



FDL Hydraulic Disconnect

MAN-TTT-701 (R02)

Thru-Tubing Technology

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FDL Hydraulic Disconnect

Description

The FDL Hydraulic Disconnect tool is essential in releasing the coil tubing from the tool string if the string has become stuck while in the wellbore. The FDL Hydraulic Disconnect is designed to achieve this requirement, but is also designed to give the ultimate resistance in tensional and torsional stresses that occur while jarring or milling.

Operation

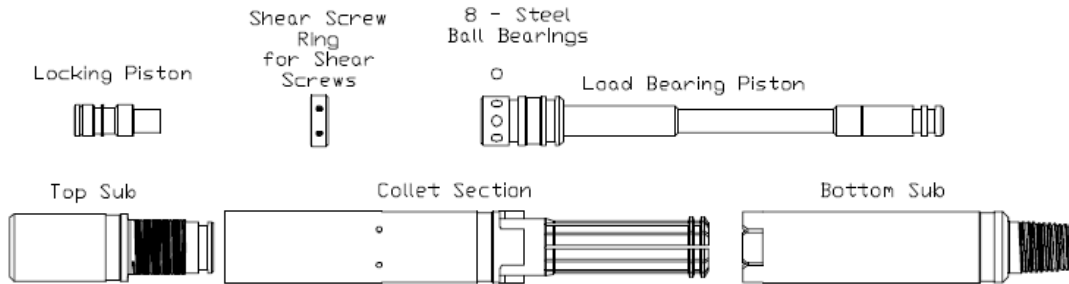
If it becomes necessary to disconnect, a ball is pumped to the disconnect, then an increase in pump pressure allows the locking piston to shift, shearing the brass shear screws and allowing the load piston to move out from under the body collets. After a drop in the pump pressure, retrieval from the stuck string is possible. The bottom sub is the only part of the disconnect that is left in the hole and it has an internal "GS" fishing neck for future fishing procedures.



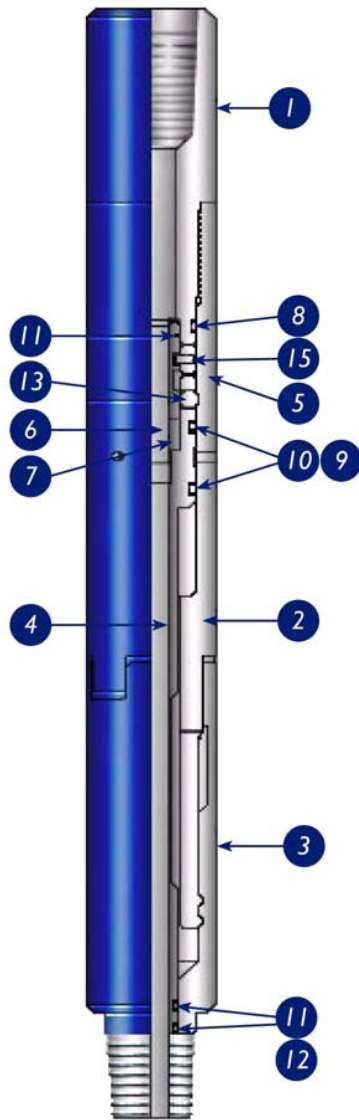
Note: Unless otherwise indicated, all the strength figures given in this manual, are the result of calculations based on the yield strength of the material used in the manufacture of this product. These strength calculations are considered accurate within plus or minus 20% and are to be used only as a guide. They do not constitute a guarantee, actual or implied. In use, appropriate allowance should be made as a safety factor.

FDL Hydraulic Disconnect

Parts Identification Chart



TT0701-175B BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0701-175B-001
2	1	Collet Section	TT0701-175B-002
3	1	Bottom Sub	TT0701-175B-003
4	1	Load Piston	TT0701-181B-004
5	1	Shear Ring	TT0701-181B-005
6	1	Locking Piston	TT0701-181B-006
7	1	Smalley Wave Spring C075-L6	PUR-TWS1048-048
8	1	O-Ring 1 1/16" x 1 1/4" x 3/32" 2-121	PUR-TORV000-121
9	2	O-Rings 1" x 1 3/16" x 3/32" 2-120	PUR-TORV000-120
10	4	Back-Up Rings 1" x 3/16" x 3/32" 8-120	PUR-TOBU000-120
11	3	O-Rings 11/16" x 13/16" x 1/16" 2-017	PUR-TORV000-017
12	4	Back-Up Rings 11/16" x 13/16" x 1/16" 8-017	PUR-TOBU000-017
13	8	Steel Ball Bearings 1/4"	PUR-TSBC000-016
14	1	Steel Ball Bearing 1/2" (not shown)	PUR-TSBC000-032
15	6	Brass Slotted Shear Screws 8-32 x 1/4"	PUR-TBSS100-016

Tool Name: 1.750 in. OD FDL Hydraulic Disconnect

Product Code: TT0701-175B **Tool OD:** 1.750 in. **Tool ID:** 0.469 in.

Material: AISI 4140 HT 285-341 Bhn **Tool Length:** 17.38 in. w/ 1 in. MT

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The internal fishing neck of the Bottom Sub when fishing with a pulling tool, 23,100 lbs; the Bottom Sub engagement area for the Collet Section fingers, 30,700 lbs.

Burst Point and Burst Pressure: The Collet Section between the Load Piston seals and Top Sub seal, 24,100 psi.

Torsional Weak Point and Ft-Lbs to Yield: 830 ft-lbs as a function of torsional yield of the box connection of the Collet Section.

Recommended Make Up Torque:

1st Connection: The Top Sub - Collet Section connection - 200 ft-lbs.

Shear Screw Value:

8-32 NC Brass, 1,150 psi (plus or minus 15%) per screw.

Ball Size Range to Release:

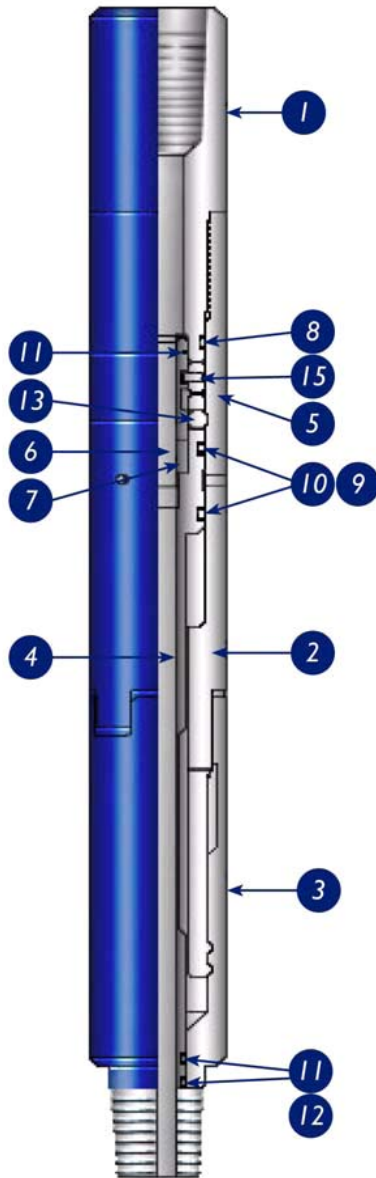
9/16 in. - 11/16 in. Steel Ball Bearing

Fishing Profile:

When disconnected, the tool leaves a 2 in. GS internal fishing neck, looking up.

FDL Hydraulic Disconnect

TT0701-181B BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0701-181B-001
2	1	Collet Section	TT0701-181B-002
3	1	Bottom Sub	TT0701-181B-003
4	1	Load Piston	TT0701-181B-004
5	1	Shear Ring	TT0701-181B-005
6	1	Locking Piston	TT0701-181B-006
7	1	Smalley Wave Spring C075-L6	PUR-TWS1048-048
8	1	O-Ring 1 1/16" x 1 1/4" x 3/32" 2-121	PUR-TORV000-121
9	2	O-Ring 1" x 1 3/16" x 3/32" 2-120	PUR-TORV000-120
10	4	Back-Up Ring 1" x 1 3/16" x 3/32" 8-120	PUR-TOBU000-120
11	3	O-Ring 11/16" x 13/16" x 1/16" 2-017	PUR-TORV000-017
12	4	Back-Up Ring 11/16" x 13/16" x 1/16" 8-017	PUR-TOBU000-017
13	8	Steel Ball Bearings 1/4"	PUR-TSBC000-016
14	1	Steel Ball Bearing 1/2" (not shown)	PUR-TSBC000-032
15	6	Brass Slotted Shear Screws 8-32 x 1/4"	PUR-TBSS100-016

Tool Name: 1.813 in. OD FDL Hydraulic Disconnect

Product Code: 701-181B **Tool OD:** 1.813 in. **Tool ID:** 0.469 in.

Material: AISI 4140 HT 285-341 Bhn **Tool Length:** 17.38 in. w/ 1 in. MT

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: 31,900 lbs at the internal fishing neck of the Bottom Sub when fishing with a pulling tool; 51,500 lbs Yield at the fingers on the Collet Section.

Burst Point and Burst Pressure: 29,050 psi at Upper Body of Collet Section Between two of Load Piston Seals and Top Sub Seal.

Torsional Weak Point and Ft-Lbs to Yield: 1,040 ft-lbs at Stub Acme connection between Top Sub and Collet Section.

Recommended Make Up Torque:

1st Connection: Top Sub and Collet Section Connection -260 ft-lbs.

Shear Screw Value:

8-32 NC Brass, 1,150 psi (plus or minus 15%) per screw.

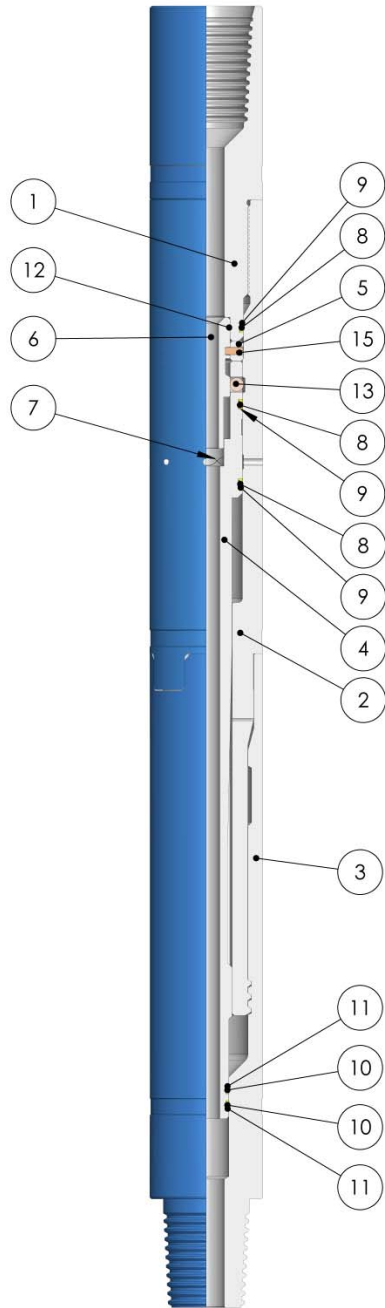
Ball Size Range to Release:

9/16 in. - 11/16 in. Steel Ball Bearing

Fishing Profile:

When disconnected, the tool leaves a 2 in. GS internal fishing neck, looking up.

TT0701-213B BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0701-213B-001
2	1	Body Collet	TT0701-213B-002
3	1	Bottom Sub	TT0701-213B-003
4	1	Load Piston	TT0701-225B-004
5	1	Shear Ring	TT0701-225A-006
6	1	Locking Piston	TT0701-225A-005
7	1	Smalley Wave Spring C100-H8	PUR-TWS1064-080
8	3	O-Rings 1/8" x 1 5/16" x 1 9/16" 2-219	PUR-TORV000-219
9	6	Back-Up Rings 1/8" x 1 5/16" x 1 9/16" 8-219	PUR-TOBU000-219
10	2	O-Rings 1/16" x 5/8" x 3/4" 2-116	PUR-TORV000-116
11	4	Back-Up Rings 1 1/16" x 5/8" x 3/4" 8-116	PUR-TOBU000-116
12	1	O-Ring 1/16" x 7/8" x 1"	PUR-TORV000-020
13	8	Steel Ball Bearings 11/32"	PUR-TSBC000-022
14	1	Steel Ball Bearing 5/8" (not shown)	PUR-TSBC000-040
15	6	Brass Slotted Shear Screws 10-24 x 5/16"	PUR-TBSS120-020

Tool Name: 2.125 in. OD FDL Hydraulic Disconnect

Product Code: TT0701-213B **Tool OD:** 2.125 in. **Tool ID:** 0.531 in.

Material: AISI 4140 HT 285-341 Bhn **Tool Length:** 22.56 in. w/1-1/2 in. MT

Minimum Yield: 100,000 psi.

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: 40,500 lbs. at Internal Fishing Neck on Bottom Sub when fishing with 2-1/2 in. GS Pulling Tool, 78,500 lbs. Yield of Disconnect at Grooves for Collet in Bottom Sub with assembled disconnect.

Burst Point and Burst Pressure: 25,900 psi Burst in Collet section between Load Piston and Top Sub.

Torsional Weak Point and Ft-Lbs to Yield: 1,128 ft-lbs yield at internal fishing neck in Bottom Sub, 1,474 ft-lbs yield at Stub Acme connection of Top Sub and Collet Section.

Recommended Make Up Torque:

1st Connection: Top Sub and Collet Section - 369 ft-lbs.

Shear Screw Value:

10-24 NC Brass, 980 psi (plus or minus 15%) per screw.

Ball Size Range to Release:

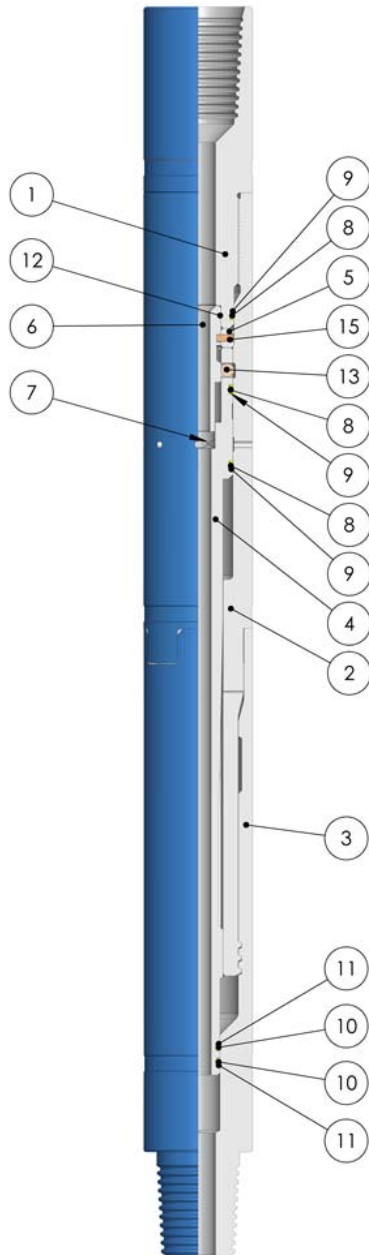
5/8 in. - 7/8 in. Steel Ball Bearing

Fishing Profile:

When disconnected, the tool leaves a 2-1/2 in. GS internal fishing neck, looking up.

FDL Hydraulic Disconnect

TT0701-225B BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0701-225B-001
2	1	Body Collet	TT0701-225B-002
3	1	Bottom Sub	TT0701-225B-003
4	1	Load Piston	TT0701-225B-004
5	1	Shear Ring	TT0701-225A-006
6	1	Locking Piston	TT0701-225A-005
7	1	Smalley Wave Spring	PUR-TWS1064-080
8	3	O-Ring 1/8" x 1 5/16" x 1 9/16" 2-219	PUR-TORV000-219
9	6	Back-Up Ring 1/8" x 1 5/16" x 1 9/16" 8-219	PUR-TOBU000-219
10	2	O-Ring 1/16" x 5/8" x 3/4" 2-116	PUR-TORV000-116
11	4	Back-Up Ring 1/16" x 5/8" x 3/4" 8-116	PUR-TOBU000-116
12	1	O-Ring 1/16" x 7/8" x 1" 2-020	PUR-TORV000-020
13	8	Steel Ball Bearings 11/32"	PUR-TSBC000-022
14	1	Steel Ball Bearing 5/8" (not shown)	PUR-TSBC000-040
15	6	Brass Slotted Shear Screw 10-24 x 5/16"	PUR-TBSS120-020

Tool Name: 2.250 in. OD FDL Hydraulic Disconnect

Product Code: TT0701-225B **Tool OD:** 2.250 in. **Tool ID:** 0.531 in.

Material: AISI 4140 HT 285-341 Bhn **Tool Length:** 22.56 in. w/1-1/2 in. MT

Minimum Yield: 100,000 psi.

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: 53,000 lbs at the internal fishing neck of the Bottom Sub **when** fishing with a pulling tool; 93,300 lbs at Top Sub stub acme pin connection when the connection is torqued to 950 ft-lbs, 99,100 lbs at Collet Section stub acme box connection when the connection is torqued to 950 ft-lbs, 103,100 lbs at Collet Fingers.

Burst Point and Burst Pressure: 25,900 psi Burst in Collet section between Load Piston and Top Sub.

Torsional Weak Point and Ft-Lbs to Yield: 1,770 ft-lbs yield at the bottom sub 1-1/2 in. AMMT pin connection.

Recommended Make Up Torque:

1st Connection: Top Sub and Collet Section - 500 ft-lbs.

Shear Screw Value:

10-24 NC Brass, 980 psi (plus or minus 15%) per screw.

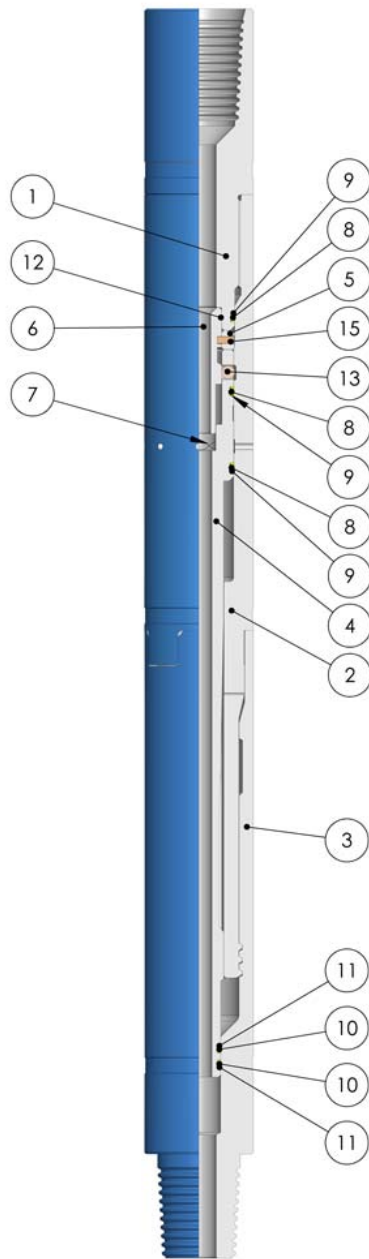
Ball Size Range to Release:

5/8 in. - 7/8 in. Steel Ball Bearing

Fishing Profile:

When disconnected, the tool leaves a 2-1/2 in. GS internal fishing neck, looking up.

TT0701-288B BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0701-288B-001
2	1	Collet Section	TT0701-288B-002
3	1	Bottom Sub	TT0701-288B-003
4	1	Load Piston	TT0701-288B-004
5	1	Shear Ring	TT0701-313B-006
6	1	Locking Piston	TT0701-313B-005
7	1	Smalley Wave Spring C125-H10	PUR-TWS1080-128
8	3	O-Ring 1 3/4" x 2" x 1/8" 2-224	PUR-TORV000-224
9	6	Back-Up Rings 1 3/4" x 2" x 1/8" 8-224	PUR-TOBU000-224
10	2	O-Ring 1 1/16" x 1 1/4" x 3/32" 2-121	PUR-TORV000-121
11	4	Back-Up Rings 1 1/16" x 1 1/4" x 3/32" 8-121	PUR-TOBU000-121
12	1	O-Ring 1 3/16" x 1 5/16" x 1/16" 2-025	PUR-TORV000-025
13	8	Steel Ball Bearings 13/32"	PUR-TSBC000-026
14	1	Steel Ball Bearing 3/4" - 15/16" (not shown)	PUR-TSBC000-048
15	8	Brass Slotted Shear Screws 10-32 x 3/8"	PUR-TBSS121-024

Tool Name: 2.875 in. FDL Hydraulic Disconnect

Product Code: TT0701-288B **Tool OD:** 2.875 in. **Tool ID:** 0.688 in.

Material: 4140 HT 285-341 Bhn **Tool Length:** 29.0 in,

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: 71,400 lbs at the internal fishing neck of the Bottom Sub **when** fishing with a pulling tool; 156,000 lbs at the Collet Fingers on the Collet Section.

Burst Point and Burst Pressure: The Burst Point of the tool is the collet section at the top end of the tool at 28,060 psi.

Torsional Weak Point and Ft-Lbs to Yield: The Torsional Weak Point of the Tool would be the Stub Acme Box Connection Between the Top Sub And the Collet Section at 4,108 ft-lbs.

Recommended Make Up Torque:

1st Connection: Stub Acme Connection on Top Sub, 1,027 ft-lbs.

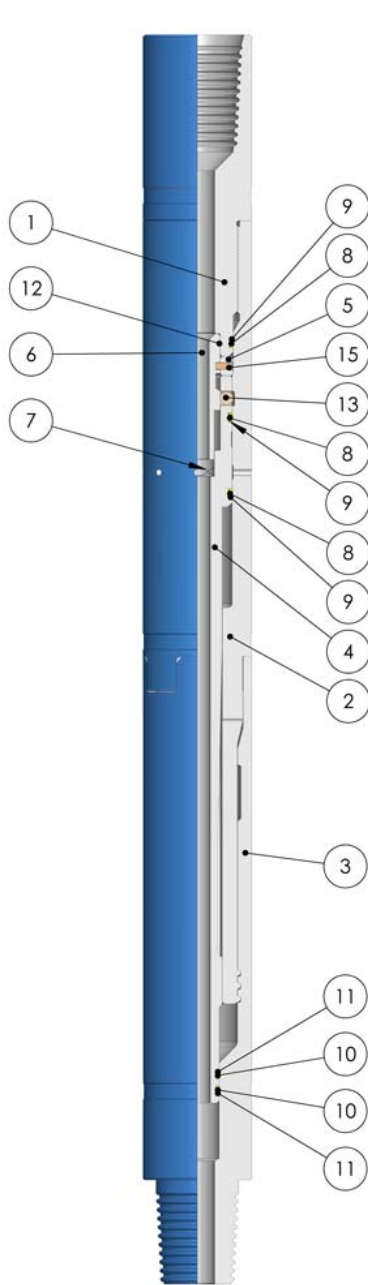
Shear Value of Brass Shear Screws: 680 psi (+/- 15%) per shear screw

Ball Range to Function Tool : 3/4 in. - 15/16 in.

Fishing Profile: When disconnected, the tool leaves a 3 in. GS internal fishing neck looking up.

FDL Hydraulic Disconnect

TT0701-313B BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0701-313B-001
2	1	Collet	TT0701-313B-002
3	1	Bottom Sub	TT0701-313B-003
4	1	Load Piston	TT0701-313B-004
5	1	Shear Ring	TT0701-313B-006
6	1	Locking Piston	TT0701-313B-005
7	1	Smalley Wave Spring C125-H10	PUR-TWS1080-128
8	3	O-Rings 1 3/4" x 2" x 1/8" 2-224	PUR-TORV000-224
9	6	Back-Up Rings 1 3/4" x 2" x 1/8" 8-224	PUR-TOBU000-224
10	2	O-Ring 1 1/16" x 1 1/4" x 3/32" 2-121	PUR-TORV000-121
11	4	Back-Up Rings 1 1/16" x 1 1/4" x 3/32" 8-121	PUR-TOBU000-121
12	1	O-Ring 1 3/16" x 1 5/16" x 1/16" 2-025	PUR-TORV000-025
13	8	Steel Ball Bearings 13/32"	PUR-TSBC000-026
14	1	Steel Ball Bearing 3/4" (not shown)	PUR-TSBC000-048
15	8	Brass Slotted Shear Screws 10-32 x 3/8"	PUR-TBSS121-024

Tool Name: 3.125 in. FDL Hydraulic Disconnect

Product Code: TT0701-313B **Tool OD:** 3.125 in. **Tool ID:** 0.688 in.

Material: 4140 HT 285-341 Bhn **Tool Length:** 33.0 in.

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: 127,500 lbs at the internal fishing neck of the Bottom Sub **when** fishing with a pulling tool; 190,000 lbs at the Collet Fingers on the Collet Section.

Burst Point and Burst Pressure: The Burst Point of the tool is the Collet Section at the top end of the tool at 37,700 psi

Torsional Weak Point and Ft-Lbs to Yield: The Torsional Weak Point of the Tool would be the Stub Acme Connection between the Top Sub and the Collet Section at 5,678 ft-lbs.

Recommended Make Up Torque:

1st Connection: Stub Acme Connection on Top Sub, 1,419 ft-lbs.

Shear Value of Brass Shear Screws: 680 psi (+/- 15%) per shear screw

Ball Range to Function Tool : ¾ in. - 15/16 in.

Fishing Profile: When disconnected, the tool leaves a 3 in. GS FA internal fishing neck looking up.

1.0 Pre-Assembly



Warning: *Make sure all tool parts and components have been thoroughly cleaned or serious damage and/or injury could occur!*



Note: *Verify that the correct O-ring redress kit and quantities are used as specified on the Bill Of Materials (for example, 5 each etc....). Lay out all redress kit components on a clean surface.*



Note: *Make sure to lubricate all O-rings and threaded surfaces.*



Note: *Visually inspect all parts for damage or wear. Thread parts together without the O-rings to check fit. Repair or replace damaged parts.*



Caution: *Always file wrench marks or burrs and clean off debris!*

2.0 Assembly

2.1 Install all O-rings and Backup rings. When using Backup rings, the order is; Backup, O-ring, Backup.

2.2 Grease the collet of the Collet Section (item #2) and grease the entire ID of the Bottom Sub (item #3).

2.3 Install the Bottom Sub onto the Collet Section so that the grooves in the Bottom Sub align with those on the Collet Section. Hold on to the Collet Section and use a rubber mallet to drive the two pieces together.

2.4 Vise the assembly in the middle of the Collet Section.



Caution: *Do not vise on the holes, as this can damage the tool!*

2.5 Grease the entire ID and holes of the Load Piston (item #4). Insert the 8 Steel Balls (item # 13) into the piston holes. The grease should hold the balls in place.

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Note: *If you put the Wave Spring (item #7) into the piston, it will help hold the balls in the place during the next steps.*

2.6 Push the Load Piston into the Collet Section as far as you can, then use a brass rod and a hammer to drive in the piston. Continue driving the piston in until it is about a 0.50 in. (1.5 cm) past the ID threads of the Collet Section.

2.7 Hold the Shear Ring (item #5) and Top Sub (item #1) together, then insert them into the Collet Section. Thread the Top Sub until it shoulders out, then unscrew and remove the sub and Shear Ring.



Note: *This step ensures that the piston is positioned correctly.*

2.8 Remove the Wave Spring (item #7) from the Load Piston (item #4). Using a flashlight, visually inspect that all 8 Steel Balls (item #13) are still in place.

2.9 Grease the entire ID of the Locking Piston (item #6) and the O-rings. Slide the Shear Ring (item #5) over the end of the piston without an O-ring, until it is positioned over the groove above the O-ring. Then depending upon your required shear values, insert 1-6 Shear Screws (item #15).

2.10 Put the Wave Spring (item #7) onto the Locking Piston and insert into the Collet Section, using a brass rod to centralize (rod OD should not be larger than the ID of the Locking Piston).

2.11 Lastly, thread on the Top Sub (item #1) and make wrench tight.

3.0 Disassembly

3.1 Vise the assembly in the middle of the Collet Section (item #2).



Caution: ***Do not vise on the holes, as this can damage the tool!***

3.2 Remove the Top Sub (item #1). If the Shear Ring and Locking Piston (item #5 and #6) did not come out with the Top Sub, remove the assembly from the vise and drop, Collet Section end first, on a wood block.



Note: *The Wave Spring (item #7) should come out after the assembly has been dropped on the block, however if it did not, remove by hand.*

3.3 Place the assembly back in the vise, in the middle of the Collet Section.

3.4 There are two ways to loosen the connection between the Collet Section (item #2) and Bottom Sub (item #3).

A. **Steel Ball Method-** Insert one of the balls into the Collet Section. Thread the Top Sub (item #1) far enough in so that the other Steel ball can be inserted. Now using a strap wrench, screw in the Top Sub until the Collet Section and Bottom Sub have separated at least 2-3 in. (5-8 cm). Remove the balls and sub.

B. **Brass Rod and Hammer Method-** Take a brass rod that has an OD the same size as the OD of the Load Piston (item #4) and insert into the Collet Section. Now using the hammer, strike the rod until the Collet Section and Bottom Sub have separated at least 2-3 in. (5-8 cm).

3.5 Move the assembly down in the vise and clamp it in the middle of the Bottom Sub. Now using both hands, grab onto the Collet Section and pull it away from the sub.





Note: *It will take about 20 lbs of pull to separate the two parts.*

3.6 Finally remove the Load Piston from the Collet Section by dropping the section, collet end up, on a wood block.



Note: *Remove and discard all O-rings. Replace O-rings after each use. Thoroughly clean tool parts in a cleaner approved by state and/or local laws.*

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-  Note: *Visually inspect tool for swelling after each use. Damaged or swelled components must be replaced.*
-  Note: *It is recommended that a Magnetic Particle Inspection (MPI) be completed on all components after each job.*