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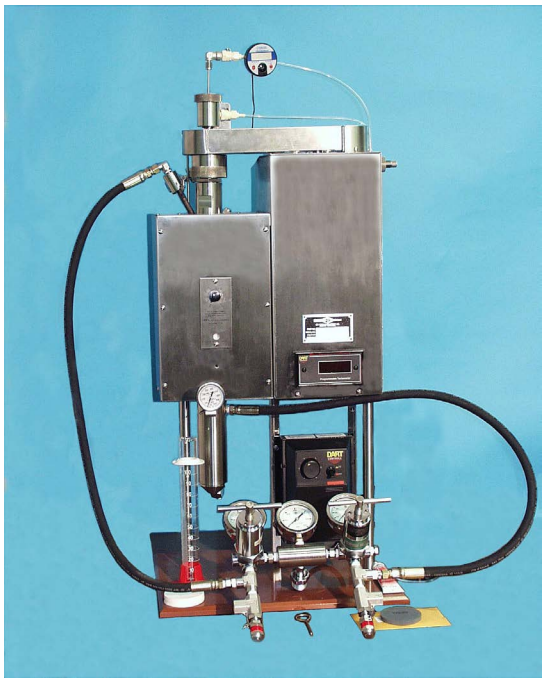

Dynamic Filter Press

170-50 (115V)
170-50-1 (230V)

Instruction Manual

Updated 3/17/2017
Ver. 4.0

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Intro

The OFITE High-Temperature, High-Pressure (HTHP) Dynamic filter press measures filtration properties under varying dynamic down-hole conditions. A motor driven shaft fitted with a propeller turns at varying speeds inside a standard 500-mL HTHP cell. Speed settings from 20 to 2,740 RPM (under no strain) impart laminar or turbulent flow to the fluid inside the cell, and by varying the shaft length, the shear stress may be increased or decreased. The power is driven to the stirring shaft by a timing belt that is easily accessible for quick adjustment and removal. Other features include a variable speed motor controlled through an SCR controller with RPM indicated on a digital tachometer.

Description

The test procedure is exactly the same as that in the conventional HTHP filtration test. The only difference is that fluid is circulating inside the cell, while filtrate is being collected. Since the filter medium is conventional disk material, the results are fully comparable with those of other laboratories or for comparing historical trends.

The Dynamic Filter Press comes with two interchangeable bottom caps to accommodate quarter inch thick ceramic or sandstone disks, conventional filter paper, sintered metal, or similar thin materials. A spacer is also provided for use with the short grooved cell cap and a thin filter medium. The other cap is a quarter of an inch thicker and has a standard 60-mesh screen back-up for thin filter materials. Each cap has a threaded hole for the valve stem, which connects to the 100-mL back pressure receiver. The primary pressure and the pressure for the back pressure receiver are both obtained through the Dual Nitrogen Manifold (Part No. 171-24) for connecting to a nitrogen bottle. The dual manifold includes pressure relief valves to prevent over-pressurization.

The pressure nut on the packing gland should only be hand tightened and only tightened enough to hold the cell pressure, since excessive mechanical pressure would cause excessive load on the drive motor. The drive motor is a ½ HP permanent magnet DC motor that is capable of being varied continuously through an SCR controller. Power is transferred to the stirring shaft by a timing belt and sheave at a 1:1 ratio. The RPM is indicated directly on a digital tachometer whose pickup is on the motor shaft. The tachometer is calibrated for operating on 60 Hz or 50 Hz.

Components

#135-18	Socket Set Screw for Clamp Sleeve
#140-60-01	O-ring for Bleeder Valve; Qty: 2
#153-12	Graduated Cylinder; 100 mL × 1 mL; Glass
#154-06	Traceable Full-Scale Thermometer; -58° - 500°F (-50° - 250°C)
#165-44	High-Temperature Thread Lubricant; 1 oz. Tube
#170-10	Thermostat Pilot Light
#170-11	Heating Element; 115V; 200W; Qty: 4
#170-13-2	Test Cell O-ring; Buna 90 ; Qty: 6
#170-16	Valve Stem; Qty: 2
#170-17	Valve Stem O-ring; Qty: 6
#170-19	Filter Paper; 2½" (6.35 cm); Specially Hardened for Filter Presses
#170-23	60-Mesh Screen
#170-26	Stainless Steel Locking Screw for HTHP Cell Caps; Qty: 12
#170-27	5/32" Allen Wrench
#170-35	6” Adjustable Wrench
#170-53	Ceramic Filter Disc; 2.5" × 0.25"; 10 Darcies; 35 Micron; Qty: 10
#170-54	Carbon Packing Ring; ⅝" × ⅛"; Qty: 8
#170-54-1	Teflon Packing Ring; 6 Piece Set; ⅝" × ⅛"; Qty: 2
#170-56	External Retainer Ring; ⅝"; Qty: 4
#170-57	Internal Retainer Ring for Lower Seal Ring; 1 ⅛"; Qty: 2
#170-63	⅝" Drive Belt
#170-64	O-ring for Water Swivel; Qty: 2
#170-66	Adapter; ⅛" Tube × ⅛" Female Elbow
#170-67	1½" Stainless Steel Propeller
#170-68	2" Stainless Steel Propeller
#170-71	⅛" NPT Pipe Plug; 316 Stainless Steel
#170-74	Internal Retainer Ring for Bearing Housing; Qty: 2
#170-75	Ball Bearing for Bearing Housing
#170-77	O-ring for Stainless Steel Spacer
#170-78	Internal Retaining Ring Pliers
#170-79	External Retaining Ring Pliers
#170-83	Female Quick-Connect; Qty: 2
#170-84	Polyurethane Tubing; ⅛" ID × 3/16" OD; Foot; Qty: 4
#170-85	T-Clip for Hoses
#170-86	Grease Fitting; ⅛" NPT Straight
#171-10	Back Pressure Receiver; 100 mL
#171-24	1350 and 750 PSI Manifold
#171-32	Midget Knob
#171-36	Thermostat Cover
#171-44	¾" Rubber Foot; Qty: 4
#171-71	Thermostat
#171-87	Location Pin for 4000-PSI Cells
#171-94	Cell Rest Plunger Assembly
#174-23	10-Place Terminal Strip

#170-50 Dynamic HTHP Filter Press (115V):

#171-82 Power Cord with Male Plug Only; 8'; 16/3 SJ; Round

#170-50-1 Dynamic HTHP Filter Press (230V):

#130-74 Transformer; 230V - 115V; 50-60Hz

#170-50-SP Spare Parts for 170-50:

#140-60-01	O-ring for Bleeder Valve; Qty: 2
#143-00-1	Diaphragm for Airco Regulator; Qty: 2
#143-07	Repair Kit for #143-00 Regulator; Qty: 2
#153-12	Graduated Cylinder; 100 mL × 1 mL; Glass; Qty: 2
#154-20	Dual Scale Thermometer with Metal Dial; 8" Stem; 50° - 500°F (0° - 250°C)
#165-44	High-Temperature Thread Lubricant; 1 oz. Tube; Qty: 2
#170-05	Thermostat; 50° - 500°F (0° - 250°C)
#170-10	Thermostat Pilot Light
#170-11	Heating Element; 115V; 200W; Qty: 2
#170-13-2	Test Cell O-ring; Buna 90 ; Qty: 50
#170-16	Valve Stem; Qty: 4
#170-17	Valve Stem O-ring; Qty: 96
#170-19	Filter Paper; 2½" (6.35 cm); Specially Hardened for Filter-Presses; Qty: 10
#170-26	Stainless Steel Locking Screw for HTHP Cell Caps;Qty: 12
#170-27	5/32" Allen Wrench
#170-32	⅛" × ⅛" NPT Male Needle Valve
#170-53	Ceramic Filter Disc; 2.5" × 0.25"; 10 Darcies; 35 Micron; Qty: 100
#170-54	Carbon Packing Ring; ⅝" × ⅛"; Qty: 18
#170-54-1	Teflon Packing Ring; 6 Piece Set; ⅝" × ⅛"; Qty: 4
#170-50-022	1/16" Thrust Bearing and Spacer; Bronze
#170-63	⅝" Drive Belt
#170-64	O-ring for Water Swivel; Qty: 4
#170-75	Ball Bearing for Bearing Housing
#170-76	Bronze Bearing Sleeve for Water Swivel; Qty: 2
#170-77	O-ring for Stainless Steel Spacer; Qty: 2
#170-84	Polyurethane Tubing; ⅛" ID × 3/16" OD; Foot; Qty: 4
#171-11	O-ring for Back Pressure Receiver; 100 mL
#171-22	Retainer Pin

Specifications

- 500-mL Stainless Steel Test Cell
- Maximum Working Pressure:
  - Static Mode (No Rotation): 1,250 PSI (8.6 MPa)
  - Dynamic Mode (With Rotation): 800 PSI (5.5 MPa)
- Variable Speed Electric Motor, ½ HP permanent magnet DC; Range: 20 RPM - 2,740 RPM under no strain
- Adjustable Thermostat from 100° to 500°F (38° to 260°C)
- Requires a Nitrogen source of at least 1,500 PSI

Setup

1. Carefully unpack the unit and place it on a stable surface near a power outlet. Unpack and unwrap each of the component pieces.

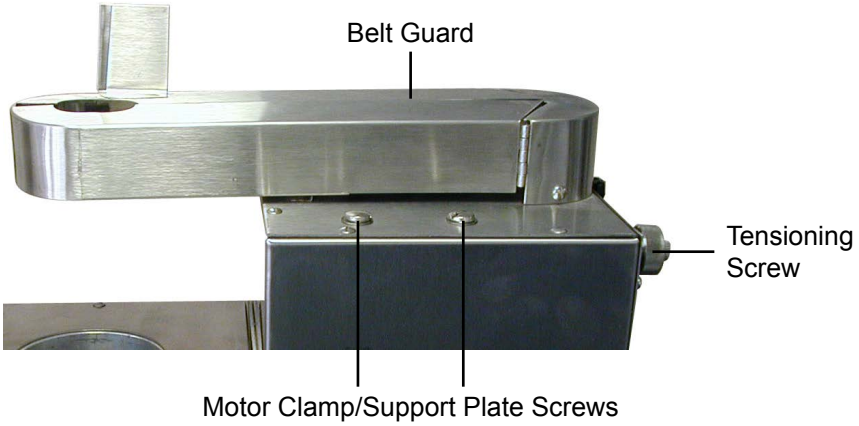
2. Slide the water inlet tube into the top of the water swivel body and screw the cap on tightly.

3. Unscrew the T-screws (counterclockwise) on the pressure manifold to make sure both regulators are completely closed. Connect a Nitrogen cylinder (at least 1,500 PSI) to the center inlet on the pressure manifold.

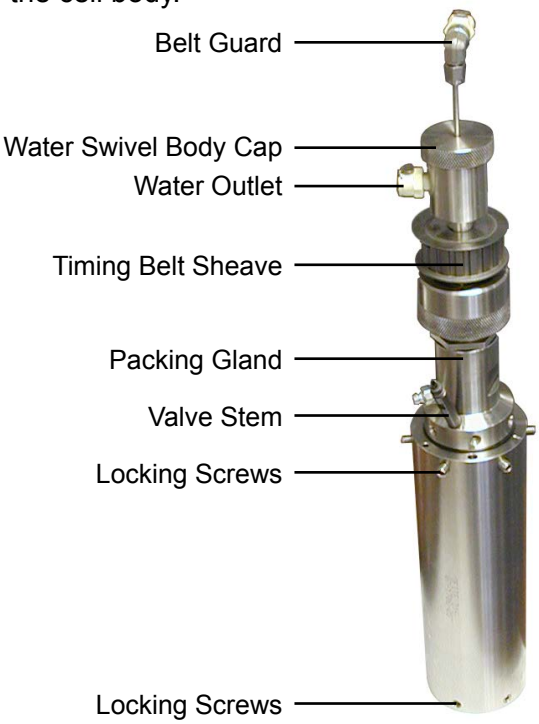
Operation

Refer to the photo on page 20 for a complete view of the assembled unit.

1. Loosen the belt tensioning screw at the top of the right side of the motor housing. Then, loosen the two screws holding the motor clamp and support plate. Open the belt guard and remove the belt. Disconnect the two water line tubes at the top of the shaft. You can now remove the test cell from the heating jacket.



2. Loosen the locking screws on the packing gland cap and remove it from the cell body.



3. Plug in the power cord and turn the thermostat about half-way to begin pre-heating the heating jacket. Place a thermometer in the heating well. The pilot light will turn on when the heating well reaches the temperature set by the thermostat.

4. Loosen the locking screws on the bottom (outlet) end of the test cell and remove the bottom cell cap.

5. Apply a thin coat of high-temperature grease to an o-ring and place it in the o-ring groove in the bottom end of the test cell. Place the appropriate filter medium on top of the o-ring.

Important

Be sure to inspect all o-rings in the cell, cell cap, and valve stems and replace any that show signs of wear or damage. The o-rings should be replaced after every test over 300°F (149°C).

Note

To prepare ceramic or sandstone discs for filtration, the disc must first be soaked for at least 10 minutes in the base fluid (water, oil, brine, etc.), otherwise the disc will seal up excessively when pressure is initially applied to the cell.

Note

For tests above 400°F (204°C), a stainless steel, Dynalloy filter disk should be used instead of paper filters.

6. Place the bottom cell cap in the test cell and tighten the locking screws to secure it in place.

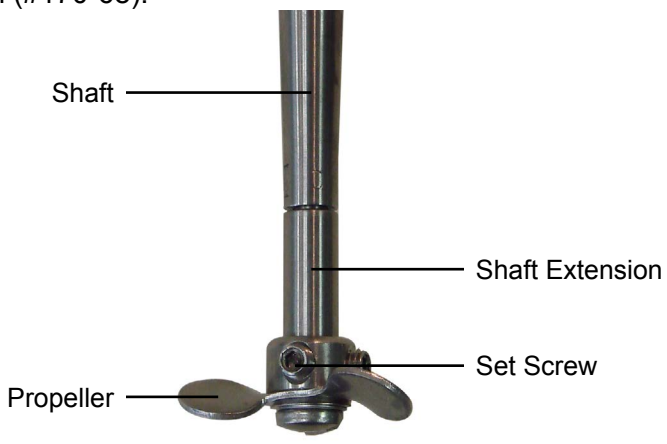
7. Screw a valve stem into the cell cap and tighten it completely.

8. Turn the cell over with the filter-end facing down. Prepare the test fluid according to API Specification. Pour the test fluid into the test cell. Allow at least 2.5" of space from the top of the fluid to the o-ring groove to allow for thermal expansion and shaft displacement. Be sure not to get test fluid in the o-ring groove.

Tip

It may be helpful to rest the test cell on blocks or on a surface with a hole for the valve stem while pouring the test fluid. Putting the weight of the test cell on the valve stem can damage the stem.

9. Attach the propeller to the end of the shaft and secure it in place with the 3/32" set screw. Be sure to seat the set screw on the flat spot at the end of the shaft. Optional shaft extenders (#170-58) adjust the distance from the filter medium, which alters the shear rate. The extenders allow for ½" adjustments, up to 1½". A four-blade propeller is also available as an optional item (#170-68).



10. Place the top cap assembly onto the test cell and secure it in place by tightening the locking screws.

11. Place the cell in the heating jacket. The cell should drop down over the locator pin in the bottom of the heating jacket. Screw a valve stem into the pressure inlet on the packing gland and tighten it completely.


Note

The inlet valve stem should be facing away from the motor housing in order to provide access for the pressure manifold. It may be necessary to remove the top cap assembly from the test cell and rotate it in order to ensure proper alignment.

12. Attach the back pressure receiver to the outlet valve stem and secure it in place with the locking pin.


Note

The back pressure receiver is only required for tests above 212°F (100°C).

13. Make sure the inlet and outlet valve stems are completely closed (turn them completely clockwise). Attach the high-pressure line (with the 1,500 PSI gauge) from the Nitrogen manifold to the inlet valve stem. Completely insert the locking pin to secure it in place. Close the bleeder valve on the manifold block. Repeat this process with the low-pressure line and connect it to the back pressure receiver.

14. Check the T-screws on the pressure regulators to be sure they are unscrewed (counterclockwise) and that no pressure is being applied to the system.

15. Open the pressure release valve on the nitrogen bottle and note the bottle pressure as registered on the middle manifold gauge.

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.*

16. Tighten the two T-screws on the manifold to apply pressure to the test cell. Set both to the recommended back pressure (refer to the chart below for recommended pressures).

17. Close the drain valve on the back pressure receiver. Open the outlet valve stem ½ turn. This will pressurize the back pressure receiver. Open the inlet valve stem ½ turn. This will pressurize the fluid inside the test cell.

18. Transfer the thermometer from the heating well to the thermometer well in the test cell. The sample will require 30 to 60 minutes to reach the test temperature. The heat time should never exceed 60 minutes.

Important

While the cell is heating, the internal pressure will rise rapidly due to thermal expansion. Carefully monitor this pressure during the heating phase.

19. Slide the belt over the top cell cap assembly and place it on the timing belt sheave. Tighten the belt tension just enough to prevent slippage. Also, tighten the two motor support clamping screws. If you need to make adjustments to the belt tension, loosen the motor support clamping screws and then re-tighten them.

Note

The tightening screw is a two-piece screw that allows for locking the screw to the housing at the proper tension.

20. Attach the water lines from the water source to the swivel at the top of the shaft. The inlet line in the center of the cap should be connected to a cold water source with the provided fittings. Run the drain line from the center of the swivel body to an appropriate drain.

Important

Do not operate the mixer shaft with the o-ring in the swivel dry. The water keeps these o-rings lubricated and reduces the load on the motor. If you are not using cooling water, the swivel body can be removed from the shaft. (See page 15, steps 5a - 5c for further instructions).

21. Set the mixing speed to the desired value between 200 and 2,740 RPM using the speed control knob on the motor control. The current speed of the motor will be displayed on the screen on the front of the unit casing.

22. Turn the T-screw on the left (high-pressure) regulator clockwise until it registers 500 PSI more than the back pressure.

23. Set a timer and collect filtrate for 30 minutes. Carefully monitor the pressure on both the cell and the back pressure receiver during the test. Maintain the selected test temperature to within ±5°F (3°C). Periodically bleed filtrate from the back pressure receiver into a graduated cylinder by opening the relief valve. Correct the filtrate volume collected to the standard API filtration area by doubling the filtrate volume collected in 30 minutes.


Note

When collecting filtrate, open the relief valve slowly and make sure all filtrate is collected in the graduated cylinder.

24. When the test is complete, turn the thermostat to zero, stop the motor, and close the inlet and outlet valve stems on the test cell. Adjust the nitrogen regulators to zero pressure and bleed of the pressure on the lines by opening the relief valves. Disconnect the inlet manifold block by removing the retaining pin. Remove the back pressure receiver and pour out any remaining filtrate into the graduated cylinder. Loosen the belt tension and disconnect the water lines from the test cell.

25. The test cell can be cooled slowly by setting it in front of a fan, or rapidly by submersing it in water. Keep the cell upright during the cooling process.


Important

Remember, the cell is still under pressure. Allow the cell to cool to 100°F (37°C) before attempting to open the valve stems. Place a dial thermometer in the thermometer well in the top edge of the cell body to determine the temperature.


Important

Cooling the cell under water can be dangerous. Exercise extreme caution to avoid severe burns. Always point the cell away from people and equipment.

26. When the cell has sufficiently cooled, slowly open the top valve stem to bleed off any remaining pressure. Pressure cannot be relieved by opening the outlet valve stem because the filter cake acts as a seal.


Tip

If you suspect that the cell is still pressurized after opening the valve stem, insert a small drill bit, wire, or straightened paper clip into the inlet cell cap to remove any obstruction. Make sure the opening is pointed away from people and equipment before attempting this.

27. Keeping the cell upright, loosen the locking screws and remove the top cap assembly from the cell. Pour the test fluid out of the cell.

28. Remove the bottom cell cap and filter medium in the same manner. Clean the cell caps, body, stirring shaft, and top cap assembly.

Data Reporting

1. Correct the filtrate volume collected to a filter area of 7.1 in^2 (4,580 mm^2) by doubling the amount collected.

2. The spurt loss is defined as the amount of mud and/or filtrate recovered from the collector immediately after the differential pressure is applied until the flow of fluid through the permeable disc stops and gas from the receiver blows out freely. The presence of whole mud in the spurt indicates that there was not an immediate seal of the mud when it passed through the filter. In most cases, the goal is to eliminate or minimize the amount of whole mud in the spurt and in the 30 minute test.

3. Measure the filter cake thickness to the nearest 1/32" (0.8 mm). Although cake descriptions are subjective, such notations such as hard, soft, tough, rubbery, firm, etc. may convey important information of cake quality.

4. The total fluid loss is calculated as follows:

   Dynamic HTHP Filtration (mL) = 2 × (*mL fluid recovered in 30 minutes)

   * This includes the spurt loss amount.

Maintenance

General

1. The top cap assembly uses a combination of carbon and Teflon rings to create a packing barrier that seals the test cell while allowing the shaft to rotate freely. In order to maintain an effective seal, the packing rings will periodically require compression. When you notice that gas is leaking from the assembly, simply loosen the locking nut (turn it counterclockwise), tighten the bearing housing (turn it clockwise), and then re-tighten the locking nut in place. Until the packing rings wear in, there may be a slight amount of gas leakage.

2. If, after several compressions of the packing rings, gas is still leaking from the cell when it is compressed, it will be necessary to remove the packing rings and replace them with new ones. To do this, you will have to remove the shaft from the packing gland. Refer to step 4 on page 14 for instructions.

3. Periodically add high-temperature, high-RPM grease to the lower bearing through the provided fitting (refer to the photo on page 16). Attach a hand-held grease gun and add three to five pumps of grease.

4. Be sure the proper size of fuse is always in the fuse holders so the components will be properly protected. These fuses should be an 8 ampere fuse for the 115V unit and a 4 ampere fuse for the 230V unit. Do not allow the motor current to exceed 5.5 amperes.

Maintenance

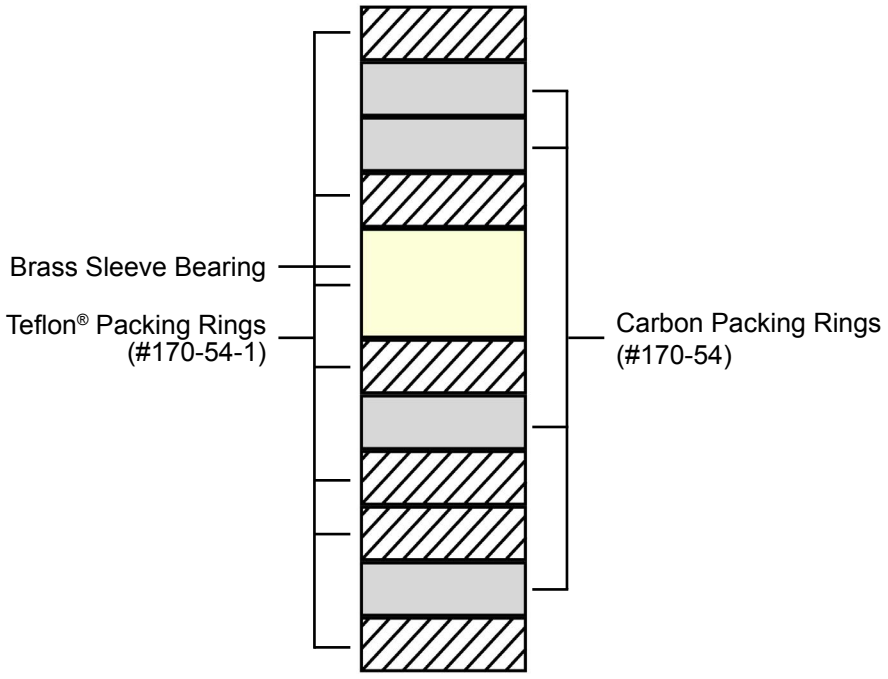
Disassembly

1. Remove the propeller from the bottom of the shaft.
2. Loosen the set screw on the splash guard and remove it from the shaft.
3. Loosen the locking nut and unscrew the bearing housing from the packing gland. The packing gland will now slid off the shaft.
4. If you need to replace the packing rings (see page 13 for details):
   a. Remove the internal retaining and retaining washer from beneath the packing gland.
   b. Remove the packing rings and the sleeve bearing.

      It is recommended that you clean the inside of the packing gland while the packing rings are removed. Grease deposits will build up inside the gland during use and cannot be removed while the packing rings are in place.

   c. Place the retaining washer and internal retaining ring back on the bottom of the packing gland.
   d. Turn the packing gland over and insert the lower set of packing rings, then the sleeve bearing, then the upper set of packing rings.

      The packing rings must be inserted in the proper order to ensure a sufficient seal. The correct order, from top to bottom, is as follows: Teflon, Carbon, Carbon, Teflon, Sleeve Bearing, Teflon, Carbon, Teflon, Teflon, Carbon, Teflon.



☑ **Tip**

5. If you hear a metal-to-metal grinding sound, or if the shaft seizes during use, the main bearing, located in the bearing housing, may need to be replaced.

   a. Unscrew the water swivel body cap and pull the water inlet tube out of the shaft.

   b. Remove the external retaining ring and thrust washer from above the water swivel body.

   c. Remove the water swivel body from the shaft.

   d. Inspect the o-rings and bearings inside the water swivel body. If any of them show signs of wear or damage, replace them before reassembling the unit.

   e. Remove the external retaining ring from below the water swivel body.

   f. Loosen the set screw on the timing belt sheave and slide the sheave off the shaft.

   g. Remove the internal and external retaining rings from above the bearing. The bearing housing will now slide off the shaft downward and the bearing will slide off the shaft upward. Inspect the bearing for damage or excessive wear and replace it if necessary.

      
      Tip

      To remove or install the bearing it may be necessary to heat the housing holding it. Also, the shaft may need to be cooled in a freezer or ice bath to move it in and out of the bearing.

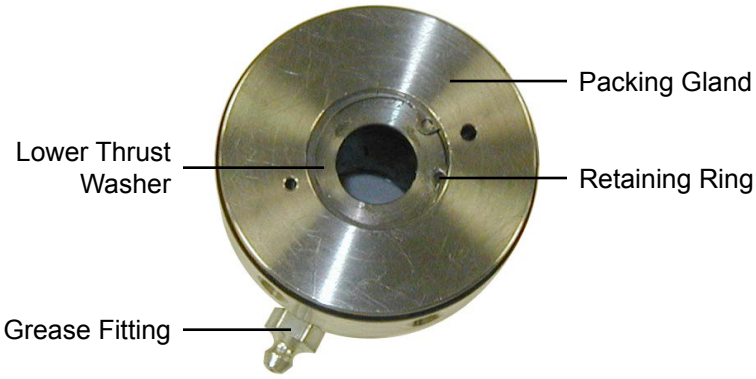
   h. Reassemble the unit (see page 16 for further instructions).

Maintenance

Reassembly

Refer to the diagram on page 19 for the correct order of components in the complete assembly.

1. Place the lower thrust washer into the bottom opening of the packing gland. Secure the washer in place with the retaining ring.



2. Turn the packing gland over and insert the lower set of packing rings, then the sleeve bearing, then the upper set of packing rings. Refer to step 4 on page 14 for more information about the packing rings.

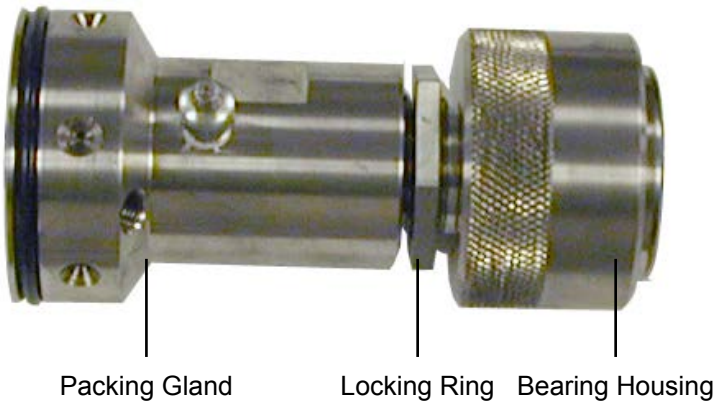
3. Place the upper thrust washer on top of the packing rings.

4. Screw the locking nut onto the threads at the bottom of the bearing housing.

5. Screw the bearing housing into the packing gland enough to compress the packing rings into place.

☑ **Tip**

Sometimes it may be necessary to leave out one carbon ring temporarily until all of the other rings are seated property. Once this is done, remove the shaft, upper thrust washer, and top Teflon ring and add the last ring.



Tip

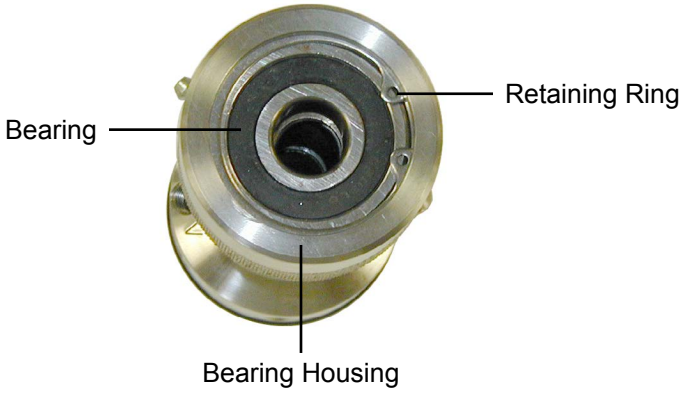
6. Place the bronze spacer over the hole inside the bearing housing.

7. Insert the shaft through the bearing housing and packing gland.

   Turning the shaft as it goes through the packing rings will reduce the resistance.

8. Slide the upper bearing onto the shaft from the top and seat it fully in the bearing housing. The bearing will sit on top of the raised notch in the shaft.

9. Secure the bearing in place with the internal retaining ring.



10. Place an external retaining ring in the designated groove on the shaft, just above the bearing.

11. Slide the timing belt sheave onto the shaft and secure it in place with the set screw.

12. Place another external retaining ring in the designated groove on the shaft, just above the timing belt sheave.

13. Place two o-rings into the o-ring grooves inside the water swivel body. Then place a bronze bearing into each opening in the water swivel body.

14. Place a thrust washer onto the shaft just above the external retaining ring and then slide the water swivel body on top of it. Be sure the threads on the water swivel body are pointed upward.

15. Place another thrust washer on top of the water swivel body and secure everything in place with an external retaining ring in the designated groove at the top of the shaft.

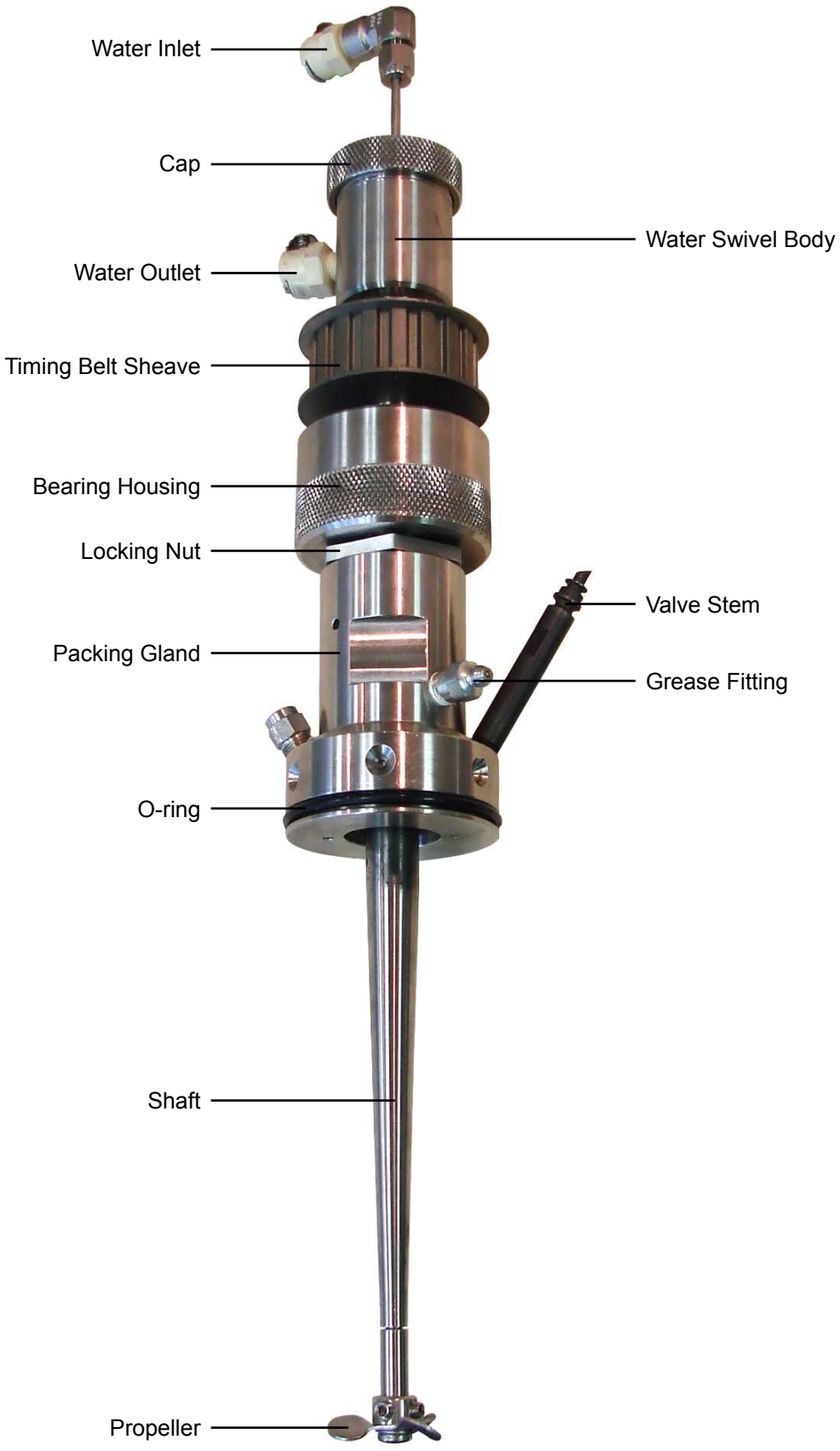
16. Slide the water inlet tube into the shaft and tighten the cap on the water swivel body.

17. Slide the splash guard onto the bottom of the shaft and secure it with the set screw just beneath the packing gland.

18. Attach the propeller to the bottom of the shaft.

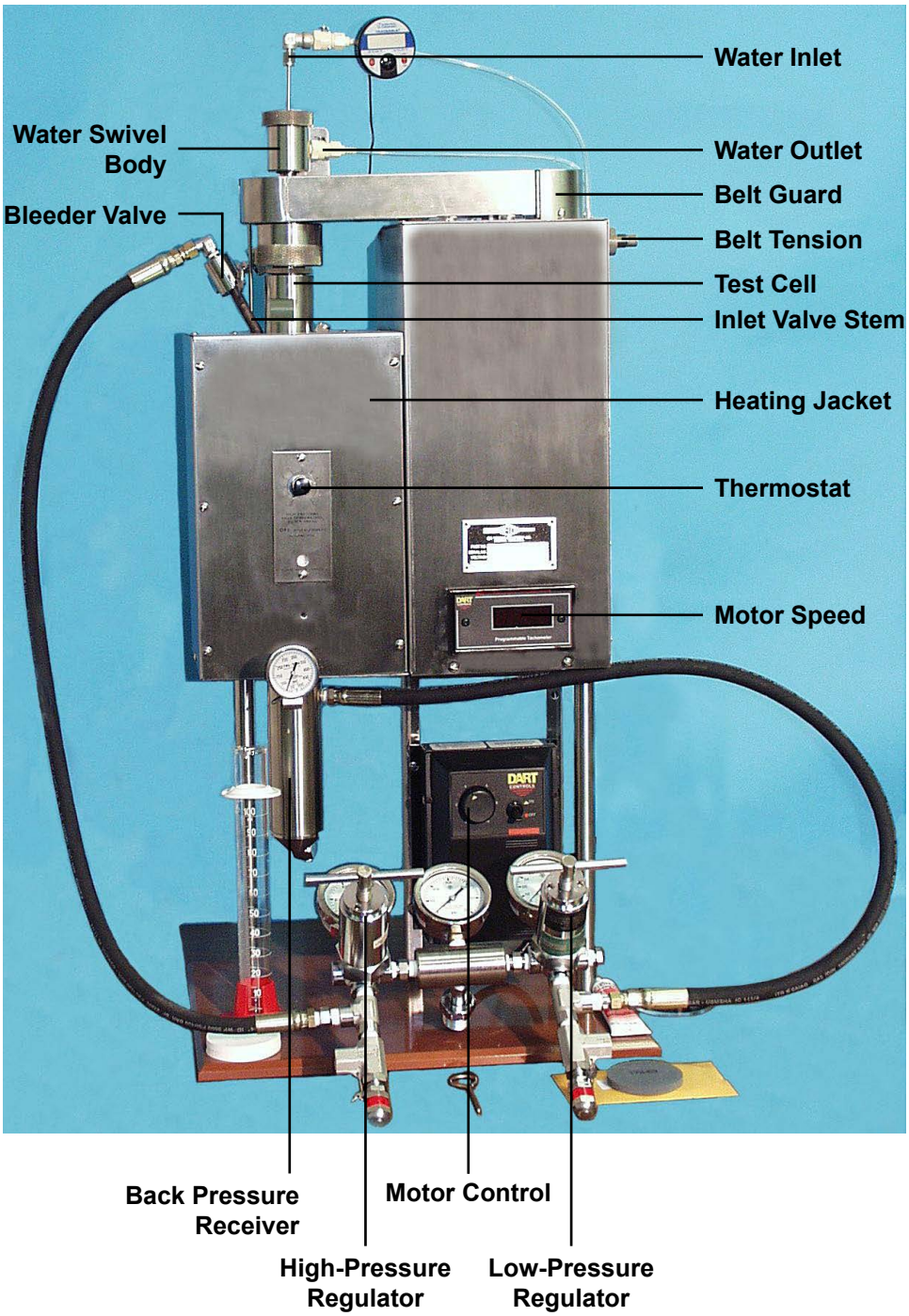
Appendix

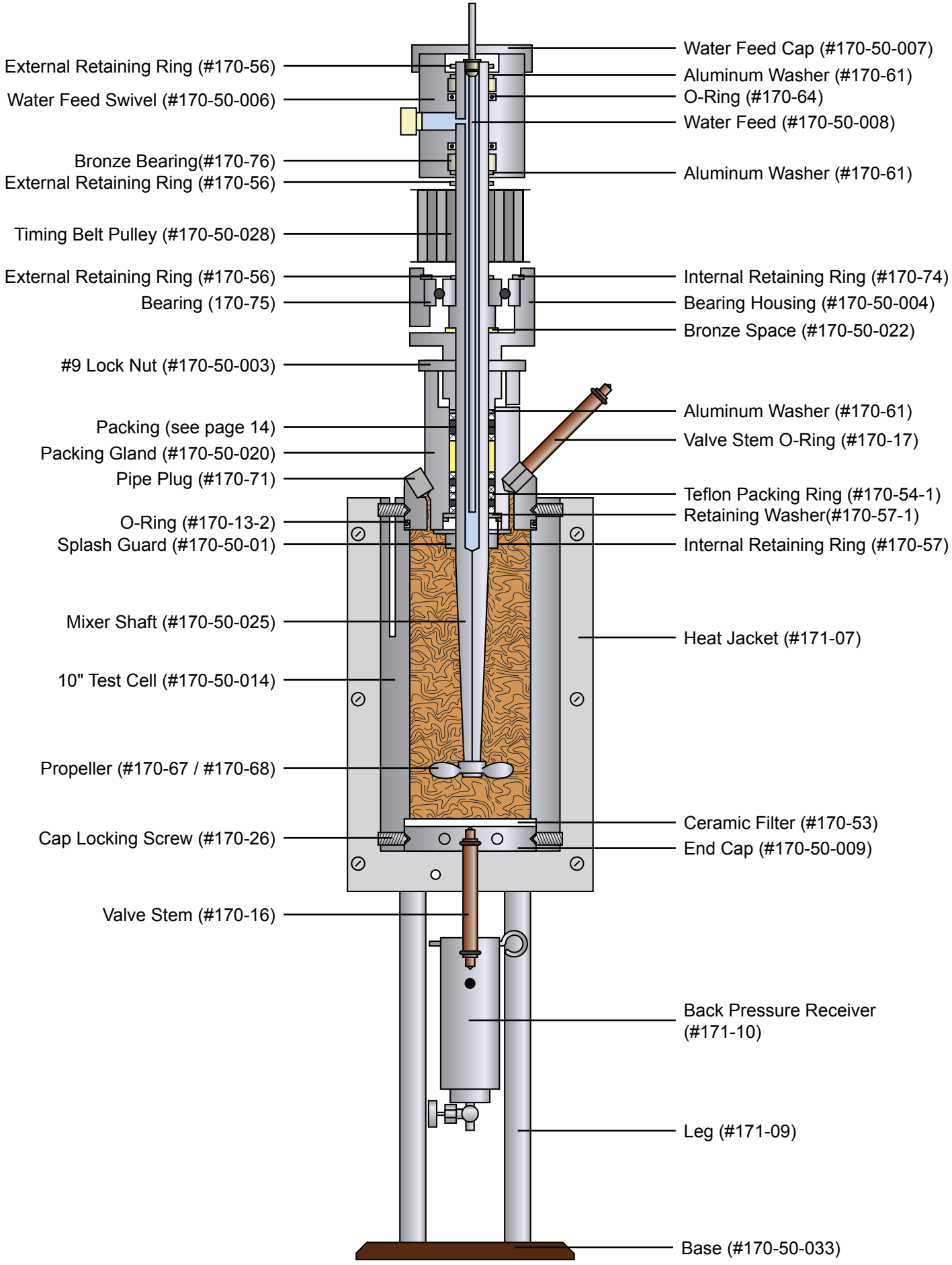
Top Cap Assembly Photo



Appendix

Fully-Assembled Unit




External Retaining Ring (#170-56)
Water Feed Swivel (#170-50-006)
Bronze Bearing(#170-76)
External Retaining Ring (#170-56)
Timing Belt Pulley (#170-50-028)
External Retaining Ring (#170-56)
Bearing (170-75)
#9 Lock Nut (#170-50-003)
Packing (see page 14)
Packing Gland (#170-50-020)
Pipe Plug (#170-71)
O-Ring (#170-13-2)
Splash Guard (#170-50-01)
Mixer Shaft (#170-50-025)
10" Test Cell (#170-50-014)
Propeller (#170-67 / #170-68)
Cap Locking Screw (#170-26)
Valve Stem (#170-16)
Water Feed Cap (#170-50-007)
Aluminum Washer (#170-61)
O-Ring (#170-64)
Water Feed (#170-50-008)
Aluminum Washer (#170-61)
Internal Retaining Ring (#170-74)
Bearing Housing (#170-50-004)
Bronze Space (#170-50-022)
Aluminum Washer (#170-61)
Valve Stem O-Ring (#170-17)
Teflon Packing Ring (#170-54-1)
Retaining Washer(#170-57-1)
Internal Retaining Ring (#170-57)
Heat Jacket (#171-07)
Ceramic Filter (#170-53)
End Cap (#170-50-009)
Back Pressure Receiver (#171-10)
Leg (#171-09)
Base (#170-50-033)

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.