steel Cell</li><li>• Ten Ceramic Filter Discs</li><li>• 750 psi, 100 ml Back Pressure Receiver Assembly</li><li>• CO<sub>2</sub> Pressurizing Assembly (Hand Pump)</li><li>• Three CO<sub>2</sub> Cartridges</li><li>• Two Graduated Glass Cylinders</li><li>• Dial Thermometer</li><li>• Piston Removal Tool</li><li>• Back Pressure Nipple</li><li>• Needle Valve</li><li>• Spanner Wrench</li><li>• Safety Locking Pin / Lock Pin Assembly</li><li>• O-Rings</li><li>• M4100 Operation Manual with Warranty</li></ul>
<b>Accessories (Optional)</b>	<ul style="list-style-type: none"><li>• Ceramic Disc(s) (Several porosities available.)</li><li>• Nitrogen Manifold</li></ul>

Looking for more? Many other sizes, configurations, finishes, and custom specifications are available! Contact Grace Instrument today for details:

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