Dependable Products From People You Trust

HTHP Filter Press for Ceramic Disks

with 175-mL, Double-Capped Test Cell and CO_2 Pressuring Assemblies

#170-00-7 - 115 Volt
#170-01-6 - 230 Volt

Instruction Manual

Updated 1/03/2012
Ver. 1.0

OFI Testing Equipment, Inc.
11302 Steeplecrest Dr. · Houston, Texas · 77065 · U.S.A.
Tele: 832.320.7300 · Fax: 713.880.9886 · www.ofite.com

Table of Contents

Intro

This OFITE HTHP (high-temperature, high-pressure) Filter Press is designed for testing drilling fluid under elevated temperatures and pressures. It simulates various downhole conditions and provides a reliable method for determining the effectiveness of the material being tested. The complete assembly consists of the following:

- Two CO_2 pressure regulators (primary and back pressure)
- A high-pressure test cell suitable for testing with ceramic disks
- A heating jacket for heating the test cell
- A suitable stand

Specifications

Size:	7.5" × 11" × 23.5" (19.1 × 27.9 × 59.7 cm)
Weight:	27 lbs. (12.3 kg)
Shipping Size:	20" × 13" × 13" (51 × 33 × 33 cm)
Shipping Weight:	33 lbs. (15 kg)
Maximum Temperature:	400°F (204°C)
Maximum Pressure:	1,500 PSI (10,343 kPa)
Pressure Source:	Two CO_2 Pressuring Assemblies
Test Cell Capacity:	175 mL
Voltage:	#170-00-7: 115V; #170-01-6: 230V
Heater:	400 Watt

Components

#153-14 Graduated Cylinder; 50 mL × 1 mL
#154-10 Dual-Scale Thermometer with Dial; 5" Stem; 50° - 500°F (0° - 250°C)

#170-00-1 Heating Jacket (115V) -OR-
#170-01-1 Heating Jacket (230V):

- #165-40-3 Power Cable, (For 170-01-1 230V Only)
- #170-05 Thermostat
- #170-10 Thermostat Pilot Light
- #170-11 Heating Element; 115V; 200W
- #170-15 Base
- #170-21 Stand Support Rod
- #170-25 Aluminum Well
- #170-30 Stainless Steel Thermostat Cover
- #170-44 ½" Rubber Foot; Qty: 4
- #171-32 Midget Knob
- #171-82 8' Power Cord with Male Plug 8; 16/3 SJ; Round (For 170-00-1 115V Only)

#170-04 CO_2 Pressurize Unit:

- #143-02-10 CO_2 Puncture Head Assembly
- #143-03 Barrel for CO_2 Cartridge
- #170-08 Regulator
- #170-20 Manifold Block
- #170-32 ⅛" × ⅛" NPT Male Needle Valve
- #171-23-1 Safety Pin
- #171-34 1,500-PSI Gauge; 2"; ¼" NPT Bottom

#170-06 Back Pressure Receiver; 15-mL Stainless Steel Tube for CO_2

- #143-00 Regulator
- #143-01 200-PSI Gauge; ⅛" Bottom Connection
- #143-02-10 CO_2 Puncture Head Assembly
- #143-03 Barrel for CO_2 Cartridge
- #143-06 Safety Bleeder Valve
- #144-11 ⅛" 90 Street Ell
- #170-07 O-ring
- #170-28 Receiver Body
- #170-32 ⅛" × ⅛" NPT Male Needle Valve
- #171-23-1 Safety Pin

#170-35 6" Adjustable Wrench

#170-46 Double-Ended Test Cell for Ceramic Disks; 2000-PSI; 316 Stainless Steel

- #170-13 Test Cell O-ring; Buna N
- #170-16 Valve Stem
- #170-17 Valve Stem O-ring
- #170-26-1 Locking Screw
- #170-27 5/32" Allen Wrench
- #170-47 Cell Body for Ceramic Disks, 175 mL, 316 Stainless Steel, Double-Capped
- #170-69 End Cap for Ceramic Disks, Scribed, 316 Stainless Steel, 2,500 PSI
- #170-72 Spacer for Filter Paper, ¼", 316 Stainless Steel
- #170-77 O-ring for Spacer
- #171-21 Cell Cap with 60-mesh Screen, 316 Stainless Steel, 2,000 PSI

Optional:

- #143-05 EZ Puncture CO_2 Bulbs; 8-Gram; UN #1013; Package of 10
- #170-03 Stainless Steel Carrying Case
- #170-13-3 Test Cell O-ring; Viton® (For temperatures over 300°F/149°C)
- #170-33 HTHP Cell Cap Puller
- #170-40 Test Cell Removal and Carrying Tool

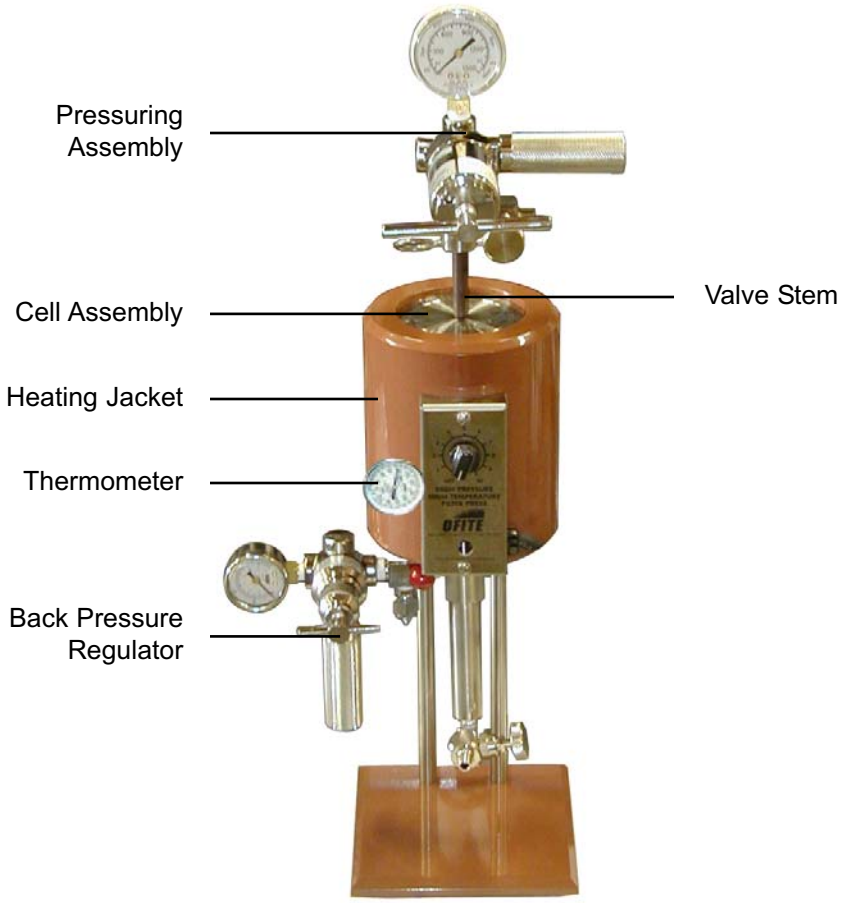
Safety

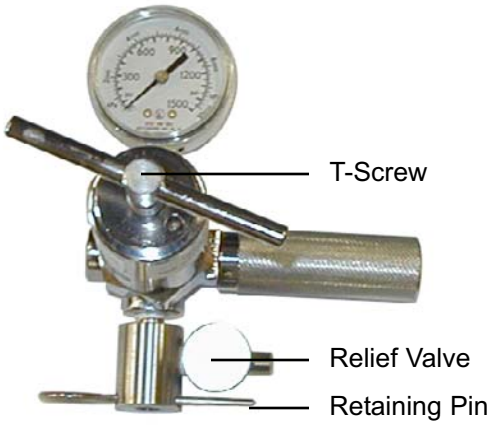
Carbon Dioxide gas is normally supplied in small bulbs or cartridges, which contain approximately 900 PSI (6,206 kPa) pressure when new. Because they are highly portable, they are usually used in field operations. These bulbs should not be exposed to high heat (50°C/120°F) as they can explode if over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

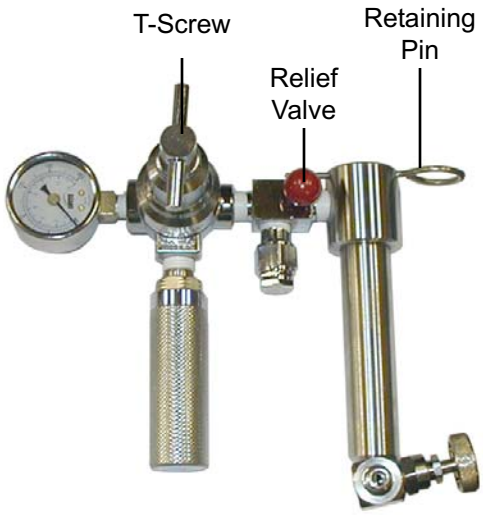
Do not use nitrous oxide cartridges as pressure sources for high-temperature, high-pressure (HTHP) filtration. Under high temperature and pressure, nitrous oxide can detonate in the presence of grease, oil, or carbonaceous materials. Nitrous oxide cartridges are to be used only for Garrett Gas Train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





Pressuring Assembly



Back Pressure Regulator

Operation

1. Connect the heating well power cord to an appropriate power source. Place a dial-type metal thermometer into 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.

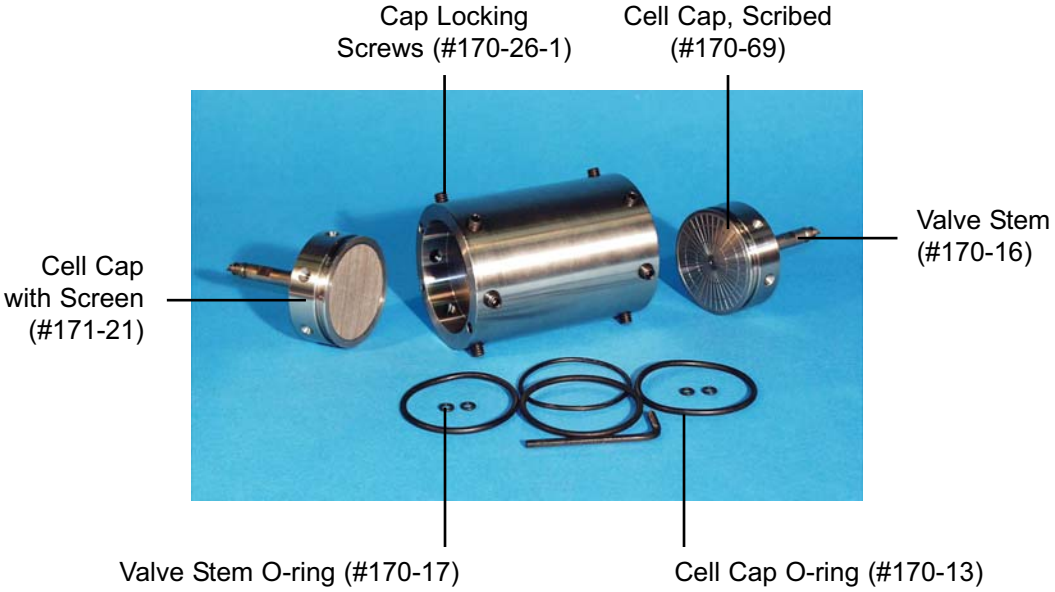
2. Be sure all of the o-rings on the valve stems are in good working condition (pliable with no nicks or cuts, etc.), and are not damaged during the assembly procedures. Place a thin film of silicone grease on all o-rings. Place an o-ring into the end of the test cell with the narrow gap. Place another o-ring around the cell cap with the screen. Then slowly push the cell cap into the end of the cell body, making sure the arrow on the cap lines up with the arrow on the cell body. Tighten the locking screws with the supplied allen wrench. Screw a valve stem into the cell cap and tighten it completely.

Note

Standard Buna N o-rings (#170-13) should be used only for tests up to 300°F (149°C). For tests over 300°F (149°C), use Viton® o-rings (#170-13-3). After tests that come close to the maximum temperature, it will probably be necessary to replace the o-rings.

Important

If the cap locking screw seats are oval shaped and no longer round, there is a possibility of stress failure and the cap should be replaced.

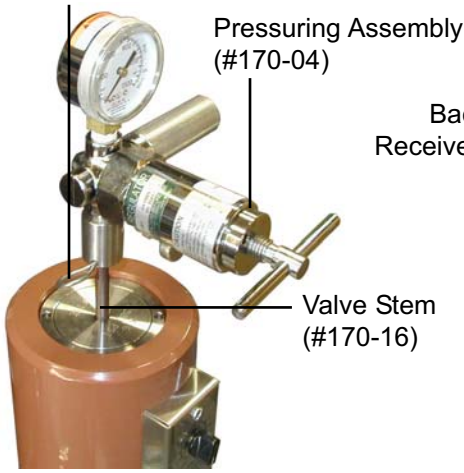


3. Prepare the sample based on API specifications. Carefully pour the sample into the cell. Do not fill the cell closer than 0.5" (13 mm) from the o-ring groove to allow for heat expansion of the fluid. Be careful not to spill fluid on the o-ring inside the cell.

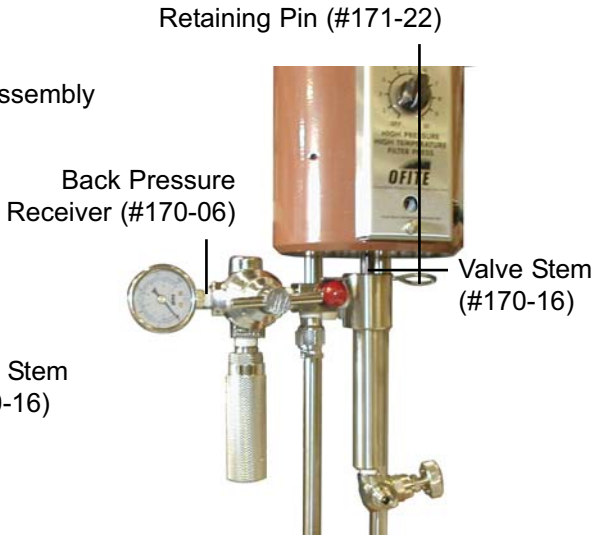
4. Place an o-ring inside the cell body. Place a ceramic filter disk on top of the o-ring. Place an o-ring around the scribed cap and push the cap into the test cell, making sure the arrows on the cap and cell body line up. Tighten the locking screws with the supplied allen wrench. Screw a valve stem into the cell cap and tighten it completely.

5. Place the cell in the heating jacket. Rotate the cell in the heating jacket so that the pin in the bottom of the heating well seats into the hole in the bottom of the cell. This will anchor the cell inside the well and prevent the cell from rotating as the valve stems are opened and closed. Transfer the thermometer from the heating jacket to the thermometer well within the cell.

6. Connect the pressuring assembly to the top valve stem and lock it in place with the retaining pin. Place the back pressure receiver on the bottom valve assembly and also lock it in place with the other retaining pin.



Top of Heating Jacket



Bottom of Heating Jacket

7. Keeping the valve stems closed, adjust the top and bottom regulators to the recommended back pressure for your test. Open (loosen) the top valve stem ½ turn to pressurize the sample. 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.*

8. When the fluid sample reaches the desired test temperature, increase the pressure on the top pressure unit to 500 PSI (3,448 kPa) more than the back pressure. Open (loosen) the bottom valve stem ½ turn to initiate filtration.

9. Collect the filtrate for 30 minutes maintaining the selected test temperature within ± 5°F (± 3°C). If the back pressure rises above 100 PSI (690 kPa) during the test, cautiously reduce the pressure by opening the valve on the receiver and drawing off some of the filtrate into the graduated cylinder.

10. At the end of the test, close (tighten) the top and bottom valve stems to seal off the cell. Turn the regulator T-screws counter-clockwise to close off the flow of pressurized gas. Open the outlet valve on the back pressure receiver to collect all of the filtrate in the graduated cylinder. Release the pressure from the top and bottom pressuring units by opening the needle and/or bleeder valves.

11. Remove the top and bottom valve stem retaining pins and remove the top pressure and the back pressure assemblies. Drain any residual filtrate collected in the receiver into the graduated cylinder. Remove the cell from the heating jacket after once again checking that the cell valve stems are tightly closed. Allow it to cool to room temperature or quick cool the cell by immersion in cool water.

    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.

Important

12. 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), temperature, pressure, and time.

13. Place the cooled cell upright with the outlet side down. Open (loosen) the inlet valve stem to bleed off pressure from the cell body.

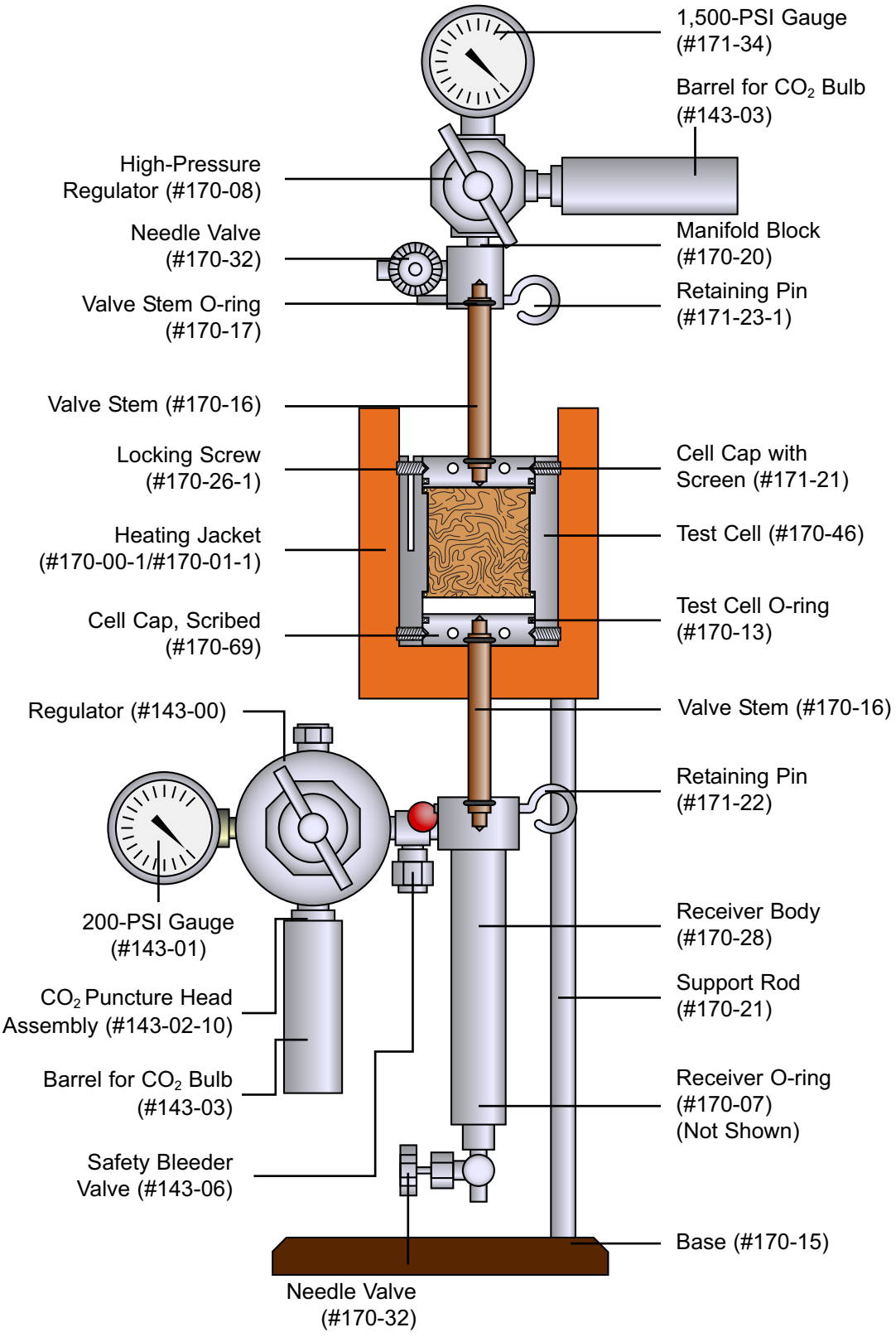
    It is a good idea to open the valve stem with the cell inside a sink, or with a rag over the valve stem in order to catch any liquid that might be ejected.

Tip

14. Loosen, but do not remove, the six cap locking screws, and separate the cap from the cell with a slight rocking motion. Discard the fluid inside the cell unless it is required for further testing.

15. Remove the other cell cap and clean and dry the apparatus thoroughly after each use. Inspect and, if necessary, replace all of the o-rings.

Diagram


1,500-PSI Gauge (#171-34)
Barrel for CO_2 Bulb (#143-03)
High-Pressure Regulator (#170-08)
Needle Valve (#170-32)
Manifold Block (#170-20)
Valve Stem O-ring (#170-17)
Retaining Pin (#171-23-1)
Valve Stem (#170-16)
Locking Screw (#170-26-1)
Cell Cap with Screen (#171-21)
Heating Jacket (#170-00-1/#170-01-1)
Test Cell (#170-46)
Cell Cap, Scribed (#170-69)
Test Cell O-ring (#170-13)
Regulator (#143-00)
Valve Stem (#170-16)
Retaining Pin (#171-22)
200-PSI Gauge (#143-01)
Receiver Body (#170-28)
CO_2 Puncture Head Assembly (#143-02-10)
Support Rod (#170-21)
Barrel for CO_2 Bulb (#143-03)
Receiver O-ring (#170-07) (Not Shown)
Safety Bleeder Valve (#143-06)
Base (#170-15)
Needle Valve (#170-32)