Dependable Products From People You Trust

Filter Press With CO_2 Assembly

Bench Mount: #140-30
Wall Mount, Basic: #140-00
Wall Mount with CO_2 Pressure Assembly: #140-10

Instruction Manual

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Ver. 4

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Introduction

Measurements of filtration behavior and wall cake-building characteristics of a drilling fluid are fundamental to control and treatment of drilling fluids, as are various characteristics of the filtrate such as oil, water, or emulsion content. These factors are affected by the types and quantities of the solids in the fluid and their physical and chemical interactions, which in turn are affected by changing temperatures and pressures. The OFITE API Filter Press helps determine filtration and wall cake-building properties of drilling fluids and is a useful tool for trend analysis in a wide range of applications.

Ideally a thin, low permeability filter cake is preferred, which normally produces less filtrate or water lost to formation. Field experience has shown that the amount and physical state of the colloidal content of the fluid is of paramount importance. Muds that are low in colloidal content but high in inert solids (cuttings) will produce a thick filter cake on the wall of the hole. A thick filter cake restricts the passage of tools in the well and allows an excessive and often expensive amount of filtrate to pass into permeable formation. Improper filtration control often results in numerous undesirable effects, some of which include wellbore instability, caving of formations, difficulty in running casing, and enhanced surge and swabbing effects. The OFITE filter press is a valuable tool to predict and prevent such effects.

The filter press design features a cell body to hold the mud sample, a pressure inlet, a base cap with screen and filter paper, and a drain tube to discharge filtrate into a graduated cylinder. The pressure cell is designed so that a 3½" (9 cm) sheet of filter paper can be placed in the bottom of the chamber to remove particles from the fluid. The filtration area is the standard American Petroleum Institute (API) recommended filtration area of 7.1 ± 0.1 in^2 (4,580 ± 60 mm^2). Pressure may be applied with any non-hazardous fluid medium, either gas or liquid. Some models are equipped with pressure regulators and may be pressurized with pressure cylinders (Nitrogen), small pressure cartridges (Carbon Dioxide), or hydraulic pressure (clean tap water). The API recommends a standard cell pressure of 100 ± 5 psi (690 ± 35 kPa) be applied to the fluid for a time period of 30 minutes. Suitable for field and laboratory use, OFITE Filter Presses have become the industry standard for low pressure/low temperature filtration testing for field and laboratory use.

Specifications

Working Pressure:	100 psi (689.5 kPa)
Working Temperature:	Ambient
Filtration Area	7.1 ± 0.1 in^2 (45.8 ± 0.6 cm^2)
Working Volume:	400 mL
Size:	9" × 8" × 19" (23 × 20 × 48 cm)
Weight:	12 lb 7 oz (5.6 kg)

Components

#140-55	Filter Paper, 3½" (9.0 cm), Box of 100
#141-00	Test Cell
#141-01	Base Cap
#141-02	Top Cap
#141-04	Screen, 60 Mesh
#141-05	Neoprene Gasket, Qty: 3
#141-09	Threaded Insert with Set Screw
#141-10	T-screw
#141-12	Support Rod
#141-18	Thumb Screw
#141-22	Felt Filter
#143-00-001	Regulator
#143-01	Gauge, 200 psi, ⅛" Bottom Connection
#143-02-10	CO_2 Puncture Head Assembly
#143-03	Barrel for CO_2 Cartridge
#143-06	Safety Bleeder Valve
#153-16	Graduated Cylinder, Glass, 25 mL × ⅒ mL

Bench-Mount Version (#140-30)

#141-08	Bench-Mount Frame
#141-11	Support For Graduated Cylinder
#141-12	Support Rod
#141-18	Thumb Screw

Wall-Mount Version (#140-00, #140-10)

#141-07	Wall-Mount Frame
#141-16	Support Arm with Clip for Graduated Cylinder
#141-20	Frog Bracket
#141-21	Wall Bracket

Optional:
#140-30-SP Spare Parts for #140-30:

Part Number	Description	Qty.
#140-55	Filter Paper for Low Pressure; 3½" (9.0 cm); Box of 100	3
#140-60-01	O-ring for Bleeder Valve	2
#141-04	Screen, 60 mesh	2
#141-05	Gasket, Neoprene	6
#141-22	Felt Filter	4
#143-02-13	O-Ring for Puncture Pin Assembly	4
#143-02-14	O-Ring for Puncture Pin Assembly	4
#143-05	CO_2 Bulbs, 8-gram, 10/box (UN1013)	30
#153-16	Graduated Cylinder, Glass, 25 mL × ⅒ mL	1

Spare parts listings are intended to be used as a reference for future purchases. Everyone's consumable requirements will be different and replacement quantities needed will depend on the number of tests performed on a daily or weekly basis.

Safety

As with any pressurization device, it is imperative that the technician be thoroughly familiar with the proper operation and the potential hazards of the filter press prior to usage. Personnel unfamiliar with filtration testing should read these instructions completely and become familiar with the equipment before attempting to run a test.

Carbon Dioxide gas, intended for field usage, is usually supplied in small bulbs or cartridges, which contain approximately 900 psi (6,206 kPa) pressure when new. These bulbs should not be exposed to high heat (50°C/120°F) as they can explode if over heated. Never transport CO_2 bulbs or cartridges by airplane without proper packaging. Cabin depressurization could cause them to explode.

Nitrous Oxide cartridges should never be used as a pressure source for any Filter Press. In some environments, nitrous oxide can detonate in the presence of grease, oil, or carbonaceous material. Never connect the Filter Press to Oxygen, compressed gas, or any other non-recommended air supply.

CO_2 Bulbs, 10/Box (#143-05)

The Maximum pressure applied to the cell should never exceed 150 psi (1,035 kPa).

The Safety Bleeder Valve (#143-06) performs a dual purpose and is a vital component to the filter press. The safety part of the valve prevents full CO_2 bulb pressurization (900 psi or 6,206 kPa) from reaching the cell assembly, which is not designed to contain such pressures. The valve is set for a maximum pressure of 200 psi and any pressures greater than that will be safely released by the valve. The bleeder part of the valve is used at the end of the test to release line pressure between the regulator and the cell assembly. An o-ring (#140-60-01) provides the sealing for the valve and should be periodically checked and replaced. Occasionally test the safety bleeder valve to verify it will release if excessive pressure occurs.

Safety Bleeder Valve (#143-06)

Regulator Safety

1. Never subject the regulator to inlet pressure greater than its rated inlet pressure as shown on the regulator body.

2. Do not allow oil, oil bearing materials, grease, or other combustibles to contaminate the inside or outside of the regulator, especially where Oxygen is in use.

3. To minimize heat effects, avoid the use of piping or tubing between the pressurized cylinder and the regulator. If unavoidable it should be as short as practical and equipped with a shutoff valve located just before the regulator.

4. It is not recommended to use Oxygen with Filter Presses.

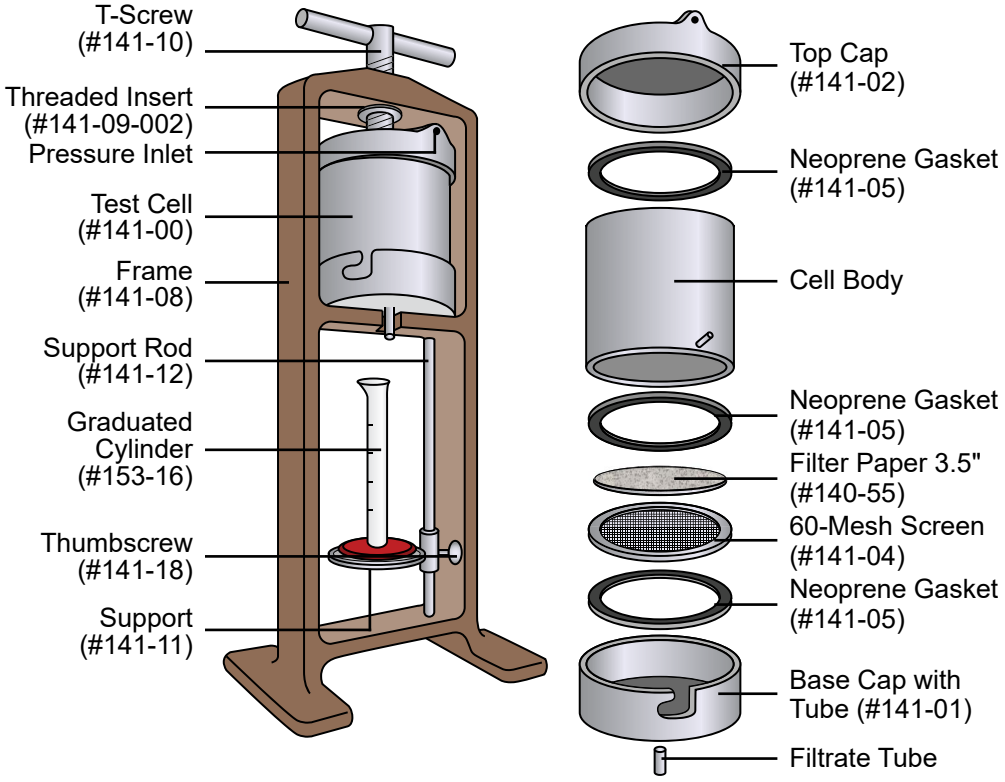
5. Never pressurize a regulator that has loose or damaged parts or is in questionable condition. Never loosen a connection or attempt to remove a part until gas pressure has been relieved.

6. Before transporting pressurized cylinders that are not secured on a cart designed for such transport, remove all regulators and recap the cylinders.

7. Check the regulator and all connections for leaks after installation and periodically thereafter. Also check for leaks after any service in which parts or connections were loosened. Brush with an approved leak detection solution and bubbles should indicate a leakage.

8. An appropriately sized pressure relief device downstream of the regulator should be installed in your system to prevent damage to equipment and/or injury to personnel should an internal failure of the regulator occur.

Diagram


T-Screw
(#141-10)
Threaded Insert
(#141-09-002)
Pressure Inlet
Test Cell
(#141-00)
Frame
(#141-08)
Support Rod
(#141-12)
Graduated
Cylinder
(#153-16)
Thumbscrew
(#141-18)
Support
(#141-11)
Top Cap
(#141-02)
Neoprene Gasket
(#141-05)
Cell Body
Neoprene Gasket
(#141-05)
Filter Paper 3.5"
(#140-55)
60-Mesh Screen
(#141-04)
Neoprene Gasket
(#141-05)
Base Cap with
Tube (#141-01)
Filtrate Tube

Quick Start

1. Ensure the cell assemble is clean and dry and the gaskets are in good shape.
2. Stir the test sample for at least 10 minutes.
3. Measure and record the initial temperature of the test sample.
4. Assemble the base cap.
5. Secure the base cap to the cell body.
6. Pour approximately 400 mL of the sample into the cell leaving 0.4" - 0.6" (1 - 1.5 cm) of void space.
7. Place a rubber gasket in the top cap.
8. Place the top cap with the CO_2 pressure assembly attached on top of the cell body.
9. Place the cell assembly in the filter press frame and tighten the frame T-screw.
10. Place a clean dry graduated cylinder under the cell filtrate tube and raise the stand.
11. Ensure the safety bleeder valve is closed (knob pushed inward).
12. Ensure the regulator T-screw is closed and turns freely.
13. Place a CO_2 bulb in the barrel and tighten onto the puncture pin assembly, puncturing the bulb.
14. Turn the regulator T-screw clockwise so the gauge registers 100 psi.
15. Set a timer to 30 minutes.
16. Collect filtrate for 30 minutes.
17. After 30 minutes close the regulator by turning the T-screw counterclockwise until it turns freely.
18. Open the safety bleeder valve by pulling the red knob outward. The gauge reading should go to zero.
19. Record the volume of filtrate collected and label it “API Filtrate”.
20. Record the time interval in which filtrate was collected.
21. Loosen the T-screw on the frame and remove the cell assembly.

22. Discard any fluid remaining in the cell and retrieve the filter paper and filter cake.

23. Measure and record the thickness of the filter cake to the nearest 1/32" or millimeter.

24. Describe the appearance and feel of the filter cake.

25. Clean everything so the next test can be run without any clean-up.

Operation

1. Before beginning a test, make sure each part of the cell is clean and dry, particularly the screen. Examine the gaskets for distortion and wear. Make sure the screen is free of sharp edges, burrs, or tears.

2. Prepare the sample according to API specifications. Stir the test sample for at least 10 minutes with a high speed mixer.

3. Measure the initial temperature of the mud sample and record it for later analysis.

4. Assemble the test cell:

   a. Place a rubber gasket (#141-05) inside the groove in the bottom of the cap.

   b. Place the screen (#141-04) on top of the gasket and add one sheet of filter paper on top of the screen.

   c. Place another gasket on top of the filter paper.

   d. Place the cell body into the base cap and turn it to lock it in place. Ensure the two pins on the cell body are far enough inside the base cap groove so that the base cap will not separate from the cell body when pressure is applied.

Base Cap (#141-01)

Gasket (#141-05)

Assembled Test Cell

Screen (#141-04)

Top Cap (#141-02)

Filter Paper and Gaskets

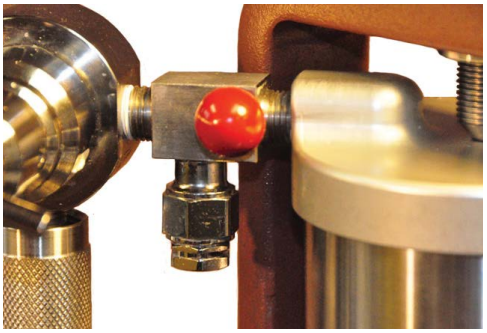
5. Pour approximately 400 mL of the freshly stirred sample fluid into the cell, leaving 0.4" - 0.6" (1 - 1.5 cm) of empty space at the top. This will minimize CO_2 contamination of the filtrate and lessen the volume of pressurizing gas required.

Important

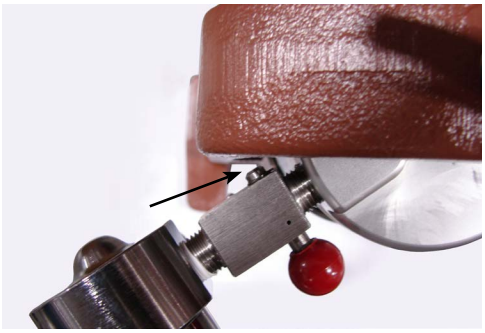
6. Place a rubber gasket inside the top cap. Make sure it is seated all the way around the cap. Then place the top cap with the manifold assembly attached onto the cell body and place the entire cell into the frame. Secure the cell with the T-screw, but do not overtighten as this can crack the top cap.

   When placing the cell assembly inside the frame, the manifold assembly makes the assembly unbalanced, and it will fall out of the frame if not held firmly in place by hand.

   Position the safety bleeder valve slightly apart from the frame so that the valve piston has room to slide back and forth and not come into contact with the frame (see below).



Safety Bleeder Valve
Front View



Safety Bleeder Valve
Top View

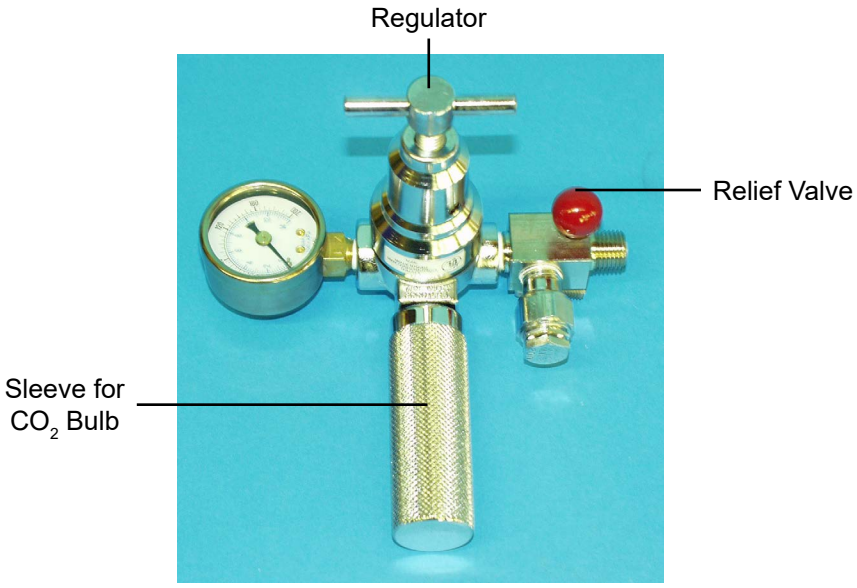
7. Place a clean, dry graduated cylinder under the filtrate tube and adjust the support stand so that the drain tube is inside the top of the graduated cylinder.

8. Check the safety bleeder valve to ensure it is closed (the red knob is pushed all the way in).

9. Screw the CO_2 pressuring assembly onto the inlet valve on the top cap. With the T-screw regulator completely closed and the relief valve pushed in, place a CO_2 bulb into the sleeve and screw it onto the assembly. This will puncture the bulb and release the pressure.

10. Adjust the regulator by tightening the regulator T-screw clockwise. Apply 100 ± 5 psi (690 ± 34.7 kPa) within 30 seconds or less of adding the test fluid to the cell. The test period begins at the time of initial pressurization. Set the timer.

11. Collect filtrate for 30 minutes. Watch the pressure gauge and ensure the pressure does not change during the test time period. If the pressure increases, carefully bleed off the excess pressure with the safety bleeder valve. If the pressure decreases, tighten the regulator T-screw to increase the pressure in the cell.



12. After 30 minutes, close the regulator by turning the regulator T-screw counterclockwise until the T-screw turns freely.

Important

The user should not attempt to save time by running a 7.5 minute test and doubling the filtrate amount collected. This practice should be avoided as a high amount of filtrate is initially collected prior to depositing a filter cake on the filter media. By doubling this amount the error will be compounded.

13. There is still pressure between the regulator and the cell assembly. To relieve this pressure open the safety bleeder valve by pulling outward on the red bleeder valve knob. There will be an audible sound as the pressure is released and the gauge pressure will go to zero. There is now no longer any pressure on the system.

14. Record the volume of filtrate collected by reading from the bottom of the meniscus curve in the graduated cylinder, in milliliters to the nearest 0.1 mL. Label this value “API Filtrate” and record the time interval that filtrate was collected. The filtrate may be discarded or retained for chemical analysis.

15. Loosen the T-screw on top of the frame while holding the cell assembly so it does not fall out of the frame. Remove the entire cell assembly from the filter press frame and remove the cell cap.

16. Loosen the CO_2 barrel which voids any remaining CO_2 gas. The CO_2 bulb can be discarded.

17. Discard any remaining liquid inside the cell and carefully retrieve the filter paper and deposited filter cake. Gently wash the filter cake with the base fluid (water or oil) to remove any excess fluids that are not part of the filter cake.

18. Measure and record the thickness of the filter cake to the nearest 1/32" (0.8 mm). A cake thickness less than 2/32" is usually considered acceptable. Observe and record the quality of the cake: Terms such as hardness, softness, toughness, slickness, rubberiness, firmness, flexibility, sponginess, etc. are acceptable for the mud report.

19. After each test, disassemble the test cell and thoroughly clean all surfaces with soap and water. Make sure all parts are clean and dry before storing the unit.

Maintenance

The threaded insert (#141-09) provides an anchor for the T-screw in the filter press frame. The insert is held in place with a set screw (#141-09-001). If the set screw is lost or damaged, it will be necessary to remove the threaded insert and replace the set screw.

1. Unscrew the set screw and let the threaded insert fall out of the frame.

2. Place the threaded insert into the hole in the frame with the collar pointed down.

Important

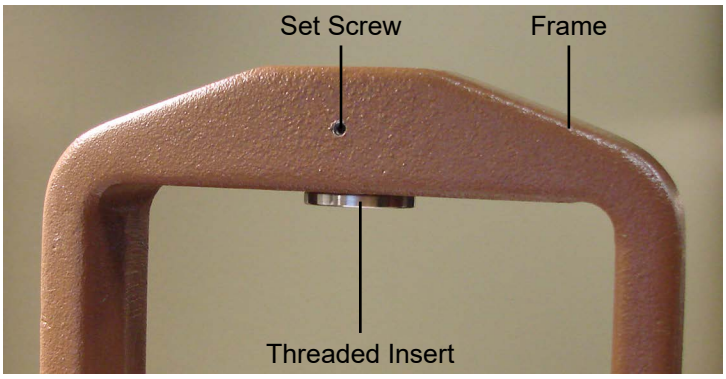
The threaded insert must be inserted from below the hole in the frame. Installing it from above will not provide enough strength to hold the pressure inside the test cell.

3. Turn the insert until the hole is aligned with the set screw hole in the frame.

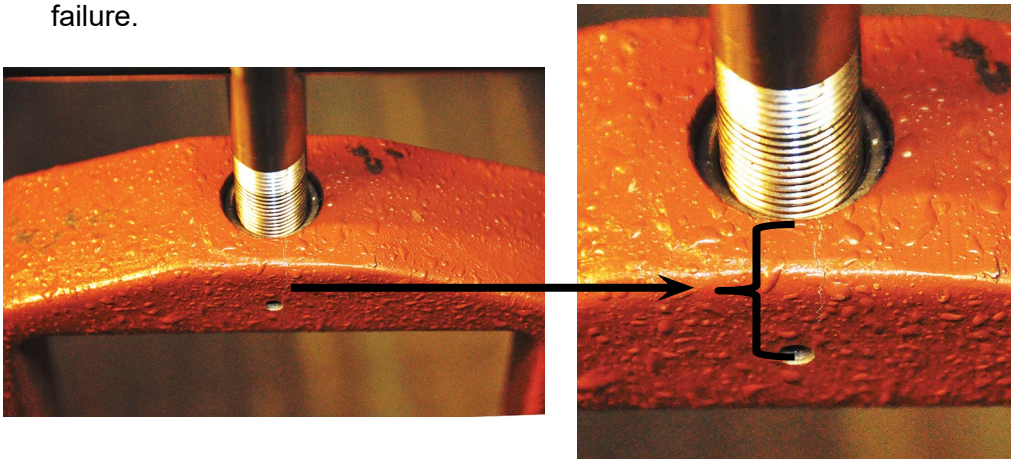
4. Screw a set screw into the frame until it engages with the threaded insert.

Note

The screw should not extend into the inner portion of the threaded insert. This will prevent the T-screw from screwing all the way in.



Filter Press frames should not have cracks. Routinely inspect the frame and the cell top cap for cracks or pit corrosion. Cracks are often hairline and difficult to see, but eventually these defects will lead to catastrophic failure. Always replace any frame showing signs of corrosion or stress failure.

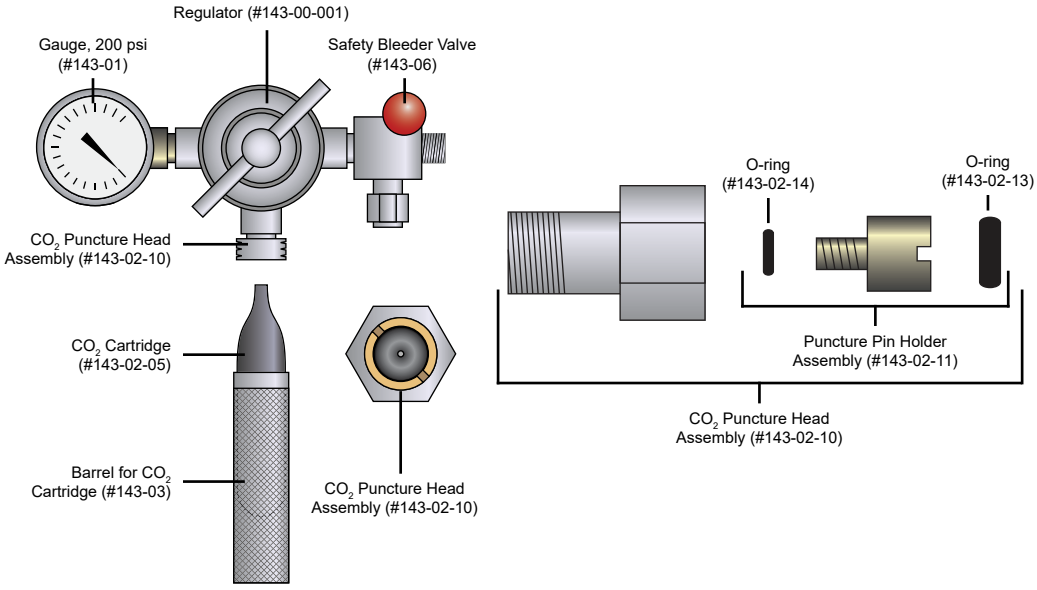


5. Regulator and Manifold Maintenance:

   a. Replace both o-rings on the puncture pin (#143-02-13 and #143-02-14) at least once a year.

   b. If the regulator loses pressure or steadiliy increases pressure, use the repair kit (#170-08-001-01) to repair it.

#142-10 - CO_2 Pressuring Assembly



Symptoms	Cause: Resolution
Gas leak at the regulator outlet when the adjusting screw is loosened fully counterclockwise	Seat leak or *creep: Repair the regulator
Outlet pressure increases while downstream valves are closed	Seat leak or *creep: Repair the regulator
Gas leak from the spring housing case	Diaphragm failure: Repair the regulator
Excess drop in outlet pressure with the regulator flow open	Blocked seat assembly or inlet filter: Repair the regulator
Gas leak from any pipe thread joint	Loose fitting: Remove the connection. Clean the affected surfaces. Reapply Teflon tape and tighten.
Gas leak from relief valve	Faulty relief valve: replace the valve. Seat leak or *creep: Repair the regulator
Inconsistent repeat readings	Seat sticking: Repair the regulator. Bad pressure gauge: Replace the gauge.
Gauge does not return to zero with no pressure applied to the regulator.	Gauge has physical damage: Replace the gauge.

*Creep is an increase in outlet pressure that occurs when pressure escapes even when the valve is closed. Regulator seats can be compromised by particles in the process stream which can cause minor imperfections in the sealing surface. The high flow and small orifice created during pressure regulation combine to turn a very small particle into a fast projectile. This projectile can nick the sealing surface of the seat and cause leaks. Filtering particulates from the process stream should be a high priority, and a small filter can reduce the potential for creep and increase the life expectancy and accuracy of the regulator.

Warranty and Return Policy

Warranty:

OFI Testing Equipment, Inc. (OFITE) warrants that the products shall be free from liens and defects in title, and shall conform in all respects to the terms of the sales order and the specifications applicable to the products. All products shall be furnished subject to OFITE's standard manufacturing variations and practices. Unless the warranty period is otherwise extended in writing, the following warranty shall apply: if, at any time prior to twelve (12) months from the date of invoice, the products, or any part thereof, do not conform to these warranties or to the specifications applicable thereto, and OFITE is so notified in writing upon discovery, OFITE shall promptly repair or replace the defective products. Notwithstanding the foregoing, OFITE's warranty obligations shall not extend to any use by the buyer of the products in conditions more severe than OFITE's recommendations, nor to any defects which were visually observable by the buyer but which are not promptly brought to OFITE's attention.

In the event that the buyer has purchased installation and commissioning services on applicable products, the above warranty shall extend for an additional period of twelve (12) months from the date of the original warranty expiration for such products.

In the event that OFITE is requested to provide customized research and development for the buyer, OFITE shall use its best efforts but makes no guarantees to the buyer that any products will be provided.

OFITE makes no other warranties or guarantees to the buyer, either express or implied, and the warranties provided in this clause shall be exclusive of any other warranties including ANY IMPLIED OR STATUTORY WARRANTIES OF FITNESS FOR PURPOSE, MERCHANTABILITY, AND OTHER STATUTORY REMEDIES WHICH ARE WAIVED.

This limited warranty does not cover any losses or damages that occur as a result of:

- Improper installation or maintenance of the products
- Misuse
- Neglect
- Adjustment by non-authorized sources
- Improper environment
- Excessive or inadequate heating or air conditioning or electrical power failures, surges, or other irregularities
- Equipment, products, or material not manufactured by OFITE
- Firmware or hardware that have been modified or altered by a third party
- Consumable parts (bearings, accessories, etc.)

Returns and Repairs:

Items being returned must be carefully packaged to prevent damage in shipment and insured against possible damage or loss. OFITE will not be responsible for equipment damaged due to insufficient packaging.

Any non-defective items returned to OFITE within ninety (90) days of invoice are subject to a 15% restocking fee. Items returned must be received by OFITE in original condition for it to be accepted. Reagents and special order items will not be accepted for return or refund.

OFITE employs experienced personnel to service and repair equipment manufactured by us, as well as other companies. To help expedite the repair process, please include a repair form with all equipment sent to OFITE for repair. Be sure to include your name, company name, phone number, email address, detailed description of work to be done, purchase order number, and a shipping address for returning the equipment. All repairs performed as "repair as needed" are subject to the ninety (90) day limited warranty. All "Certified Repairs" are subject to the twelve (12) month limited warranty.

Returns and potential warranty repairs require a Return Material Authorization (RMA) number. An RMA form is available from your sales or service representative.

Please ship all equipment (with the RMA number for returns or warranty repairs) to the following address:

OFI Testing Equipment, Inc.
Attn: Repair Department
11302 Steeplecrest Dr.
Houston, TX 77065
USA

OFITE also offers competitive service contracts for repairing and/or maintaining your lab equipment, including equipment from other manufacturers. For more information about our technical support and repair services, please contact techservice@ofite.com.