



# HYDROSET II with FLAT TOP

## 7" X 2-3/8" X 2-3/8"

Manual No:  
**DL-905-7000-034**

Revision: **D**

Revision Date:  
**08/17/2018**

Authored by: *B.Mathis*

Approved by: *F.Johnson*

### A) DESCRIPTION

The Hydroset II Packer is a hydraulic set, mechanically held dual string production packer normally run above a single string hydraulic set or wireline set seal bore packer. Because no tubing manipulation is required to set this packer, the well head can be installed and flanged up before setting.

This packer is available with short string or long string setting capabilities and a variety of tubing connections. This packer is also adaptable for electrical submersible pump applications. This packer features a sequential upper slip release system designed to release each slip individually to reduce the pull required to release the packer. The angles on the upper slips and upper slip body result in the slips releasing smoothly from the casing.

### B) SPECIFICATION GUIDE

CASING			TOOL			PART NUMBER
SIZE (INCHES)	WEIGHT (LBS/FT)	RECOMMENDED HOLE SIZE (INCHES)	GAGE OD (INCHES)	LONG STRING ID (INCHES)	SHORT STRING ID (INCHES)	
7	17.0 – 26.0	6.276 – 6.538	6.062	1.94	1.94	90572-BAB
	26.0 – 32.0	6.094 – 6.276	5.938	1.94	1.94	90570-BAB
	29.0 – 35.0	6.004 – 6.184	5.875	1.94	1.94	90571-BAB-BAB

THREAD CONNECTION	
LONG STRING BOX UP / PIN DOWN	SHORT STRING BOX DOWN
2-3/8 EUE	2-3/8 EUE

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
4,500 PSI	18,500 LBS*

\*Using all eight (8 qty) releasing shear screws.

SETTING				
SETTING AREA (SQ INCHES)	SHEAR VALUE (PSI/SCREW)	INITIATION PRESSURE (PSI)	MINIMUM SETTING PRESSURE (PSI)	RECOMMENDED SETTING PRESSURE (PSI)
14.10	168	1,347	1,986	2,978

RELEASING
Shear release is adjustable from 15,000 to 40,000 lbs (5,000 lbs increments). Minimum of 3 shear screws required.



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## C) PRE-INSTALLATION INSPECTION PROCEDURES

**CAUTION1:** D&L ships tool connections made-up **HAND TIGHT**—labeled with hand-tight tape on the tool (Fig. 1)—unless stated otherwise. Tighten/torque all connections properly before operating tool.



Fig. 1

GENERAL THREAD CONNECTION TORQUE RECOMMENDATIONS			
STUB ACME / ACME THREADS	INTERNAL TAPERED TUBING THREADS		PREMIUM THREADS
	UP TO 2-3/8"	GREATER THAN 2-3/8"	
600 – 800 FT-LBS	600 – 800 FT-LBS	800 – 1,200 FT-LBS	Consult thread manufacturer's recommendations.

**NOTE6:** Do not tighten long string mandrel (2) into flat top (1) with more than 200 ft-lbs of torque.

GENERAL SCREW TORQUE RECOMMENDATIONS									
SCREW SIZE (INCHES)	#6	#8	#10	1/4	5/16	3/8	7/16	1/2	5/8 and larger
TORQUE RANGE (INCH-POUNDS)	5 – 8	10 – 15	18 – 25	25 – 40	50 – 80	90 – 135	160 – 210	250 – 330	450 – 650

Before first use, D&L recommends disassembly and inspection of the tool unless stated otherwise. Ensure parts have not been damaged during shipping. Replace damaged parts with D&L replacement parts. Contact D&L sales for replacement part information.

Re-assemble the tool after inspection. Install parts in the correct order and orientation. Properly tighten connections.

Before re-using the tool, D&L recommends disassembly and inspection of the tool. Clean parts and ensure parts are in good working condition. Replace worn or damaged parts with D&L replacement parts.

When redressing the tool, D&L recommends replacement of all seals, elements, o-rings, shear screws, etc. Contact D&L sales for redress kit and/or other replacement part information.

## D) OPERATION

**CAUTION2:** Do not run the tool without properly tightening connections. Running the tool with loose connections may damage the tool and cause malfunction.

When tubing pressure is applied to the packer, the inlet port allows pressure differential to be present in the setting chamber. This differential forces the setting mandrel to separate from the setting cylinder, shearing the setting shear screws. The setting cylinder is forced down, which shears the lower slip body shear screws and sets the lower slips. The setting mandrel is forced up, which shears the upper slip body shear screws, and sets the upper slips and packs off the elements. Any relative motion between the setting cylinder and the setting mandrel is held in place by the lock ring, which will ratchet in only one direction. With a pressure differential from above, the force is transferred through the outer components of the packer and is supported by the lower slips. With the pressure differential from below, the force transfers through the outer components of the packer and is supported by the upper slips.

### D-1) SETTING PROCEDURES

Running speed is critical, especially in heavy or viscous fluid where excess speed can result in swabbing off the packing element or in creating pressure waves which could lead to creating a preset condition. As a guide it is recommended that running speed should not be more than 30 seconds per joint (range II or 30 feet). **Do not exceed this speed**, particularly when running the packer in the heaviest weight casing for the range for which the packer is dressed.

A run in the well with a junk basket and suitable sized gauge ring or a bit and scraper is strongly recommended prior to running. The location of any tight spots should be noted and the running speed for the packer through these spots should be reduced.



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### D) OPERATION (cont'd)

Being a hydraulically set packer, it can be subject to preset conditions by pressure waves through the fluid. A slow steady running speed should be used and sudden stops and starts, such as when setting or pulling slips, should be avoided. Make up the packer to the tubing string in the desired position and to the required torque.

Allow at least 30 minutes for the packer to equalize thermally before setting. Temporarily plug the long string below the packer and apply a minimum of 1,986 psi differential in the tubing at the packer and hold it for 30 minutes. The packer should now be fully set and can be pressure tested if desired.

#### D-2) RELEASING PROCEDURES

The packer is released by a straight pick up on the long string. The shear release value is adjustable from 15,000 lbs to 40,000 lbs (in 5,000 lbs. increments—see technical illustration).

The long string mandrel can carry a maximum of 58,500 lbs below the packer. If the amount of tension required to shear the releasing shear screws plus the weight below the tool exceeds 58,500 lbs, a Telescoping Union should be run directly below the packer. The shear release value is adjustable from 15,000 to 40,000 lbs (5,000 lbs increments). A minimum of 3 shear screws are required.

### E) ELASTOMER TRIM TEMPERATURE GUIDE

TEMPERATURE RANGE (F°)			
TEMPERATURE RANGE (F°)	DUROMETER		
	END	MIDDLE	END
40° - 125°	60	60	60
125° - 300°	80	70	80
300° +	Contact D&L Sales		

RUBBER TYPE	TEMPERATURE RANGE
NITRILE	40° - 250°F
HSN (HNBR)	70° - 300°F
VITON	100° - 350°F

### F) RECOMMENDED HAND TOOLS

- VISE
- GLOVES
- ALLEN WRENCHES
- TAPE MEASURE
- O-RING PICK
- BAR
  - 1/2-INCH
  - 3/4-INCH
- PAINT BRUSH, 2-INCH
- PIPE WRENCH, 3-FT (2 EA)
- “CHEATER” PIPE, 4-FT LONG
- ADJUSTABLE WRENCH, 12-INCH
- CORDLESS DRILL, 18V
- SNAP RING SPREADER PLIERS
- ALIGNING PUNCH
- BOLTS, 1/4-20 X 1-1/4” LONG (4EA)
- SCREWDRIVER SET, FLAT-TIPPED
- SOCKET SETS
  - 3/8-INCH DRIVE
  - 1/2-INCH DRIVE
- HAMMERS
  - SLEDGE
  - BALL PEEN
  - DEAD BLOW

### G) DISASSEMBLY

G-1) Clamp flat top (1) in vise.

G-1.1) Unscrew and remove pup joint (24) and coupling (25).

G-1.2) Unscrew and remove pup joint (9) and crossovers (23).

G-1.3) Unscrew and remove shear screws (22).

G-1.4) Unscrew and remove shear sleeve (20) from lower slip body cap (19).

G-1.5) Unscrew and remove socket cap (torque) screws (7) and shear screws (6) from lower slip body (15).

G-1.6) Slide lower slip body assembly off of lower cone (16), long string mandrel (2) and short string mandrel (3).



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## G) DISASSEMBLY (cont'd)

G-1.7) Disassemble lower slip body assembly:

G-1.7.1) Unscrew and remove lower slip body cap (19) from lower slip body (15).

G-1.7.2) Remove alignment mandrel (26) from lower slip body cap (19). Remove o-ring (27).

G-1.7.3) Remove lower slips (21), button head screws (29), and slip springs (28) from lower slip body (15).

G-1.7.3.1) Unscrew and remove button head screws (29) to remove slip springs (28) from lower slips (21).

G-1.8) Remove pick up ring (18) from long string mandrel (2)

G-1.9) Unscrew and remove long string mandrel (2) from flat top (1). Pull long string mandrel (2) out through lower cone (16).

**NOTE:** Do NOT wrench or clamp on seal surface.

G-1.10) Remove setting mandrel assembly (13, 14, 16, and 17) from short string mandrel (3).

G-1.11) Disassemble setting mandrel assembly:

G-1.11.1) Unscrew and remove lower cone (16) from setting chamber (14) and remove o-rings (27, 30).

G-1.11.2) Unscrew and remove shear screws (6).

G-1.11.3) Rotate setting mandrel (13) to remove it from locking ring (17) and out of setting chamber (14). Remove o-ring (31).

G-1.11.4) Unscrew and remove locking ring (17) from setting chamber (14).

G-1.11.5) Remove o-rings (27) from setting mandrel (13).

G-1.12) Remove elements (10, 11) and rubber spacers (12) from short string mandrel (3).

G-1.13) Remove short string mandrel (3) from flat top (1).

**NOTE:** Do NOT wrench or clamp on seal surface.

G-1.14) Unscrew and remove upper slip body assembly from flat top (1) and disassemble:

G-1.14.1) Remove shear screws (6) and socket cap (torque) screws (7) from upper slip body (4).

G-1.14.2) Slide upper cone (5) out of upper slip body (4). Remove o-rings (27).

G-1.14.3) Remove upper slips (8), button head screws (29), and slip springs (28) from upper slip body (4).

G-1.14.3.1) Unscrew and remove button head screws (29) to remove slip springs (28) from upper slips (8).

G-2) Unclamp and remove flat top (1) from vise.



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## H) ASSEMBLY

H-1) Clamp flat top (1) in vise.

H-1.1) Assemble upper body assembly:

H-1.1.1) Install and secure slip springs (28) to upper slips (8) using button head screws (29).

H-1.1.2) Install upper slip assemblies into upper slip body (4).

H-1.1.3) Install o-rings (27) into upper cone (5), then slide upper cone (5) into upper slip body (4).

**CAUTION:** Do NOT rip or tear o-rings on threads while installing into upper slip body.

H-1.1.4) Install shear screws (6) and socket cap (torque) screws (7) to secure upper cone (5) to upper slip body (4).

H-1.2) Screw upper slip body assembly into flat top (1).

H-1.3) Screw short string mandrel (3) into flat top (1).

H-1.4) Slide elements and rubber spacers (10, 11, 12) onto short string mandrel (3),

H-1.5) Assemble setting mandrel assembly:

H-1.5.1) Install o-rings (27) into setting mandrel (13).

H-1.5.2) Install o-ring (31) into setting chamber (14).

H-1.5.3) With setting mandrel (13) on bench with thread facing up, CAREFULLY slide setting chamber (14) onto setting mandrel (13).

H-1.5.4) With holes aligned, screw a shear screw (6) through setting chamber (14) and into setting mandrel (13).

**NOTE:** Install one shear screw to assist and hold parts together temporarily.

H-1.5.5) Insert locking ring (17) into setting chamber (14) and screw it onto setting mandrel (13) until locking ring (17) is flush with lower end of setting mandrel (13).

H-1.5.6) Install o-rings (27, 30) on lower cone (16).

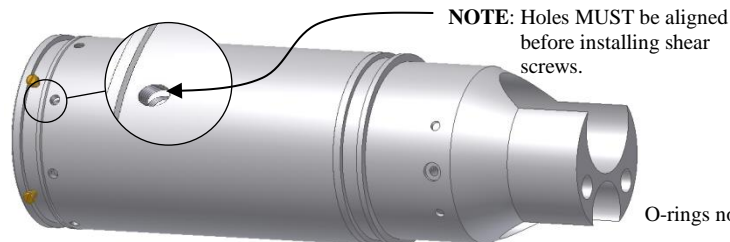
H-1.5.7) CAREFULLY start the lower cone (16) into the setting chamber (14).

**CAUTION:** Do NOT rip or tear the o-rings on the threads while installing into the setting chamber.

H-1.5.8) Screw lower cone (16) into setting chamber (14) until they shoulder.

H-1.5.9) Remove shear screw (6) from setting chamber (14).

H-1.5.10) Rotate setting chamber (14) and lower cone (16) in unison about setting mandrel (13) until holes for strings align.



H-1.5.11) Align set screw holes in setting chamber (14) with setting mandrel (13). Looking from lower end of lower cone (16), rotate setting chamber (14) and lower cone (16) clockwise until shear screw holes align with pockets in setting mandrel (13).

**NOTE:** This should NOT take more than 45° rotation.

H-1.5.12) Install shear screws (6). Tighten and back off 1/4 turn.



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## H) ASSEMBLY (cont'd)

H-1.5.13) Backing up on setting chamber (14), back off lower cone (16) just enough to allow holes for short & long strings (2, 3) to align again.

H-1.6) Slide the setting mandrel assembly onto the short string mandrel (3).

**CAUTION:** Do NOT rip or tear the o-rings on the threads while installing.

H-1.7) Screw long string mandrel (2) into flat top (1).

H-1.8) Install pick up ring (18) onto long string mandrel (2).

H-1.9) Assemble lower slip body assembly:

H-1.9.1) Install and secure slip springs (28) to lower slips (21) using button head screws (29).

H-1.9.2) Install lower slip assemblies into lower slip body (15).

H-1.9.3) Install o-ring (27) into the lower slip body cap (19).

H-1.9.4) Screw alignment mandrel (26) into lower slip body cap (19).

H-1.9.5) Screw lower slip body cap (19) into lower slip body (15).

H-1.10) Slide lower slip body assembly onto lower cone (16). Install shear screws (6) and socket cap (torque) screws (7). Tighten shear screws and back off 1/4 turn.

**NOTE:** Back off lower slip body cap (19) as needed to align short and long string mandrels (2, 3).

H-1.11) Screw shear sleeve (20) into lower slip body cap (19) until shouldered. Back off shear sleeve (20) just enough to install releasing shear screws (22).

**NOTE:** Install quantity of releasing shear screws (22) needed to achieve desired shear value.



H-1.12) Install pup joints (9, 24), couplings (25) and crossovers (23).

H-2) Unclamp and remove flat top (1) from vise.



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### I) PRESSURE TEST

#### I-1) ASSEMBLY

**NOTE<sub>7</sub>:** Prior to testing, all o-rings must be properly installed and in good condition (no rips, tears, cuts, etc).

- I-1.1) Remove all but one of setting shear screws (6) from setting chamber (13).
- I-1.2) Install two halves of pressure test ring (P1) into groove in lower cone (16).
- I-1.3) Screw cap screws (P3) into pressure test ring (P1)
- I-1.4) Install two halves of pressure test ring (P1) into groove in long string mandrel (2).
- I-1.5) Screw cap screws (P3) into pressure test ring (P1)
- I-1.6) Install threaded rods (P2) through holes in pressure test rings (P1).
- I-1.7) For each end of threaded rods (4 total), install one (1ea) flat washer (P5) and two (2ea) hex nuts (P4). Thread hex nuts (P4) onto threaded rods (P2) until washers and nuts are snug against rings.
- I-1.8) Fill the setting port with hydraulic oil or inhibited water.
- I-1.9) Apply pressure to the setting port. Hold and observe for leaks.

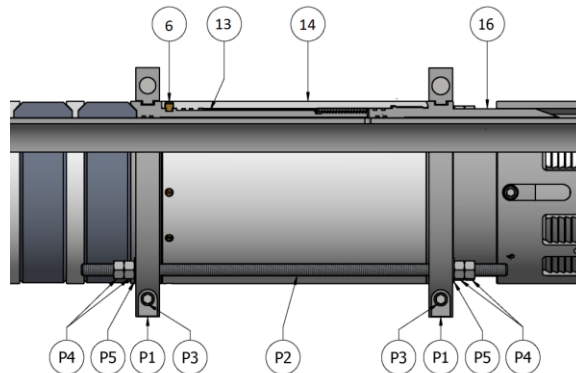
**WARNING: Do NOT exceed 1,000 PSI. To test over 1,000 PSI contact D&L sales.**

- I-1.10) Release pressure, remove pressure test kit, and re-install setting shear screws (6) in setting chamber (13).

#### I-2) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 94570PTF	P/N 94572PTF
P1	2	PRESSURE TEST RING (2 HALVES PER SET)	DLMS110	94570PTF001	94572PTF001
P2	8	THREADED ROD 1/2-13 UNC	STEEL	94555PTF002	94555PTF002
P3	4	CAP SCREW 1/2-13 UNC X 1"	STEEL	SCS050C100	SCS050C100
P4	32	STEEL HEX NUT .500-13 UNC	STEEL	SHN050C	SHN050C
P5	16	FLAT WASHER 1/2	STEEL	FW050	FW050

#### I-3) TECHNICAL ILLUSTRATION





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### J) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	17.0 – 26.0# P/N 90572-BAB	26.0 – 32.0 P/N 90570-BAB	29.0 – 35.0 P/N 90571-BAB-BAB
1	1	FLAT TOP	DLMS80	90570611		90571611
2	1	LONG STRING MANDREL	DLMS80	90570213		
3	1	SHORT STRING MANDREL	DLMS80	90570221		
4	1	UPPER SLIP BODY	DLMS110	90570321		90571321
5	1	UPPER CONE	DLMS80	90572411	90570411	90571411
6	16	SHEAR SCREW (2375#)	DLM360BRS	60100990		
7	4	SOCKET CAP SCREW 3/8-16 X 3/8	STEEL	SCS037C037		
8	4	UPPER SLIP	DLMS35	90570111		
9	1	PUP JOINT 24"	DLMS80	PJ-BBB-24-B	PJ2375N24L80	
10	2	ELEMENT	80 DURO NITRILE	90570512		90571512
11	1	ELEMENT	70 DURO NITRILE	90570511		90571511
12	2	RUBBER SPACER	DLMS80	90572841	90570841	90571841
13	1	SETTING MANDREL	DLMS80	90572750	90570750	90571750
14	1	SETTING CHAMBER	DLMS110	90572755-C	90570755	90571755
15	1	LOWER SLIP BODY	DLMS80	90570316		90571316
16	1	LOWER CONE	DLMS80	90572421	90570421	90571421
17	1	LOCKING RING	DLMS80	90570720		
18	1	PICK UP RING	DLMS80	94570760	90570760	
19	1	LOWER SLIP BODY CAP	DLMS80	90570335		90571335
20	1	SHEAR SLEEVE	DLMS60	94570740	90570740	
21	4	LOWER SLIP	DLMS35	90570131		





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### J) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	17.0 – 26.0# P/N 90572-BAB	26.0 – 32.0 P/N 90570-BAB	29.0 – 35.0 P/N 90571-BAB-BAB
22	8	SHEAR SCREW 1/2-13 w/.418 DOG POINT (5000#)	DLM360BRS	65050902		
23	2	CROSSOVER	DLMS80	CH-BBB-BAB-B-1	CH2375N2375ESC	
24	1	PUP JOINT 48"	DLMS80	PJ-BBB-48-B	PJ2375N-48-L80	
25	1	COUPLING	DLMS80	CP-BAB-BBB-B-1	CP2375N2375E-SC	
26	1	ALIGNMENT MANDREL	DLMS60	90570215		
27	7	229-90 O-RING	90 DURO NITRILE	90229		
28	8	SLIP SPRING		72455950	72470950	
29	8	BUTTON HEAD CAP SCREW #10-24	STEEL	BHSC1024C025	BHSC010C025	
30	1	252-90 O-RING	90 DURO NITRILE	90252		
31	1	254-90 O-RING	90 DURO NITRILE	90254		

REDRESS KIT (RDK)		90572-B-B-050	90570-B-B-050	90571-B-B-050
ASSEMBLED WEIGHT		289 LBS	284 LBS	276 LBS



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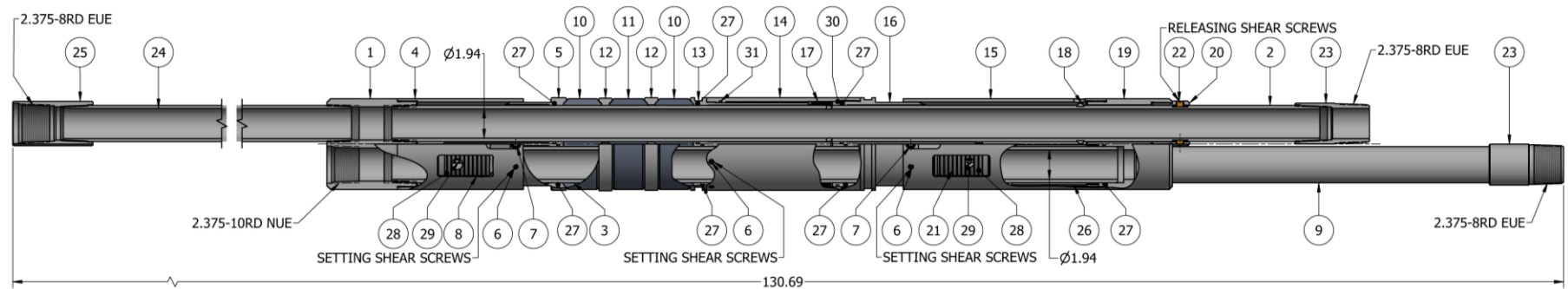
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### K) TECHNICAL ILLUSTRATION



PART NUMBER	GAGE OD
90572-BAB	6.062
90570-BAB	5.938
90571-BAB-BAB	5.875

### L) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
08/17/2018	D	Revised entire manual	J.Anderson	K.Riggs