NATIONAL OILWELL VARCO

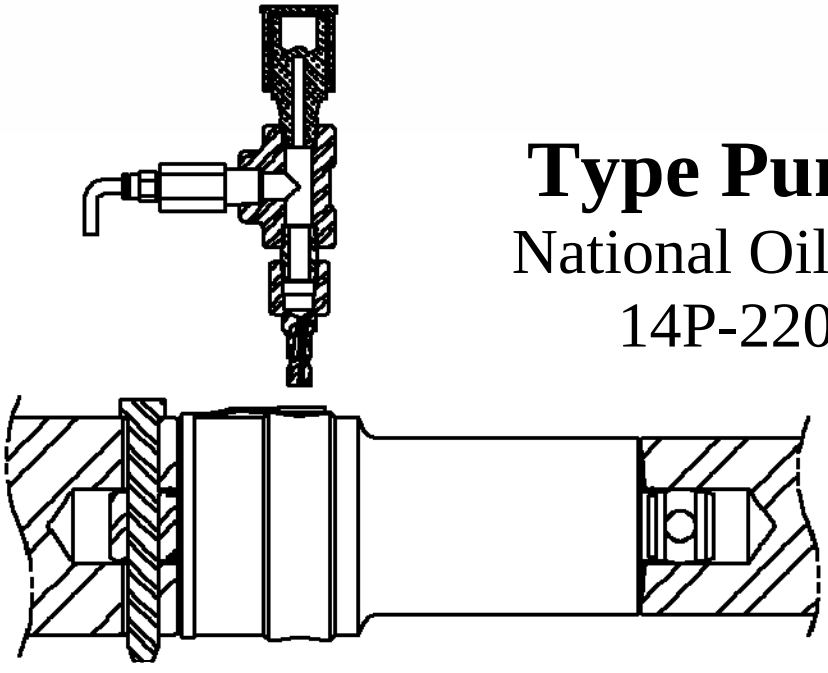
PATENT-PENDING



Blak-JAK™

HydrA-LIGN ROD™

Hydraulic Self Aligning Piston Rod Retention System



Type Pump

National Oilwell

14P-220

NATIONAL OILWELL VARCO

P.O Box 4638
Houston, Texas 77210-4638

MANUAL: 80-600-209

NATIONAL OILWELL VARCO

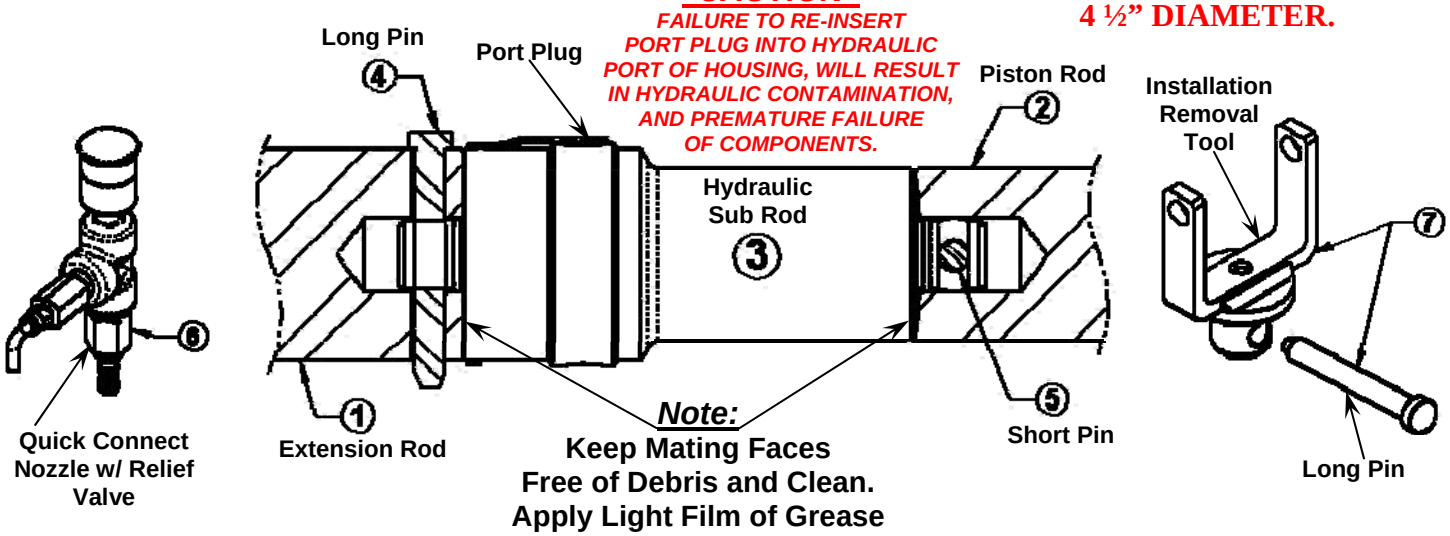
HydrA-LIGN ROD: NATIONAL (14P-220)

"WARNING"

DO NOT USE THIS PRODUCT ON LINERS SMALLER THAN 4 ½" DIAMETER.

"CAUTION"

FAILURE TO RE-INSERT PORT PLUG INTO HYDRAULIC PORT OF HOUSING, WILL RESULT IN HYDRAULIC CONTAMINATION, AND PREMATURE FAILURE OF COMPONENTS.



Note:

Keep Mating Faces Free of Debris and Clean. Apply Light Film of Grease

NOTE:

DO NOT EXCEED 3,000 PSI WITH HYDRAULIC PUMP RELIEF VALVE IS FACTORY SET TO RELIEVE PRESSURE IN EXCESS OF 3,000 PSI.

"CAUTION"

READ OPERATING MANUAL FOR HYDRAULIC PUMP PRIOR TO CONNECTING.

Installation Instructions

1. **Replace OEM Extension Rod With Extension Rod (Item 1).**
2. **Install Piston (Not Supplied) Onto Piston Rod (Item 2). Tighten Hex Nut Securely, Utilizing The Flats On Piston Rod. Maximum Torque When Lubricated: 750 Ft. Lb's.**
3. **Insert Installation Tool (Item 7) Into Front End Of Ext-Rod (Item 1). Use Long Pin Supplied.**
4. **Insert Assembled Piston Rod W/ Piston In Between Installation Tools (Item 7) Yoke. Insert Long Pin Supplied Through Yoke And Piston Rod.**
5. **Align Piston With Liner Bore, Rotate Pump (BY HAND ONLY) Until Piston Is In Liner Bore, Rotate Pump To The Full Forward Position. Pin Through Piston Rod Can Now Be Removed.**
6. **Rotate Pump In The Reverse Direction (BY HAND ONLY) To The Full Back Position. Remove Installation Tool (Item 7).**
7. **Insert Hydraulic Sub-ROD (Item 3) Into The Piston Rod (Item 2).**
8. **Insert Short Pin (Item 5) Through Both Piston Rod And Sub Rod.**
9. **Rotate Pump (BY HAND ONLY) Until Rods Are Mated.**

Note: Make Note Of Hole Position And Align Before Inserting.

Operating Instructions

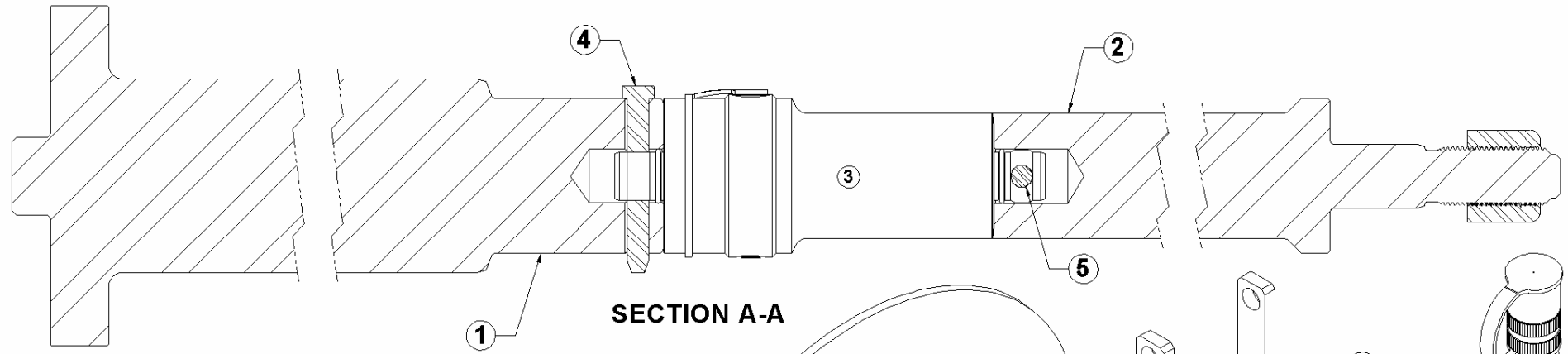
1. **After Installation Is Complete, Attach Hand Pump To Quick Connect Nozzle (Item 6).**
2. **Remove Port Plug From Hydraulic Sub-ROD (Item 3). Insert Quick Connect Nozzle (Item 6) Into Female Port In Hydraulic Sub-ROD (Item 3).**
3. **Pressurize Hydraulic Sub-Rod (Item 3) To #3,000 P.S.I. Maximum.**
4. **Insert Long Pin (Item 4) Through Both Ext- Rod And Sub Rod. Tapping On Top Of Pin (Item 4) Is Permissible. As Log As 3,000 PSI Is Maintained.**
5. **After Pin (Item 4) Is Seated, Release Pressure From Hand Pump.**
6. **With Hydraulic Pressure Released, Remove Quick Connect Nozzle (Item 6). And Replace Port Plug.**
7. **To Remove HydrA-LIGN ROD, Pressurize As Per Line 3, Remove Pins (Item 4 & 5).**
8. **Release Pressure From Hand Pump. Remove Hydraulic Sub-Rod (Item 3)**
9. **Remove Piston Rod (Item 2) Using Installation / Removal Tool (Item 7).**

Note: (BY HAND ONLY) Rotate Mud Pump as necessary to remove Components.

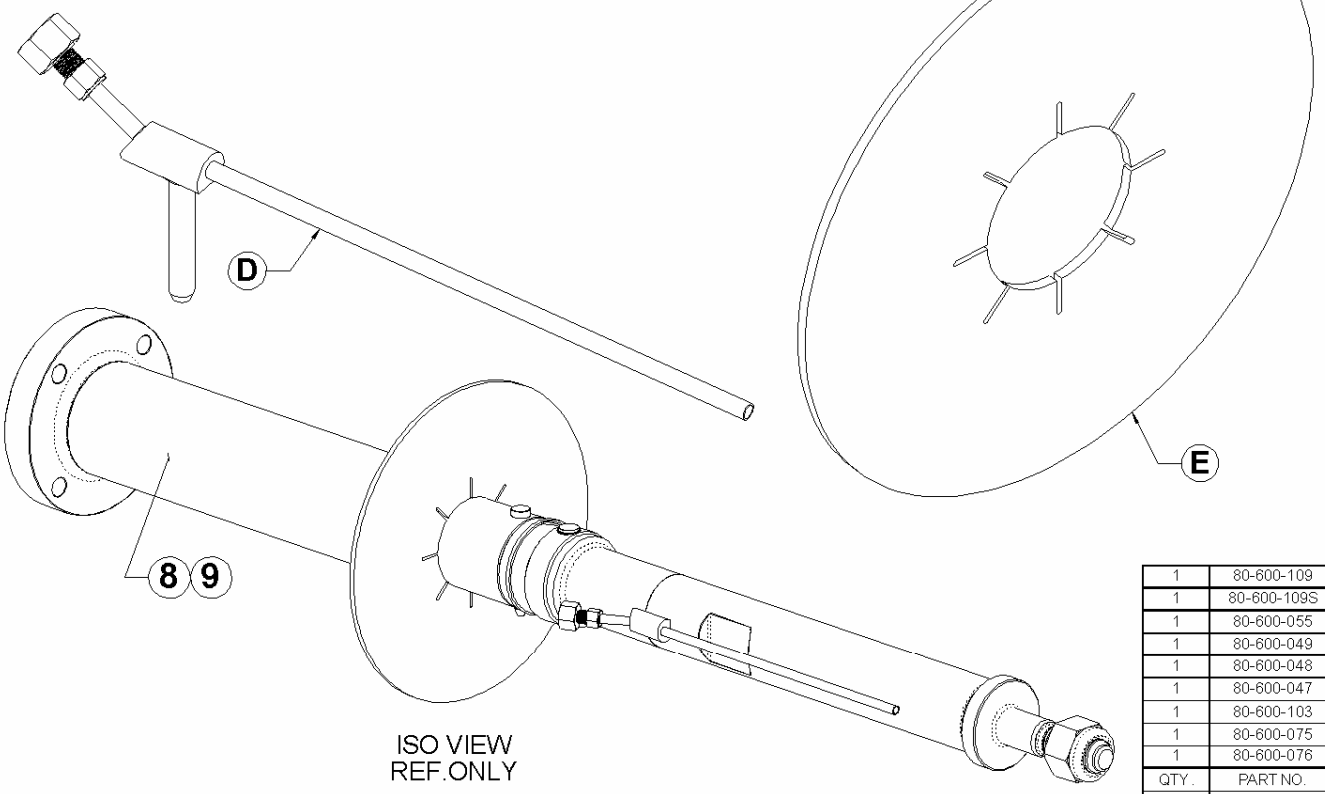
QTY.	PART NO.	DESCRIPTION / MATERIAL / SPECIFICATION	ITEM NO.
		LIST OF MATERIAL	
1	80-600-109	***HydrA-LIGN ROD***, ASSEMBLY 14P-220 MUD PUMP (INCLUDES ITEMS 1 - 7)	9
1	80-600-109S	***HydrA-LIGN ROD***, ASSEMBLY 14P-220 MUD PUMP (INCLUDES ITEMS 1 - 5)	8
1	80-600-055	INSTALLATION / REMOVAL TOOL W/ PIN	7
1	80-600-049	QUICK CONNECT NOZZLE W/ RELIEF VALVE ASSEMBLY	6
1	80-600-048	PIN, RETAINER (PISTON ROD END) SHORT	5
1	80-600-047	PIN, RETAINER (EXT. ROD END) LONG	4
1	80-600-103	SUB ROD, HYDRAULIC ASSEMBLY	3
1	80-600-075	PISTON ROD (***HydrA-LIGN ROD***) w / Rod Nut (P/N: 005402052)	2
1	80-600-076	EXTENSION ROD (***HydrA-LIGN ROD***)	1

PATENT-PENDING

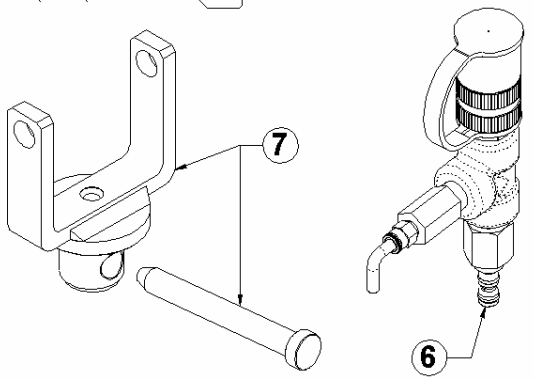
LTR	DESCRIPTION OF CHANGE	BY	CHK'D	DATE	APP'D



SECTION A-A



ISO VIEW
REF.ONLY



QTY.	PART NO.	DESCRIPTION / MATERIAL / SPECIFICATION	ITEM NO.
		LIST OF MATERIAL	
1	80-600-109	Blak-JAK HydrAlign-ROD, 14P-220 MUD PUMPS (INCLUDES ITEMS 1 - 7)	9
1	80-600-109S	Blak-JAK HydrAlign-ROD, 14P-220 MUD PUMPS (INCLUDES ITEMS 1 - 5)	8
1	80-600-055	INSTALLATION / REMOVAL TOOL W/ PIN	7
1	80-600-049	QUICK CONNECT NOZZLE W/ RELIEF VALVE ASSEMBLY	6
1	80-600-048	PIN, RETAINER (PISTON ROD END) SHORT	5
1	80-600-047	PIN, RETAINER (EXT. ROD END) LONG	4
1	80-600-103	SUB ROD, HYDRAULIC ASSEMBLY	3
1	80-600-075	PISTON ROD (HydrAlign-ROD) W/ ROD NUT (P/N: 005402052)	2
1	80-600-076	EXTENSION ROD (HydrAlign-ROD)	1

QTY.	PART NO.	DESCRIPTION / MATERIAL / SPECIFICATION	ITEM NO.
		OPTIONAL EQUIPMENT: B/M (NOT SHOWN)	
1	80-600-061	SPLASH GUARD (SHOWN)	E
1	80-600-060	FLUSHING TUBE ASSEMBLY (SHOWN)	D
1	80-500-040	GAGE, PRESSURE #10,000 (GP-10S)	C
1	45-804-097	HOSE, 1/4" I.D X 15' LG. W/ 3/8" NPT (M) ENDS	B
1	80-500-039	HAND PUMP, HYDRAULIC #10,000 (P-392)	A
1	80-500-112	ASSEMBLY INCLUDES ITEMS A, B, & C	

PROPRIETARY INFORMATION

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APPLICABLE SPECS

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES
BREAK SHARP CORNERS 1/32"
FILLET RADII 1/32"
CONCENTRICITY .010
SQUARENESS .010
PARALLELISM .010 EXCEPT WHEN (M) MODIFIED

DIMENSIONAL TOL.
FRACTIONS ±1/64"
X.XXX ± .005
X.XX ± .010
X.X ±
ANGLE ± .50 DEC FREE
SURFACE FINISH 125

SIMILAR TO | SUPERSEDES
HEAT ASS'Y | SUPERSEDED BY
LAYOUT No.

MATERIAL SPEC: SEE LIST

DESIGNED BY		DATE
DRAWN BY	RFW	DATE 02/27/06
CHECKED BY		DATE
P.E. APPROVAL		DATE
Q.A. REVIEW		DATE

NATIONAL OILWELL VARCO

TITLE: Blak-JAK, HydrAlign-ROD 14P-220

SIZE	REFERENCE No.	DRAWING No.	REV
C		80-600-109	

SCALE | BIT WT #228. | SHEET

ON DWG 80-600-109 SHT