



Parr Instrument Company

4635-39 Cell Disruption Vessels Operating Instruction Manual



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Preface

Related Instructions

The following Parr publications are also included to further your understanding of this instrument and its component parts:

No.	Description
201M	<i>Limited Warranty</i>
231M	<i>Safety Rupture Disc Operating Instructions</i>
665M2	<i>4639 Cell Disruption Vessel Supplement</i>
4635MB	<i>Cell Disruption Vessels Bulletin</i>

Scope

These instructions cover the basic steps to be followed when using any of the several Parr Cell Disruption Vessels. They are intended to be used in conjunction with Parr Bulletin 4635 which describes various applications for these vessels and lists a number of references to technical literature describing procedures in which this type of cell disruption equipment has been used. Replacement parts lists for the 45 mL, 920 mL, 1850 mL, and 1 and 2 gallon vessels are included with these instructions.

Customer Service

Questions concerning the installation or operation of this instrument can be answered by the Parr Customer Service Department:

1-309-762-7716 • 1-800-872-7720 • Fax: 1-309-762-9453

E-mail: parr@parrinst.com • <http://www.parrinst.com>

How To Use The Vessel

Temperature and Pressure Limits

Parr Cell Disruption Vessels are intended to be used at or near ambient room temperature for preparing cell suspensions by the nitrogen decomposition method. The maximum working pressure varies by vessel size.

Pressure Limits			
Vessel Number	Vessel Size	Maximum Pressure	Maximum Temp
4639	45mL	2900 psig (200 bar)	40 °C
4635	920 mL	3000 psig (200 bar)	150 °C
4636	1850mL	3000 psig (200 bar)	150 °C
4637	1 Gallon (O-Ring)	2200 psig (152 bar)	150 °C
4638	2 Gallon (O-Ring)	2200 psig (152 bar)	150 °C
4637	1 Gallon (PTFE Flat Gasket)	1900 psig (131 bar)	150 °C
4638	2 Gallon (PTFE Flat Gasket)	1900 psig (131 bar)	150 °C

If higher pressures should accidentally develop, the 920 mL and 1850 mL vessels are protected by a safety rupture disc which will burst at approximately 3000 psig, well below the pressure at which any parts of these vessels will fail. The 1 and 2 gallon vessels are equipped with 1/2" rupture discs rated at the maximum pressure of the assembly. For flat gasket seal, the rupture disc is rated to burst at 1900 psig, while the o-ring assembly is rated at 2200 psig. The 2200 psig maximum working pressure is purposely set below the 3000 psig range of the pressure gage and rupture disc since the gage works best when it is used below its top limit, and a rupture disc will not be reliable if stressed to more than 90 percent of its burst rating during normal operations.

Note: The 45mL assembly does not include a designated safety relief device and is rated for the maximum pressure of a filled nitrogen fill tank. Please refer to the 665M2 that is included with these vessels.

These vessels are designed to be operated conveniently in an open laboratory without cumbersome closing or holding devices and without the protective screen usually required for high pressure reactors. In the usual cell disruption procedures the non-reactive vessel charge does not introduce a serious explosion or fume hazard.

Opening and Closing Operations

No. 4635 and 4636 Vessels, 920 and 1850 mL and No. 4637 and 4638 O-ring Vessels, 1 and 2 Gallon

To open the vessels, release the latch on the split ring. The two ring sections can now be removed and the head with all attached fittings lifted from the cylinder. Handle the head carefully so as not to damage any of the attachments.

Before closing these vessels, make sure that the O-ring head seal is in good condition and properly positioned on the pilot of the vessel head. If previous usage has stretched the O-ring so that it will not hang onto the head, drop the ring into the gasket groove on the vessel cylinder. As the head is installed, check to make certain that the dip tube reaches into the inner sample holder if one is used. A drop of water spread around the O-ring will make it easier to slide the head into the cylinder.

Slide the two ring sections into place and latch the split ring closure. Ensure proper engagement of the latch mechanism prior to putting into service.

No. 4637 and 4638 Flat Gasket Vessels, 1 and 2 gallon

To open the one and two gallon flat gasket vessels, open the gas release valve to discharge any internal pressure, then loosen the ten caps screws in the split ring sections and raise each screw about three turns to clear the rim on the compression ring. When all screws are clear, slide the two ring sections outward to release the head. The head can now be lifted from the cylinder by grasping the valves with two hands and lifting upward. If the head tends to stick to the cylinder, insert a broad, flat screwdriver into the space between the head and cylinder to break the seal. Handle the head carefully so as not to damage any of the attachments.

Before closing the vessel, examine the head gasket carefully to be sure that it is in good condition. After considerable use some of the Teflon gasket may extrude into a thin, ragged edge around the inside and outside diameters. This does not necessarily mean that the gasket must be replaced, but the extruded portion should be removed with a sharp knife. Examine the mating surfaces on the cylinder and head to be sure they are clean and free from burrs.

To close the vessel, set the head on the cylinder and slide the two ring sections into place. Loosen the cap screws if necessary to clear the rim on the compression ring. Use the wrench furnished with the vessel to apply a firm, hard pull on each screw, working in a criss-cross pattern progressively around the circle. If a torque wrench is available, apply 25 ft-lbs. to each screw. Tighten each screw at least twice to compensate for any gasket flow. If a new gasket is being used for the first time it is advisable to let the vessel stand for fifteen minutes after the initial tightening, then tighten the screws again to compensate for any gasket flow.

No. 4639 Vessel, 45 mL

A firm closure for the small, 45 mL Cell Disruption Vessel is obtained by simply turning a knurled cap until it is hand tight. No wrenches or fixtures are required. An O-ring seal held in a recess in the vessel head will maintain a tight seal without excessive loading on the screw cap. When closing the vessel, set the head in place and push it down until it rests firmly in the cylinder, then turn the screw cap down by hand to complete the assembly. A drop of water spread on the O-ring will make it easy to slide the head into the cylinder. When opening the vessel, always release any internal gas pressure before attempting to unscrew the cap. Keep the O-ring groove and vessel surfaces clean at all times.

Attaching The Filling Connection

The 1831 Nitrogen Filling Connection provides all of the valves and fittings needed to fill a cell disruption vessel from a commercial nitrogen tank equipped with a standard CGA 580 outlet. To attach the filling connection to the gas tank, remove the protective cap from the tank valve and inspect the outlet socket to be sure that it is clean and in good condition. Place the ball end of the filling connection into the socket and tighten the follower nut firmly with a wrench while keeping the delivery hose pointing downward. The connection to the vessel is made by inserting the hose fitting into the adapter on the inlet valve and tightening the knurled nut finger tight. It is not necessary to use pliers or a wrench on this quick disconnect coupling. The gage on the side of the filling connection shows the supply pressure in the nitrogen tank when the tank valve is open, and the valve built into the end of the block controls the flow of gas to the vessel. The small valve pointing downward from the block is used to release the pressure in the filling hose before disconnecting the hose from the vessel.



1831 Nitrogen Filling Connection

Preparing The Vessel Charge

Each operator will determine by experiment the procedure for preparing a cell suspension and for charging the vessel with the appropriate amount of pressure which will produce the best results for his particular material. Detailed instructions given in Parr Bulletin 4635MB will be helpful and should be reviewed before starting to use the apparatus. But in all operations, the user must observe the basic vessel handling and safety precautions given here.

Pressurizing With Nitrogen

Starting with all valves closed and with the hose attached to the vessel inlet valve, proceed as follows: Open the nitrogen tank valve not more than one quarter turn; open the vessel inlet valve one or two turns; then open the filling connection control valve slowly and watch the vessel gage as the pressure rises to the desired level. Close the control valve momentarily and watch the pressure gage to see if the pressure drops significantly as the sample absorbs nitrogen. If so, add nitrogen to maintain the desired pressure level; then close all valves and open the dump valve on the underside of the filling connection to release the residual pressure in the filling hose. Now disconnect the hose from the inlet valve and close the dump valve.

Equilibrium

Sufficient time must be allowed for the nitrogen to dissolve and come to equilibrium with the cells. Periods as short as five minutes may be sufficient for small samples while longer times up to thirty minutes may be required for larger samples. Stirring with a magnetic bar placed in the bottom of the vessel will accelerate this process, particularly when working with large samples. Stirring will also hold the cells in a uniform suspension. Since these vessels are made of a non-magnetic stainless steel, the stirrer bar can be driven by simply placing the vessel on a magnetic stirring plate. If cooling is required to protect the sample, the vessel can be pre-cooled before it is charged, or ice can be packed around the inner sample holder, or the vessel can be packed in ice or held in a cold room during equilibrium.

Disruption and Collection

Disruption occurs as the homogenate is released to atmospheric pressure through the discharge valve. A side arm suction flask works well as a receiver, with the delivery tube inserted through a stopper in the neck and the side arm left open to release the nitrogen. The sample does not have to be discharged rapidly to attain maximum disruption since the disruption process occurs on an individual cell basis, independent of the rate at which the cells are released from the high pressure chamber. To prevent splattering in the receiver and freezing in the discharge tube, close the discharge valve after the bulk of the sample has been recovered and release the remaining nitrogen through the inlet valve.

If the vessel pressure drops significantly when discharging a large sample, add nitrogen through the inlet valve to maintain a constant pressure in the vessel during the discharge period. After the sample has been recovered, release the residual nitrogen through the inlet valve. This valve should also be used to release the pressure should it become necessary to abort a test after the vessel has been pressurized. All vessel pressure must be released before attempting to open the cover clamp.

Vessel Maintenance

Keep all parts of the vessel clean and dry when not in use and replace the vessel head gasket or O-ring whenever it shows signs of wear or deterioration. The small 357HC O-ring in the quick disconnect hose fitting will also have to be replaced occasionally.

If it becomes necessary to remove the gage or valves from the vessel head, the tapered threads on these fittings must be coated with Teflon tape, plastic lead or a similar luting material on reassembly to ensure a tight seal.

The Safety Rupture Disc

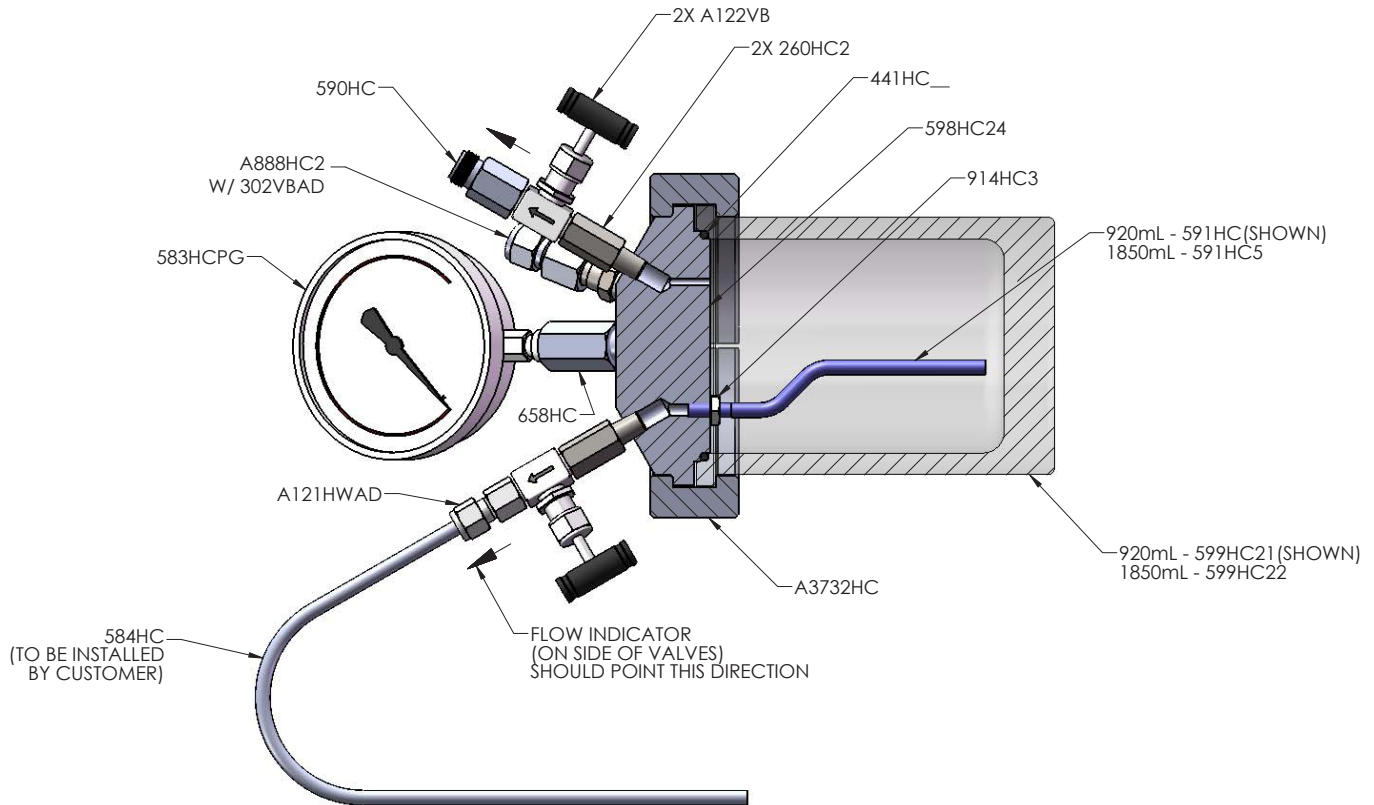
4635-4636 Parr Cell Disruption Vessels include the A888HC2 safety head assembly to protect the vessel from accidental overpressure. The 526HCPG rupture disc usually installed in this assembly has a burst rating of 3000 psig at room temperature.

4637-4538 Parr Cell Disruption Vessels include the A707HC2 safety head assembly to protect the vessel from accidental overpressure. The flat gasket seal includes a 708HCP19CT rupture disc installed in this assembly and has a burst rating of 1900 psig at room temperature. The O-Ring seal includes a 708HCP22CT rupture disc installed in this assembly and has a burst rating of 2200 psig at room temperature.

A metal tag attached to the safety head on each vessel identifies the burst rating for the disc and the construction material from which the disc is made. This tag must remain with the apparatus so that both present and future operators will be aware of the disc rating. When installing a replacement disc, always attach the new tag to the safety head. Refer to the 231M manual included with the vessel for more information regarding rupture disc assemblies, replacing rupture discs, and proper safety precautions.

Parts Lists

Parts for the 4635 and 4636 Cell Disruption Bombs

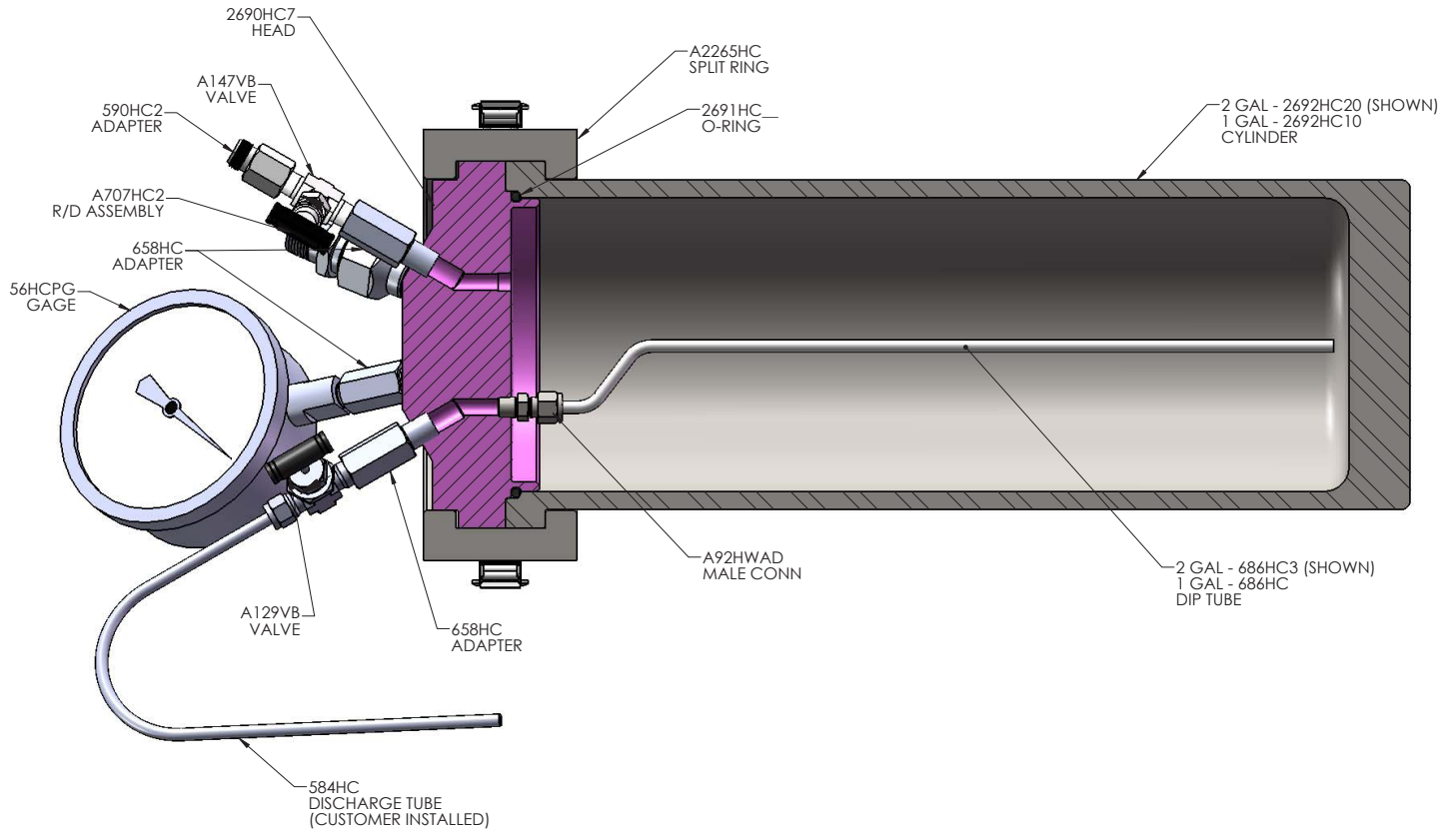


Part No.	Description
A121HWAD	Tube connector
A122VB	Needle valve, 1/8" NPT(M), T316
260HC2	Valve extension
441HC	O-ring, Neoprene
526HCPG	Rupture disc, 3000 psi, Inconel
A888HC2	Rupture disc assembly
49HC2	Orifice cone
527HC	Orifice ring
433HC4	Safety head outlet
302VBAD	Female conn; 3/8" tube to 1/4" NPT

Part No.	Description
584HC	Discharge tube
590HC	Filling connection adapter
591HC	Dip tube with nut, 920 mL
591HC5	Dip tube with nut, 1850 mL
593HCPG	Pressure gage, 3/2", 3000 psi
598HC24	Bomb head, bare, T316SS
599HC21	Bomb cylinder, 920 ml, T316SS
599HC22	Bomb cylinder, 1850 ml, T316SS
658HC	Gage adapter
A3732HC	Split ring w/ latches assembly

Parts for the 4637 and 4638 Cell Disruption Bombs

(2 Gallon Model with O-ring Seal Shown)



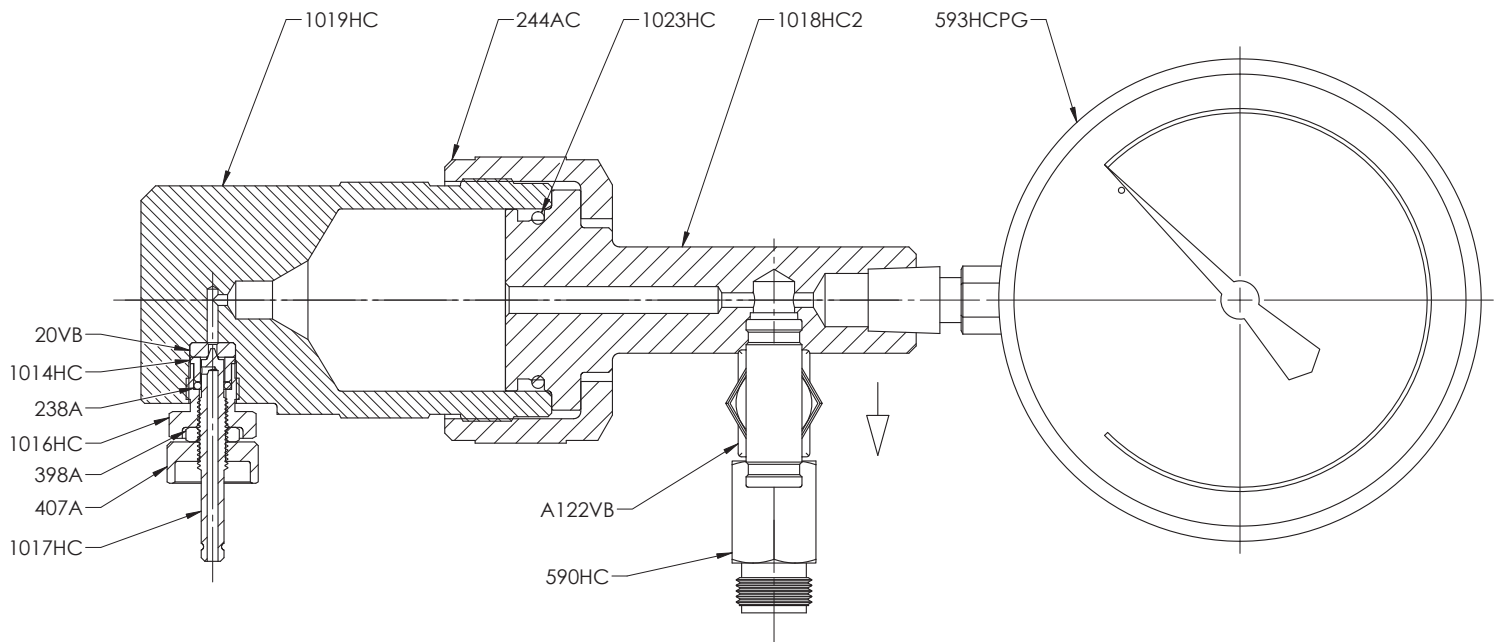
Code Key Description

OR -	O-Ring Seal
FG -	Flat Gasket Seal

Part No.	Description	Code
660HC	Cylinder, 1 gallon	FG
660HC6	Cylinder, 2 gallon	FG
2692HC10	Cylinder, 1 gallon	OR
2692HC20	Cylinder, 2 gallon	OR
657HC101	Head	FG
2690HC7	Head	OR
A754HC	Split ring closure	FG
A2265HC	Split ring closure	OR
655HC	PTFE flat gasket	FG
2691HCJV	FKM o-ring gasket	OR
659HC	Compression ring	FG
708HCP19CT	1900 psi rupture disc	FG
708HCP22CT	2200 psi rupture disc	OR
737HC	Combination wrench	FG

Part No.	Description
56HCPG	4 1/2" 3000 psi gage
A707HC2	1/2" Rupture disc assembly
A147VB	Needle valve, 1/4" NPT(M)
A129VB	Needle valve, 1/4" NPT(M) x 1/4" Tube
1831	Nitrogen fill connection, CGA-580
590HC2	1/4" Adapter
658HC	Gage & Valve adapter
A92HWAD	Male connector; 1/4" tube to 1/8" NPT
686HC	Dip tube, 1 gallon
686HC3	Dip tube, 2 gallon
584HC	Discharge tube

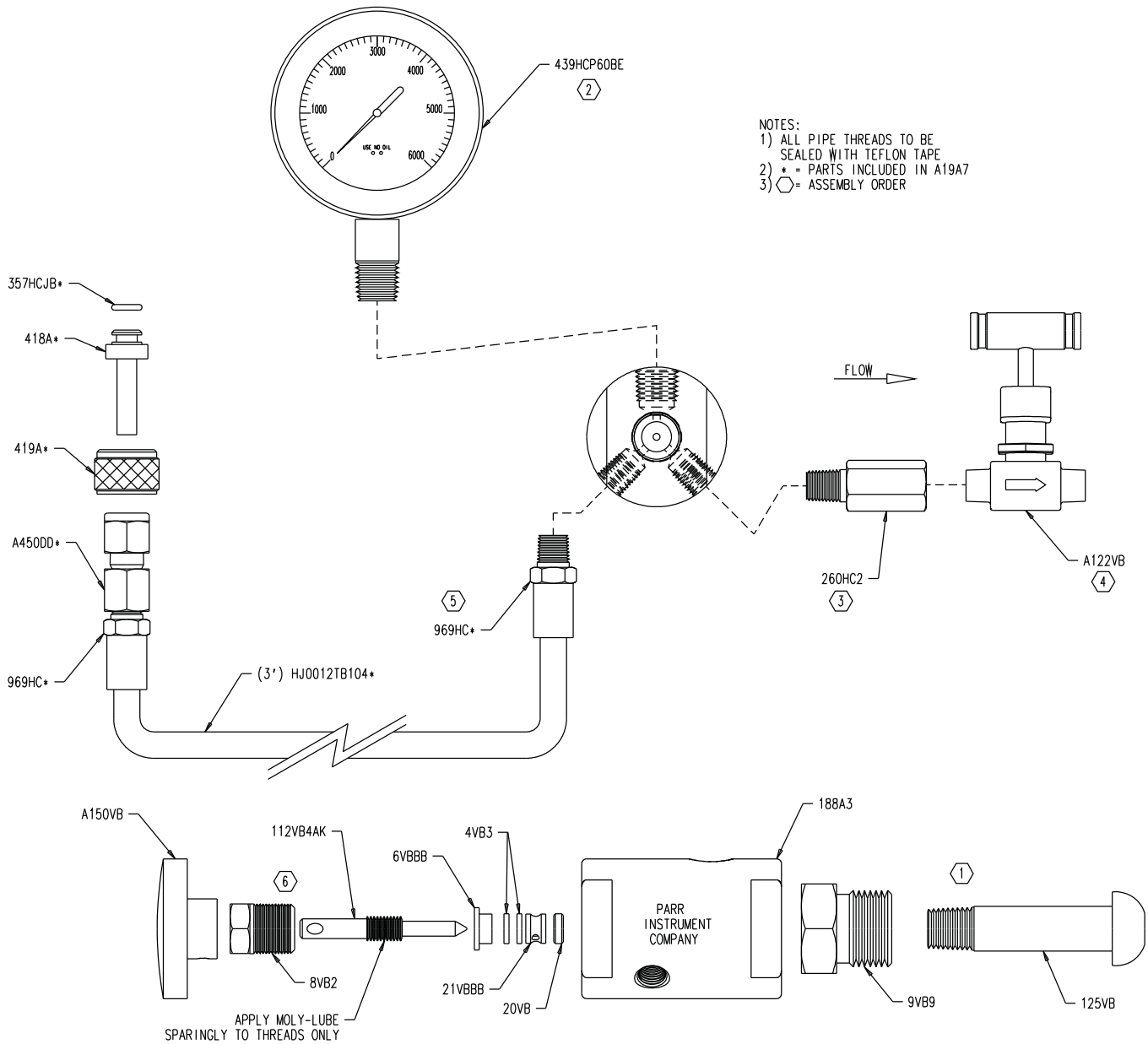
Parts for the 4639 Cell Disruption Bomb



- NOTES:
 1) USE TEFLON TAPE SEALANT ON ALL PIPE THREADS.
 2) REMOVE A122VB HANDLE AND STEM TO INSTALL VALVE INTO HEAD.

Part No.	Description
20VB	Valve seat, PCTFE
A122VB	Needle valve, 1/8" NPT(M)
238A	O-ring, Buna-N
244AC	Screw cap
398A	Lock nut
407A	Valve knob
504HCAD	Reducer
590HC	Filling connection adapter
593HCPG	Pressure gage, 3 1/2", 3000 psi
1014HC	Packing follower
1016HC	Compression nut
1017HC	Valve needle
1018HC	Bomb head, bare, T304SS
1019HC	Bomb cylinder, 45 ml, T304SS
1023HC	O-ring, Neoprene

Parts for the 1831 Nitrogen Filling Connection



- NOTES:
 1) ALL PIPE THREADS TO BE SEALED WITH TEFLON TAPE
 2) * = PARTS INCLUDED IN A19A7
 3) ○ = ASSEMBLY ORDER

Part No.	Description
439HCP60BE	Gage, 2½" 0-6000 psi 1/4" NPT
A19A7	Flexible tube assembly
357HCJB	O-ring
418A	Union fitting
419A	Union nut, knurled
969HC	Coupling, hose end; 1/8" NPTM
HJ0012TB104	Hose, Pressure 1/8 ID .104W NY
A450DD	Female conn, 1/4T - 1/8 NPTF, brass
260HC2	Valve extension, 1/8" NPT, T316
A122VB	Needle valve, 1/8" NPT(M), T316
419DD	Plug, 1/4" NPT, socket head

Part No.	Description
188A3	Valve body, bare
9VB9	Tank union nut, CGA 580
125VB	Tank union stem, CGA 580
A150VB	Control knob
8VB2	Packing nut
112VB4AK	Valve needle
6VBBB	Packing cover
4VB3	Packing ring, Teflon
21VBBB	Lantern ring
20VB	Valve seat, PCTFE
424HC	Moly-lube



Parr Instrument Company

211 53rd Street
Moline, Illinois 61265-1770 USA
Phone: 1-309-762-7716 or 1-800-872-7720
Fax: 1-309-762-9453
E-mail: parr@parrinst.com
<http://www.parrinst.com>