Dependable Products From People You Trust

Model MB HTHP Filter Press

171-50 (115V)
171-51 (230V)

For temperatures up to 350°F (177°C)

Instruction Manual

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Ver. 2.1

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Intro

The OFITE Model MB HTHP Filter Press is designed to test drilling fluids and cement under elevated temperatures and pressures. This simulates various downhole conditions and provides a reliable method for determining the effectiveness of the material being tested. The complete assembly consists of a controlled pressure source, regulators, a high pressure cell, a system for heating the cell, a pressurized collection cell able to maintain proper back pressure in order to prevent flashing or evaporation of the filtrate, and a suitable stand.

Specifications

Size:	19" x 21" x 28" (49 x 54 x 72 cm)
Weight:	40 lbs. (18.2 kg)
Shipping Size:	23" x 13" x 13" (59 x 33 x 33 cm)
Shipping Weight:	50 lbs. (22.8 kg)
Maximum Temperature:	350°F (176°C)
Maximum Pressure:	1,500 PSI (10,342.5 kPa)
Pressure Source:	2 CO_2 Cartridges
Test Cell Capacity:	250 mL
Voltage:	#171-50: 115V; #171-51-C: 230V
Heater:	200 Watt

Components

#153-16 Glass Graduated Cylinder; 25 mL x 2/10 mL
#153-55 Silicone Stopcock Grease; 150 g Tube
#154-10 Dual-Scale Thermometer with Metal Dial; 5" Stem; 50 - 500°F; 0 - 250°C
#170-19 2½" (6.35 cm) Filter Paper; Specially Hardened for Filter Presses
#171-56 Complete HTHP Cell
- #170-34 ¼" x ¼" NPT Male Needle Valve; Qty: 2
- #171-72 T-handle for Needle Valve; Qty: 2
- #171-64 Male Coupling; Qty: 2
- #171-60 HTHP Cell
- #171-78 Locking Screw; Qty: 3
- #171-52 O-ring; 2 5/16" x 2½" x 3/32"
- #171-62 Cell Lid

#171-57 HTHP Regulator Assembly
- #142-58 O-ring for HTHP Coupling
- #143-02-10 CO_2 Puncture Head Assembly
- #143-03 Barrel for CO_2 Cartridge
- #144-15 Plated Brass Bushing; ¼" NPT Male to 1/8" NPT Female; Qty: 2
- #170-34 ¼" x ¼" NPT Male Needle Valve
- #171-53 High-Pressure Regulator
- #171-73-1 1000-PSI Gauge; 1/8" Bottom; 1½" Face
- #171-74-1 2000-PSI Gauge; 1/8" Bottom; 1½" Face
- #171-76 Female Coupling for Top Valve
- #171-77 Coupling Ring for Top Valve

#171-58 HTHP Complete Back Pressure Receiver
- #142-37 Victor Regulator
- #142-58 O-Ring for HTHP Coupling
- #142-61 200-PSI Gauge; 2"; ¼" Bottom Connection
- #143-02-10 CO_2 Puncture Head Assembly
- #143-03 Barrel for CO_2 Cartridge
- #143-06 Safety Bleeder Valve
- #143-09 200-PSI Relief Valve
- #170-07 O-ring; Qty: 2
- #170-32 1/8" x 1/8" NPT Male Needle Valve
- #171-66 Stainless Steel Receiver Tube
- #171-75 Receiver Body

#171-79 ¼" Hex Wrench

#171-50 HTHP Filter Press Without Case (115V):

#171-55 HTHP Heating Jacket and Stand; 115V
- #142-58 O-ring for HTHP Coupling
- #170-07 O-Ring
- #170-11 Heating Element; 115V; 200W; Qty: 4
- #171-54 Fuse
- #171-59 Stand; Base and Leg
- #171-59-1 Micarta Insulator Strip
- #171-61 Heating Block Jacket
- #171-63 Dial Plate for Thermostat
- #171-65 Fuse Block
- #171-67 Thermostat Knob
- #171-68 Red Pilot Light
- #171-69 White Pilot Light
- #171-70-1 Waterproof Thermostat Cover
- #171-71 Thermostat
- #171-71-1 Thermostat Space Plate
- #171-71-2 Sleeve and Nut for Thermostat
- #171-82 Power Cord with Male Plug Only; 8'; 16/3 SJ; Round

#171-51 HTHP Filter Press Without Case (230V):

#171-55-1 HTHP Heating Jacket and Stand; 230V
- #142-58 O-ring for HTHP Coupling
- #164-32 Male Connector for Power Cable; 230V
- #165-40-2 18 Gauge Cable; 3-Conductor; SJ00W; Qty: 8
- #170-07 O-Ring
- #170-11 Heating Element; 115V; 200W; Qty: 4
- #171-54 Fuse
- #171-59 Stand; Base and Leg
- #171-59-1 Micarta Insulator Strip
- #171-61 Heating Block Jacket
- #171-63 Dial Plate for Thermostat
- #171-65 Fuse Block
- #171-67 Thermostat Knob
- #171-68 Red Pilot Light
- #171-69 White Pilot Light
- #171-70-1 Waterproof Thermostat Cover
- #171-71 Thermostat
- #171-71-1 Thermostat Space Plate
- #171-71-2 Sleeve and Nut for Thermostat

Optional:

#143-05 EZ Puncture CO_2 Bulbs; 8-Gram; UN #1013; Package of 10
#143-20 Repair Kit for High-Pressure Victor Regulator (#171-53)
#171-81 Stainless Steel Carrying Case

#171-50-SP	**Spare Parts for #171-50 and #171-51:**
#140-60-01	Bleeder Valve O-ring; Qty: 4
#142-42	Diaphragm; Qty: 2
#142-58	HTHP Coupling O-ring; Qty: 36
#142-61	200-PSI Gauge; 2"; ¼" Bottom Connection
#143-02-13	Puncture Pin Holder Assembly O-ring; CO_2 Cartridge; Qty: 2
#143-02-14	Puncture Pin Holder Assembly O-ring; Qty: 2
#143-05	EZ Puncture CO_2 Bulbs; (8-GRAM); (UN #1013); Box of 10; Qty: 60
#143-19	Repair Kit for Victor Regulator; Qty: 2
#143-20	Repair Kit for High-Pressure Victor Regulator; Qty: 2
#153-16	Glass Graduated Cylinder; 25 mL x 2/10 mL; Qty: 2
#153-55	Silicone Stopcock Grease; 150 g Tube; Qty: 2
#154-10	Dual-Scale Thermometer with Metal Dial; 5" Stem; 50 - 500°F; 0 - 250°C
#170-07	O-ring; Qty: 2
#170-11	200-Watt Heating Element; 115V; Qty: 4
#170-19	2½" (6.35 cm) Filter Paper; Specially Hardened for Filter Presses; Qty: 10
#171-52	O-ring; 2 5/16" x 2½" x 3/32"; Qty: 12
#171-54	Fuse
#171-67	Thermostat Knob
#171-68	Red Pilot Light
#171-69	White Pilot Light
#171-71	Thermostat
#171-73-1	1000-PSI Gauge; 1/8" Bottom; 1½" Face
#171-78	Cell Screw; Qty: 4
#171-79	¼" Hex Wrench

Safety

Carbon Dioxide gas is normally supplied in small bulbs or cartridges, which contain approximately 900 PSI (6,206 kPa) pressure when new. Because they are highly portable, they are usually used in field operations. These bulbs should not be exposed to high heat (50°C/120°F) as they can explode if over heated.

Carbon Dioxide cartridges are pressurized to approximately 900 PSI at 1 atmosphere (sea level). Therefore, they should never be transported by airplane without proper packing because cabin de-pressurization may cause an explosion.

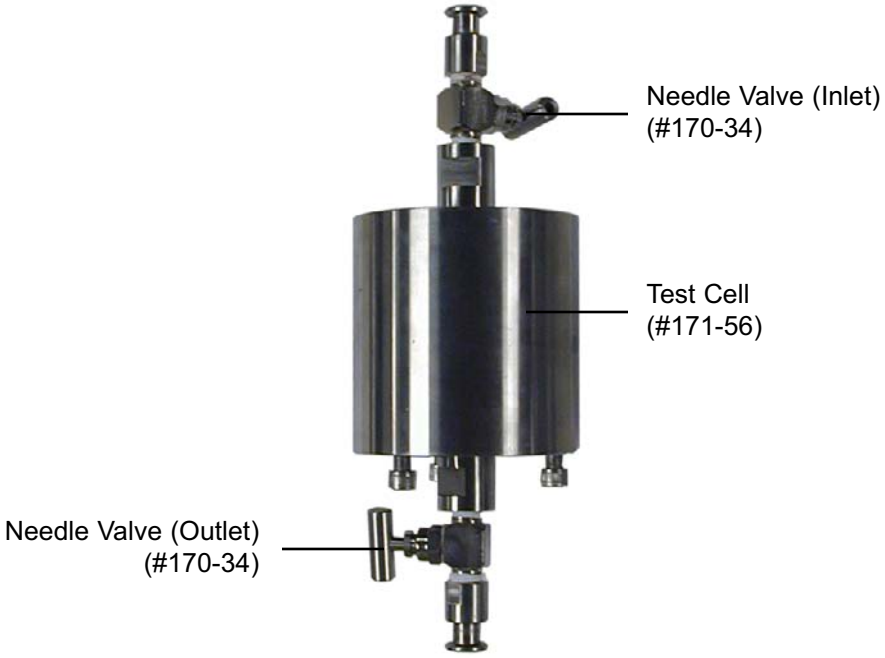
Do not use nitrous oxide cartridges as pressure sources for high-temperature, high-pressure (HTHP) filtration. Under high temperature and pressure, nitrous oxide can detonate in the presence of grease, oil, or carbonaceous materials. Nitrous oxide cartridges are to be used only for Garrett Gas Train Carbonate Analysis.

Due to the high temperatures and pressures involved in this test, extreme care must be exercised at all times. All safety precautions must be met, especially in the cell breakdown procedure after the filtration procedure has been completed.

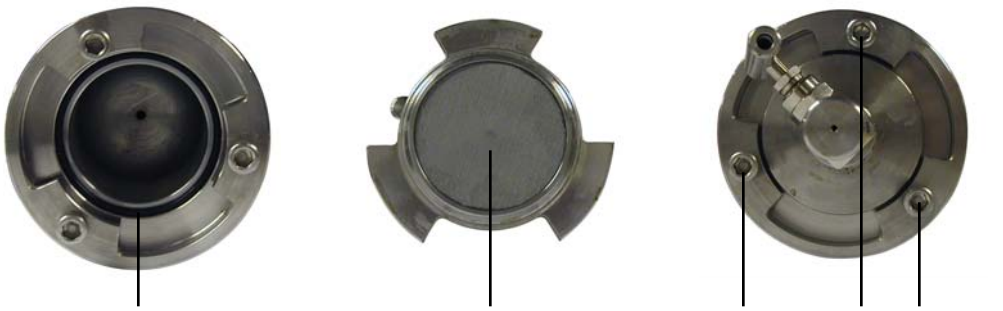
Procedure

1. Connect the heating well power cord to the appropriate power source. Place a dial-type metal thermometer in the well in the heating jacket and preheat to 10°F (6°C) above the desired test temperature. A pilot light will come on when the heating jacket is at the desired temperature as selected by the thermostat control knob.

2. Stir the sample for 10 minutes with a high speed mixer. Close both needle valves on the test cell by turning them counter-clockwise. Invert the cell and carefully pour the test fluid into the cell body. Leave at least 0.5" (13 mm) of empty space below the o-ring groove to allow for heat expansion of the fluid. Do not spill fluid on the o-ring inside the cell.



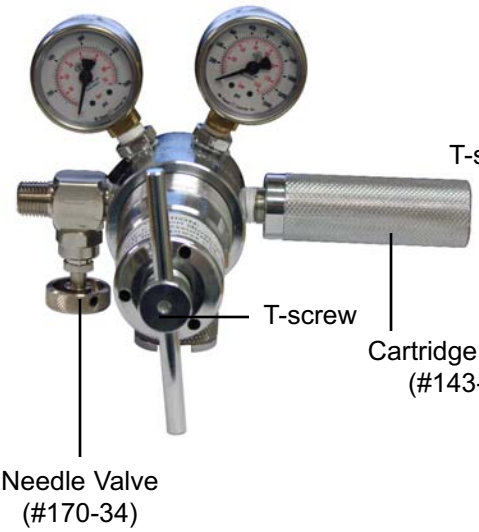
3. Place a circle of filter paper in the groove and place an o-ring on top of the paper. Place the cell cap into the cell, and twist it into position so the cap locking screws will fasten to the wings of the cell cap. Evenly tighten the set screws with the allen wrench.



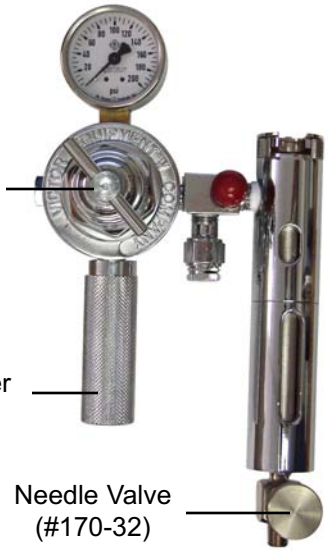
4. Place the cell in the heating jacket with the outlet or filter side of the cell cap properly oriented down. Make sure both valves on the cell are closed. Transfer the thermometer into the thermometer well within the cell.

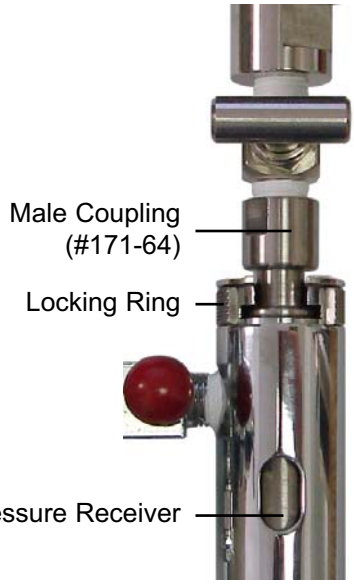
5. Check the o-ring on the inside of the female coupling on the top pressure assembly for nicks and cuts. Apply a thin coat of silicone grease to the o-ring but do not seal up the hole with grease. Connect the pressuring assembly to the top male slip coupling by lifting the lock ring and sliding the pressure assembly onto the male coupling. Release the lock ring and the top pressure assembly has been installed.

Pressuring Assembly (#171-57)



Back Pressure Receiver (#171-58)





6. If you will be operating above 200°F (93.3°C), place the back pressure receiver on the bottom valve assembly in the same manner.

7. Remove the CO_2 cartridge holder from both the top pressuring assembly and the back pressure receiver. Make sure both regulator T-screws are unscrewed completely and the needle valves are completely closed. Place a CO_2 cartridge in each holder and screw the holder onto the pressuring assemblies until the cartridges puncture. If the red relief valve on the backpressure receiver is not already pulled out, pull it out now.

8. Keeping the test cell valves closed, adjust the top and bottom regulators to the recommended back pressure for your test. Open the top valve one full turn to pressurize the sample. This pressure will minimize boiling while the sample is heating. Maintain this pressure on the fluid until the desired temperature is stabilized, as indicated by the thermometer. The heating time of the sample should never exceed one hour.


Note

The upper and lower limits of the test pressure differential are determined by the test temperature. As this temperature exceeds 212°F (100°C), the back pressure must be increased in order to prevent vaporization of the filtrate. The 500 PSI differential pressure must be maintained, so the top pressure will have to be increased accordingly. The table below shows the pressures recommended for various test temperatures.

Recommended Minimum Back Pressure

Test Temperature		Vapor Pressure		Minimum Back Pressure	
°F	°C	PSI	kPa	PSI	kPa
212	100	14.7	101	100	690
250	121	30	207	100	690
300	149	67	462	100	690
350	177	135	932	160	1,104
400*	204	247	1,704	275	1,898
450*	232	422	2,912	450	3,105
500*	260	680	4,692	700	4,830

**For tests above 400°F, use Teflon o-rings.*

9. When the fluid sample reaches the desired test temperature, increase the pressure on the top pressure unit to 500 PSI (3,447.5 kPa) above the back pressure. Open the bottom valve to initiate filtration and begin timing.

10. Collect the filtrate for 30 minutes maintaining the selected test temperature within ± 5°F (± 3°C). If the back pressure rises above recommended setting during the test, reduce the pressure by carefully opening the valve on the receiver and drawing off some of the filtrate into the graduated cylinder. When the pressure is back down to the recommended setting, close the valve.

11. At the end of the test, close the top and bottom valves on the cell. Unscrew the regulator T-screws and open the needle valves on the pressuring assembly and the back pressure receiver to release all of the pressure.

12. Remove the back pressure receiver and drain any remaining filtrate into the graduated cylinder. Correct the total filtrate volume collected to a standard filtration test area of 7.1 in^2 (45.8 cm^2) by doubling the filtrate volume collected in 30 minutes. Record this total filtrate volume (doubled), and the temperature, pressure, and time.

13. Disconnect the primary pressure assembly by lifting the lock ring and slipping the pressure assembly off the cell coupling. Remove the cell from the heating jacket and allow it to cool to room temperature or quick cool the cell by immersing it in cool water. Keep the cell in an upright position during this procedure. When the cell has cooled, slowly open the two needle valves to bleed off the cell pressure.

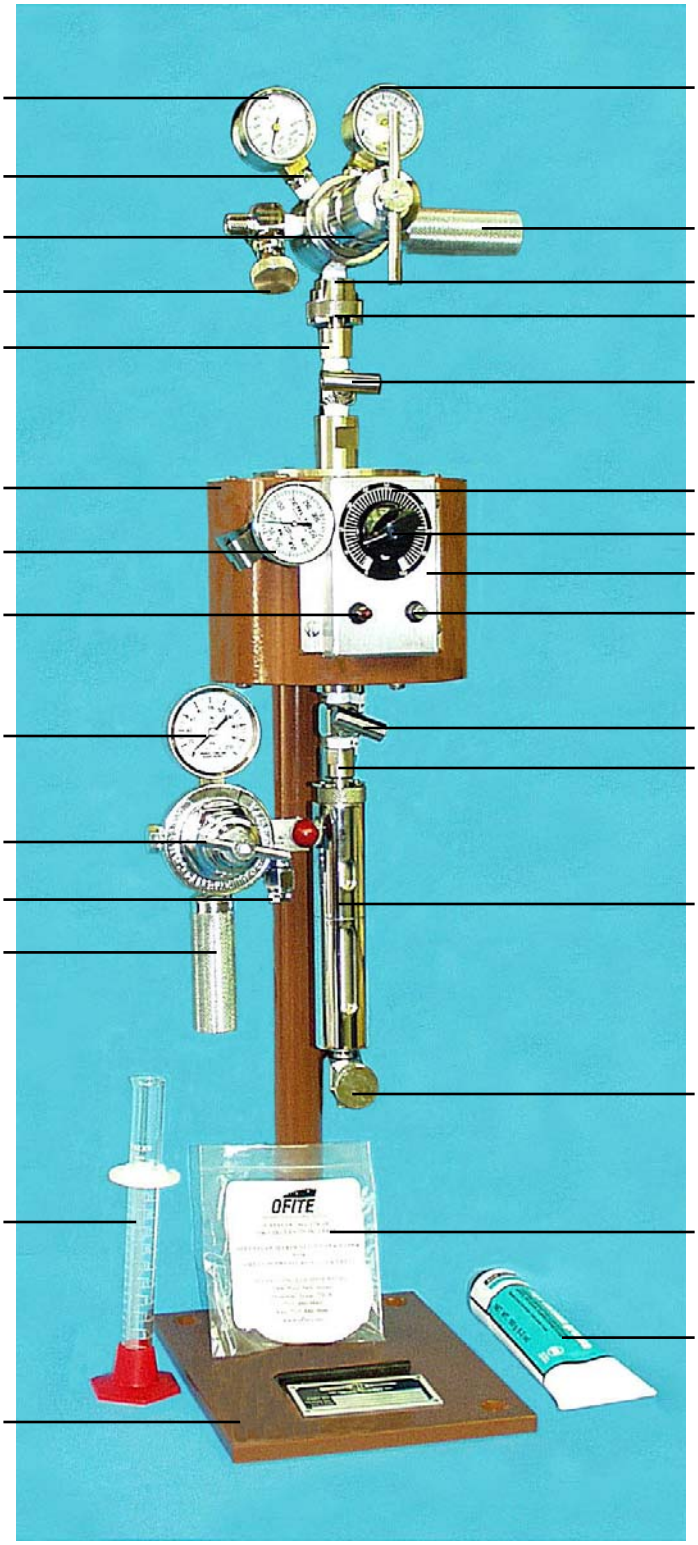
Important

Pressure inside the sample cell will still be approximately 500 PSI (3,450 kPa). Keep the cell upright and cool it to room temperature before disassembling. The cell must be cool for at least one hour at room temperature or at least 10 minutes in cool water before loosening the cap locking screws and removing the cell cap.

14. Invert the cell and loosen the cell cap screws with the Allen wrench. Use extreme care to save the filter paper and deposited filter cake. Discard the fluid inside the cell, and retrieve the filter cake.

15. Wash the filter cake on the paper with a gentle stream of water. Measure and report the thickness of the filter cake to the nearest 1/32" (0.8 mm).

16. Clean and dry the apparatus thoroughly after each use. Inspect all o-rings and replace if necessary.



1000-PSI Gauge (#171-73-1)

Bushing (#144-15)

Victor Regulator (#171-53)

Male Needle Valve (170-34)

Male Coupling (#171-64)

Heating Jacket (#171-55/171-55-1)

Thermometer (#154-10)

Red Pilot Light (#171-68)

200-PSI Gauge (#142-61)

Victor Regulator (#142-37)

Safety Bleeder Valve (#143-06)

CO_2 Cartridge Barrel (#143-03)

Graduated Cylinder (#153-16)

Stand and Base (#171-59)

2000-PSI Gauge (#171-74-1)

CO_2 Cartridge Barrel (#143-03)

Female Coupling (#171-76)

Coupling Ring (#171-77)

Male Needle Valve (#171-80)

Thermostat Dial Plate (#171-63)

Thermostat Knob (#171-67)

Thermostat Cover (#171-70-1)

White Pilot Light (#171-69)

Male Needle Valve (#171-80)

Male Coupling (#171-64)

Back Pressure Receiver (#171-75)

Male Needle Valve (#170-32)

Filter Paper (#170-19)

Stopcock Grease (#153-55)