



#09 MODEL “H” HYDRAULIC SETTING TOOL, 3 PISTON, BLANK TOP SUB

Manual No:
DL-391-09-1277

Revision: C

Revision Date:
08/15/2022

Authored by: J.Anderson

Approved by: K.Plunkett

A) DESCRIPTION

The Model “H” Hydraulic Setting Assembly (HST) is a hydraulic setting tool designed for setting packers and plugs without pipe manipulations in deep, high-temperature wells. It is used to set packers and plugs that are normally set with a Model “E-4” Wireline Pressure Setting Assembly (or similar wireline setting equipment). The same adapter kit that is used on wireline can be used with the Model “H” HST.

The Model “H” HST and packer (or plug) is run in on the tubing to the desired setting depth and a ball is dropped to the HST. Pressure is applied to close the fill ports, which also opens the setting pistons to pressure. As pressure is applied, force is transmitted to the packer (or plug) to set. Tubing tension can also be applied to supplement the setting force generated by the pressure applied.

The standard setting tool comes with three pistons, but additional pistons can be added to reduce setting pressure.

Features include:

- The primary feature of the D&L Model "H" Hydraulic Setting Assembly is that it permits setting on tubing equipment, which could previously be set only with wireline setting tools. This is particularly advantageous in high angle or deviated wells where wireline setting is extremely difficult.
- Premature setting is prevented by means of a shear screw in the cross link sleeve.
- The tubing fills automatically as it is run in the hole through a ported top sub in the setting assembly. These ports also permit circulation through the setting assembly at any time.

B) RELATED TOOLS (sold separately)

B-1) Wireline adapter kits (WLAK) (PN varies)—refer to applicable technical manual.

B-2) Wireline set tools (PN varies)—refer to applicable technical manual.

C) SPECIFICATION GUIDE

SIZE (INCHES)	TOOL OD (INCHES)	STROKE LENGTH (INCHES)	TOTAL EFFECTIVE PISTON AREA (IN ²)	CONNECTION		PART NUMBER
				TOP	BOTTOM (BAKER E-4)	
#09	2.700	9.44	9.814	BLANK / SIZE #09		39109-3-XD 39109H-3-XD ¹ 39109V-3-XD ²

Elastomer Trim Options: ¹HSN, ²Viton

NOTE₁: Replace temporary steel set screw used for shipping with brass shear screw before running.

TENSION (MAX LBS)
51,000

D & L OIL TOOLS
P.O. BOX 52220 TULSA, OK 74152
PHONE: (800) 441-3504 www.dloiltools.com



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D) 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.

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.

E) OPERATION

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

The Model "H" Hydraulic Setting Assembly uses the same wireline adapter kit (WLAK) used with the Baker wireline pressure setting assembly. To set packer or plug with the hydraulic setting tool, make up the hydraulic setting tool to the WLAK and the packer or plug. Run the pressure setting assembly downhole on tubing to the desired setting depth.

With the pressure setting assembly at the desired setting depth, pump the setting ball down the tubing to its seat in the support sleeve of the hydraulic setting tool. Apply 1,200 psi to shear the shear screws in the support sleeve and close off the top sub ports.

Continue to hold a minimum of 800 psi to force the pistons and cross link sleeve downward. The setting mandrel remains stationary while the cross link sleeve forces the WLAK and the packer or plug body downward. The resulting squeeze action applied to the packer or plug forces the slips to set and the elements to pack off. Apply tension and/or pump pressure to complete setting of the packer or plug and releasing of the pressure setting assembly.

Pick up on the work string to remove the hydraulic setting assembly from the well. As the pistons move downwards, cylinder ports open to allow the fluid in the tubing to unload.



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F) APPLIED FORCE WITH PRESURE

NOTE₂: Piston Area = 3.271 in² / piston

PSI	FORCE (LBS)	
	w/2 PISTONS (Total Area = 6.543 in ²)	w/3 PISTONS (Total Area = 9.814 in ²)
1,000	6,543	9,814
2,000	13,086	19,628
3,000	19,629	29,442
4,000	26,172	39,256
5,000	32,715	49,070
6,000	39,258	N/A

CAUTION₄: Some packers may not be energized by mechanical pull after slips are set. It is your responsibility to identify these packers and set with pressure only.

G) STORAGE RECOMMENDATIONS

When preparing the tool for storage, follow the Pre-Installation Inspection Procedures. Re-assemble the tool with connections hand-tight only and in running position if applicable. Elastomers should be in a relaxed state—free from tension, compression or other deformation.

Store the tool, if possible, in an enclosed, temperature and humidity controlled environment. Avoid excessively high temperatures over long periods of time. Shield elastomeric parts from ultraviolet light sources. Keep tool dry and protected from condensation. Do not store in contact with or near volatile or corrosive chemicals. Do not store near ozone generating equipment or operations such as welding.

H) ELASTOMER TRIM TEMPERATURE GUIDE

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

I) 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
- SCREWDRIVER SET, FLAT-TIPPED
- SOCKET SETS
 - 3/8-INCH DRIVE
 - 1/2-INCH DRIVE
- HAMMERS
 - SLEDGE
 - BALL PEEN
 - DEAD BLOW



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J) DISASSEMBLY

J-1) Clamp lower end of lower cylinder (4) in vise.

J-1.1) From upper end of tool, unscrew and remove top sub assembly from upper cylinder (4).

J-1.1.1) Remove o-ring (21) from top sub (1).

J-1.1.2) Unscrew and remove piston stop (2) from top sub (1).

J-1.1.3) Unscrew and remove shear screws (15) from top sub (1).

J-1.1.4) Remove support sleeve (3) from top sub (1).

J-1.1.4.1) Remove o-rings (20) from support sleeve (3).

J-1.2) Unscrew and remove upper cylinder (4) from cylinder connector (14).

J-1.3) Remove upper piston assembly from cylinder connector (14) and disassemble:

J-1.3.1) Unscrew and remove piston rod (13) from piston cap (12).

J-1.3.2) Remove o-rings (19, 23) from piston cap (12).

J-1.4) Unscrew and remove cylinder connector (14) from middle cylinder (4).

J-1.4.1) Remove o-rings (22, 23) from cylinder connector (14).

J-1.5) Unscrew and remove middle cylinder (4) from cylinder connector (14).

J-1.6) Remove middle piston assembly from cylinder connector (14) and disassemble:

J-1.6.1) Unscrew and remove piston rod (13) from piston cap (12).

J-1.6.2) Remove o-rings (19, 23) from piston cap (12).

J-1.7) Unscrew and remove cylinder connector (14) from lower cylinder (4).

J-1.7.1) Remove o-rings (22, 23) from cylinder connector (14).

J-1.8) Moving to lower end of tool, unscrew and remove set screws (18) from lower coupling (17).

J-1.9) Unscrew and remove lower coupling (17) from setting mandrel (9).

J-1.10) Unscrew and remove shear screw (15) from cross link sleeve (6).

J-1.11) Unscrew and remove head cap screw (16) from cross link sleeve (6).

J-1.12) Unscrew setting mandrel (9) from cylinder head (5).

J-1.13) Move setting mandrel (9), piston rod (8), and cross link sleeve (6) downwards until cross link (10) can be removed. Remove cross link (10).

J-1.14) Remove cross link sleeve (6) from setting mandrel (9).

J-1.14.1) Remove cross ring (11) from cross link sleeve (6).

J-1.15) Remove setting mandrel (9) from piston rod (8).

J-1.16) Unscrew and remove cylinder head (5) from lower cylinder (4).

J-1.17) Remove lower piston assembly from lower cylinder (4) and disassemble:

J-1.17.1) Unscrew and remove piston rod (8) from lower piston (7).

J-1.17.2) Remove o-ring (23) from lower piston (7).

J-2) Unclamp and remove lower cylinder (4) from vise.



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K) ASSEMBLY

NOTE3: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, and orientation and tighten/torque all connections properly.

CAUTION4: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread reliefs (Fig. 2).

K-1) Clamp lower cylinder (4) in vise.

K-1.1) Assemble lower piston assembly and install:

K-1.1.1) Install o-ring (23) in o-ring groove in lower piston (7).

K-1.1.2) Screw piston rod (8) into lower piston (7).

K-1.1.3) Install lower piston (7) into lower cylinder (4).

CAUTION3: Do not rip or tear o-ring during installation.

K-1.2) Screw cylinder head (5) into lower cylinder (4).

K-1.3) Install setting mandrel (9) onto piston rod (8).

K-1.4) Install cross ring (11) onto cross link sleeve (6).

K-1.5) Install cross link sleeve (6) onto setting mandrel (9).

K-1.6) Align setting mandrel (9), piston rod (8), and cross link sleeve (6) slots and install cross link (10) into slots.

K-1.7) Screw setting mandrel (9) into cylinder head (5).

K-1.8) Align hole in cross ring (11) with threaded hole in cross link sleeve (6). Screw head cap screw (16) into cross link sleeve (6).

K-1.9) Align threaded hole in cross link sleeve (6) with recessed hole in setting mandrel (9).

K-1.10) **TEMPORARILY** screw a long 1/4-20 UNC steel bolt into cross link sleeve (6) to allow further assembly without damaging shear screw.

K-1.11) Screw lower coupling (17) onto setting mandrel (9).

K-1.12) Screw set screws (18) into lower coupling (17).

K-1.13) Install o-rings (22, 23) in o-ring grooves in cylinder connector (14).

K-1.14) Screw cylinder connector (14) into lower cylinder (4).

CAUTION3: Do not rip or tear o-ring during installation.

K-1.15) Assemble middle piston assembly and install:

K-1.15.1) Install o-rings (19, 23) in o-ring grooves in piston cap (12).

K-1.15.2) Screw piston rod (13) into piston cap (12).

K-1.15.3) Install piston rod (13) into cylinder connector (14).

K-1.16) Install middle cylinder (4) onto piston cap (12) and screw cylinder (4) onto cylinder connector (14).

CAUTION3: Do not rip or tear o-ring during installation.

K-1.17) Install o-rings (22, 23) in o-ring grooves in cylinder connector (14).

K-1.18) Screw cylinder connector (14) into middle cylinder (4).

CAUTION3: Do not rip or tear o-ring during installation.

K-1.19) Assemble upper piston assembly and install:

K-1.19.1) Install o-rings (19, 23) in o-ring grooves in piston cap (12).

K-1.19.2) Screw piston rod (13) into piston cap (12).

K-1.19.3) Install piston rod (13) into cylinder connector (14).

CAUTION3: Do not rip or tear o-ring during installation.

K-1.20) Install upper cylinder (4) onto piston cap (12) and screw cylinder (4) onto cylinder connector (14).

CAUTION3: Do not rip or tear o-ring during installation.

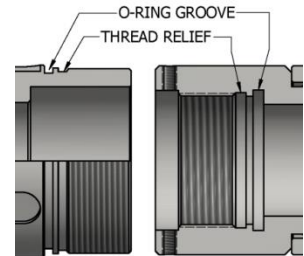


Fig. 2



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K) ASSEMBLY (cont'd)

K-1.21) Assemble top sub assembly and install:

K-1.21.1) Install o-rings (20) in o-ring grooves in support sleeve (3).

K-1.21.2) Install support sleeve (3) into top sub (1). Align groove at upper end of support sleeve (3) with threaded holes in top sub (1).

CAUTION: Do not rip or tear o-ring during installation.

K-1.21.3) Screw shear screws (15) into top sub (1). Tighten until shear screws (15) contact support sleeve (3). Back shear screws (15) out 1/4 turn.

K-1.21.4) Screw piston stop (2) into lower end of top sub (1).

K-1.21.5) Install o-ring (21) in o-ring groove in top sub (1).

K-1.21.6) Screw top sub (1) into upper cylinder (4.)

CAUTION: Do not rip or tear o-ring during installation.

K-1.21.7) Unscrew and remove temporary long 1/4-20 UNC steel bolt from cross link sleeve (6).

CAUTION: Failing to remove temporary long 1/4-20 UNC steel bolt will cause the tool to malfunction.

K-1.21.8) Screw shear screw (15) into cross link sleeve (6). Tighten until shear screw (15) contacts setting mandrel (9). Back shear screw (15) out 1/4 turn.

K-2) Unclamp cylinder (4) from vise and remove assembled tool.

K-3) Tool is ready to take to location. Remember to take correct size setting ball.

L) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 39109-3-XD
1	1	TOP SUB	DLMS110	39109101-XD
2	1	STOP	DLMSFB18	39109102
3	1	SUPPORT SLEEVE	DLMS110	39120103-1-0500
4	3	CYLINDER	DLMS110	39109104
5	1	CYLINDER HEAD	DLMS110	39109106
6	1	CROSS LINK SLEEVE	DLMS110	39109108
7	1	LOWER PISTON	DLMS110	39109113
8	1	PISTON ROD	DLMS110	39110112
9	1	SETTING MANDREL	DLMS110	39110109
10	1	CROSS LINK	DLMSFB4	39109111
11	1	CROSS RING	DLMS110	39109110
12	2	PISTON CAP	DLMS110	39109105A
13	2	PISTON ROD	DLMS110	39110105B
14	2	CYLINDER CONNECTOR	DLMS110	39109107
15	3	SLOTTED SHEAR SCREW (1200#) 1/4-20 UNC X 1/2	DLM360BRS	BSSSLT025C050
16	1	LOW HEAD SOCKET CAP SCREW 1/4-20 UNC X 1/4	STEEL	LHSC025C025



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L) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 39109-3-XD
17	1	LOWER COUPLING	DLMS110	39110114
18	4	SOCKET SET SCREW #10-24 UNC X 3/16	STEEL	SSS1024C018
19	2	121 O-RING	90 DURO NITRILE	90121
20	3	220 O-RING	90 DURO NITRILE	90220
21	1	227 O-RING	90 DURO NITRILE	90227
22	2	321 O-RING	90 DURO NITRILE	90321
23	5	329 O-RING	90 DURO NITRILE	90329
24	1	STEEL BALL 1/2	STEEL	SB0500

REDRESS KIT (RDK)	39109050-3
ASSEMBLED WEIGHT	79 LBS

L-1) ELASTOMER TRIM OPTIONS

NOTE: For temperature range, refer to Elastomer Trim Temperature Guide.

L-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 39109H-3-XD
19	2	121 O-RING	90 DURO HSN	90121H
20	3	220 O-RING	90 DURO HSN	90220H
21	1	227 O-RING	90 DURO HSN	90227H
22	2	321 O-RING	90 DURO HSN	90321H
23	5	329 O-RING	90 DURO HSN	90329H

REDRESS KIT (RDK)	39109050H-3
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L-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 39109V-3-XD
19	2	121 O-RING	90 DURO VITON	90121V
20	3	220 O-RING	90 DURO VITON	90220V
21	1	227 O-RING	90 DURO VITON	90227V
22	2	321 O-RING	90 DURO VITON	90321V
23	5	329 O-RING	90 DURO VITON	90329V

REDRESS KIT (RDK)	39109050V-3
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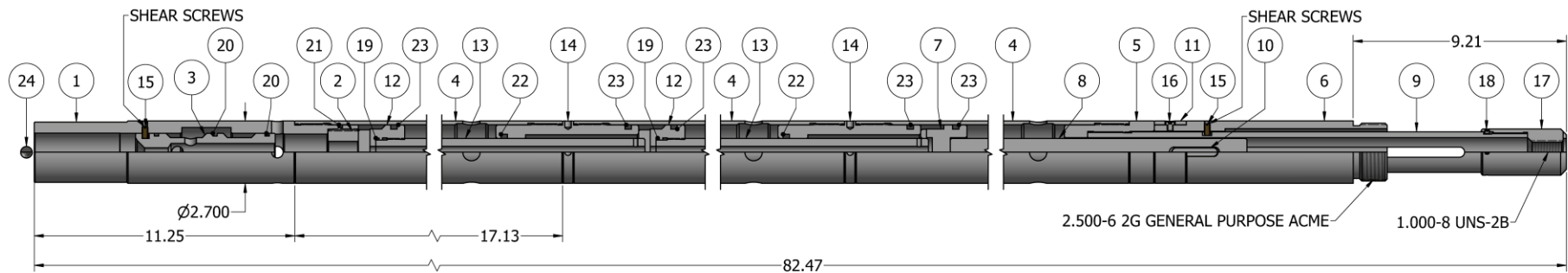
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M) TECHNICAL ILLUSTRATION



N) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
08/15/2022	C	Revised P/N SB0500 was SB050	J.Anderson	D.McKeon
04/30/2020	B	Add stroke length; Revised 39120103-1-0500 was 39120103-0500, 90220 qty 3 was 2, Removed 90219	J.Anderson	K.Plunkett
10/16/2019	A	Created new manual	-	-