



**BXS**

**Slip Type Elevator  
User's Manual**

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## Changes in this revision C manual compared to revision B manual

- Patent information added
- Various images improved
- Chapter Maintenance: Statement about API-PRP8B added
- All 50000203Y information removed from the manual
- Chapter Operations: Crush load information added
- Chapter Specifications: New slip, top and bottom guide added

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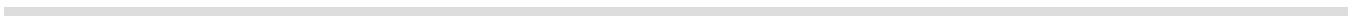
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# General information

## How to use this manual

This manual is divided into 9 sections. Each page within each section is marked with a black tab that lines up with the thumb nail index tabs for each section. You can quickly find each section without looking through a full table of contents. Use the symbols printed at the top corner of each page as a quick reference system. Each section uses a different symbol.

When applicable, each section includes:

1. A table of contents, or an illustrated view index showing:
  - Major assemblies, system or operations
  - Page references to descriptions in text
2. Disassembly / assembly information and tools
3. Inspection information
4. Testing / trouble shooting information
5. Repair information
6. Adjustment information
7. Torque values

### Special information

Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. Please note that this manual may contain warnings about procedures which could damage equipment, make it unsafe, or cause PERSONAL INJURY. Please understand that these warnings cannot cover all conceivable ways in which service (whether or not recommended by Varco) might be done, or the possible hazardous consequences of each conceivable ways. Anyone using service procedures or tools, whether or not recommended by Varco Systems, must be thoroughly satisfied that neither personal safety nor equipment safety will be jeopardized.

All information contained in this manual is based upon the latest product information available at any time of printing. We reserve the right to make changes at any time without notice.

### Intended audience

This manual is intended for use by field engineering, installation, operation, and repair personnel. Every effort has been made to ensure the accuracy of the information contained herein. Varco® 2006, Varco I/P (Inc), will not be held liable for errors in this material, or for consequences arising from misuse of this material.

### Conventions

#### Notes, Cautions, and Warnings

Notes, cautions, and warnings provide readers with additional information, and to advise the reader to take specific action to protect personnel from potential injury or lethal conditions. They may also inform the reader of actions necessary to prevent equipment damage. Please pay close attention to these advisories.



**Note:**



The note symbol indicates that additional information is provided about the current topics.

**Caution:**



*The caution symbol indicates that potential damage to equipment or injury to personnel exists. Follow instructions explicitly. Extreme care should be taken when performing operations or procedures preceded by this caution symbol.*

**Warning:**



**The warning symbol indicates a definite risk of equipment damage or danger to personnel. Failure to observe and follow proper procedures could result in serious or fatal injury to personnel, significant property loss, or significant equipment damage.**

**Illustrations**

Illustrations (figures) provide a graphical representation of equipment components or screen snapshots for use in identifying parts or establishing nomenclature, and may or may not be drawn to scale.

For component information specific to your rig configuration, see the technical drawings included with your Varco documentation.



## Safety Requirements

Varco equipment is installed and operated in a controlled drilling rig environment involving hazardous situations. Proper maintenance is important for safe and reliable operation. Procedures outlined in Varco manuals are the recommended methods of performing operations and maintenance.



*CAUTION: To avoid injury to personnel or equipment damage, carefully observe requirements outlined in this section.*

## General System Safety Practices

The equipment discussed in this manual may require or contain one or more utilities, such as electrical, hydraulic, pneumatic, or cooling water.



*CAUTION: Read and follow the guidelines below before installing equipment or performing maintenance to avoid endangering exposed persons or damaging equipment.*

- ❑ Isolate energy sources prior to beginning work.
- ❑ Avoid performing maintenance or repairs while the equipment is in operation.
- ❑ Wear proper protective equipment during equipment installation, maintenance, or repair.

## Personnel Training

All personnel performing installation, operations, repair, or maintenance procedures on the equipment, or those in the vicinity of the equipment, should be trained on rig safety, tool operation, and maintenance to ensure their safety.



*CAUTION: Personnel should wear protective gear during installation, maintenance, and certain operations.*

Contact the Varco Drilling Equipment training department for more information about equipment operation and maintenance training.

## Recommended Tools

Service operations may require the use of tools designed specifically for the purpose described. Varco recommends that only those tools specified be used when stated. Ensure that personnel and equipment safety are not jeopardized when following service procedures or using tools not specifically recommended by Varco.



## Replacing Components

- ❑ Verify that all components (such as cables, hoses, etc.) are tagged and labeled during assembly and disassembly of equipment to ensure correct installation.
- ❑ Replace failed or damaged components with Varco certified parts. Failure to do so could result in equipment damage or injury to personnel.

## Routine Maintenance

Equipment must be maintained on a routine basis. See this manual for maintenance recommendations.



*CAUTION: Failure to conduct routine maintenance could result in equipment damage or injury to personnel.*

## Proper Use of Equipment

Varco equipment is designed for specific functions and applications, and should be used only for its intended purpose.

## Lifting

The lifting procedures should carefully be observed and carried out according to the manual.

## Torque values (US) for bolts

Dia.	Threads per inch	Bolts Lubricated with Light Machine Oil Grade 8			Bolts lubricated with Anti-seize compound Grade 8		
		Min. Torque (ft lb)	Max. Torque (ft lb)	Clamp force (lb)	Min. Torque (ft lb)	Max. Torque (ft lb)	Clamp force (lb)
<b>Coarse Thread Series, UNC</b>							
1/4"	20	11.4	12.6	2860	8.6	9.5	2860
5/16"	18	24	26	3720	17.8	19.7	3720
3/8"	16	43	47	7000	32	35	7000
7/16"	14	67	74	9550	50	55	9550
1/2"	13	105	116	12750	78	87	12750
9/16"	12	143	158	16100	107	118	16100
5/8"	11	209	231	20350	157	173	20350
3/4"	10	361	399	30100	271	299	30100
7/8"	9	570	630	41600	428	473	41600
1"	8	855	945	54500	641	709	54400
1 1/8"	7	1216	1344	68700	912	1008	68700
1 1/4"	7	1729	1911	87200	1297	1433	87200
1 3/8"	6	2261	2499	104000	1696	1874	104000
1 1/2"	6	3002	3318	126500	2252	2489	126500

Tensile Strength = 120,000 psi to 1" dia. Proof Strength = 85,000 psi

Dia.	Threads per inch	Bolts Lubricated with Light Machine Oil Grade 8			Bolts lubricated with Anti-seize compound Grade 8		
		Min. Torque (ft lb)	Max. Torque (ft lb)	Clamp force (lb)	Min. Torque (ft lb)	Max. Torque (ft lb)	Clamp force (lb)
<b>Fine Thread Series, UNF</b>							
1/4"	28	13.3	14.7	3280	10	11	3280
5/16"	24	24	26	5220	17.8	19.7	5220
3/8"	24	48	53	7900	36	39	7900
7/16"	20	76	84	10700	57	63	10700
1/2"	20	114	126	14400	86	95	14400
9/16"	18	162	179	18250	121	134	18250
5/8"	18	228	252	23000	171	189	23000
3/4"	16	399	441	33600	299	331	33600
7/8"	14	627	693	45800	470	520	45800
1"	14	950	1050	59700	713	788	59700
1 1/8"	12	1368	1512	77000	1026	1134	77000
1 1/4"	12	1900	2100	96600	1425	1565	96600
1 3/8"	12	2584	2856	118400	1938	2142	118400
1 1/2"	12	3382	3738	142200	2537	2804	142200

Tensile Strength = 120,000 psi to 1" dia. Proof Strength = 85,000 psi



## Torque values (metric) for bolts

Dia meter	Threads per inch	Bolts Lubricated with Light Machine Oil Grade 8			Bolts lubricated with Anti-seize compound Grade 8		
		Min. Torque (Nm)	Max. Torque (Nm)	Clamp force (N)	Min. Torque (Nm)	Max. Torque (Nm)	Clamp force (N)
<b>Coarse Thread Series, UNC</b>							
1/4"	20	15.5	17.1	12870	11.7	12.9	12870
5/16"	18	32.6	35.4	16740	24.2	26.8	16740
3/8"	16	58.5	64	32500	43.5	47.6	31500
7/16"	14	91.1	100.6	42980	68	92.5	42980
1/2"	13	143	158	57380	106	118	57380
9/16"	12	195	215	72450	145.5	160	72450
5/8"	11	284	314	91580	213.5	235	91580
3/4"	10	491	542	135450	368	407	135450
7/8"	9	775	857	187200	582	643	187200
1"	8	1163	1285	245250	872	965	245250
1 1/8"	7	1654	1828	309150	1240	1370	309150
1 1/4"	7	2351	2598	382400	1764	1949	392400
1 3/8"	6	3075	3398	468000	2306	2549	468000
1 1/2"	6	4082	4512	569250	3062	3385	569250

Dia meter	Threads per inch	Bolts Lubricated with Light Machine Oil Grade 8			Bolts lubricated with Anti-seize compound Grade 8		
		Min. Torque (Nm)	Max. Torque (Nm)	Clamp force (N)	Min. Torque (Nm)	Max. Torque (Nm)	Clamp force (N)
<b>Fine Thread Series, UNF</b>							
1/4"	28	18.1	20	14760	13.6	15	14760
5/16"	24	32.6	35	23490	24.2	26.8	23490
3/8"	24	65.3	72	35550	49	53	35550
7/16"	20	103	114	48150	77.5	86	48150
1/2"	20	155	171	64800	117	129	64800
9/16"	18	220	239	82130	165	182	82130
5/8"	18	310	343	103500	232	257	103500
3/4"	16	542	600	151200	406	450	151200
7/8"	14	853	943	206100	639	707	206100
1"	14	1292	1428	268650	970	1071	268650
1 1/8"	12	1860	2056	346500	1396	1542	346500
1 1/4"	12	2584	2856	434700	1938	2128	434700
1 3/8"	12	3514	3884	532800	2635	2913	532800
1 1/2"	12	4599	5083	639900	3450	3813	639900

## **BX-S Elevator general description**

The BX-S elevator is a hydraulic operated double door elevator, which is equipped with replaceable slips to handle various styles and sizes of tubular. The elevator will close or open when the driller gives the command “close-elevator or open-elevator”. The driller has the option to set and raise the slips once the doors are closed.

The BX-S-elevator has vertically hydraulic loaded slips which will be pushed downwards automatically after the command from the driller. By detecting the return signal-pressure (XP-line) from the elevator it is determined that the elevator is properly closed and latched + the slips are set.

### **BX-S Elevator restrictions**

The BX-S Elevator is designed to be used as an elevator for lifting tubular goods, and must not be used for any other purpose.

### **BX-S usage**

The BX-S Slip Type Elevator is suitable to run flush, near flush (small upset) and special clearance tubulars without manual intervention.

The elevator can be used in combination with a rotator, which can rotate the elevator in one direction 90° forward (doors pointing down) OR 90° backward (doors pointing up). See also the user’s manual of the Universal Rotator

The elevator and rotator combination will fit 250, 350 and 500 tons Varco links

### **Unauthorised use**

Under no circumstances should the loads applied to the elevator exceed the rated load.

### **Design safety factor.**

The design-safety factor and design verification of the elevators is in accordance with requirements of API specification 8C.

During manufacturing the elevator is proof load tested to 1.5 times the rated load.

### **Limited warranty**

The warranty will be void if the BX-S Elevator or parts were either:

- unauthorized modified, repaired or serviced
- replacement parts not manufactured by Varco were utilized
- not properly stored or maintained



## Identification numbers

You will find the serial number of the tool stamped into the body.

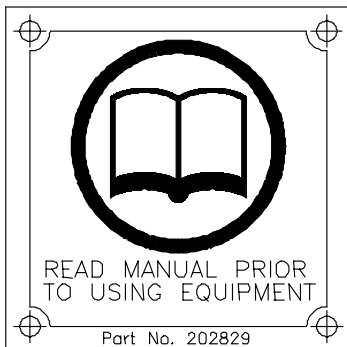


Warning, rating and and identification plates

## Warning plates



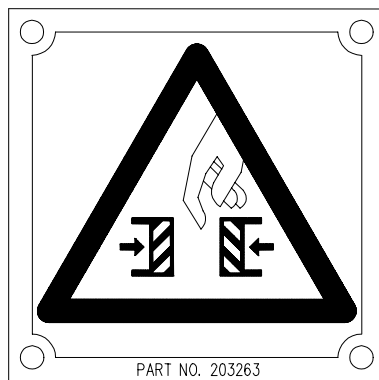
**WARNING: Warning plates must be present on the BX-S Elevator. Do not remove the labels. When a label or warning plate has disappeared, it must be replaced.**



Warning plate part no.202829 Read the manual prior to use



Warning plate part no. 201647. Be careful: Falling load or parts can cause severe injury or death. Keep out of range.

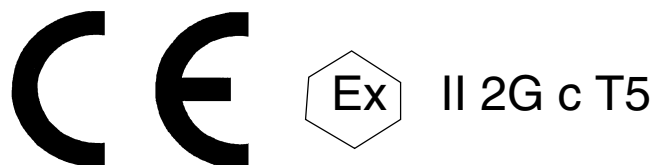


Warning plate part no 203263. Be careful: Keep hands out of range of moving parts. Do not touch the elevator.

### CE marking

The BX-elevator complies with the Machinery Directive 89/392/EEC and the Directive 94/9/EC "Equipment and protective systems in potentially explosive atmospheres".

The marking is as follows:



**WARNING: Care should be taken to avoid creating possible ignition sources, like sparks, due to improper use of the tool in combination with other equipment.**







## General specifications

### General specifications, requirements & sizes

Subject		Description
Weight and dimensions	BX-S Elevator without slips	Up to 2,730 Lbs. /1,238 kg
	BX-S Elevator with slips	Up to 2,900 Lbs. / 1,315 kg
Rating BX-S	Pipe mass	Depending on pipe type
	Pipe size	2 3/8" - 7 5/8"
	Rating elevator	350 short tons (312 metric tons)
	Power down force by cylinders	15,000 lbs @ 1,750 Psi (6,800 kg @ 12,065 KPa)
Slips		Equipped with standard VarcoBJ slip inserts
		Slips can accommodate BJ type nonmarking inserts for handling tubulars with a high chrome content
Hydraulic system	Minimum working pressure	2,000 Psi (13,789 KPa) and 5 Gpm (19 l/min) flow at elevator and rotator
	Maximum working pressure	2,500 Psi (17,236 KPa) and 7 Gpm (26.5 l/min) at elevator and rotator
	Tubing and hose sizes	All tubing and hoses that connect the elevator to the power unit main ring need to have a minimum nominal size of 1/2" diameter
	Maximum oil temperature	60°C (140°F)
	Maximum return (tank) line pressure	250 Psi (1,724 KPa)
	Filter to be applied in the hydraulic supply line	50 micron
Temperature	Minimum allowed ambient temperature	-20°C (-4°F)
	Maximum allowed ambient temperature	+40°C (104°F)
	In case the ambient temperature is outside this range, please contact Varco for guidance	

### Ratings

Purpose/rating of the elevator, as stamped on the elevator.

Type	Part no.	Size range	Rating		Link size
			Short / metric	Min	Max
BX-S	50000202Y slips controls	2 3/8" - 7 5/8"	350 / 312	2 3/4"	4 3/4"



## Overview BX-S-slips & size components.

Slips can be dressed for minimal 2 sizes by replacing standard Varco BJ inserts.

Size	Part number Slip carrier	Insert	Qty. inserts	Dimension insert
<b>2 7/8" - 2 3/8" 50000205</b>				
2 7/8	50000205Y1	24773	12	3"x2"
2 3/8	50000205Y2	29255	12	3"x2"
<b>3- 1/2" - 2 7/8" 50000206</b>				
3 1/2	50000206Y1	24774	24	3"x1.25"
2 7/8	50000206Y2	30358	24	3"x1.25"
<b>4 1/2" - 3 1/2" 50000207</b>				
4 1/2	50000207Y1	2165	24	2.75"x 1.29"
4	50000207Y2	2164	24	2.75"x 1.29"
3 1/2	50000207Y3	2163	24	2.75"x 1.29"
<b>5 1/2" - 4 1/2" 50000208</b>				
5 1/2	50000208Y1	2170	24	2.75"x 1.29"
5	50000208Y2	2169	24	2.75"x 1.29"
4 1/2	50000208Y3	2168	24	2.75"x 1.29"
4 3/4	50000208Y4	2638	24	2.75"x 1.29"
<b>6 1/2" - 5 5/8" 50000209</b>				
6 1/2	50000209Y1	2173	36	2.75"x 1.29"
6 1/8	50000209Y2	2172	36	2.75"x 1.29"
6	50000209Y3	2169	36	2.75"x 1.29"
5 7/8	50000209Y4	2623	36	2.75"x 1.29"
5 5/8	50000209Y5	2650	36	2.75"x 1.29"
<b>7 5/8" - 6 5/8" 50000210</b>				
7 5/8	50000210Y1	2633	36	2.75"x 1.29"
7	50000210Y2	2623	36	2.75"x 1.29"
6 5/8	50000210Y3	2632	36	2.75"x 1.29"

### Guide Plate Kits

Size	Kit top guide's	Kit bottom guide's
2 3/8	50000245-1	50000246-1
2 7/8	50000245-2	50000246-2
3	50000245-3	50000246-3
3 1/2	50000245-4	50000246-4
4	50000245-5	50000246-5
4 1/2	50000245-6	50000246-6
5	50000245-7	50000246-7
5 1/2	50000245-8	50000246-8
5 5/8	50000245-9	50000246-9
5 7/8	50000245-10	50000246-10
6	50000245-11	50000246-11
6 1/8	50000245-12	50000246-12
6 1/2	50000245-13	50000246-13
6 5/8	50000245-14	50000246-14
7	50000245-15	50000246-15
7 5/8	50000245-16	50000246-16
4 3/4	50000245-17	50000246-17



## Major components

### General description

The BX-S is a tool to hoist pieces or sections of pipe up and down the derrick and is suspended from a set of links, which on their turn are suspended by a Top Drive or Hook. The BX-S is able to hold and hoist sections of pipe that show no or very small external upsets or load shoulders. The BX-S is used to run the string to a maximum string weight of 350 short (312 metric) tons. The BX-S can handle pipe sizes (O.D.) from 2-3/8" to 7-5/8".

The body transfers the hoist load to the links, either directly or through the doors. Hoisting a load will also introduce a spreading force from the slips to the body and doors due to a tapered outer contour of the slips. The latch keeps the doors closed in order to withstand this spreading force. The latch has a negative latching angle, preventing the doors from inadvertent opening due to operational mechanical shocks or when the command "open elevator" is given with load hanging in the elevator. The slips are operated up and down hydraulically. The power down force on the slips is high enough to create an initial penetration of the inserts into the pipe, preventing the pipe from slipping through the slips and allowing the buildup of the downward hoist load. The power down force is high enough to withstand upward pipe loads up to 5 Tons (push down function of elevator). The spring energized power up force is high enough to release the slips from the pipe and to overcome the friction between the slips and the body/doors, but is kept as low as possible to prevent inadvertent rising of the slips when hoisting pipe.

A "doors closed and slips set" signal is provided. The elevator is designed such that the chance of getting a false signal is eliminated. Elevator door closed & latch closed feedback signals uses proven BX-S pilot ports and positive signal from latch valve, activated when slips are set.

Slip set feedback by means of double signal of slips set sequence and pressure build up. The above feedback signal results in a very reliable elevator closed & latched and slip set signal (XP) to the drillers console. The BX-S has the option to be tilted by a rotator on the link to allow picking up pipe from or laying pipe down on the v-door.

### How the BX-S elevator works

#### 50000202Y: BX-S with Slips Control 2 3/8" – 7 5/8"

(Hydraulic Schematic drawing: 50000200-1)

Elevator closing sequence:

- ❑ XP= 0 Psi.
- ❑ P= System pressure (2,000-2,300 Psi).
- ❑ Pilot= not activated (Pilot= 0 Psi)
- ❑ Slips are in up position
- ❑ When XP= 0 Psi, the elevator closing sequence starts, with closing the door, the latch will close when the signal port of the door cylinder is pressurized. When the latch valve is activated the slips start setting.
- ❑ When the pressure builds up to 1500 Psi or higher, the feedback signal XP from the elevator (reduced to 1000 Psi), indicating the elevator is closed and the slips are set, will be given.
- ❑ If the BX-S elevator is equipped with a Rotator, a float signal (B5) will be given to the rotator when the latch valve is actuated.



Slips control

- ❑ When the pilot port is activated the slips will stay in the up position.
- ❑ When the pilot port is not activated the slip actuator will be activated to set the slips
- ❑ When the slips are set and the latch valve is operated, a feedback signal will be given.

Elevator open sequence:

- ❑ P= System pressure (2,300 Psi). XP= 2500 Psi
- ❑ Pilot= 0 or 2500 Psi

When XP signal is sent to the elevator, the pressure on the Pilot port must drop off, the elevator open sequence starts with activating the slip actuators in. When the pipe load is released from the slips, the slips will travel up by the spring force, the latch will open, and the door will open when the signal port of the latch cylinder is pressurized. The elevator stays open until XP is high.

**H.U.K. schematic 50000200-12, BX-S with slip control & rotators**

0= NOT ACTIVATED, 1= ACTIVATED

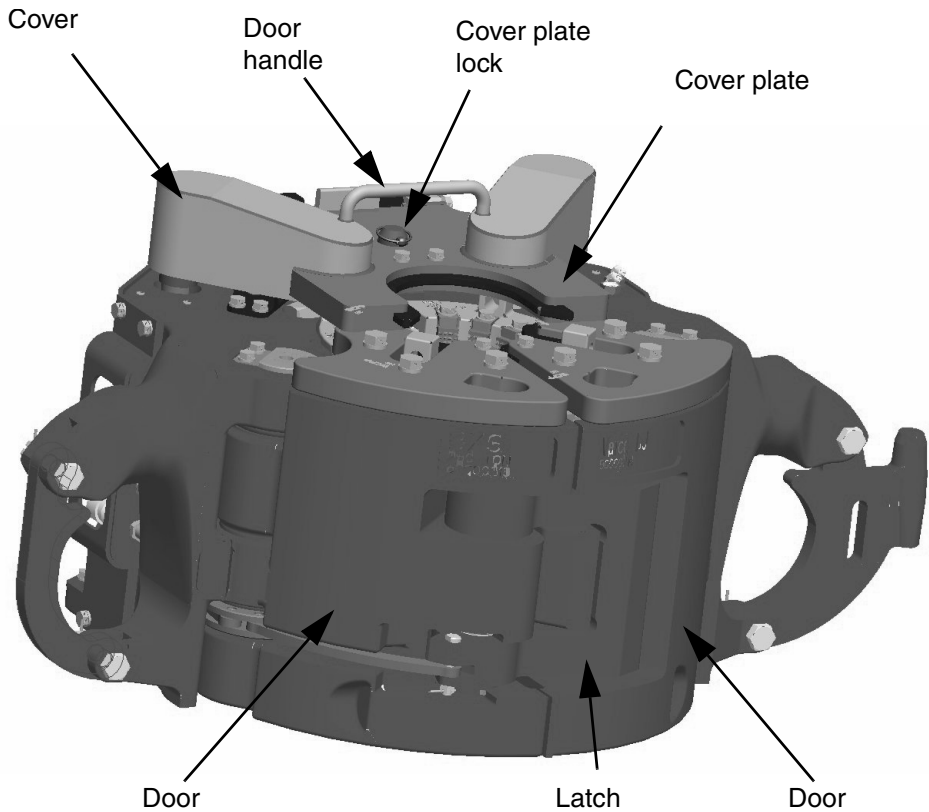
S2/ XP	V1	V2	Action
0	0	0	Elevator closed, when latch is closed, float signal to Rotators, slips set. Xp= 1000 Psi.
0	0	1	Elevator closed, when latch is closed, float signal to Rotators, slips stays up. Xp= 1000 Psi.*
0	1	1	Elevator closed, when latch is closed, float signal to Rotators, slips stays up. Xp= 1000 Psi.*
1	1	1	Elevator open, and float signal to elevator **
1	1	0	Elevator open, and elevator rotate backward
1	0	0	Elevator open.
0	1	0	Elevator closed, when latch is closed, float signal to Rotators, slips set. Xp= 1000 Psi.
1	0	1	Elevator open, and float signal to elevator

\* When V2 is activated than you may not have an indication in the drillers cabin that the elevator is closed and the slips are set.

\*\* When the elevator is open and you want to rotate the elevator backward than you must not activate signal V2.



Part break down

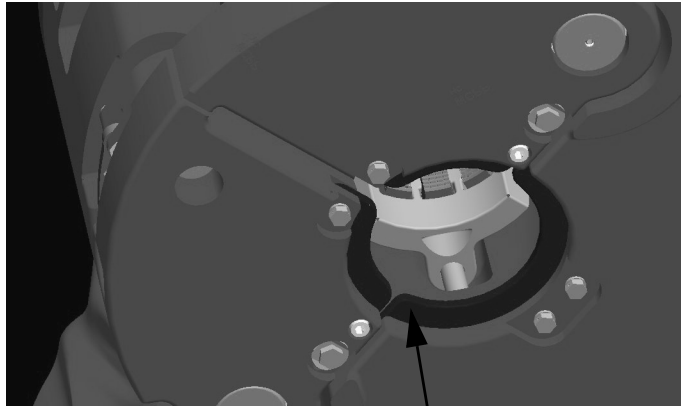
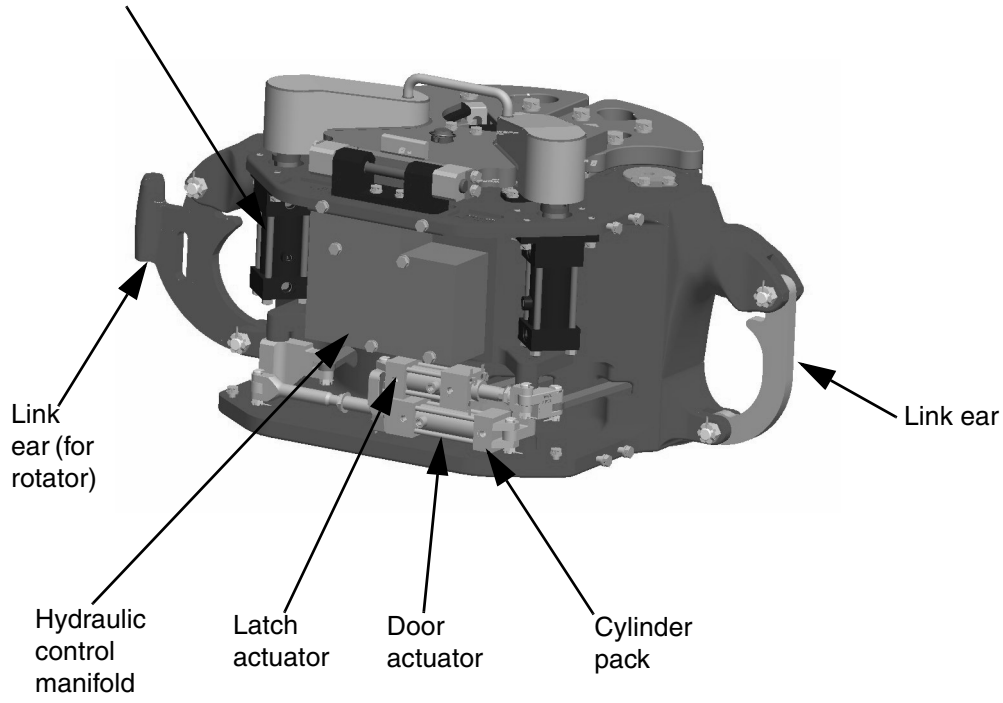


2

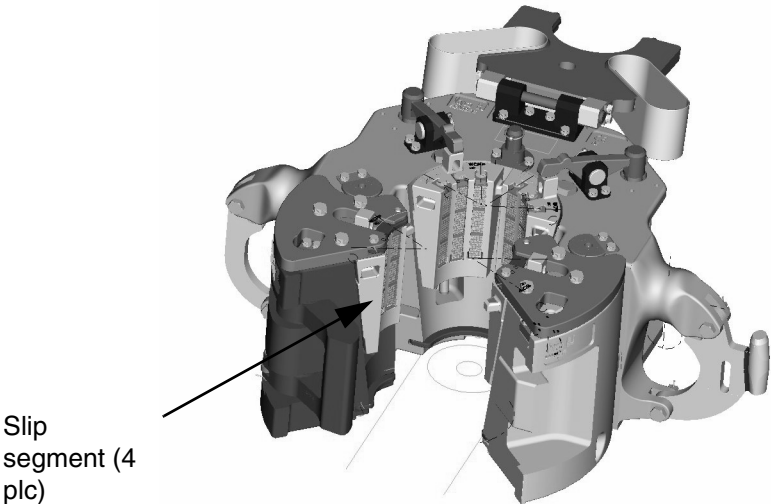


2

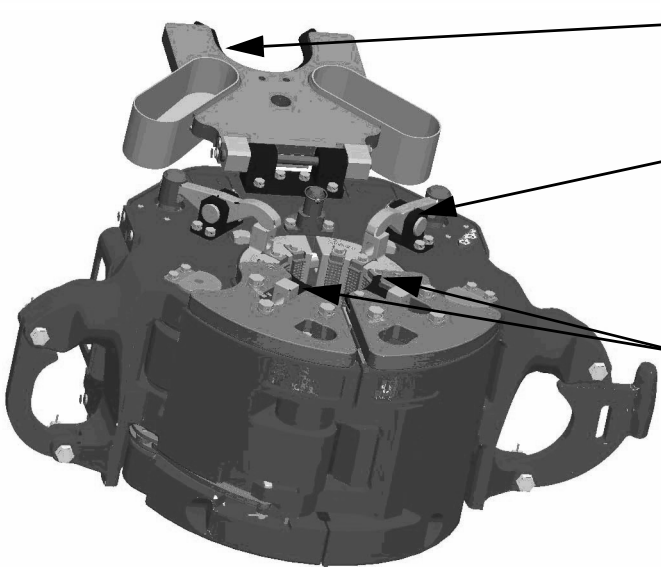
Cylinders (2 plc)



Bottom guide plate



Slip segment (4 plc)

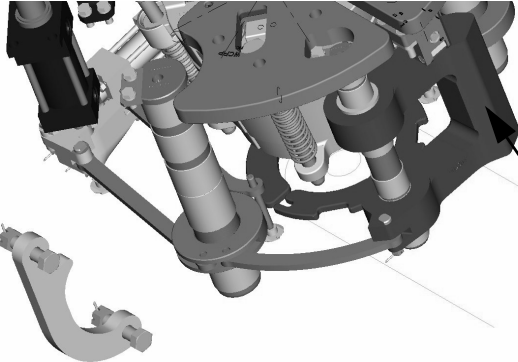


Pipe guide

Slip operating mechanism

Pipe guide

**Operating mechanism door and latch**



Latch valve







# Maintenance

## Safety



**WARNING:** It is not allowed to weld on elevators.  
Please contact an authorized Varco repair facility.

## API recommended practice RP 8B

### Recommended inspections

The owner of the equipment should develop his own schedule of inspections based on experience, manufactures recommendations and considerations of one of the following factors: Environment, load cycles, regulatory requirements, operating time, testing, repairs and remanufacture. Long term planning shall be adjusted to not interfere unnecessarily with drilling operations. Alternatively, NOV recommends using the Periodic inspection and maintenance Categories and Frequencies as mentioned in API RP8B Table 1.

#### Category I.

Observation of equipment during operation for indications of inadequate performance

#### Category II.

Category I inspection plus further inspection for corrosion, loose or missing components, deterioration, proper lubrication, visible external cracks and adjustment.

#### Category III

Category II inspection plus further inspection which should include NDE of exposed critical areas and may involve some disassembly to access specific components and identify wear that exceeds the manufacturers allowable tolerances.

#### Category IV

Category III inspection plus further inspection where the equipment is disassembled to the extent necessary to conduct NDE of all primary load carrying components

## Recommended General Purpose EP grease

Lube code description	Above -20° C	Below -20° C
<b>Castrol</b>	MP grease	n/a
<b>Chevron</b>	Avi-Motive	Avi-Motive W
<b>Exxon</b>	Lidok EP2	Lidok EP1
<b>Gulf</b>	Gulfcrown EP2	Gulfcrown EP1
<b>Mobil</b>	Mobilux EP2	Mobilux EP1
<b>Shell</b>	Alvania EP2	Alvania EP1
<b>Texaco</b>	Multifak EP2	Multifak EP1
<b>Union</b>	Unoba EP2	Unoba EP1



## Maintenance



**WARNING:** Ensure that all hydraulic lines are disconnected before ANY work is performed on the elevator. It's not always sufficient to isolate the hydraulic lines by using a ball valve, as the hoses might function as an accumulator, which could generate movement of the elevator. The ball-valve is installed to ease connecting and disconnecting the QD with pressure still on the line and for disconnecting the elevator from the power source.



**NOTE:** To reduce the chance of inserts seizing in the insert slots, NOV recommends to remove inserts after each job, preserve the insert slot with light machine oil, AP-2 grease or any other preservation fluid that does not affect the friction coefficient with string weight compared to a none preserved insert slot.

### Hydraulic filters

Depending on the quality of the hydraulic fluids on the rig it is important to check the condition of the inline-filters on a regular basis. The filters are designed to stand for at least 1-year service in conditions as required in this manual. However, rig conditions may differ from these required conditions, or change by contamination, incidents, repairs etc.

Depending on the actual conditions it is important to conduct regular checks on the filters in the manifold block. For this reason the manifold block, the hoses and couplings need to be checked and cleaned thoroughly. It is advised to conduct the check at least after 1 month of service, after 6 months service and after one year of service. Depending on the results of the checks the interval between checks can be increased or decreased.

### Filter in manifold block

#### Procedure

1. XP-line filter on the side (p/n 979796-25-S)
2. Check filters.
3. Clean filters when needed (rinse with a solvent)



Filter set: Spring (not shown) (p/n 980252) and Cartridge (p/n 979796-25-S)



## Daily inspection schedule (when BXS Elevator is in use)

### Procedure

#### Daily Inspection (cat II) Visually inspect and repair when needed

1 Check for worn and damaged parts	<input type="checkbox"/> OK
2 Check for loose and missing parts	<input type="checkbox"/> OK
3 Check for leakage free fittings, tubes, hoses, valves & cylinders.	<input type="checkbox"/> OK
4 Check proper locking of all lock bolts and nuts	<input type="checkbox"/> OK
5 Check that all slips are well seated and retained in body and doors.	<input type="checkbox"/> OK
6 Check that all slips are locked by secondary safety snaps.	<input type="checkbox"/> OK
7 Check hoses for signs of cracks, wear or abrasion.	<input type="checkbox"/> OK

#### Daily Inspection (cat II) Visually inspect and repair when needed

Check the proper locking of:

1 Bolts and nuts	<input type="checkbox"/> OK
2 Slotted nuts & cotter pins	<input type="checkbox"/> OK
3 Lock tabs & lock bars	<input type="checkbox"/> OK
4 Roll pins and dowel pins	<input type="checkbox"/> OK
5 Snap rings	<input type="checkbox"/> OK

## Daily operational check

### Procedure

#### Daily operational check

1 Check the functioning of the latch mechanism.	<input type="checkbox"/> OK
2 Open and close 10 times. Elevator should close and latch completely and slips set (starts when latch is closed) at each cycle	<input type="checkbox"/> OK
3 Check whether "elevator closed & slip set" signal is present	<input type="checkbox"/> OK

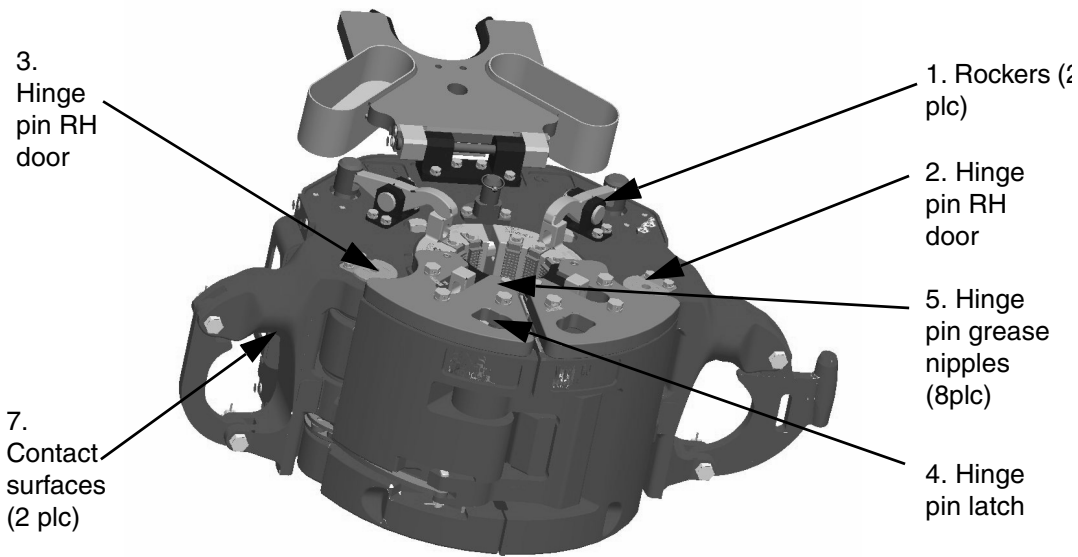
## Daily lubrication

### Procedure

#### Daily Lubrication.

Apply prescribed grease to all grease points until grease is visible coming out of the bores

1 Grease slip operation mechanism rockers	<input type="checkbox"/> OK
2 Grease hinge pin Right hand door	<input type="checkbox"/> OK
3 Grease hinge pin Left hand door	<input type="checkbox"/> OK
4 Grease hinge pin latch	<input type="checkbox"/> OK
5 Grease inside of bowl (contact surface slips) via grease nipples (8plc)	<input type="checkbox"/> OK
6 Coat blank parts	<input type="checkbox"/> OK
7 Grease contact surfaces links (when elevator combined with rotator every 6 hours!)	<input type="checkbox"/> OK
8 Grease back of slips	<input type="checkbox"/> OK
9 Grease the slip springs	<input type="checkbox"/> OK



## Weekly maintenance

### Procedure

#### Weekly maintenance

Perform the cylinder adjustment test

## Six monthly inspection (cat III)

### Procedure

#### Six montly inspection

Check orientation of elevator doors and latch (no visible drop allowed)

Check easy and full closing of latch onto its lug contact surface without touching bottom or top of lug

## Six monthly inspection (cat III) on RIG

### Procedure

#### Procedure on rig

MPI exposed critical areas according Critical Area Drawings.

Check if indications are out of acceptance standard

If indications out of acceptance standard, remove elevator of service.

The elevator needs repair at the nearest authorized repair facility.

Please contact Varco BJ for guidance



## Annual (1 year) inspection

### Procedure

#### Annual (1 year) Inspection (cat IV)

Magnetic Particle Inspection; please contact a Varco BJ repair center for guidance

## Magnetic particle inspection

The Magnetic Particle Inspection (MPI) should be conducted as outlined in the latest API RP 8B revision as a minimum.

### Procedure

1. Clean the elevator from oil, grease, sand and loose rust, paint and dirt.
2. Equipment to be used must meet the performance criteria's of Tiede Universal SW 170, Magnaflux CRV 120 or Interflux Yoke as a minimum.
3. MPI must be performed according the continuous method.
4. Examinations must be performed with sufficient overlap to assure 100% coverage of the area or part under inspection.
5. Wet continuous must be done in accordance with ASTM E 709 and defects compared to ASTM E 125 reference photographs to Varco BJ acceptance.
6. Applicable standards
  - ASTM E 709; Standard practice for magnetic particle examination
  - ASTM A 275; Standard test method for magnetic particle examination of steel forging
  - ASTM E 125; Reference photographs for magnetic particle indications on ferrous castings
  - MSS SP-55; Quality Standard for Steel Castings Visual Method
  - Varco BJ critical area drawings
  - API Specification 7K, 8C and Varco BJ standards

## Acceptance criteria for MPI

See also the critical area drawings in chapter "Drawings".

Type	Discontinuity descriptions	Max. Permitted degree	
		Critical areas	Non critical areas
I	Hot tears, cracks	None	Degree 1
II	Shrinkage	Degree 2	Degree 2
III	Inclusions	Degree 2	Degree 2
IV	Internal chills and chaplets	Degree 1	Degree 1
V	Porosity	Degree 1	Degree 2



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NOTE: Only a Varco BJ authorized repair facility is allowed to remanufacture BXS Elevators which have indications outside the acceptance criteria.

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**WARNING: BXS Elevators which have experienced wear or are found to have cracks must be replaced or repaired by a Varco BJ authorized repair facility.**

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**WARNING: Only original Varco BJ parts must be used. BXS Elevators are produced from cast alloy heat treated steel and must not be welded in the field. Improper welding can cause cracks and brittleness in heat-affected areas which can result in dramatic weakening of the part and possible failure. Repairs involving welding and/or machining should be performed only by an Varco BJ authorized repair facility. Using a BXS Elevator that has been improperly welded or repaired is dangerous.**

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## Wear data/criteria



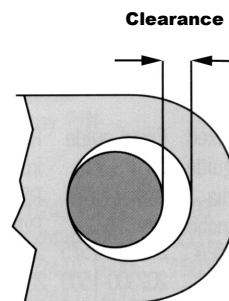
NOTE: The wear data as given in the table(s) are for accepting the equipment in the field. The criteria that determine if equipment needs to be repaired are more stringent. After repair, the equipment must have wear allowance. Therefore on a repaired tool the Hinge & Latch Pin to Bore clearance should generally not exceed 50% of the maximum wear allowance.



NOTE: In case the guidelines given in this chapter, conflict with the guidelines as set out in the Varco BJ Repair manual, the guidelines set out in the Varco BJ Repair manual shall prevail.

## General Data

Description	Size
Allowed repair clearance Hinge & Latch pins	Max 0.023"
Allowed in-service clearance Hinge & Latch pins	Max 0.045"
Allowed in-service clearance Lever & Bracket pins	Max 0.015"





## Elevator Close mechanism

<b>Levers Pins &amp; Bushings</b>		<b>Size (inch)</b>
Lever pins	0.500 Nominal diameter, new	Min 0.4950
Lever pins	0.500 Nominal diameter, worn	Min 0.4880
Lever pins fitment bore		Max 0.5050
Lever bushings	0.500 ID (fitted) new	Max 0.5017
Lever bushings	0.500 ID worn	Max 0.5035
Lever bushing fitment bore		Max 0.5940

<b>Door Hinge Pins BX-S 50000215-1</b>		<b>Size (inch)</b>
Hinge pin doors	diameter new	Min 2.9510
Hinge pin doors	worn	Min 2.9760
Door bushing ID	(fitted) new	Max 2.9539
Door bushing ID	worn	Max 2.9789
Door bushing fitment bore		Max 3.1517

<b>Latch Pins BX-S 50000216-1</b>		<b>Size (inch)</b>
Latch pin diameter	new	Min 1.9673
Latch pin diameter	worn	Min 1.9423
Latch bushing ID	(fitted) new	Max 1.9710
Latch bushing ID	worn	Max 1.9960
Latch bushing fitment bore		Max 2.1666

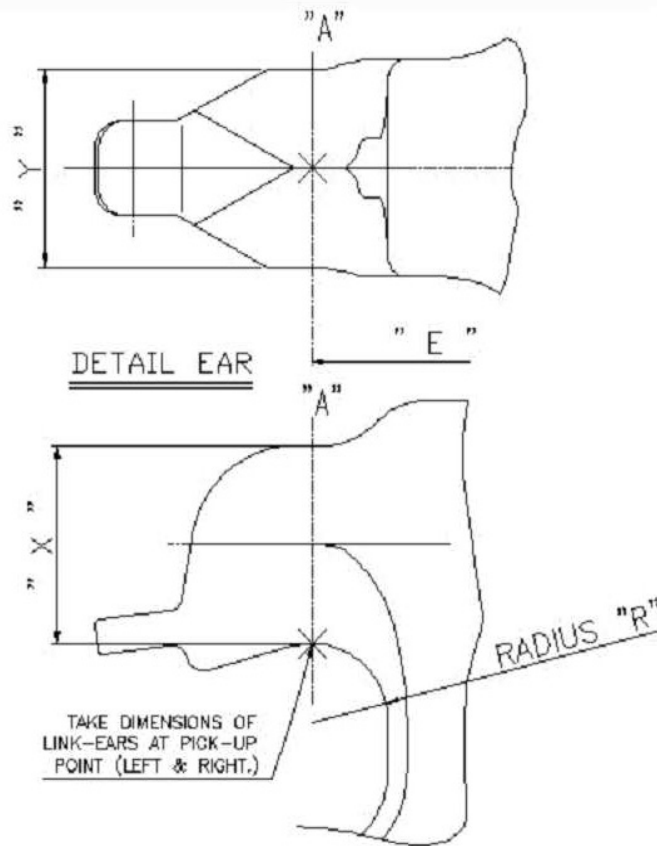




### Hinge pin repair parts

	Part number;	Quantity;
Cylinder bracket bushing	59000010-0812	4
Door/Latch lever bushing	59000010-0808	10
Bracket pin bushing 3/4"	203254	4
Latch lock lever bushing	203247-1	2
Door hinge-pin assembly	50000215-1	2
1. Door hinge-pin wear-bushing, top	979770-7560	4
2. Door hinge-pin wear-bushing, bottom	979770-7580	2
3. Latch hinge-pin wear-bushing	979770-64	2
Latch-pin assembly	50000216-1	1

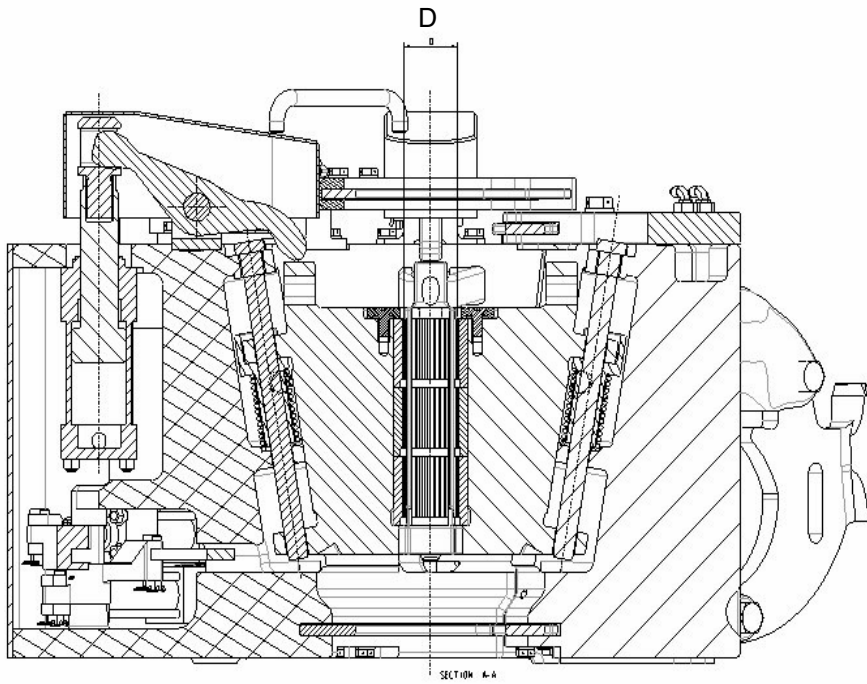
### Link Ear Wear



Part no. ass'y: 50000202y/50000203y	Size (inch)
Dimension "X" min. new	new 4.88"
Dimension "X" min. worn	worn 4.25"
Dimension "Y" min. new	new 4.88"
Dimension "E"	36.5"



## Replacement of the slip segments or inserts.



When the opening D is larger than the pipe diameter then you have to replace inserts, when the opening D is still to large then you have to replace the slip segments.



## Installation and commissioning

A range of control manifolds and hook up kits to control the elevator or elevator/rotator combination are available. The control manifolds also protect the elevator and rotator against overload.



**WARNING:** Make sure that all hydraulic lines are disconnected before ANY work is performed on the elevator. When the lines are connected the elevator doors will close automatically when  $X_p = 0$  psi , which can cause serious injury to personnel. It's not always sufficient to isolate the hydraulic lines by using a ball valve, since the hoses might function as an accumulator, which could generate movement of the elevator

### Instrumentation in driller's console according HUK drawing.

Three different forms of instrumentation are possible:

1. Instrumentation in driller's console.
2. Certified J-box.
3. Integrated instrumentation in existing J-box.

Check the proper functioning of the control lights and switches on the control panel after electrical hooking up.

### Cabinets

Available are two types of Hook Up Kits, with the control manifold for BX-S-elevator OR the combination BX-S-elevator/rotator.

In case of a Varco top drive a control manifold will be mounted on the top drive (no drawing added, see TDS manual).

### Universal Rotator

Please refer to the User's Manual of the Universal Rotator for information about the Rotator.

### Hook Up Kit

Drawing gives guidelines for the installation of the Hook Up Kits.

When customer has a new Varco Top Drive, the following hose kits need to be used:

1. BX-S without rotator

Varco Part Number	Qty.	Description
203120	1	Hose connection from S2 to XP (BX-S)
203121	1	Hose connection T to T (BX-S)
203122	1	Hose connection from P to P (BX-S)
50004350	1	PRV-kit



2. BX-S with rotator

Varco Part Number	Qty.	Description
203120	1	Hose connection from S2 to XP (BX-S)
203121	1	Hose connection T to T (BX-S)
203122	1	Hose connection from P to P (BX-S)
203123	1	Hose connection X (FM) to B5 (BX-S)
203124	1	Hose connection Tee to ½" QD Rotator
203125	1	Hose connection Tee to 3/8" QD Rotator
50004350	1	PRV-kit



NOTE: Protect hoses against freezing when applied in circumstances below 0° C (32°F). Fit control manifold close to the hydraulic supply of the top drive on the fingerboard level.

**Options Controls for BX-S elevator**



*CAUTION: During operation, when the elevator doors are open, and one wishes to rotate the BX-S backward (controlled by DV2), valve DV3 (used for slips up/down control, when the doors are closed, or when the doors are open for float signal in combination with DV2 valve)", is de-energized. If not the rotators are in float-mode.*

**Part number**

50000202y BX-S with Slips control
50004130 Universal Rotator (new) 1 required
202020 / 202060 Rotator (old) 2 required

**Double operated solenoid with detention**

Power	Part number
24 V/DC	112554-X2
110V/AC	112554-X3
220V/AC	112554-X4



**Description: In case Varco Etten-Leur supplied the BX- HUK with control manifold for the Varco Top drive / Derrick** **Part number**

<b>Description: In case Varco Etten-Leur supplied the BX- HUK with control manifold for the Varco Top drive / Derrick</b>	<b>Part number</b>
<b>1) 50000202y Schematic 50000200-13:</b>	
<ul style="list-style-type: none"> <li>Change control valve DV1 from Single operated solenoid valve into Double operated solenoid valve with detention.</li> </ul>	See table above
<ul style="list-style-type: none"> <li>Add extra manifold with extra valve for slips up/down control (when elevator doors are closed)</li> </ul>	202049-6
<b>2) 50000202y with Rotator 50004130 Schematic 50000200-12:</b>	
<ul style="list-style-type: none"> <li>Change control valve DV1 and DV3 from Single operated solenoid valve into Double operated solenoid valve with detention.</li> </ul>	See table above
<b>3) 50000202y with Rotator 202020 / 202060 Schematic 50000200-16:</b>	
<ul style="list-style-type: none"> <li>Change control valve DV1 from Single operated solenoid valve into Double operated solenoid valve with detention.</li> </ul>	See table above
<ul style="list-style-type: none"> <li>When a free port is available on TDRH, add an extra Double operated solenoid valve for operating the slips up/down when the doors are closed. Apply the same valve as mentioned above. This may require a new design of the control manifold BX-HUK. If this is not an option and rotation of the BX-S is required, use rotator 50004130. See point 2.</li> </ul>	See table above

## **Commissioning**

Commissioning must be carried out according the TSEL-0138 “COMMISSIONING SPECIFICATION BX-S-ELEVATOR & ROTATOR”. This specification describes all tests and checks to be carried out by the Varco BJ installation-engineer after rigging-up the equipment.



NOTE: See also the Universal Rotator User’s manual for additional information regarding installation and commissioning the Rotator.





# Operations

## Intended usage

The BX-S-elevator is designed to RUN IN HOLE (RIH) and to PULL OUT OF HOLE (POOH) of various tubulars



**WARNING:** Ensure that all hydraulic lines are disconnected before ANY work is performed on the elevator. It's not always sufficient to isolate the hydraulic lines by using a ball valve, as the hoses might function as an accumulator, which could generate movement of the elevator. The ball-valve is installed to ease connecting and disconnecting the QD with pressure still on the line and for disconnecting the elevator from the power source.

## Installing the elevator and rotator in the links

### Procedure

1. Lift the elevator by the lifting ears only
2. Bring the elevator as near to the well center as possible.
3. Remove both lock bolt assemblies
4. Lower both the link blocks
5. Push the links in position and close the link blocks.
6. Fit the lock bolt assemblies.
7. Do not forget the cotter pin



**NOTE:** Clean the hydraulic couplings thoroughly prior to connecting

8. Connect the hydraulic hoses to the elevator.



## Fitting the rotator to the elevator.



**WARNING:** Ensure that all hydraulic lines are disconnected before ANY work is performed on the elevator. When the hydraulic lines are connected the elevator doors will close when  $X_p = 0$  Psi, which can cause serious injury to personnel. It's not always sufficient to isolate the hydraulic lines by using a ball valve, since the hoses might function as an accumulator, which could generate movement of the elevator.

### Procedure

1. Lift the elevator/rotator combination only by the lifting ears of the elevator and never by the rotator lifting eyes.



**NOTE:** Lift the rotator by its lifting eye only to prevent damage.



**NOTE:** Check if the correct size wear guide is fitted in the link clevis.

2. Bring the rotator to the drill-floor.
3. Remove the link block from the elevator and replace it by the rotator link block p/n 50004100-34
4. Remove lock bolt assembly
5. Hook a tugger line in the rotator lifting eye bolt
6. Bring rotator into position
7. Install the upper bolt
8. Install the lower bolt
9. Connect the elevator and rotator hoses.
10. Check quick disconnect couplings for proper positioning.
11. Lift elevator from the drill floor.





## Installing slips in elevator

### Procedure

1. Open the doors.
2. Make sure that all hydraulic lines are disconnected before ANY work is performed on the elevator.
3. Apply grease to the back of the slips and contact surfaces in body & doors
4. Remove the rockers
5. Pull out the bolts, first from the body, than the doors
6. Fit the slip elements.
7. Slide the bolts in place
8. Tighten the bolts
9. Lubricate the rockers and place them back

## Installing inserts in the slips

### Procedure

1. Open the doors.
2. Remove the slips from the elevator
3. Remove the cap flat head screws
4. Lubricate the grooves with light machine oil.
5. Change/install the inserts
6. Place the bolts back

## Determining pipe crushing loads



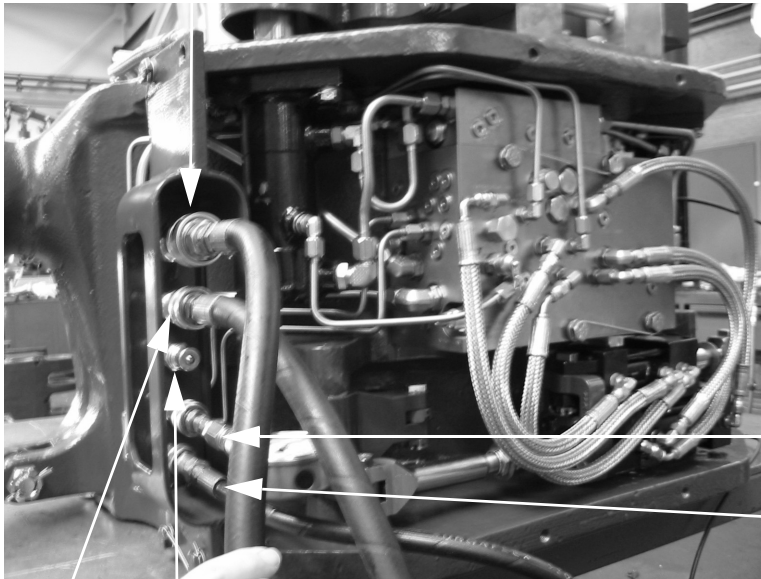
**WARNING:** Keep in mind that the actual rating is determined by the pipe. Below formula is based on an ideal situation where the pipe is completely circumferential clamped. In reality, especially for big sizes, the slips do not enclose the pipe completely, hence the risk for crushing the pipe is higher.



Applicable for casing with wall thickness $t > 0.1 R$ . Critical hook load of pipe at slip contact.
$F = Q_{yp} * A * \sqrt{\frac{1}{1 + \frac{RK}{L} + \left[\frac{RK}{L}\right]^2}}$
No safety factor to account for dynamic factors is used in this formula
F = Crushing load in lbs.
Qyp = Yield stress of pipe in psi.
A = Sectional area of pipe in inch <sup>2</sup>
R = Outside radius of pipe in inches.
L = Length of slip contact in inches.
K = Crushing factor (used =) 2.6

### Connecting the hoses to the elevator.

Return (T) 1/2"  
Female



Float BS 1/4"  
male

Signal (XP) 1/4"  
Male

Pressure line  
(P) 3/8" Female

Pilot 3/8" male QD for  
slip control



## Disconnecting the elevator.

### Procedure

1. Give command-to-close.
2. Elevator will close automatically
3. Switch off the hydraulic power supply.
4. Close the ball valve in P line and disconnect the P-line.
5. Remove the XP-line



NOTE: Last (!) remove the tank line to avoid pressure build up in elevator.

## Disconnecting the elevator while elevator is open

### Procedure

1. Give command-to-open.
2. Switch off the hydraulic power supply.
3. Close the ball valve in P line and disconnect the P-line.
4. Remove the XP-line



NOTE: Last (!) remove the tank line to avoid pressure build up in elevator.





## Assembly and dis-assembly

### Elevator Disassembly



NOTE: Before the elevator and / or rotator can be disassembled make sure that: Doors are open, elevator is placed on a steady underground, lifting equipment is available for handling heavy parts.



**WARNING:** Ensure that all hydraulic lines are disconnected before ANY work is performed on the elevator. It's not always sufficient to isolate the hydraulic lines by using a ball valve, as the hoses might function as an accumulator, which could generate movement of the elevator. The ball-valve is installed to ease connecting and disconnecting the QD with pressure still on the line and for disconnecting the elevator from the power source.

Prior to disassembly, clean the elevator thoroughly with a steam-cleaner in order to prevent the disassembled parts from getting contaminated with dirt, mud etc..

## Removing manifold block from elevator

### Procedure

1. Disconnect the hydraulic lines and tubing.
2. Plug-off hoses, tubing , cylinders and manifold ports.
3. Tag the hoses.
4. Remove the bolts of the manifold block
5. Remove the manifold block
6. Clean manifold prior to further disassembly.



## Disassembly hydraulic manifold block.



NOTE: Ensure that the work area is clean and dust free. Clean the manifold thoroughly before disassembly.

### Procedure

1. Bleed off all hydraulic fluid.
2. Remove the cartridges, plugs and socket and nipples.
3. Remove filter plugs, filters and filter springs



NOTE: Be aware that the spring will force the filter out of its cavity.

## Removal cylinder package

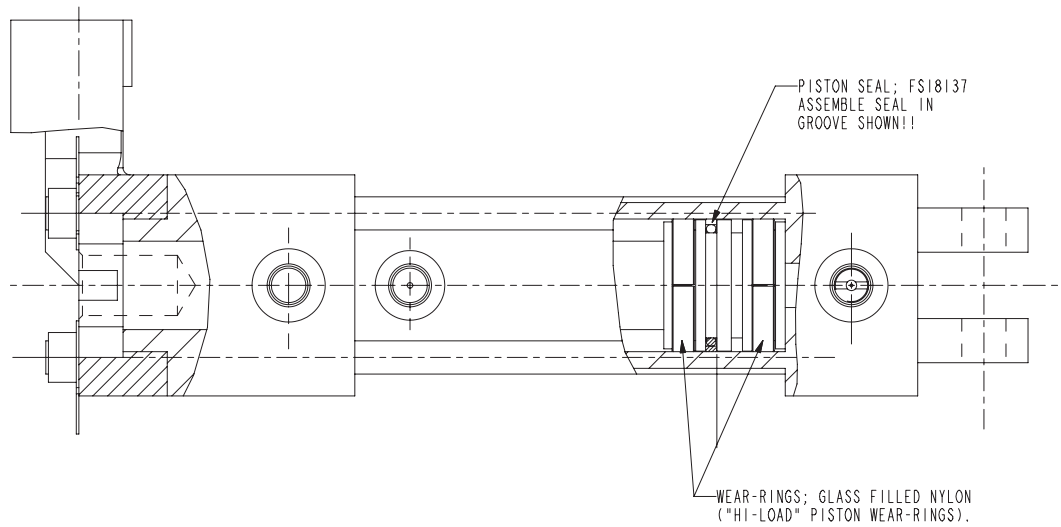
### Procedure

1. Remove cotter pins
2. Unscrew nuts
3. Remove screws, washers and bolts (3x)
4. Remove the cylinder package

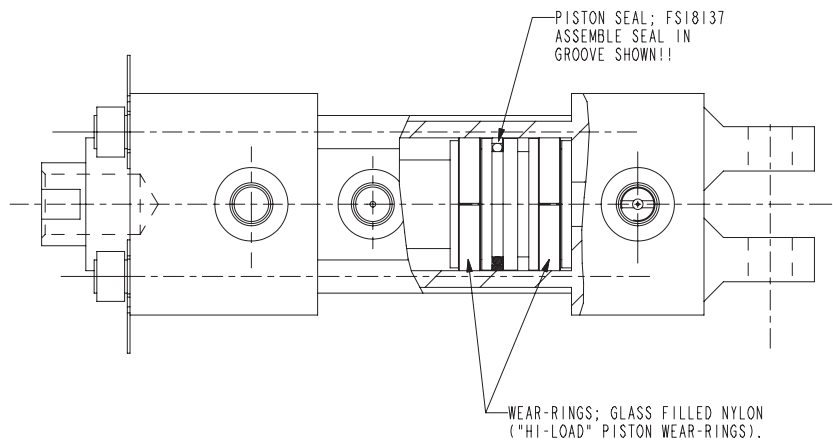
## Disassembly cylinders

### Procedure

1. Remove nuts and washers.
2. Remove washer and rod end.
3. Use a plastic mallet to remove the cylinder top. Remove piston and sleeve. Take extra care with the seal-assembly. It consists of one seal-ring with 'O'ring and should always be inspected and -when damaged- replaced before assembly of the cylinder



Latch cylinder



Door cylinder

## Exchanging seals

### Procedure

1. The O-ring seal can be replaced by hand.
2. The white PTFE-fiber seal needs to be warmed in clean hydraulic oil up to 75° C



**CAUTION:** DO NOT OVER STRETCH the PTFE seal. Just slip it over the piston after lubricating the seal-ring with fresh hydraulic fluid. The seal **MUST** be put in the groove shown.



## Disassembly latch-doors-lever package

### Procedure

1. Remove the hinge-pin lock bars (3x)
2. Remove the bracket pins from the brackets on the rear side (3x).
3. Remove the left and right door hinge pins.
4. Pull the left door with levers and latch out of the body
5. Pull the right door with the levers out of the body.

## Disassembly latch

### Procedure

1. Remove the latch hinge pin
2. Remove the rings on top of the latch (2 plc)
3. Remove the latch with the lever
4. Remove the bolt from the latch.
5. Remove the lever-disc package

## Disassembly control brackets

### Procedure

1. Remove the lock rings, plugs and bracket pins from underneath the elevator
2. Remove the hinge pins from the brackets
3. Remove the brackets

## Replacement lever wear bushings

### Procedure

1. Remove the lever-wear bushings with a hammer and proper sized drift.
2. Carefully press-fit the wear bushing into place

## Replacement of hinge pin wear bushings

### Procedure

1. Place the bushings and a correct sized drift over the bushing journal
2. Carefully drive the bushing into place





## Elevator assembly

### General note



NOTE: Use the proper torque for assembly parts. Cartridges could be easily damaged by applying too much torque. Apply 30-36 Ft Lbs (40 - 49 Nm) on cartridges MAX.

### Procedure

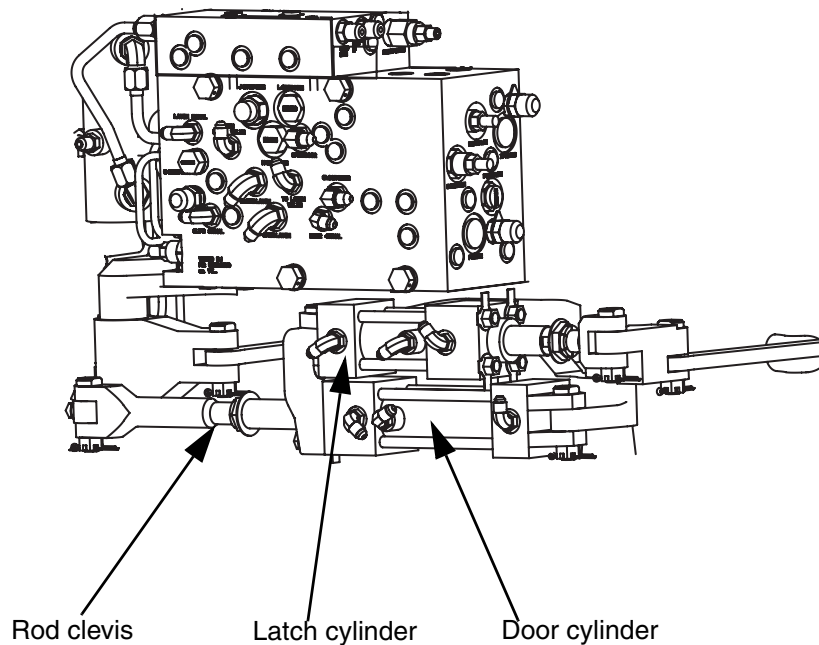
1. Assembly can be done by doing disassembly in reverse sequence.
2. Lock all parts as indicated on the assembly drawings.
3. Check the elevator according the Test Procedure (see TSEL-0136).

## Cylinder adjustment

### Procedure

After re-assembly of the elevator it might be necessary to adjust the cylinder package. When cylinders are found to be out of adjustment, follow the procedures as described below. Check first whether lock-nuts #944422-12 and SS lock-tabs #203268 are still in good condition. When necessary replace these before doing the re-adjustment.

1. Hook-up the elevator to a Hydraulic Power-Unit using Varco BJ test kit #202539, or to its HUK. Connect pressure gauges to the appropriate gauge ports for 'P' and 'XP' on the elevator manifold
2. Open the doors and close again, placing a 1 1/2" thick steel bar between the doors, preventing the doors from fully closing. Connect ('Tee-off") a pressure gauge to the barrel-port of the door cylinder.
3. NO signal (equal to 'P' pressure) may occur on the barrel-port gauge. Latch may NOT start to close.
4. When a signal (equal to 'P' pressure) out of the barrel-port is present (latch will start to close) then turn the rod-clevis OUT. (**Elongate the Cylinder**)
5. Then remove the bolt or bar.
6. Power the doors to close fully.
7. When the doors are fully closed, (Tip of the doors MUST close against each other, NO gap allowed.) , a signal (equal to 'P' pressure) out of the barrel-port MUST occur. (Latch will start to close)
8. When NO signal occurs, turn the rod-end IN. (Shorten the Door-Cylinder)
9. With the elevator open, check whether doors are making contact with their Hard Stops (see picture on next page). If not, turn rod-end clevis IN. (**Shorten the Door cylinder.**)
10. REPEAT this procedure until the proper barrel-port signals occur at the correct moment.



### Latch Cylinder Adjustment

After Door cylinder adjustment is found to be OK, the latch cylinder must be adjusted according the following procedure..

#### Procedure

1. Power the elevator to close and latch
2. Check whether the closed latch is in contact with it's hard stop on the left-hand door. Stop is located on the inside (back) of the bottom latch strap. You may need to use marking-paint (Blue-Dye) to get a proper indication, as this hard stop is difficult to reach with a feeler gauge. When latch does not contact hard-stop IN, turn rod-end clevis OUT. (lengthen Cylinder)
3. In the condition described in item 2, the elevator closed signal on port 'XP' MUST be present. (1,000 Psi / 6,895 KPa) When NO "elevator-closed-signal" (1,000 Psi / 6,895 KPa on "XP") Is present, turn rod-end clevis IN.(Shorten Cylinder)
4. Open the elevator and check whether latch is in contact with its Hard-stop for the open position. If not turn the rod-end clevis IN. (Shorten Cylinder)
5. REPEAT these steps until OK.
6. When BOTH the door-cylinder and latch-cylinder are adjusted correctly, lock both rod ends with their lock nut and SS lock-tabs. Do not to use the same folded part of the lock-tab twice. Replace lock-tab with cracks or other damage preventing proper locking.
7. Finally check the elevator with the test procedure (TSEL-0136).

# Trouble shooting

## Overview possible problems



NOTE When no solutions are available below, please contact an authorized Varco repair facility for further information.

Prior to trouble shooting a problematic elevator, check the following:

<b>P</b>	Check the <b>P</b> ressure to the hook up manifold is at least 2,000 Psi (600 KPa).
<b>C</b>	Check that all hoses and connectors are properly <b>C</b> onected
<b>P</b>	Check that electrical <b>P</b> ower is available
<b>R</b>	Check that the <b>R</b> eturn line pressure does not exceed 250 Psi (1,725 KPa)
<b>O</b>	Ckcek for <b>O</b> il leakage
<b>L</b>	Check <b>L</b> ubrication status of the BX-S

## General solution

### Procedure

1. Before starting trouble shooting connect three pressure gauges to the standard gauge connectors that are mounted on the BX-S manifold. The connectors can be found on sheet 50000250-1 & 50000251-1
  - “T”: Tank line, front side of the manifold.
  - “P”: Pressure line, right-hand side of manifold, bottom connector.
  - “XP” Signal pressure, Right-hand side of the manifold, top connector.
2. Check that the hydraulic power supply is providing 2,000 Psi / 13,790 KPa minimum at the elevator. The hydraulic power-unit pressure may need to be set higher at the power unit to ensure that 2,000 Psi / 13,790 KPa (2,500psi / 17,236 KPa MAX) is available at the BX-S-elevator.
3. Check hose-size to be ½” nominal diameter and flow being 5 GPM /19 l/min
4. Check Quick disconnects for dirt or malfunctioning, replace if necessary
5. Check that XP-line pressure (when elevator is commanded to open), is at least equal or 200 Psi (1,370 KPa) higher than P-line pressure.
6. Check the pressure in the return (Tank) line. Pressure may not exceed 250 Psi / 1,724 KPa.



## 1. Open elevator does not close and slips set

P = system pressure

T = close 0 Psi

XP = close to 0 Psi

Pilot = 0

## 2. 50000202Y; Elevator will close but not latch

P = system pressure

T = close to 0 Psi

XP = 0 Psi

Pilot = 0

1. Do both doors close completely to hard stops (welded on inside contact area between doors and body lugs)?

- Check if something is stuck between doors. Remove object
- Check if cylinders have sufficient stroke to close doors completely, adjust if necessary. Lock cylinder rods with nut and lock tab after adjustment.

2. Is the pressure on line #11 (“latch-out”) close to system pressure ?

- Check cylinder signal in line #10 to be close to system pressure, adjust cylinder stroke if signals are not fully present.
- Component K (CVCV-XEN) probably stuck, replace if necessary.

3. Does the latch cylinder mal-function , is it stuck ?

- Check Cylinder, Disassemble Replace cylinder if necessary.

4. If elevator is closed, latched and slips set, then elevator “Floats” and the latch valve is engaged.

Check Pressure in line 4 to be close to system pressure. If no signal at all replace component L CKCB-XEN or replace Latch valve G..

5. If elevator is closed and latched & indicator- light at control Panel is ON?

- Check XP Pressure 1000 psi / 6,894 Kpa at the HUK control manifold. Check pressure switch on HUK Elevator control manifold for pressure setting being too high. Check setting of bleed-off valve on HUK manifold.

### 3. 50000202Y: Closed elevator will not open while commanded to open.

P = system pressure

T = close to 0 Psi

XP = System pressure or higher

Pilot = 0 or system pressure

1. Is the load of the string still on the slips?

- Release the load of the slips.

2. When the load is off the slips, cold welding of the slips may have occurred due to improper lubrication

- Take slips out and check for damage.
- When no damage, lubricate slip and bore and place back.

3. Is XP line pressure equal or higher than the P-line pressure, check this at the elevator manifold?

- Check 'XP' QD for correct function. Check XP-line filter for correct function. Adjust PRV "PC1" at the HUK control manifold until XP pressure is equal or higher than P line pressure, if necessary.
- Is XP-pressure measured at the manifold lower than the P-line pressure; replace component C (CXCD-XCN)

4. Is the pressure on the line marked with #6 equal to XP line pressure ?

- Check pressure setting of component E (DPBO-LAN) to be 1,500 psi / 10,340 KPa, inspect it for dirt/malfunction and replace if necessary.

5. Is the pressure on the line marked with #8 equal to P line pressure ?

- Check component F (DCCC-XXN), inspect it for dirt/malfunction and replace if necessary.

6. Is the pressure on the line marked with #11 close to 0 Psi (Tank pressure)?

- Check component H (CKCB-XEN), probably stuck in closed position, check functions and replace if necessary



#### 4. Elevator is hesitating to open.

P = system pressure

T = close to 0 Psi

XP = System pressure or higher

Pilot = 0 or system pressure

1. Is component E (DPBO-LAN) set at 1,500 Psi / 10,340 KPa?
  - ❑ Set component E (DPBO-LAN) at 1,500 Psi / 10,340 KPa.
2. Is system pressure 2,000 Psi / 13,789 KPa min & 2,500 psi / 17,236 KPa max. at the elevator?
  - ❑ Adjust system pressure to 2,000 Psi / 13,789 KPa at the elevator.

#### 5. The elevator opening / closing operation is slow.

1. Is the flow (partly) blocked in one of the QD's (check for damage) ?

Replace damaged QD

2. Is one of the filters A and/or B clogged with dirt
  - ❑ Clean filters with a solvent.
  - ❑ Replace filters if necessary.
3. Is one of the restrictors (lines #7 and #11) (partly) blocked with dirt ?
  - ❑ Remove dirt.

#### 6. Elevator will close and latch, but slips won't set

P = system pressure

T = close to 0 Psi

XP = close to 0 Psi or higher

Pilot = close to 0 Psi

1. Check pressure on line 7 (to latch valve). Pressure must be equal to system pressure
  - ❑ When pressure is 0 psi, check signal line pressure from latch
  - ❑ When pressure is close to system pressure in line 7, replace component L (CKCB-XEN)
2. Check pressure on line 4. Pressure must be equal to system pressure. When pressure is 0, replace latch valve G.
  - ❑ When pressure equals system pressure . Replace component J CVCV-XEN

## 7. Rotated elevator will not close/latch.

### Rotated elevator will not close/latch onto pipe being presented under an angle.

Does rotator stop at an angle different from the pipe angle ?

- ❑ Adjust the stop pin's of the rotator to get a proper alignment of the elevator and the pipe
- ❑ Check whether a correct slip size is fitted.



**WARNING: Ensure all hydraulic lines are disconnected before any work is performed to the elevator**



NOTE: Use drawings #50000202Y, 50000250-1 "manifold" 50000200 "hydraulic schematic".

## Test kit BX-S-elevator (p/n 202539) + power slip

This test kit can be used for trouble shooting and functional testing of the BX-S elevators and rotators and PS 21/30 power slip. Its contents will allow in line pressure measurements to determine the cause of a problem.



NOTE: Advised is to do the trouble shooting in the shop instead of the drill floor because of the possible danger of falling parts down the hole

The special hose assembly for the BX-S elevator will allow testing in the shop and only requires a "pressure" and "return" line from the power unit. The way the kit is designed a "Xp" signal can be generated by operating two ball valves.

Contents:

- ❑ parts for pressure measurements
- ❑ hose assembly for testing BX-S elevator
- ❑ hose assembly for testing PS 21/30
- ❑ storage boxes (2x) for small parts
- ❑ storage box with complete kit in it that can be hand carried
- ❑ this document
- ❑ DRAWING and parts list of all parts in kit
- ❑ Caps, plugs, fittings, hydraulic sealant



On the drawing is described how the hose assembly must be hooked up to the power unit. How the elevator can be controlled is also described.

Fig.1 shows the hose assembly for testing the BX-S elevator and rotator. Refer to drawing 202539 sh.1 (included in kit) that shows the assembly in a schematic. On the left side you see 3 lines that must be connected to the elevator (pressure, return and signal Xp). On the right side there are 2 lines that must be connected to the power unit (pressure and return). To the top and to the right there is a PRV (pressure regulating valve) mounted. With this valve the pressure to the elevator can be set to any desired value allowed by the HPU press .

Fig 1

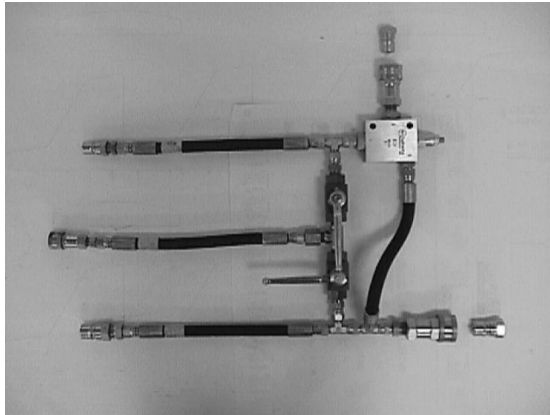


Fig 2

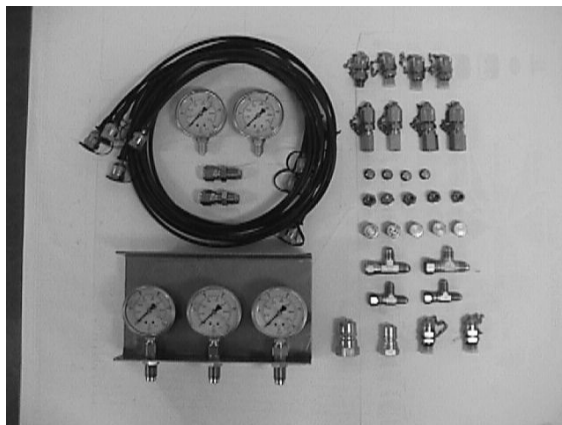


Fig.2 shows most of the parts that are in the kit. Ref. Drawing 202539. It has spare pressure gauges and hoses. The plate that contains 3 gauges can be used for checking the 3 pressures on the elevator that are most important (pressure, return and XP signal). The hoses need to be connected to the gauges and to the elevator standard connectors on the elevator manifold. On the assembly drawing of the manifold the location of these connectors can be found. They can also be recognized by the little cap and chain that covers the end of the connector. The plate has an extra side plate on the back which makes it easy to clamp it onto the top flange at the back of the elevator.



Fig 3



Fig.3 shows the box that contains the complete kit. The box is made of strong shock resistant material and can be locked. Weight of total kit with box is 31 lbs (14 kg).The box contains 2 smaller boxes that are used for storage of smaller hydraulic components.

Fig 4



Fig.4 shows the hose assembly that can be used for checking sagging of the slips on the power slips PS 21/30. Refer to drawing 202539 sh.2 (included in kit) that shows the hose assembly in a schematic. On the drawing itself there is a description of the testing procedure.

Fig 5



Fig.5 shows how to connect and disconnect the 2 hoses when testing has begun.



:



## Appendixes

### Risk assessment acc. to NEN EN1050

The risk assessment showed is according to standard NEN EN 1050.

Determination the limits of machinery according to NEN-EN 1050 chapter 5 and NEN-EN 292-1 clause 5.1.

Identification and noting hazards and hazardous situations was conducted according to NEN-EN 414.

Estimating the risks according to prEN 1050.

Identify and note all hazards and hazardous situations by use of NEN-EN 414 Annex A.

No	Identified potential hazard	Probable consequence/injury	R
<b>SYSTEM</b>			
1	Get jammed between the door or latch and body while opening or closing body halves	Fracture of fingers/hand/ limbs	5
2	Sharp corners may cause cuts, for example while lifting bushings.	Injury of body parts.	3
3	Breaking of lifting sling.	Cut of body parts	5
4	Feet placed under BX when the BX is lowered to the floor	Cut of feet	6
5	Get fingers / hand pinched between bushings and body during installation / removing of the bushings	Injury of fingers, hand	5
6	Get hit by the BX during lifting operations	Fractures of body	4
7	Oil in system is under high pressure and in case of leakage it may spurt out	Injection of oil into or through the body	5
8	Rotating the rotator with hydraulic hoses connected wrongly	Breaking hoses, Injection of oil into or through the body	4
9	Unable to talk to each other because of the noise on the rig floor	Misunderstandings and failures	5
10	Installing/removing of the bushings by manual force	Excessive effort	5
11	Running strings is monotonous work	Carelessness during the job	5
12	Not reading the manual / not being instructed, may result in hazardous situations when described procedures are not carried out properly	Several injuries possible	11
<b>PERSONNEL</b>			
1	Squeezing hand, finger or foot by elevator during installation	Fractures of hand, finger or foot	5
2	Squeezing hand or finger between elevator and link eye during installation	Fractures of hand or finger	5
3	Get hit by rotator	Fractures of body	5



## Appendix

4	Squeeze finger, hand, arm or foot between closing doors during trouble shooting, maintenance on operating elevator	Fractures of finger, hand or arm	6
5	Squeeze finger, hand, arm or foot by heavy elevator parts during assembly, disassembly for maintenance	Fractures of finger, hand or foot	5
6	Hit finger with bushing part during changing of bushing	Bruise of finger	6
7	Hit foot by bushing part during change out	Fractures of foot	5
8	Get hit by rotating elevator	Fractures of body	6
9	Get hit by spring during maintenance	Bruise	3
10	Get hit by from BX falling parts during operation	Death	8
11	Get hit by falling pipe during operation	Death	8
12	Burst of hydraulic hose	Injection of oil into or through the body	5
13	Squeeze hand or fingers between latch lock parts during maintenance	Bruise/fracture of hand or fingers	4
14	Squeeze finger between door and latch during maintenance	Bruise/fracture of finger	4
15	Trapping between elevator and rotator during maintenance	Bruise/fracture of finger, hand or arm	4
16	Reduced stability during installation by use of worn-out tugger lines	Fractures of body	2
17	Disable to talk to each other because of the noise on the rig floor	Misunderstandings and failures; death	9
18	Drilling jobs are monotonous	Carelessness during the job; death	9
<b>COMPONENT LEVEL</b>			
1	Missing link block retainer bolts	Elevator may fall from 1 bail	6
2	Breaking link block retainer	Elevator may fall from 1 bail	6
3	Excessive wear of link ear	Ear may break	6
4	Sticking trigger pin	Elevator stops operation	6
5	Failing hydraulic components	BX does not respond to commands. Temp. stop of operation	3
		BX does not open during tripping. Temp. stop of operation	3
		No signal to driller. Temp. stop of operation	3
6	Breaking hydraulic couplings	False signal to driller. Opening elevator while not allowed, loosing string. Possible only when no load in elevator, so no loss of string possible	3
		No signal possible. Temp. stop of operation	3
		No opening/closing possible. Temp. stop of operation	3
		Oil leakage	5



7	Missing (not fitted) bushing lock pin/missing lynche pin clips in combination with breaking chain in combination with event causing the bushing falling out the BX	Bushing falls into well	7
8	Breaking chains in combination with not fitted to bushing	Chain falling into well	4
9	Missing warning labels	Not understanding dangers of BX	7
10	Loose service loop/hydraulic hoses	Hoses move freely around, hitting crew members	9
11	Loose parts like bolts/nuts/chains	Parts falling down the well	6
12	Missing/loose wear button retainer bolts	Button /bolt may come out, damaging pipe/ bushing	4
13	Setting bushings on tool joint.	Setting at wrong moment, damaging joints / bushings. Elevator will not close, so no "elevator closed" signal will occur at drillers cabinet.	4
14	Closing of BX whilst exchanging bushings	Fractures / death	7
15	Dirt/contamination in hydraulic system	Any of above events may take place.	3
16	Excessive wear on door and latch levers	No opening/closing possible. Temp. stop of operation	4
		Unpredictable opening/closing possible. Temp. stop of operation	4
17	Excessive wear on hinge pins and hinge pin lugs.	No opening/closing possible. Temp. stop of operation	4
		Unpredictable opening/closing possible. Temp. stop of operation	4
		Breaking hinge pin	7
18	Excessive wear on latch lug	Unpredictable opening/closing possible. Temp. stop of operation	4
19	Unauthorised welding	Breaking or failure of parts, resulting in loosing string / falling parts	9
20	Excessive wear of trigger finger or related parts, leading to closing sequence	Elevator does not close properly, resulting in loosing string	3
21	Excessive wear on mechanical latch lock	Elevator can open when running collar type pipe, resulting in loosing string	5
22	Wrong adjustment of cylinders	Lock remains under latch, while signal "elevator closed" is generated, resulting in loosing string	5
23	String on bushing prior to signal "elevator closed"	Mechanical latch lock will hit bottom of latch resulting in wear, resulting in loosing string	9

### Conclusion Risk Assessment

Follow up rig procedures / Work according to procedures in manual / Follow training / Wear personal safety equipment



S = Severity of the possible harm:

- Slight (normally reversible) injury or damage to health.
- Serious (normally irreversible) injury or damage to health.
- Death.

F = Frequency of exposure:

- Seldom to quite often.
- Frequent to continuous.

P = Probability of occurrence of an event that can cause harm:

- Low (so unlikely, it can be assumed occurrence may not be experienced).
- Medium (likely to occur sometime in life of an item).
- High (likely to occur frequently).

A = Possibilities of avoidance:

- Possible under specific conditions.
- Scarcely possible.

The values used for factor S are pessimistic. Although fractures are normally reversible, it can be assumed that the person in question will not be able to perform his normal duties during a few weeks. Thus absenteeism is used to measure severity of the possible harm more than reversibility.

A possible division in acceptability of safety-levels is:

1 - 4 risk low

5 - 7 risk medium high

8 -10 risk high

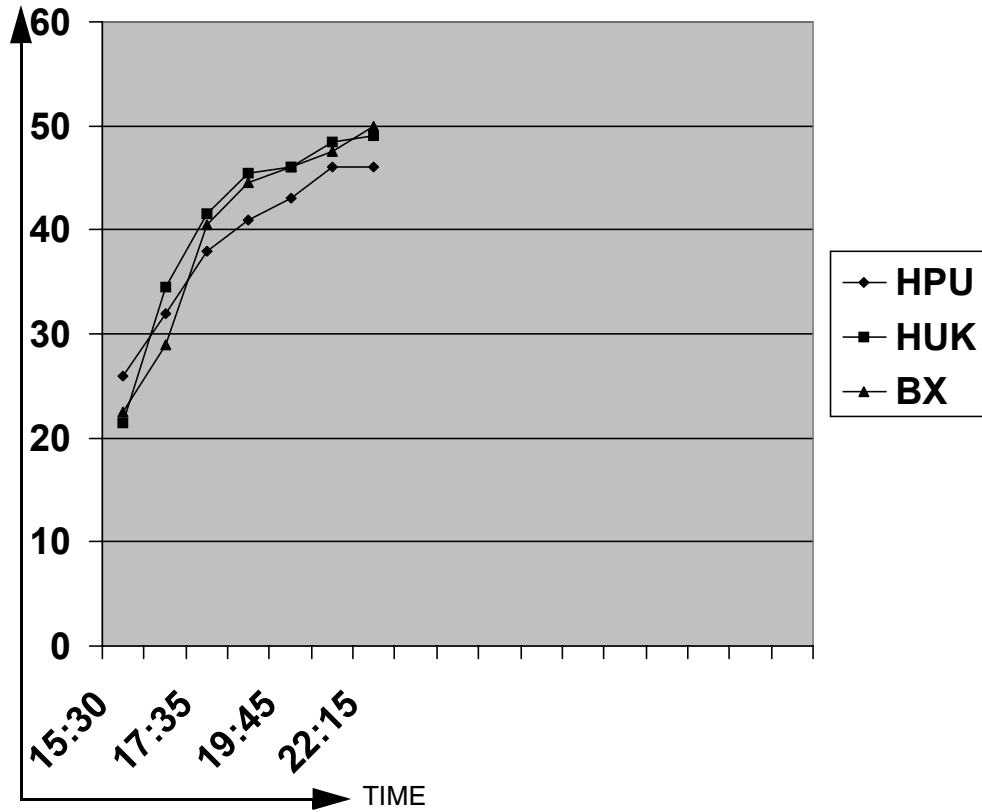
11 - 14 risk very high



## Relevant explosion safety tests

The maximum temperature reached during simulation tests with an elevator was 56° C (133°F), the maximum temperature reached with the Hook Up Kit was 69.5° C (157°F). The test was carried out over a period of 6h45m.

TEMPERATURE (°C)





## Frequently asked questions

### What is the weight of an BX-S-elevator?

This depends on the type of slip.

An BX-S elevator weights about 1,238 kg (2,730 Lbs) without slips

The slips weigh between 23,5 - 30 kg (52 - 66 Lbs).

A rotator weights appr. 150 kg (330 Lbs).

### How does a BX-S-elevator function?

The driller gives the command “elevator -close”.

### Is it safe working on an elevator without disconnecting the hoses?

The hoses could function as an accumulator and supply enough energy to start the closing cycle when  $XP < \text{System Pressure}$ . This could result in injury or death. Hence it is required to disconnect hoses before starting any work on the BX-S.

### What should I do when the elevator doesn't functions well?

Start with conducting the possible causes as outlined in the chapter trouble shooting. When no solutions at hand PLEASE contact an authorized Varco BJ repair facility. They will help you with finding a solution. When you start adjusting the elevator without exactly knowing what you are doing, you might increase the problem, even when the basic problem is a very simple one.

### Why can't I use parts from NON Varco BJ origin ?

All Varco BJ parts are tested and are traceable on vendor, material, strength etc. When using not original parts one might use parts which are not strong enough for the purpose, which might result in breaking of parts from the elevator.

### I know how to operate an elevator. Do I need to read this manual ?

It's highly recommended to read this manual as the elevator, even though you feel you have sufficient knowledge on how to operate one. It can be used to prevent problems and solve problems when they occur. When following the maintenance advice you will have a reliable tool with a long operational life.

### Why can't I use tool joint compound/pipe-dope as a lubricant ?

Tool joint compound is a sealant to prevent fluids from escaping out off the drill-pipe. This means it is a sticky compound with basically the opposite result as required: It sticks parts, but doesn't make parts break loose easily (except from tool joints).





## Spare parts

### Operational spares

Part number	Description	Qty
50000222	Lever cylinder (rocker)	2
50000225	Push pin cylinder	2
50000227	Hinge pin cylinder lever	2
50000253	Cylinder BX-S	2
50000254	Lock ring cylinder	2
50918-C	Washer, lock regular 1 1/8"	4

### Spare parts BX-S Manifold #50000251-1

Part number	Description	Qty
980252	Compression Spring D-253	2
107029-175N	Pilot to Open Check Valve	2
108087-1OAN	3-Way Sequence Valve	1
109858-1BN	Pressure Reducing Valve	1
50506-C	Nut, Hex slotted 3/8-16 UNC	2
51300-110-B	O-Ring O 2-110 Parker	2
51300-113-B	O-Ring O 2-113 Parker	2
51301-110	Back-up-Ring T 8-110 Parker	2
51301-113	Back-up-Ring T 8-113 Parker	4
51425-8	Pin, Cotter	2
56529-4-4-S	Connector 'O'Ring Boss	8
979798-1	Pressure gauge connector	3
93547-1B75N	Pilot to open check-valve	2
93548-1530N	Check valve cartridge	1
979512-10	Plug 7/8"-14 'O'Ring	3
979796-25-S	Filter Element BX-S	2
979880-8	Sun 3/4 Cartridge	1
980045-10-4	Reducer 'O'Ring boss	1
979512-3	Plug 7/16"-20 'O'ring	10
50003460	BX-Latch valve	1
59000274-LAN	Sun cartridge DKDP-LAN	1
59000047-T	Flucon, VAT/4203TN	1
979880-8	SUN 3/4 cartridge	1



## Storage, transport & scrapping.

### Storage

When the elevator is not being used for a longer period then 3 days the following steps should be carried out:

- ❑ Remove the slips.
- ❑ Clean elevator and slips.
- ❑ Grease elevator and slips as described in checklist lubrication.
- ❑ Place elevator in closed position.
- ❑ Grease all blank parts.
- ❑ Use an extreme pressure, multi-purpose, lithium based grease of No. 1 or No. 2 consistency and multi grade motor oil.
- ❑ Grease trigger finger-shaft.
- ❑ Clean and cap hydraulic Quick Disconnect Couplings.
- ❑ Recommended rust preventative (slushing compound) for bare metal surfaces: Kendall Grade 5(GE-D6C6A1) or equivalent.

### Transport

- ❑ Lift the BX-S-elevator by the lifting ears only
- ❑ The best way of transporting the BX-S-elevator is in its original crate. Use oiled paper and seal the box with plastic from leaking when stored outside. Secure the top safely.

### Scrapping

- ❑ The tool contains hydraulic fluids, grease, aluminum, steel, rubbers, plastic and several assembled components from undefined consistency or mixtures. The tool can be contaminated with mud.
- ❑ When the tool is taken out of permanent service it is recommended to disassemble the tool in a place where drainage for waste fluids is possible.
- ❑ Hydraulic fluids, mud and grease are unsafe when touched by the skin. Always wear gloves and safety goggles when disassembly the tool.
- ❑ Remove all quick-disconnects, hoses, cylinders and manifold block and bleed of hydraulic oil.
- ❑ Clean the tool with a steam cleaner.
- ❑ Remove the doors, latch, trigger valve, levers and discs and remove all bronze wear slips from the parts.
- ❑ Carry of to proper place for final storage or destruction.



## Drawings

Number	Name
TSEL-0136	Test specification BX-S 50000202Y + (- 203Y)
TSEL-0138	Field commissioning Procedure
TSEL-0137	Test specification 50000250-1 + 50000251-1
PSEL-0002	Pre installation sheet

Number	Name
50000202Y	BX-S elevator, final assembly with slip control
50000215-1	Hinge pin assembly door BX-S-elevator
203220-5	Door cylinder BX-S
50000229	Door cylinder assembly BX-S
203221-5	Latch cylinder BX-S
203221-1	Latch cylinder assembly BX-S
50000251-1	Manifold BX-S with slip control
50000200-1	Hydraulic schematic BX-S + Slip Control
50000200-12	Schematic BX-S 50000202Y & Rotator 50004130
204682	General hook-up kit drawing BX-S-elevator with rotators
202539	Test kit BX-S elevator + PS
DD-50000202	Dimensional drawing BX-S
CA-320 c/m	Critical areas body BX-S - elevator
CA-321 c/m	Critical areas doors BX-S - elevator
CA-253	Critical areas latch BX-S - elevator
CA-208	Critical areas slips BX-S - elevator





# TEST SPECIFICATION

## BXS 5000202Y

## BXS 5000203Y

Serial Number : \_\_\_\_\_

Part Number : \_\_\_\_\_

Part Description : \_\_\_\_\_

Order Number : \_\_\_\_\_

Test Technician Name : \_\_\_\_\_ Date: \_\_\_\_\_  
Semi-Finished.

Test Technician Name : \_\_\_\_\_ Date: \_\_\_\_\_  
Load-Test and MPI

Test Technician Name : \_\_\_\_\_ Date: \_\_\_\_\_  
Final-Assembly

3rd Party Witness:  
Agency-Name, Name,  
Signature and Date : \_\_\_\_\_

Final Inspection:  
Inspectors: name, signature  
and stamp : \_\_\_\_\_

Remarks \_\_\_\_\_

	Name:	Date	C	700193	L.Sonneveld	Okt-3-2005	M.Schats
Prepared	M.Schats	June-8-2004	B	601424	L.Sonneveld	July-9-2004	M.Schats
Checked	L.Sonnev	June-8-2004	A	601225	M.Schats	June-8-2004	L.Sonneveld
Approved	A.Krijnen	June-8-2004	Rev	ECN	Name	Date	Checked
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			<b>TSEL-0136</b>		<b>BX SLIP TYPE</b>		<b>1 of 8</b>



**This specification defines the production testing of the BXS elevators. Each unit is to be tested according to the following procedure. Any defect is cause for stopping the test until the defect has been eliminated. All defects found during the test will be noted and signed off by the test-technician on the front page of this test-sheet. In the event of a major defect whose repair would affect items previously inspected or tested, these affected items shall also be re-tested or re-inspected after the defect has been eliminated.**

**1.0 SEMI-FINISHED BEFORE LOAD-TEST**

Initials:

- 1. Check symmetric closing of doors. Hard-Stops \_\_\_\_\_
- 2. Push doors fully closed; check that latch clears the the latch lug and can open freely. \_\_\_\_\_
- 3. Place wedges between closed doors, verify position of the doors. Check that latch does not interfere with right door. \_\_\_\_\_
- 4. Check latch / latch lug for 75 % surface contact. Use Blue Dye. \_\_\_\_\_
- 5. Check symmetric door-opening by measuring the smallest Gap (bottom site without slips) between both doors. Door-opening should be: 10" unto 11" \_\_\_\_\_
- 6. Open and close latch, check for smooth operation and correct contact with Hard-Stops. \_\_\_\_\_
- 7. Open and close both doors; check for smooth operation and correct contact with Hard-Stops. \_\_\_\_\_
- 8. Install the FUNCTIONAL TEST SLIPSET GA 1571. Check for body and both doors, that the slip is in contact with the elevator conical load pad, use Bleu Dye. Top SLIPS should be equal to the top BODY and DOORS Within 0.1" on play, see marks on BODY and DOORS. DOORS should open en close without any obstruction. \_\_\_\_\_

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- 9. Check that SLIPSET GA 1571 can fully hinge around their position pins. \_\_\_\_\_  
 Check that SLIPS can be pulled downwards on full stroke 2.50" without finding any obstruction. \_\_\_\_\_  
 Disassemble the SLIPSET GA 1571 and store it \_\_\_\_\_
- 10. Fill in the table for Heat-numbers, Part-number and Elevator Serial number on page 8. \_\_\_\_\_
- 11. **Before Load-Test**; verify that semi-finished elevator is assembled according drawing 50000211 and that TSEL items 1.1 thru 1.10 have been checked. \_\_\_\_\_
- 12. Check that elevator has been load tested. \_\_\_\_\_
- 13. Check that elevator has been MPI inspected. \_\_\_\_\_

## 2.0 **FINAL ASSEMBLY INSPECTION.**

- 1. Check smooth functioning of the 4 SLIP lock pins \_\_\_\_\_
- 2. Functioning of the SPRING HOLDER stroke.  
 Install SLIPSET GA 1571 and push fully down.  
 Check length of stroke should be more than 2.50".  
 Check free movement of those SLIPS  
 Disassemble SLIPSET and store it. \_\_\_\_\_
- 3. Functional inspection of lever-mechanism:  
 Check that no lever-mechanism parts act as a stop for doors and latch.  
 1/8" minimum clearance with casting \_\_\_\_\_
- 4 Check that doors and latch, in open and closed position, are in contact with their hard stops.  
 (Cylinders should not be end of stroke) \_\_\_\_\_
- 5 Check Latch valve setting 500003960-11 see drawing P 4  
 SIGNAL SHOULD COME UP 0.2" before completely closed \_\_\_\_\_

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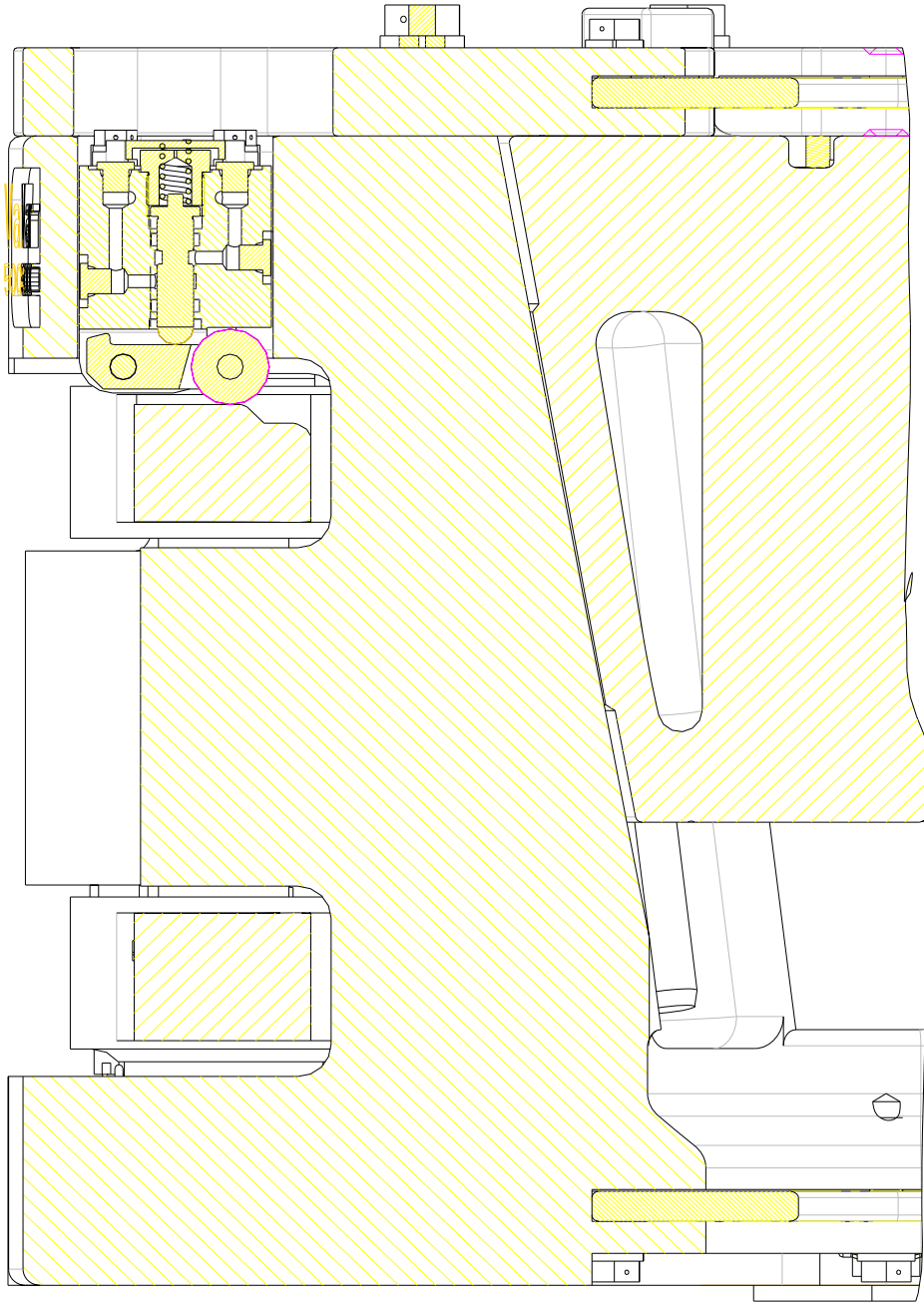
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SPACE TO BE  
DETERMED BY  
VALVE



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### 5 Pressure Test.

**Grease all greasing points before (cycle)testing!**

- 1: Hinge pins.
- 2: Latch pin.
- 3: Latch contact surfaces
- 4: Conical surface in BODY and DOORS.
- 5: SPRING HOLDERS 4x

Hook-up elevator to Power Unit. P = 2000psi flow-rate at 3 GPM. (11 L/min)

### 50000202Y BXS ELEVATOR SLIP CONTROLS

Hydraulic schematic drawing 50000200-1

<b>P</b>	2000 psi	2000 psi	2000 psi
<b>T</b>	Max 50 psi	Max 50 psi	Max 50 psi
<b>XP</b>	2000 psi	0→1000 psi *	0→1000 psi *
<b>PILOT</b>	2000 psi	2000 psi	0 psi
<b>FLOAT</b>	0 psi	2000 psi	2000 psi
<b>Result</b>	<b>ELEVATOR OPEN SLIPS UP</b>	<b>ELEVATOR CLOSED SLIPS UP</b>	<b>ELEVATOR CLOSED SLIPS DOWN</b>
<b>Initials</b>			

### 50000203Y BXS ELEVATOR

Hydraulic schematic drawing 50000200

<b>P</b>	2000 psi	2000 psi
<b>T</b>	Max 50 psi	Max 50 psi
<b>XP</b>	2000 psi	0→1000 psi *
<b>FLOAT</b>	0 psi	2000 psi
<b>Result</b>	<b>ELEVATOR OPEN SLIPS UP</b>	<b>ELEVATOR CLOSED SLIPS DOWN</b>
<b>Initials</b>		

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\*XP= 0 psi, Elevator close cycle start.

XP= 1000 psi , Elevator doors are closed and latched and slips are set.

## 5.1 Valve settings:

- 6. Check XP signal-elevator-closed, must be 1000 psi.  
When not adjust PRDB-LBN (D) until 1000 psi is reached. \_\_\_\_\_
- 7. Check setting of adjustable cartridge, DPBO-LAN (E), for elevator open cycle. Start with a closed elevator and. Verify 1500 psi pressure setting by starting with a low (1000psi) system pressure command-to-open on XP. Slowly increase HPU system-pressure. Once pressure is increased to 1500 psi the closed elevator shall open. \_\_\_\_\_
- 8. Check setting of adjustable cartridge, DKDP-LAN (X), for slips set signal. Start with a closed elevator. Verify 1500 psi pressure setting by starting with a low (1000psi) system pressure. Slowly increase HPU system-pressure. Once pressure is increased to 1500 psi, XP must come up, (1000 psi). \_\_\_\_\_
- 9. Only for Elevator 50000202Y.  
Check setting of adjustable cartridge, flucom, VDT20/4203TN (Q), slips set signal. Start with a closed elevator and slips down. Verify 1500 psi pressure setting by starting with a low (1000psi) pilot pressure. Slowly increase pilot pressure. Once pressure is increased to 1500 psi, the slips starts to come up. \_\_\_\_\_

## 5.2 Cycle time

Check response Time. At 3 GPM. (11L/min) and 2000 psi,

- 10. Elevator cycle-to-open: 5 sec. max. \_\_\_\_\_
- 11. Elevator cycle-to-close: 5 sec. max. \_\_\_\_\_
- 12. Elevator SLIPS UP / SLIPS DOWN 4 sec. max. \_\_\_\_\_

13. Check the LATCH is completely closed before “SLIPS DOWN”, has been activated. \_\_\_\_\_

**Cycle Test.**

The elevator shall be opened / closed for 250 times minimum.  
 Hydr. system pressure set at 2000 psi, flow-rate 3 GPM (11 l/min).  
 Each cycle the elevator needs to open, close and latch and slips set completely in proper order.  
 If elevator fails during cycle-test, the test must be restarted after the defect has been eliminated. \_\_\_\_\_

14. Check for loose parts, cotter pins, lock-tabs etc. \_\_\_\_\_

15. Inspect for wear on movable parts / hoses after cycle test. \_\_\_\_\_

16. When check items 2.9 thru 2.15 are OK.  
 Increase system-pressure to 3000 psi and keep elevator closed for 5 minutes minimum.  
 Repeat this with elevator opened for 5 minutes minimum.  
 No leakage shall occur. \_\_\_\_\_

**6.0 FINAL INSPECTION**

17. Verify that the elevator is assembled according to the latest revision of the final assembly drawings. \_\_\_\_\_

18. Verify that all bolts and nuts are tightened to the correct torque-value and secured by lock tabs or cotter pins. \_\_\_\_\_

19. Verify that all grease points and surfaces are greased. \_\_\_\_\_

20. Verify that latch and hinge pins are properly locked. \_\_\_\_\_

21. Verify that correct Quick Disconnects are installed. \_\_\_\_\_

22. Verify presence and correctness of markings. \_\_\_\_\_



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## 7.0 SERIALNO's, PARTNO's and HEATNO's.

Elevator NL number: \_\_\_\_\_ Partno: \_\_\_\_\_

	Part Number:	Foundry:	Heat Number:	Heat Code:
Body	50000212Y	_____	_____	_____

Left Door	50000213Y	_____	_____	_____
-----------	-----------	-------	-------	-------

Right Door	50000214Y	_____	_____	_____
------------	-----------	-------	-------	-------

Latch	203304Y-10	_____	_____	_____
-------	------------	-------	-------	-------

Hinge Pin	50000215-1			_____
-----------	------------	--	--	-------

Hinge Pin	50000215-1			_____
-----------	------------	--	--	-------

Latch Pin	50000216-1			_____
-----------	------------	--	--	-------

Manifold Part No.	50000250-1	Manifold Serial Number	_____
-------------------	------------	------------------------	-------

Manifold Part No.	50000251-1	Manifold Serial Number	_____
-------------------	------------	------------------------	-------



# TEST SPECIFICATION

## PART NUMBER 50000250-1 50000251-1

Test Technician Name : \_\_\_\_\_

Company Name : \_\_\_\_\_

3rd Party Witness Agency : \_\_\_\_\_

3rd Party Witness Name : \_\_\_\_\_

3rd Party Witness Signature : \_\_\_\_\_

Test Date : \_\_\_\_\_

Remarks : \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

SERIAL NUMBER(S)	

**One Test certificate per Batch / Varco Purchase Order is allowed.  
(Note each serial number in the table above)  
After Completion of tests return the completed  
certificate with the parts shipment to Varco BJ.**

	Name:	Date	C				
Prepared	M.Schats	09-Jun-04	B	601424	L.Sonneveld	09-jul-04	M. Schats
Checked	L.Sonnev.	09-Jun-04	A	601225	M.Schats	09-Jun-04	L.Sonneveld
Approved	A. Krijnen	09-Jun-04	Rev	ECN	Name	Date	Checked
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			<b>TSEL 0137</b>		<b>BX-S MANIFOLD 50000250-1 50000251-1</b>		<b>1 of 4</b>



This specification defines the production testing and inspection of manifold. Varco Part number: 50000250 / 251. For use in Hydraulic Operated BXS. Each unit is to be tested and inspected according to the following procedure. Any discrepancy is cause for discontinuing the test until the discrepancy has been eliminated. All these discrepancies will also be noted and signed off by the test technician on the front page of this test sheet. In the event of a major discrepancy whose repair would affect items previously inspected or tested, the affected items shall also be re-tested or re-inspected after the discrepancy has been eliminated.

**1.0 FLUSHING BEFORE AND AFTER ASSEMBLY**

*Before assembly of valves* clean manifold block to remove all possible dust, dirt, drilling swarf, drilling fluid etc.

*After assembly*, the manifold needs to be flushed according NAS class 8 specifications.

\_\_\_\_\_ OK

**2.0 ASSEMBLY:**

All cartridges shall be installed according OEM's recommendations on assembly torque-value, lubrication, etc. (Press-fit the covers over the adjust-screws after all testing is completed )

\_\_\_\_\_ OK

**2.1 VALVE SETTINGS MANIFOLD 50000250-1**

For reference see drawing: 50000200

**VALVE: D**

Set valve PRDB-LAN at 1000psi according SUN corp. recommendations prior to assembly in manifold.

\_\_\_\_\_ OK

**VALVE: E**

Set valve DPBO-LAN at 1500psi according SUN corp. recommendations prior to assembly in manifold.

\_\_\_\_\_ OK

**VALVE: X**

Set valve DKDP-LAN at 1500psi according SUN corp. recommendations prior to assembly in manifold.

\_\_\_\_\_ OK

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**2.2 VALVE SETTINGS MANIFOLD 50000251-1**

For reference see drawing: 50000200-1

**VALVE: Q**

Flucom cartridge, VDT20/4203TN

Set valve at 1500psi.

\_\_\_\_\_ OK

**3.0 PRESSURE TESTING**

Set pressure of HPU at 2000psi minimum, flow rate: 3 GPM (11 Ltr./Min)

**3.1 50000203Y BXS ELEVATOR**

Hydraulic schematic drawing 50000200

<b>P</b>	2000 psi	2000 psi
<b>T</b>	Max 50 psi	Max 50 psi
<b>XP</b>	2200 psi	1000 psi
<b>FLOAT</b>	0 psi	2000 psi
<b>Result</b>	<b>ELEVATOR OPEN SLIPS UP</b>	<b>ELEVATOR CLOSED SLIPS DOWN</b>
<b>Initials</b>		

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**BX-S MANIFOLD  
50000250-1  
50000251-1**

Sheet:

**3 of 4  
(Rev. A)**



### 3.2 50000202Y BXS ELEVATOR WITH SEPARATE SLIP CONTROL

Hydraulic schematic drawing 50000200-1

<b>P</b>	2000 psi	2000 psi	2000 psi
<b>T</b>	Max 50 psi	Max 50 psi	Max 50 psi
<b>XP</b>	2200 psi	1000 psi	1000 psi
<b>PILOT</b>	2000 psi	2000 psi	2000 psi
<b>FLOAT</b>	0 psi	2000 psi	2000 psi
<b>Result</b>	<b>ELEVATOR OPEN SLIPS UP</b>	<b>ELEVATOR CLOSED SLIPS UP</b>	<b>ELEVATOR CLOSED SLIPS DOWN</b>
<b>Initials</b>			

# Once the condition gives the read outs as per the above table, increase HPU pressure to 3000 psi and hold for 5 minutes minimum.  
No leakage shall occur. \_\_\_\_\_ OK

#### 4.0 ADDITIONAL CHECKS:

All cartridges are installed according OEM's specifications. ( torque-value, lubrication, etc.) \_\_\_\_\_ OK

Cap all open connections with steel caps. \_\_\_\_\_ OK

#### 5.0 NAS CLASS 8 QUALIFICATION

Is manifold flushed according NAS class 8 specifications? \_\_\_\_\_ OK

#### 6.0 SERIALIZATION

Is manifold stamped with serial number? \_\_\_\_\_ OK

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Document No.:

**TSEL 0137**

Title:

**BX-S MANIFOLD  
50000250-1  
50000251-1**

Sheet:

**4 of 4  
(Rev. A**





**Rig name** : \_\_\_\_\_

**Part Description** : \_\_\_\_\_

**Part Number** : \_\_\_\_\_

**Serial Number** : \_\_\_\_\_

**Customer ref. Number** : \_\_\_\_\_

**Varco BJ sales order Number** : \_\_\_\_\_

**Varco BJ rep. Name/ Job title** : \_\_\_\_\_  
: \_\_\_\_\_

**Varco BJ Witness Signature** : \_\_\_\_\_

**Reviewed manual revision/ Date** : \_\_\_\_\_

**Commissioning date** : \_\_\_\_\_

**Remarks** : \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## TEST SPECIFICATION ( Field Commissioning and Instruction procedure )

	Name:	Date	C				
Prepared	L.Sonneveld	Jule-5-2004	B	700193	L.Sonneveld	Oct-3-2005	P. Dekker
Checked	P. Dekker	Jule-5-2004	A	601225	L.Sonneveld	Jule-5-2004	P. Dekker
Approved	A.Krijnen	Jule-5-2004	Rev	ECN	Name	Date	Checked
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			<b>TSEL-0138</b>		<b>Field Commissioning procedure BX-S Elevator</b>		<b>1 of 9</b>



- During commissioning, all of the following rig personnel need to be present for witnessing. Please check and have them signed for their presence during the complete commissioning procedure.

**Rig company man** \_\_\_\_\_ :

**O.I.M** \_\_\_\_\_ :

**Tool pusher** \_\_\_\_\_ :

**Rig mechanic** \_\_\_\_\_ :

**(Assistant) Driller(s)** \_\_\_\_\_ :

After successful completion of the commissioning procedure, the following people need to sign for approval:

**Rig company man** \_\_\_\_\_ :

**O.I.M** \_\_\_\_\_ :

**Tool pusher** \_\_\_\_\_ :

**After final approval, hand over copies of the completed TSEL to all attendees.**

*( FIELD COMMISSIONING ROTATOR SEE TSEL-0089 latest Revision.)*

**General Warnings:**

- **MAKE SURE A SAFE WORKING ENVIRONMENT IS PROVIDED WHEN FIELD COMMISSIONING THE BX-S ELEVATOR.**
- **CLEANING REQUIREMENT OF THE SYSTEM BEFORE CONNECTING SYSTEM 21 PRODUCTS.**  
 Clean, purge and pickle all hydraulic piping during and after installation and prior to hooking up Varco System 21 equipment. The installation’s hydraulic pressure line from the hydraulic power unit is to be looped to the installation’s hydraulic return line back to the hydraulic power unit and hydraulic fluid is to be run through this loop for a period of 1 hour minimum, before hooking up pressure and return lines to system 21 equipment.
- **REQUIRED (PLC input) FUNCTIONS IN DRILLERS CONSOLE AS SUPPLIED BY DRILLERS CONSOLE MANUFACTURER.**

**Operating the BX-S Elevator 50000202Y with Rotators.**

(Schematic HUK: 50000200-12)

On the driller’s console the following control functions need to be provided;

- “Open” BX-S Elevator.
- “Close” BX-S Elevator.
- “Slips up” BX-S Elevator
- “Slips set” BX-S Elevator

**Operating the BX-S Elevator 50000203Y with Rotators.**

(Schematic HUK: 50000200-13)

On the driller’s console the following control functions need to be provided;

- “Open” BX-S Elevator.
- “Close” BX-S Elevator.

The functions can for instance be controlled with a two-position switch, One position of the switch being the “Open” or “Slips up” function, the other position being the “Close” or “Slips set” function.

The (PLC outputs) Output function controls a solenoid operated Hydraulic valve Situated on the Top-drive or inside the Hydraulic BX-S control cabinet situated in the derrick at finger board level.

S2	Pressurized @2000	BX-S Open command
S2	De-Pressurized	BX-S Close command
S2	Pressurized @1000	BX-S closed,latched and Slips set feed-back signal

Closed-Feedback Signal from BX-S Elevator is converted into Electrical signal input for PLC or Drillers console indicating light, through a pressure switch mounted near the BX-S control Manifold.

## PROCEDURE

### 1. General.

- After unpacking BX-S Elevator verify presence of all parts and size components of the Elevator, necessary to fully hook-up to the Top-drive and BX-S controls (see manual)  OK
- Go through section 4 “Elevator Inspection” prior to bringing the equipment to the rig-floor. This can aid in saving time on the rig-floor during commissioning. Before proceeding with other tests. (See User manual Universal Rotator.)  OK
- Review BX-S Elevator Manual with customer representatives, as mentioned on page 2, during commissioning procedure. Show all attendees the Operations part of the Elevator, as a minimum. Get agreement on the manual’s contents.  OK
- Show the location of the BX-S Elevators Instruction chart in the driller’s cabin and get agreement on the content.  OK
- Show location of;
  - BX-S Elevator  OK
  - Hook up Control manifold and Solenoids  OK
  - Controls in driller’s cabin  OK

### 2. Hydraulic controls:

There are two different BX-S models to control the Elevator:

50000202Y , BX SLIP TYPE ELEVATOR ASSEMBLY, 2 3/8 – 7 5/8”  
WITH SLIP CONTROL.

Schematic: 50000200-1

50000203Y , BX SLIP TYPE ELEVATOR ASSEMBLY, 2 3/8 – 7 5/8”  
Schematic: 50000200

- Explain general functioning of the BX-S Elevator and its controls using the Varco installation and hook-up drawings and general schematic inside manual.  OK
- Verify that pressure, and tank lines from the Hook Up manifold are connected to the hydraulic power unit. And verify that hydraulic lines from this manifold are connected the right way with the correct QD’s to the BX-S Elevator according the Varco installation and hook up drawings. Minimum is ½” nominal hose size, for all lines. OK
- Verify that a ball-valve is fitted into Hydr. Pressure-Line near the BX-S Elevator.  OK

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- Verify that any Steel hoist cables, Hoses etc. hanging in the derrick structure do not interfere with the Hydraulic hoses and Quick disconnects to the BX-S Elevator. This to prevent these items rubbing against each other and causing damage / malfunction. (A tigger-line rubbing against the sliding ring of a Quick disconnect can cause this to disconnect and block oil-flow to and from the tool!)  OK
- Point out the location of the H.U.K. items (valves, Q-D's, pressure switches/junction boxes, etc.) shown in the H.U.K. drawings, to Driller, Tool-pusher and Rig-Mechanic.  OK
- Hand over the H.u.k drawings and Operations Manual to the Rig-Mechanic / Tool-pusher, get signature for receipt: OK

Rig Mechanic Drawing / Manual receipt: \_\_\_\_\_

- Verify oil quality meets NAS class 8 requirements. Take a sample from the pressure line between ring line and inlet on control manifold. In case not, prior to continuation of the commissioning, continue the process cleaning, purging and pickling of the hydraulic circuit until all requirements are met.  OK
- Demonstrate how to clean hydraulic quick disconnects prior to connection. Explain that non-removed dirt on the quick disconnects will enter the hydraulic circuit and clog up the filters, resulting in a malfunctioning system.  OK
- Demonstrate that malfunctioning Quick disconnects can work as a check-valve preventing flow in one direction. Emphasize the risks of severe equipment damage and possible personnel injury, due to uncontrolled overpressure, should this occur!  OK
- Verify that the hydraulic flow to the hook up kit manifold is sufficient to get the adequate response times for the BX-S Elevator. ( 5GPM at BX-S QD's )  OK
- System Pressure at the BX-S Elevators Quick disconnects must be between 2,000 psi and 2,500 psi.  OK

System- Pressure is; :.....psi.
------------------------------------

Pressure on “P”-line must be 200 psi lower than the pressure on “XP” line for this a Pressure reduce kit #50004350 is available to place in-line with “P” to the BX-S elevator.

XP- Pressure is; :.....psi.
--------------------------------

- Check all quick-disconnects are opening easily and are not damaged or leaking. If not, replace these with items out of the Spare parts kit for Commissioning  OK

**3. Electrical controls.**

- Let the rig mechanic/electrician verify that all electrical wiring is connected according to the Varco Installation and Hook-Up drawings.  OK

**4. BX-S Elevator Inspection.**

**Before bringing the BX-S Elevator to the rig-floor.**

 **Make sure that the BX-S Elevator is closed and all hydraulic lines are disconnected before ANY repair or inspection work is performed on the elevator.**

*The following tests can be done with the BX-S Elevator as “stand-alone” and disconnected from it’s controls, provided the elevator is placed OPEN. Before doing these checks.*

- Verify that all bolts, nuts and pins are locked with lock tabs or cotter pins, and latch and hinge pins are properly locked.  OK
  - Verify that all linch pins, safety chains are (or can be) correctly installed.  OK
- Verify that all grease points are greased.  OK
  - 1: Hinge pins.
  - 2: Latch pin.
  - 3: Elevator bore and back of slips
  - 4: Rotator Link-blocks and Bail contacts.
- Install all 4 slip segments in elevator. First in the Body than in the doors.  OK
- With the elevator’s doors fully opened; Check “Pipe-Opening” of the Door Slips, Verify for each slip set that the correct pipe can enter the elevator, without interfering the door-slips.  OK
- **Repeat these items for all delivered Slip sets.**  OK

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR USED FOR MANUFACTURING PURPOSES WITHOUT THE WRITTEN PERMISSION OF THE OWNER.	Document No.: <b>TSEL 0138</b>	Title: <b>Field Commissioning procedure BX-S Elevator</b>	Sheet: <b>6 of 9</b>
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## 5. FUNCTION TESTING. (See Manual Section Operation)

Bring BX-S elevator to the rig-floor fitted with a slip set and Hook it up to the elevator controls.

- Connect the Hydraulic hose(s) to the BX-S Elevator's Quick-disconnects. Verify adequate free play in the length of each hose as it runs down the length of the Link.

No interference with other equipment or stretching of the hoses may occur when the Link-tilt function is used forward and backward, full stroke.  OK



**Make sure that all hydraulic lines are disconnected before ANY repair or inspection work is performed on the elevator.**

### • Pressure Tests.

The elevator shall be tested in different conditions.

### 50000202Y BXS ELEVATOR SLIP CONTROLS

Hydraulic schematic drawing 50000200-1

<b>P</b>	2000-2500 psi	2000-2500 psi	2000-2500 psi
<b>T</b>	Max 50 psi	Max 50 psi	Max 50 psi
<b>XP</b>	2000-2500 psi*	0→1000 psi **	0→1000 psi **
<b>PILOT</b>	2000 psi	2000 psi	0 psi
<b>FLOAT</b>	0 psi	2000-2500 psi	2000-2500 psi
<b>Result</b>	<b>ELEVATOR OPEN SLIPS UP</b>	<b>ELEVATOR CLOSED SLIPS UP</b>	<b>ELEVATOR CLOSED SLIPS DOWN</b>
<b>Initials</b>			

\* XP to open elevator is 200 psi higher than P.

\*\*XP= 0 psi, Elevator close cycle start.

XP= 1000 psi , Elevator doors are closed and latched and slips are set.

By Pilot control slips up, when doors BX-S are closed and latched then you have also an hydraulic XP signal 1000 PSI. When the pilot signal for slips up is activated 2000 PSI than you may not have the indicator lamp for elevator closed and slips set activated. See H.u.k. schematic 50000200-12.





## 50000203Y BXS ELEVATOR

Hydraulic schematic drawing 50000200

<b>P</b>	2000-2500 psi	2000-2500 psi
<b>T</b>	Max 50 psi	Max 50 psi
<b>XP</b>	2000-2500 psi*	0→1000 psi **
<b>FLOAT</b>	0 psi	2000-2500 psi
<b>Result</b>	<b>ELEVATOR OPEN SLIPS UP</b>	<b>ELEVATOR CLOSED SLIPS DOWN</b>
<b>Initials</b>		

\* XP to open elevator is 200 psi higher than P.

\*\*XP= 0 psi, Elevator close cycle start.

XP= 1000 psi , Elevator doors are closed and latched and slips are set.

*Depending on circumstances it may be wise to start with the commissioning tests for the BX-S Rotator at this point, before going further with the tests for the Elevator.*

### • Response Times.

Elevator cycle-to-open:

5 sec. max. BX-S \_\_\_\_\_ sec.

OK

Elevator cycle-to-close:

5 sec. max. BX-S \_\_\_\_\_ sec.

OK

- Command elevator to close, leave closed and hydraulically pressurized for 15 minutes minimum. After this, elevator must open without hesitation i.e. normal response times.  OK

- With hydraulics pressurized: Check for oil leakage.  OK





- With complete system hooked up, check correct functioning of the “Closed-feedback Signal” feature of the BX-S elevator (and “Float” for Universal rotator, see TSEL-0089) as controlled by the BX-S Control Manifold mounted at the Top-drive or near Fingerboard level. Start with BX-S (and Rotator) fully hooked-up, hanging in the vertically positioned Links Steps to take to verify this function;
  - Open BX-S Elevator.  OK
  - Rotate BX-S Elevator Doors UP full rotation. (If rotators installed)  OK
  - Close the BX-S Elevator.  OK
  - Verify “Closed-feedback-Signal” functions correct.  OK
  - Verify the manual “FLOAT” function when BX-S elevator is opened by using the Rotator controls Located in the driller’s console. (Only if rotators installed)  OK

After completing it’s close sequence the BX-S puts out a high pressure (1000psi ) signal via line XP (S2) to the control manifold for signaling / interlocking purposes. When the BX-S elevator door is closed and latch, a signal is send out a high pressure (equal to system pressure) signal to the “Float-manifold located at / near the Pipe handler frame via line B5, to port. “X” in the Float manifold.

This B5 “Float” Signal will activate valves inside the Float Manifold that will overrule all Manual Rotate commands given by the Operator.

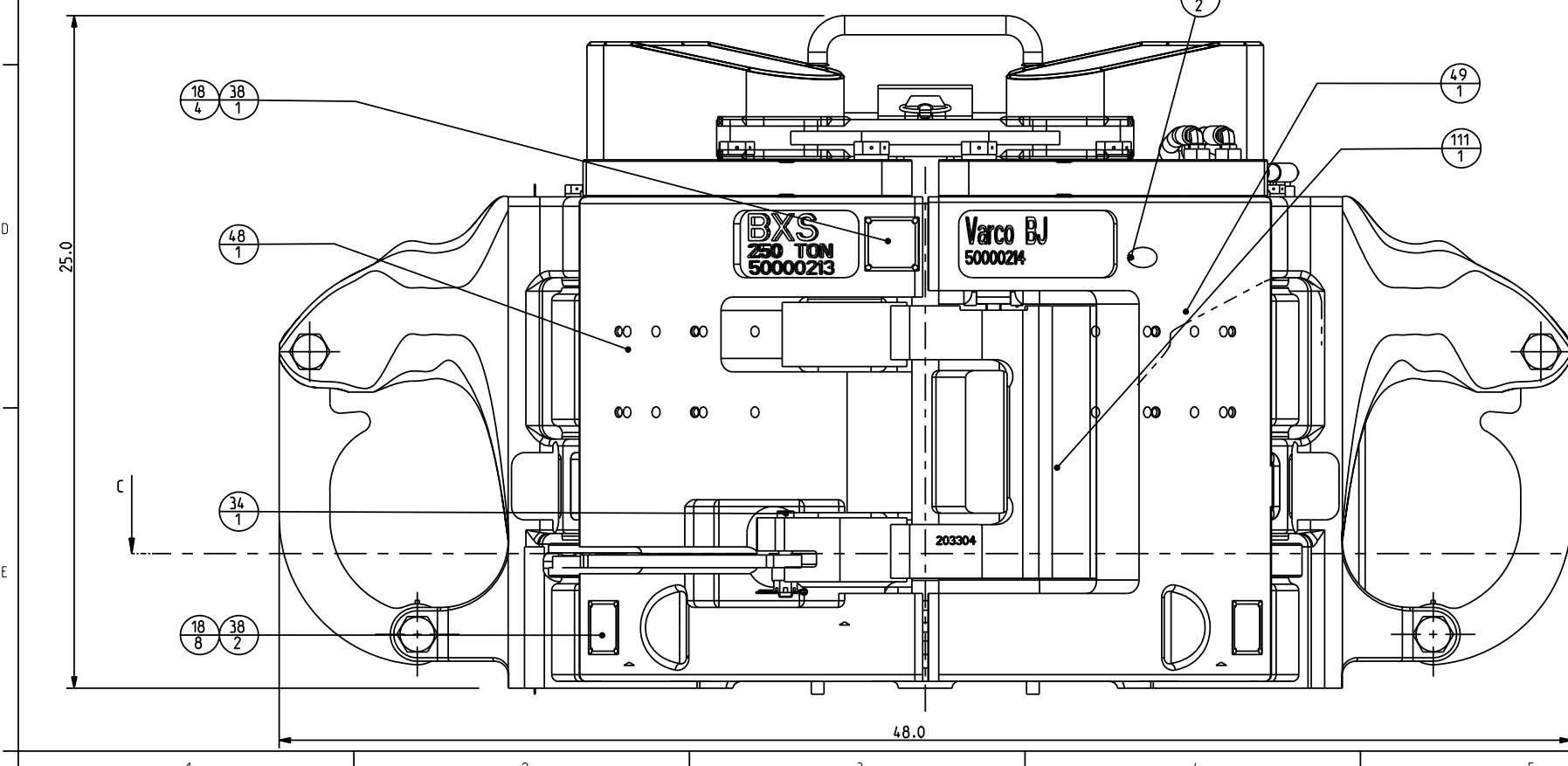
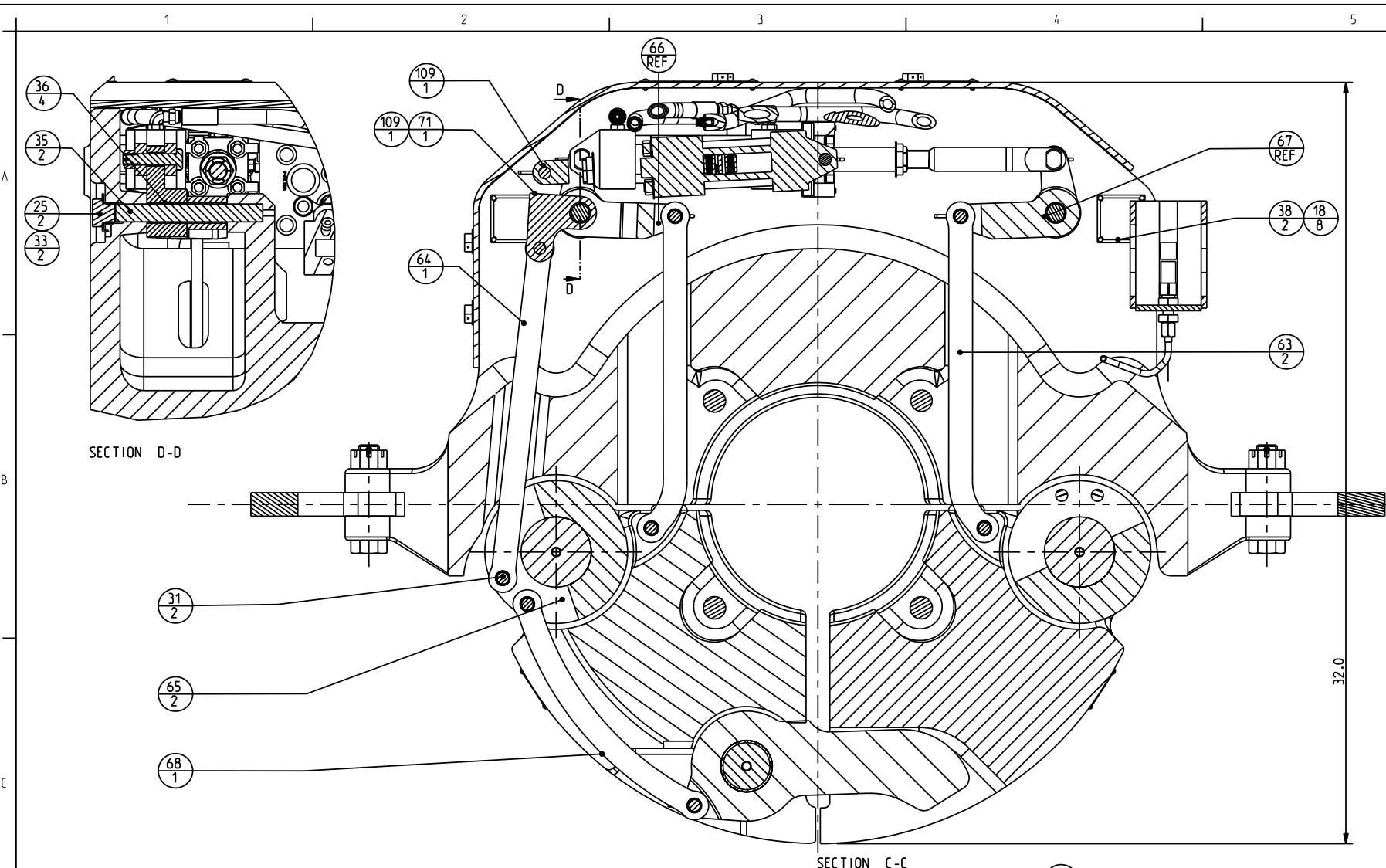
So after the last step of the “Closed-Signal” (and “Float”) test sequence is done, i.e. “Elevator closed and latched”, the Rotator will start Floating the BX-S Elevator to it’s normal near level position. OK

- Verify correct functioning of Elevator - Power-slip Interlock.  OK
- If not installed, inform customer that this is recommended, details available at nearest Varco BJ office.  OK

## 6. Operational Test.

After successful completion of all above mentioned items and after successful completion of all commissioning tests for the BX-S Rotator (TSEL-0089) proceed with this tests, have all attendees a mentioned on the first page of this document available for witnessing this test.

- Have BX-S ( and Universal Rotator) hooked-up and operational.
- Have a stand/joint of tubular. available to run tests with.
- Present tubular to BX-S.
- When Rotators installed, Rotate BX-S to angle of presented pipe. Adjust rotation angle if necessary.
- Pick up pipe with BX-S.
- After BX-S is closed and latched, verify “FLOAT” function. When slips are set verify, XP-signal= 1000 PSI
- Hoist pipe into derrick, with TDS / Block  OK



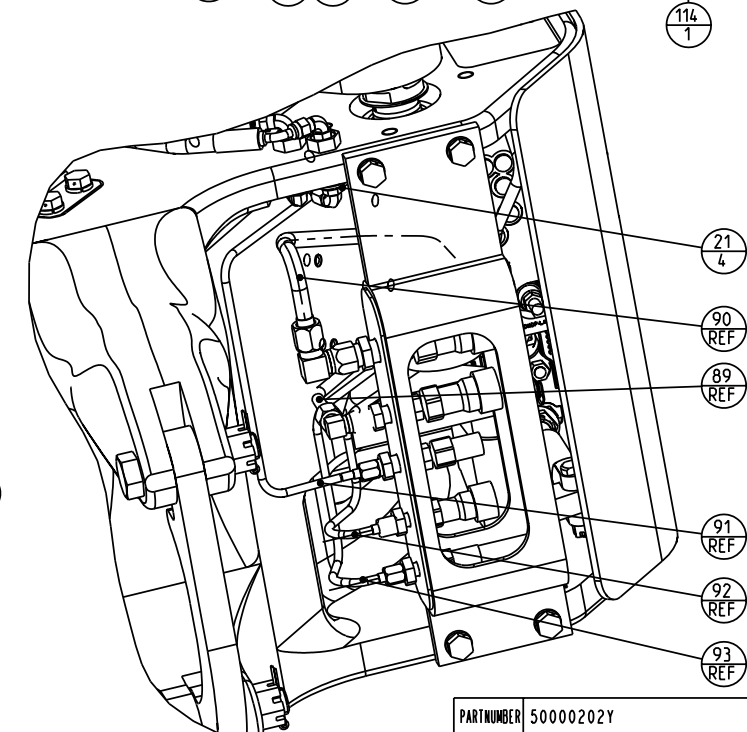
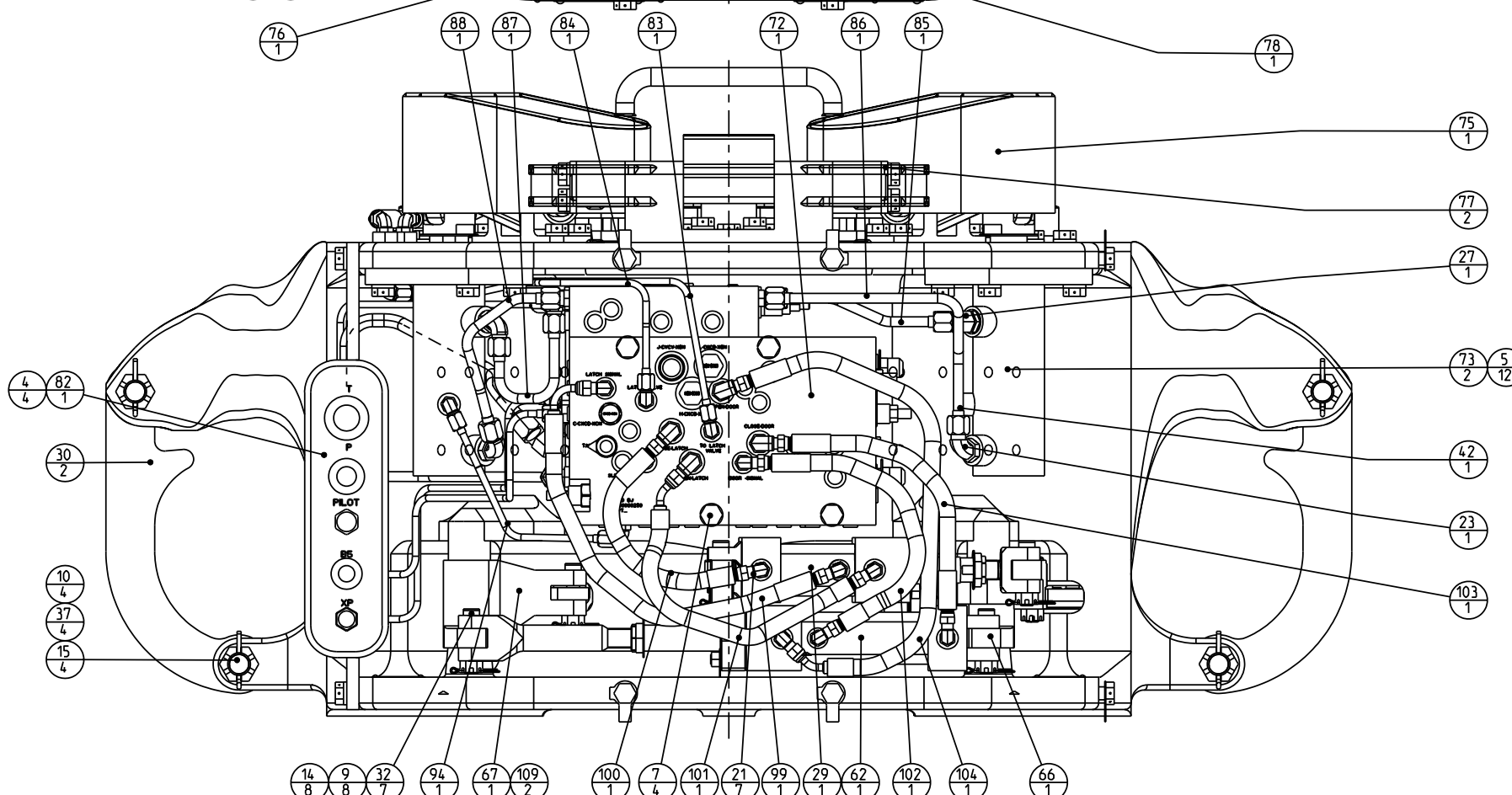
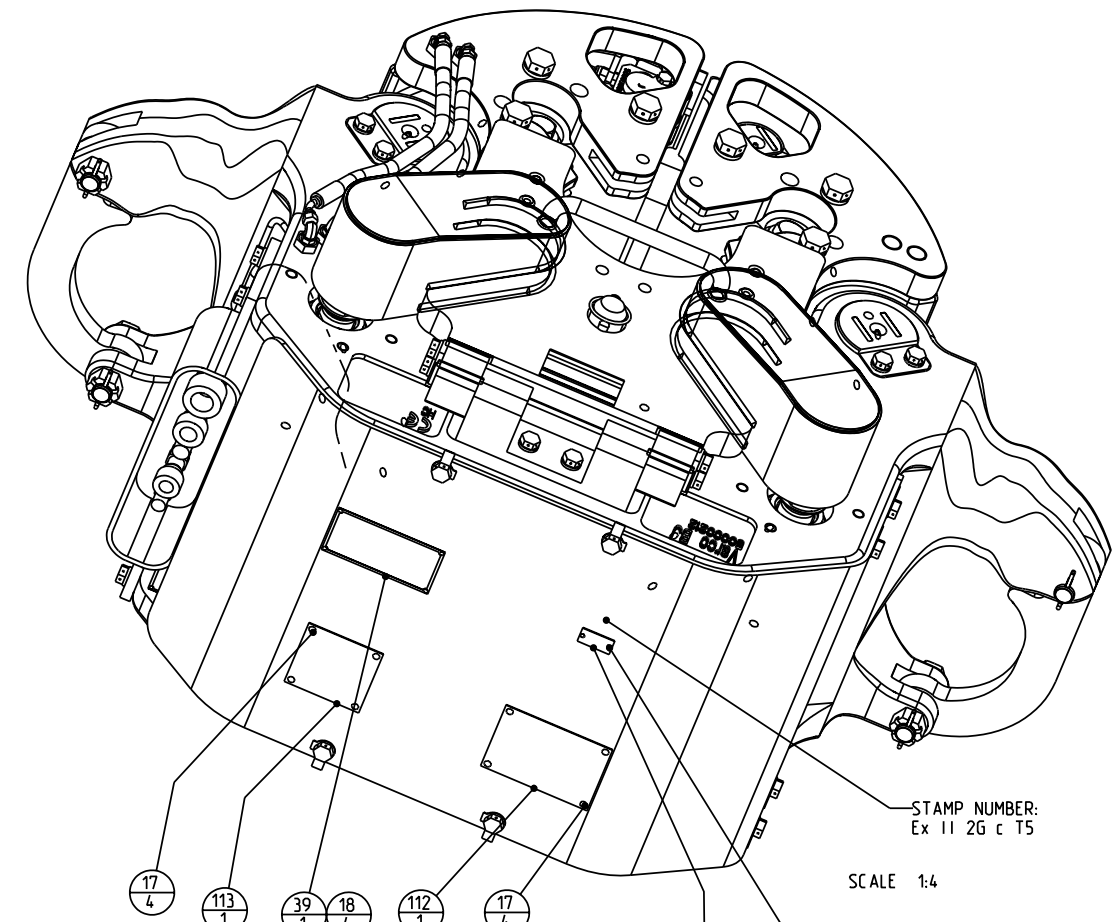
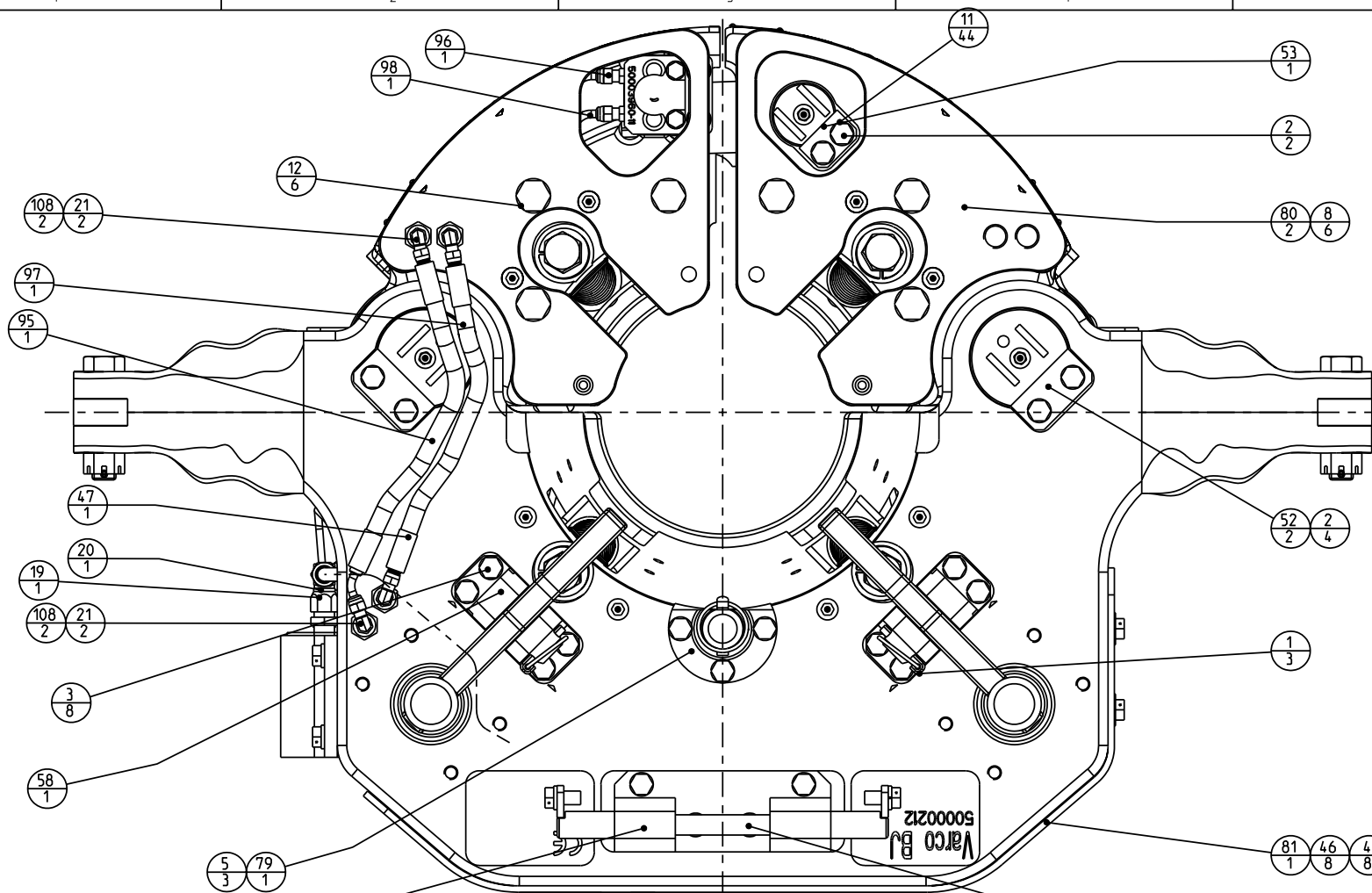
59	2	5000225	PUSH PIN CYLINDER	1	3	7887	LYNCH PIN
60	4	5000226	SLIP RETAINING BOLT	2	10	50008-08-C8D	SCREW, CAP-HEX HD (UNC 1/2")
61	2	5000227	HINGE PIN CYLINDER LEVER	3	8	50008-10-C8D	SCREW, CAP-HEX HD (UNC 1/2")
62	1	5000229	ASS'Y DOOR CYLINDER BXS	4	12	50008-12-C8D	SCREW, CAP-HEX HD (UNC 1/2")
63	2	5000231-1	ASS'Y LEVER	5	15	50008-14-C8D	SCREW, CAP-HEX HD (UNC 1/2")
64	1	5000232-1	ASS'Y LATCH LEVER	6	2	50008-18-C8D	SCREW, CAP-HEX HD (UNC 1/2")
65	2	5000233	THRUST PLATE	7	4	50008-44-C8D	SCREW, CAP-HEX HD (UNC 1/2")
66	1	5000234	LEFT DOOR BRACKET MACHINING	8	6	50012-20-C8D	SCREW, CAP-HEX HD (UNC 3/4")
67	1	5000235	RIGHT DOOR BRACKET MACHINING	9	8	50508-C	NUT, HEX-SLOTTED 1/2-13
68	1	5000236-1	ASS'Y LATCH LEVER	10	4	50514-C	NUT, HEX-SLOTTED 7/8-9
69	2	5000237	DOOR LEVER PIN	11	44	50908-C	WASHER, LOCK-REGULAR 0.500
70	2	5000238	LOCK RING 0.875 x 1.625	12	6	50912-C	WASHER, LOCK-REGULAR 0.750
71	1	5000239	CONTROL BRACKET LATCH	13	4	50918-C	WASHER, LOCK-REGULAR 1.125
72	1	5000251-1	ASS'Y SLIP CONTROL MANIFOLD BX-S	14	8	51402-12	COTTER PIN 0.125X1.5
73	2	5000253	Cylinder BXS	15	4	51435-14	COTTER PIN 0.156 X 1.75
74	2	5000254	LOCK RING CYLINDER	16	10	53201	GREASE FITTING, STRAIGHT
75	1	5000260-1	TOP COVER BXS	17	8	53301-10-6	SCREW, DRIVE 0.179 DIA X 3/8
76	1	5000262	HINGE BLOCK	18	26	53301-4-5	SCREW, DRIVE 0.114 DIA X 5/16
77	2	5000263	LOCKPLATE HINGE PIN COVER BXS	19	1	56518-6-6-S	ELBOW 90° 9/16"-18JIC SWIVEL - 9/16"-18JIC MALE
78	1	5000264	SHAFT COVER BXS	20	1	56518-8-8-S	ELBOW 90° 3/4"-16JIC SWIVEL - 3/4"-16JIC MALE
79	1	5000265	SHAFT BAR	21	15	56519-4-4-S	ELBOW 90° O-RING EXT. 7/16UNF TO EXT. 7/16UNF
80	2	5000266-W	WELDMENT GUIDE PLATE HOLDER DOOR	22	2	56519-6-6-S	ELBOW 90° O-RING EXT. 9/16UNF TO EXT. 9/16UNF
81	1	5000270	PLATE, BACK COVER	23	1	56519-8-6-S	ELBOW 90° O-RING EXT. 3/4UNF TO EXT. 9/16UNF ST. SI.
82	1	5000272	ASS'Y O.D. PLATE	24	2	56529-4-4-S	CONNECTOR SAE O-RING #4 TO 37 JIC #4
83	1	5000280	TUBE ASS'Y FROM LATCH VALVE, 1/4	25	2	56531-10	PLUG, O-RING BOSS 7/8-14
84	1	5000281	TUBE ASS'Y TO LATCH VALVE, 1/4	26	2	56531-8-S	PLUG, O-RING BOSS 3/4-16 UNF
85	1	5000282	TUBE ASS'Y LEFT CYL. SLIPS UP. 3/8	27	1	56557-8-6-S	ELBOW, 45° O-RING BOSS/37°
86	1	5000283	TUBE ASS'Y LEFT CYL. SLIPS DOWN. 3/8	28	16	202349-25	GREASE RESTRICTOR 2.5MM
87	1	5000284	TUBE ASS'Y RIGHT CYL. SLIPS UP. 3/8	29	1	203221-1	LATCH CYLINDER ASSY BX III & IV
88	1	5000285	TUBE ASS'Y RIGHT CYL. SLIPS DOWN. 3/8	30	2	203241	LINK BLOCK
89	1	5000286	TUBE ASS'Y O.D. BRACKET: P - 3/8"	31	2	203245	DISC LEVER PIN
90	1	5000287	TUBE ASS'Y BRACKET: T 1/2"	32	7	203246	BRACKET LEVER PIN
91	1	5000288	TUBE ASS'Y O.D. BRACKET: PILOT 1/4	33	2	203251	LOCK RING 0.875 x 1.625
92	1	5000289	TUBE ASS'Y O.D. BRACKET: B5 FLOAT 1/4	34	1	203252	PIN LATCH LEVER
93	1	5000290	TUBE ASS'Y O.D. BRACKET: XP 1/4	35	2	203253	BRACKET PIN
94	1	5000291	TUBE ASS'Y RIGHT CYLINDER SIGNAL PORT, 1/4	36	4	203254	BUSHING 0.750
95	1	5000295	HOSE ASSEMBLY FROM LATCH VALVE 1	37	4	203261	LINK BLOCK BOLT
96	1	5000296	HOSE ASSEMBLY FROM LATCH VALVE 2	38	5	203263	WARNING PLATE
97	1	5000297	HOSE ASSEMBLY TO LATCH VALVE 1	39	1	203264	WARNING PLATE LOAD RATINGS
98	1	5000298	HOSE ASSEMBLY TO LATCH VALVE 2	40	2	203265	RING, LATCH
99	1	5000299	HOSE ASSEMBLY CYL. LATCH SIGNAL	41	16	979455-10	EXPANDER
100	1	5000300	HOSE ASSEMBLY CYL. LATCH CLOSE	42	1	979512-3	PLUG 7/16" - UNF + 'O' RING
101	1	5000301	HOSE ASSEMBLY CYL. LATCH OPEN	43	2	979770-64	50X55X60 MM PLAIN BEARING
102	1	5000302	HOSE ASSEMBLY CYL. DOOR SIGNAL	44	4	979770-7560	75X80X60 MM PLAIN BEARING
103	1	5000303	HOSE ASSEMBLY CYL. DOOR OPEN	45	2	979770-7580	75X80X80 MM PLAIN BEARING
104	1	5000304	HOSE ASSEMBLY CYL. DOOR CLOSE	46	8	979785-12	TAB WASHER M12 DIN 463
105	1	50003960-11	LATCH VALVE, ASS'Y FOR BX FRAME IV	47	1	50000212	MACHINING BODY BXS
106	1	50003968-1	SHIM 1MM FOR LATCH VALVE BX-IV	48	1	50000213	MACHINING LEFT DOOR BXS
107	1	50003968-2	SHIM 2MM FOR LATCH VALVE BX-IV	49	1	50000214	MACHINING RIGHT DOOR BXS
108	4	50003981	ADAPTER, STRAIGHT FOR LATCH VALVE	50	2	50000215-1	ASS'Y HINGE PIN DOOR BXS
109	4	5900010-0812	FIBERGLIDE JOURNAL BEARING CJS0812	51	1	50000216-1	ASS'Y HINGE PIN LATCH BXS
110	4	59000268-6080	COMPRESSION SPRING, D 13910	52	2	50000217	LOCKPLATE HINGE PIN DOOR BXS
111	1	203304Y-10	LATCH BX-S	53	1	50000218	LOCKPLATE HINGE PIN LATCH BXS
				54	2	50000220	SPRING BOX
112	1	201647	Warning Plate, overhead load	55	1	50000220-1	SPRING BOX BODY RIGHT
113	1	202829	Warning Plate, read manual	56	1	50000220-2	SPRING BOX BODY LEFT
114	1	50006151	CE Plate	57	2	50000222	LEVER CYLINDER
				58	2	50000223	Bracket Lever

OVERALL CHANGE OF BX-S AFTER BUILDING PROTOTYPE.  
ADD HOSES AND TUBING TO ASSEMBLY.

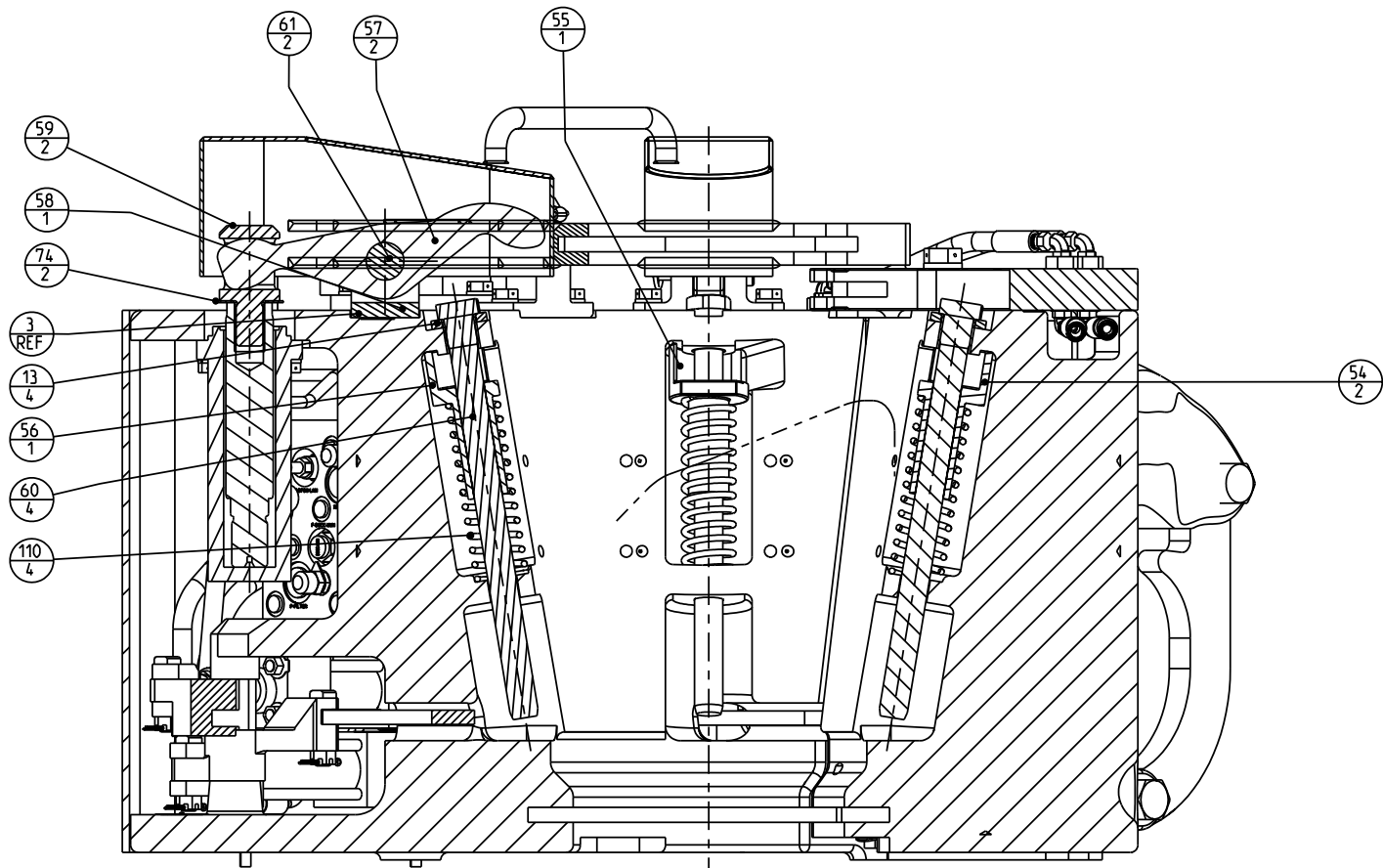
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MATERIAL				TOLERANCES (PER ANSI Y 14.5)	
SURF. FINISH / PAINTSPEC.				3 PLACE DECIMAL .XXX ± .010	
COLOR				2 PLACE DECIMAL .XX ± .03	
WEIGHT		2726.2 lbs 1236.6 kg		1 PLACE DECIMAL .X ± .1	
ORIGINAL DOCUMENT		LATEST REVISION		ANGLES ± .5 DEGREE	
NAME L.S.		NAME J.W.		BREAk SHARP CORNERS .010 ± .005	
DATE 22-Dec-03		DATE 28 JUN 04		MACHINED SURFACES 100%	
CONTROLLED		E.C.W. 601377		TOUCHUP SURFACES 100%	
TITLE		ASS'Y BX SLIP TYPE ELEVATOR		DO NOT SCALE DOCUMENT	
SIZE		DRAWING NO. 50000202Y		SCALE 1:3	
SHEET 1 of 3				PROJ. UNITS INCH (mm)	

**Varco BJ.**  
A Varco Company

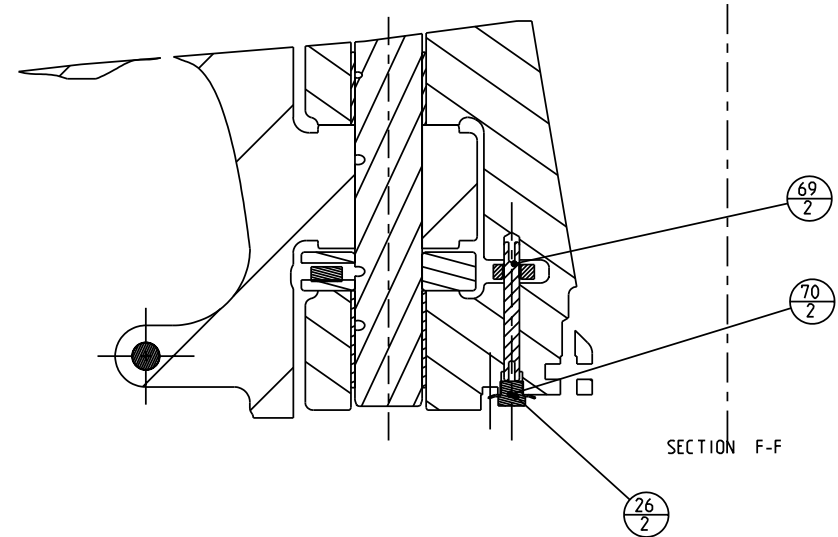
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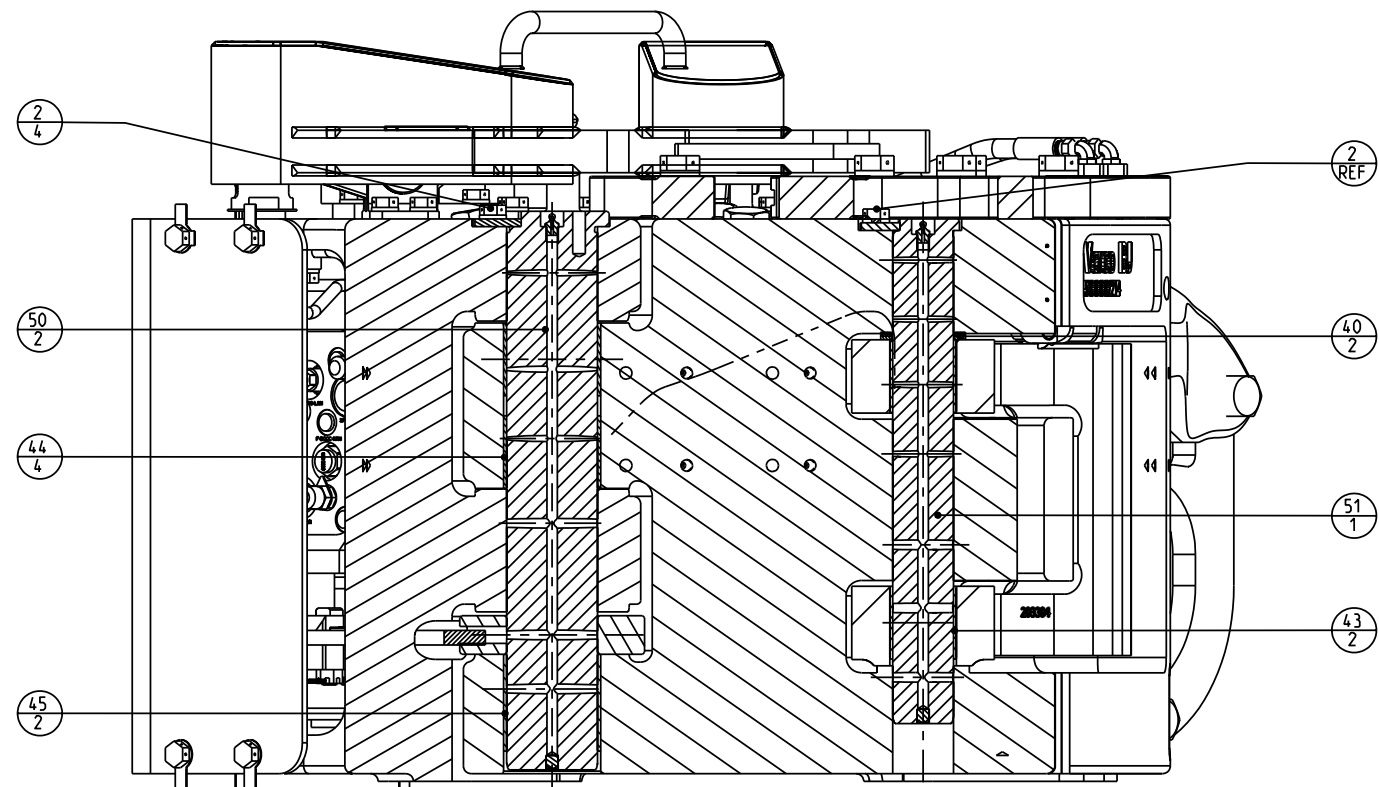
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MATERIAL		TOLERANCES (PER ANSI Y 14.5)		A Varco Company	
SURF. FINISH / PAINTSPEC.		3 PLACE DECIMAL .xxx ± .010		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER.	
COLOR		2 PLACE DECIMAL .xx ± .03			
WEIGHT 2726.2 lbs 1236.6 kg		1 PLACE DECIMAL .x ± .1			
ORIGINAL DOCUMENT		LATEST REVISION		DO NOT SCALE DOCUMENT	
NAME L.S.		NAME J.W.		SCALE 1:3	
DATE 29-Jun-04		DATE 29 JUN 04		THIS DOCUMENT IS DWS CONTROLLED	
		REV. B		UNITS INCH (mm)	
TITLE ASS'Y BX SLIP TYPE ELEVATOR D		SIZE DRAWING NO. 50000202Y		SHEET 2 of 3	



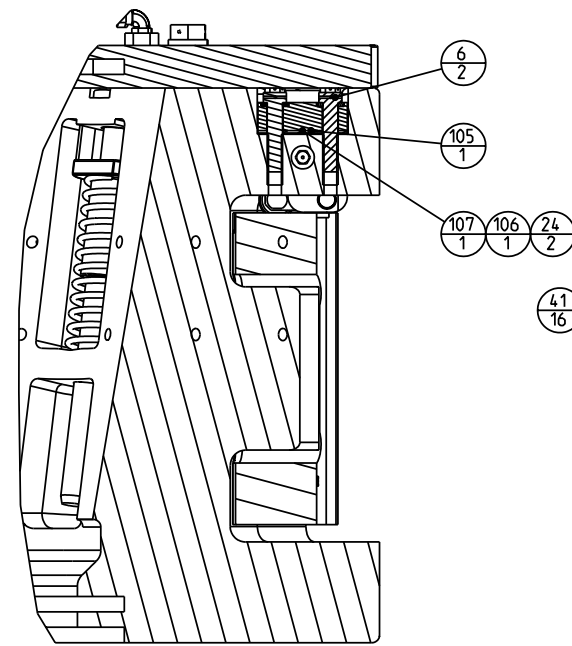
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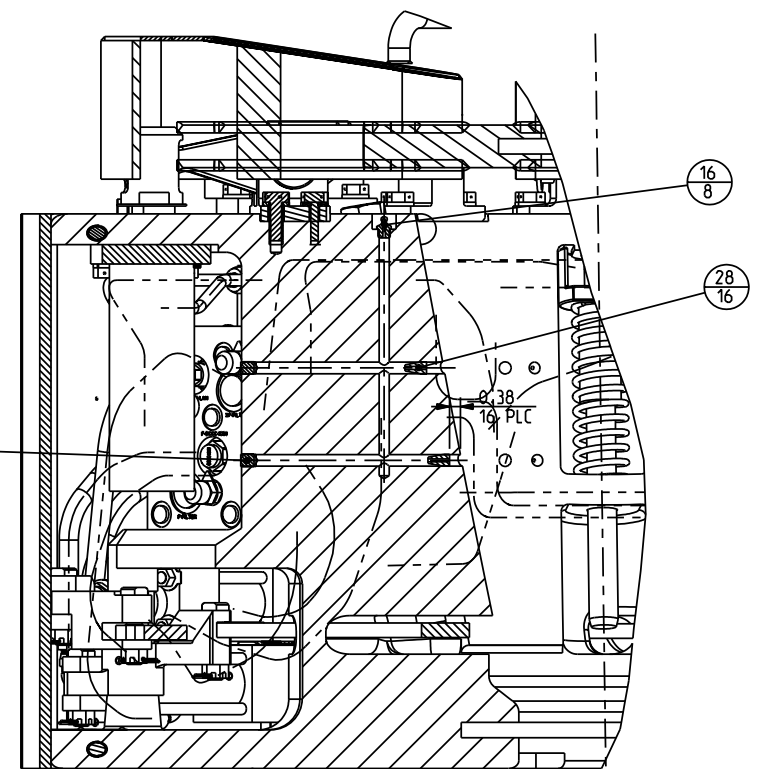
SECTION F-F



SECTION B-B



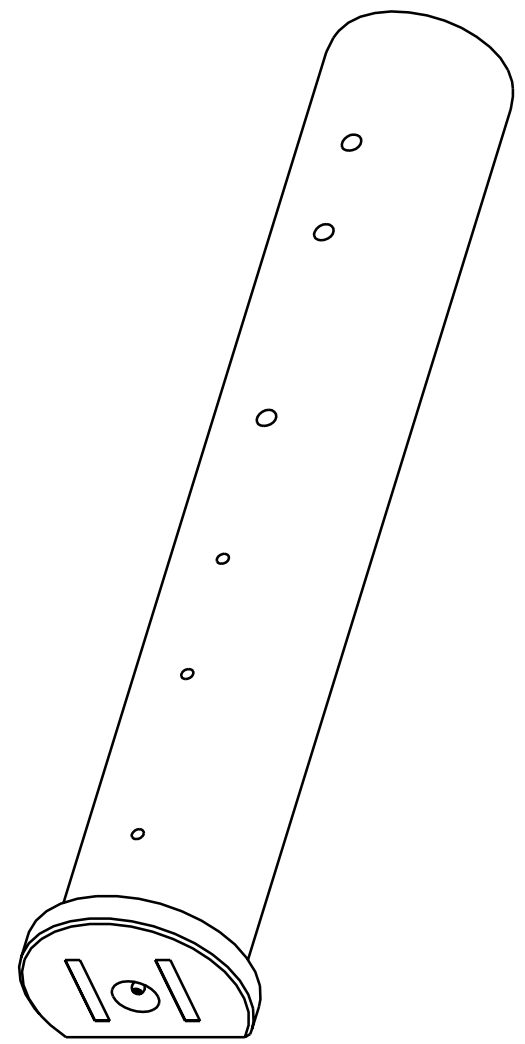
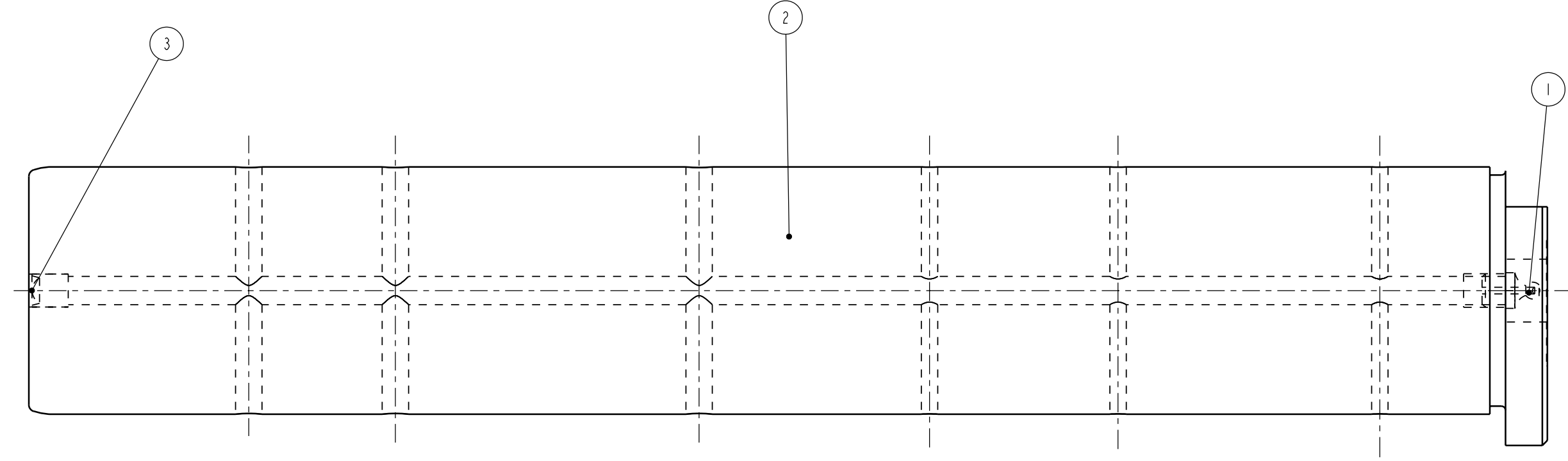
SECTION E-E



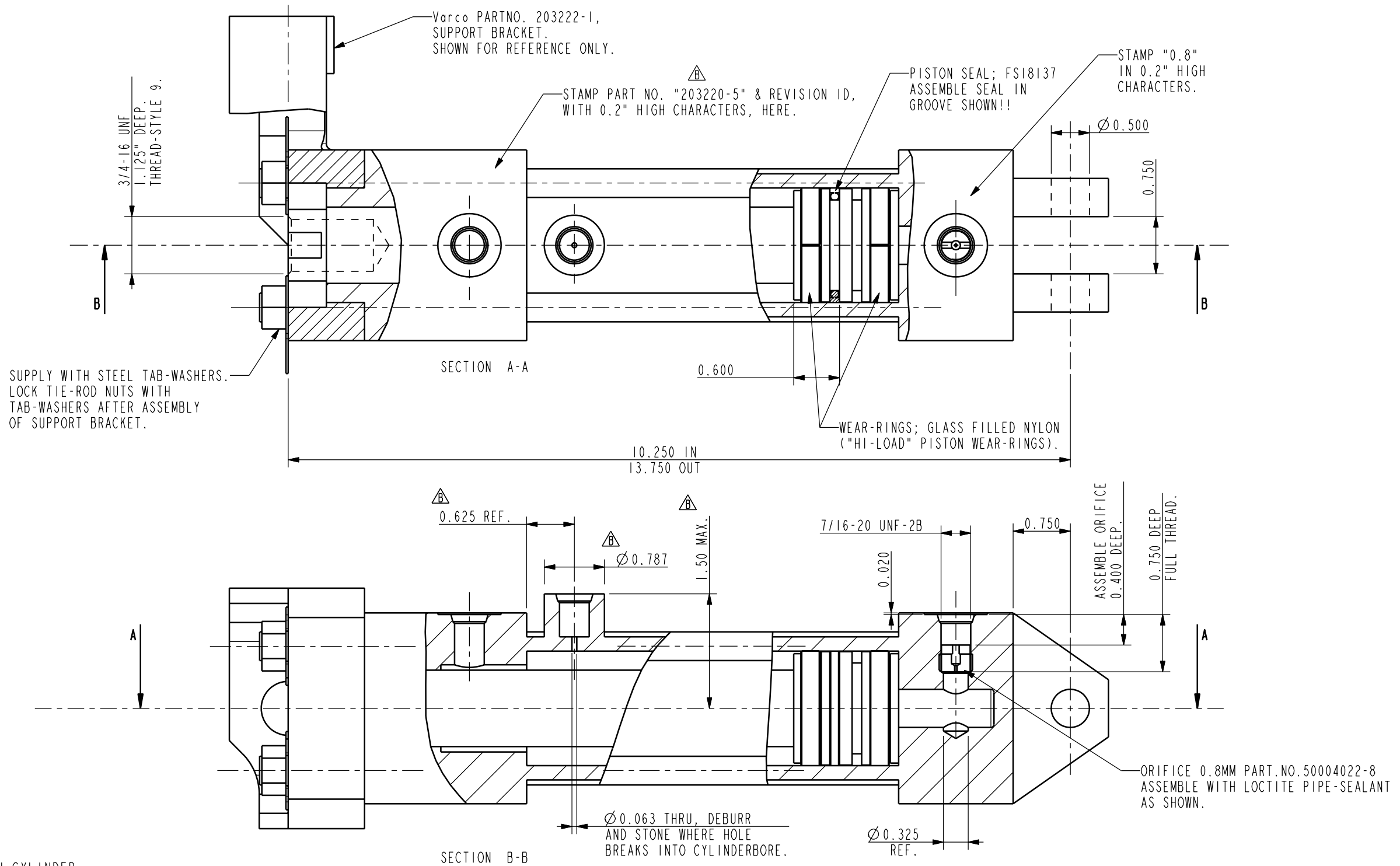
SECTION G-G

PARTNUMBER 50000202Y		UNLESS OTHERWISE SPECIFIED		Varco <b>BJ.</b>	
MATERIAL		TOLERANCES (PER ANSI Y 14.5)		A Varco Company	
SURF. FINISH / PAINTSPEC.		3 PLACE DECIMAL .XXX ± .010		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER.	
COLOR		2 PLACE DECIMAL .XX ± .03			
WEIGHT 2726.2 lbs 1236.6 kg		1 PLACE DECIMAL .X ± .1			
ORIGINAL DOCUMENT		ANGLES ± .5 DEGREE			
NAME L.S.		BREAK SHARP CORNERS .010 ± .005		DO NOT SCALE DOCUMENT	
DATE 29-Jun-04		MACHINED SURFACES 25%		SCALE 1:3	
LATEST REVISION		TOUCHTUP SURFACES 100%		THIS DOCUMENT IS DWS CONTROLLED	
NAME J.W.		DO NOT SCALE DOCUMENT		UNITS INCH (mm)	
DATE 29 JUN 04		SCALE 1:3		PROJ.	
E.C.W. 601377		THIS DOCUMENT IS DWS CONTROLLED		SHEET 3 OF 3	
TITLE ASS'Y BX SLIP TYPE ELEVATOR D		SIZE DRAWING NO. 50000202Y			

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	53201	GREASE FITTING, STRAIGHT
2	1	50000215	HINGE PIN DOOR BXS
3	1	979455-10	EXPANDER



PARTNUMBER	50000215-1			UNLESS OTHERWISE SPECIFIED		<b>Varco BJ.</b> A Varco Company THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER
MATERIAL				TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE		
SURF. FINISH / PAINTSPEC.	-			BREAK SHARP CORNERS .010 ± .005		
COLOR	-			MACHINED SURFACES 250 ✓ TORCHCUT SURFACES 1000 ✓		
WEIGHT	33.6 Lbs 15.3 kg			DO NOT SCALE DOCUMENT		SCALE 1:1
ORIGINAL DOCUMENT		LATEST REVISION		THIS DOCUMENT IS DMS CONTROLLED		UNITS INCH (mm)
NAME	SBe	NAME	L. S.	REV.	A	PROJ.
DATE	16-Feb-04	DATE	16 FEB 04			
		E.C.N.	601225			
TITLE				SIZE	DRAWING NO.	SHEET OF
ASS'Y HINGE PIN DOOR BXS				C	50000215-1	1 OF 1

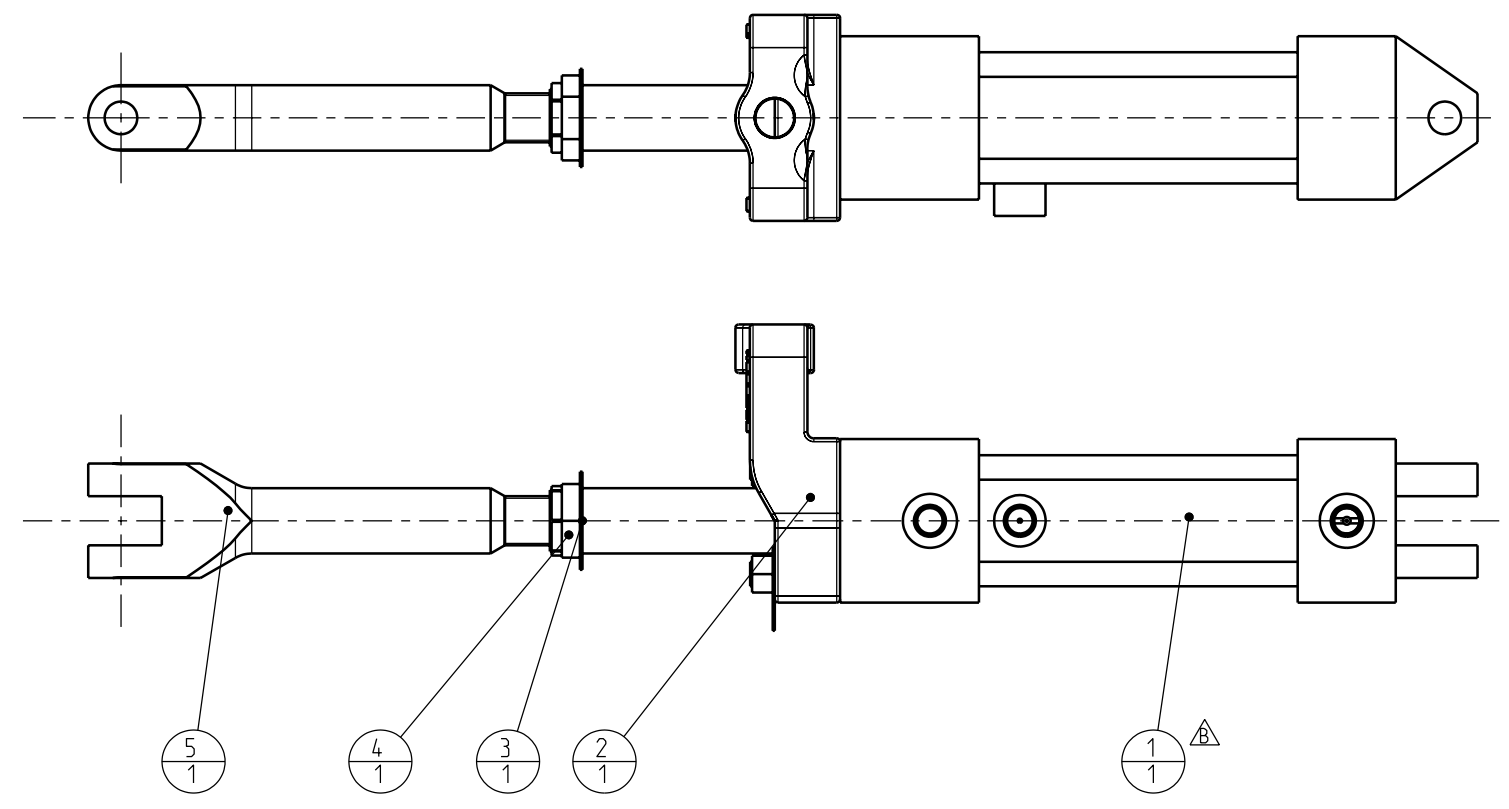
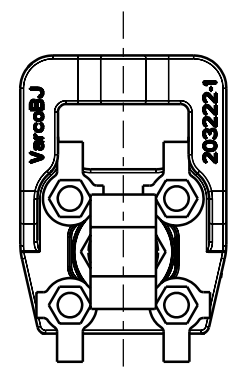


SUPPLY WITH STEEL TAB-WASHERS.  
LOCK TIE-ROD NUTS WITH  
TAB-WASHERS AFTER ASSEMBLY  
OF SUPPORT BRACKET.

- NOTES:
- PARKER SERIES 2H CYLINDER.
  - BORE; 1.5"
  - STROKE; 3.50"
  - ROD S.S.17-4 PH, CHROME PLATED.
  - ROD NO.; 2.
  - ROD-END THREAD-STYLE; 9 (3/4-16 UNF)
  - △ HEAD MOUNTING STYLE; TB
  - CAP MOUNTING STYLE; BB 0.750"LENGTH.
  - PORT SIZE 7/16-20 UNF-"SAE-4 'O'-RING"
  - "Hi-Load" PISTON WITH:
    - PISTON SEAL RING; FS-18137 (GLASS-FILLED PTFE)
    - PISTON WEAR RING; GLASS FILLED NYLON
  - TEST CYLINDER ACCORDING TSEL-0091
  - SENSE PORT POSITION 0.120" BEFORE END-OF-STROKE OUT.
  - CAP ALL PORTS PRIOR TO PAINTING.
  - STAMP Varco PART NO. +REVISION ID. AT INDICATED LOCATION.

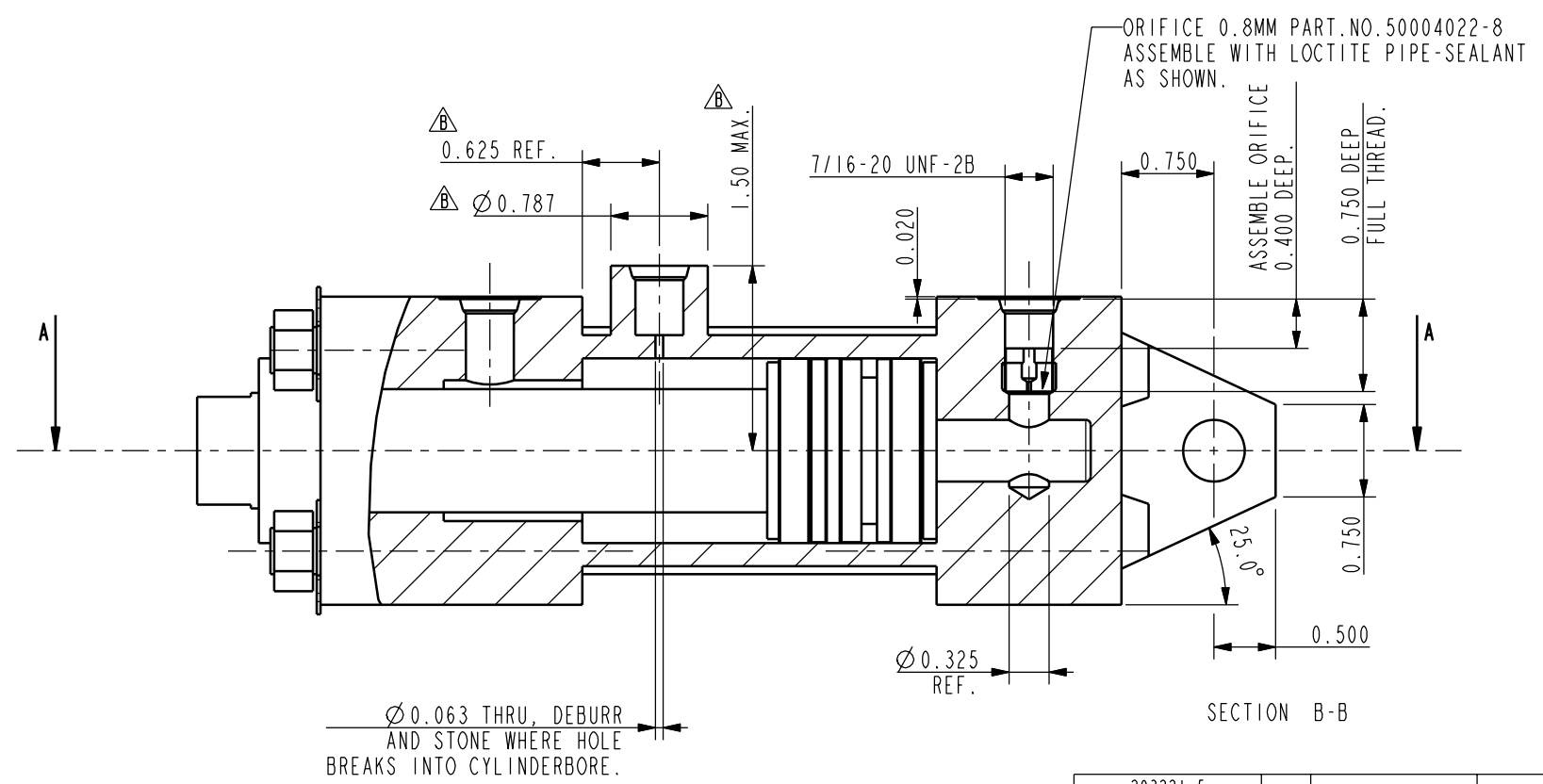
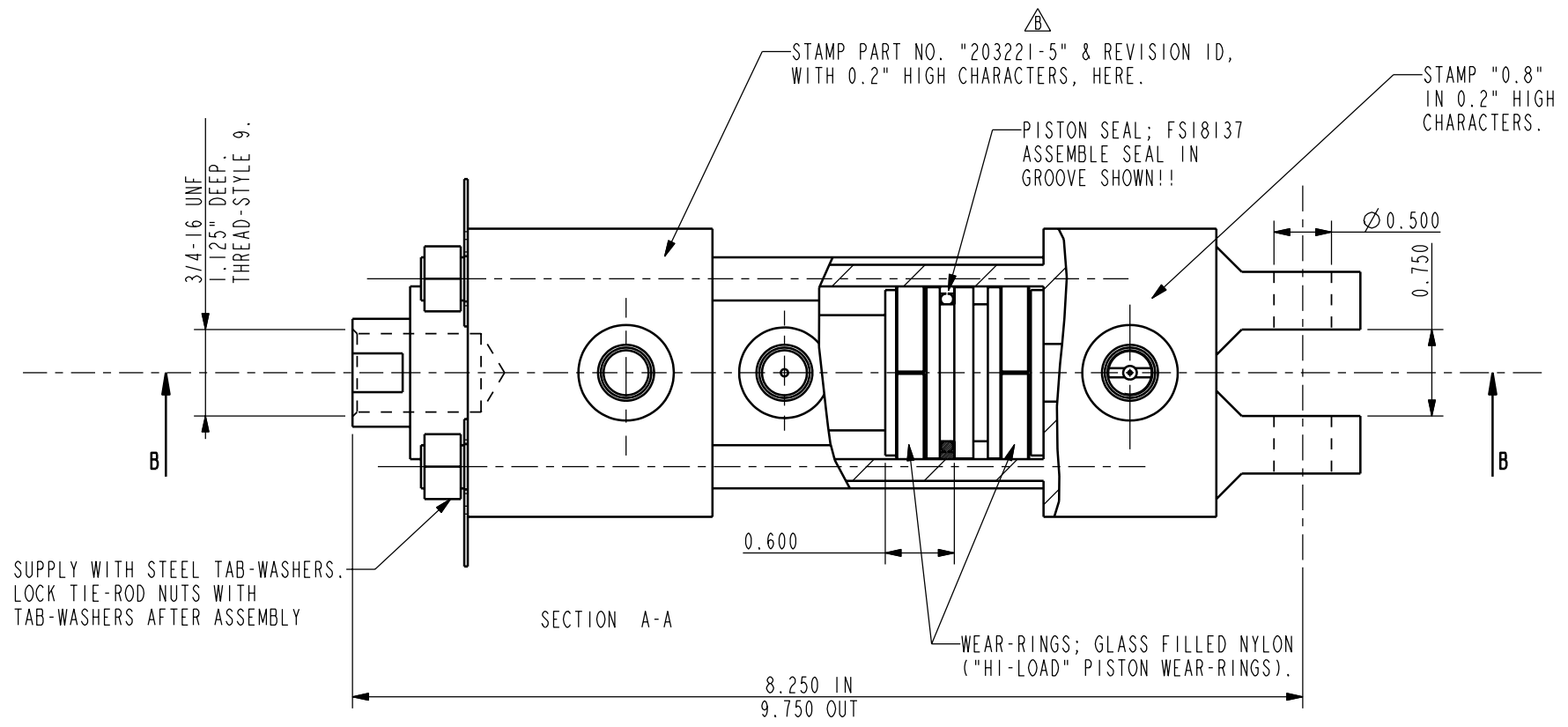
203220-5		QTY.	NEXT ASSY.	FINAL ASSY.	K	-	-	-	-
PART NO.					J	-	-	-	-
Varco OIL TOOLS ETTEN-LEUR, THE NETHERLANDS		UNLESS OTHERWISE SPECIFIED			I	-	-	-	-
		TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .xxx ± .010 2 PLACE DECIMAL .xx ± .03 1 PLACE DECIMAL .x ± .1 ANGLES ± .5 DEGREE BREAK SHARP CORNERS .010 ± .005 MACHINED SURFACES 250			H	-	-	-	-
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER					G	-	-	-	-
MATERIAL					F	-	-	-	-
APPROVED	NAME	DATE	PROJ.		E	-	-	-	-
CHECKED	A. K.	29-Nov-01	SCALE 1:1		D	-	-	-	-
PREPARED	P. D.	29-Nov-01	UNITS INCH (MM)	WEIGHT 11.169 LBS/ KG	C	-	-	-	-
TITLE					B	600699	P. D.	23-May-02	A. K.
CYLINDER DOORS BX 4					A	600614	P. D.	29-Nov-01	A. K.
REDRAWN / REPLACED BY:					REV.	E. C. N	NAME	DATE	CHECKED
					SIZE	DRAWING NO.		SHEET	
					C	203220-5		1 of 1	
					REPLACES 203220				

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	203220-5	CYLINDER DOORS BX 4
2	1	203222-1-M	SUPPORT BRACKET CYLINDER
3	1	203268	LOCK RING 0.75 X 1.50
4	1	944422-12	FLEXLOC NUT, 3/4"-16 UNF
5	1	50000230	CLEVIS HEAD CYLINDER



PARTNUMBER 50000229		UNLESS OTHERWISE SPECIFIED		<b>Varco BJ.</b> A Varco Company
MATERIAL		TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE		
SURF. FINISH / PAINTSPEC. -		BREAK SHARP CORNERS .010 ± .005		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER
COLOR -		MACHINED SURFACES 250 ✓		
WEIGHT 14.3 Lbs 6.5 kg		TORCHCUT SURFACES 1000 ✓		
ORIGINAL DOCUMENT		LATEST REVISION		DO NOT SCALE DOCUMENT
NAME L.S.	NAME L.S.	REV. B	DATE 17 MAR 04	SCALE 1:2
DATE 01-Mar-04	E.C.N. 601353			UNITS INCH (mm)
TITLE ASS'Y DOOR CYLINDER BXS		SIZE C	DRAWING NO. 50000229	PROJ.
				SHEET 1 OF 1

203221-5  
PART NUMBER



- NOTES:
- PARKER SERIES 2H CYLINDER.
  - BORE; 1.5"
  - STROKE; 1.50"
  - ROD S.S.17-4 PH, CHROME PLATED.
  - ROD NO.; 2.
  - ROD-END THREAD-STYLE; 9 (3/4-16 UNF)

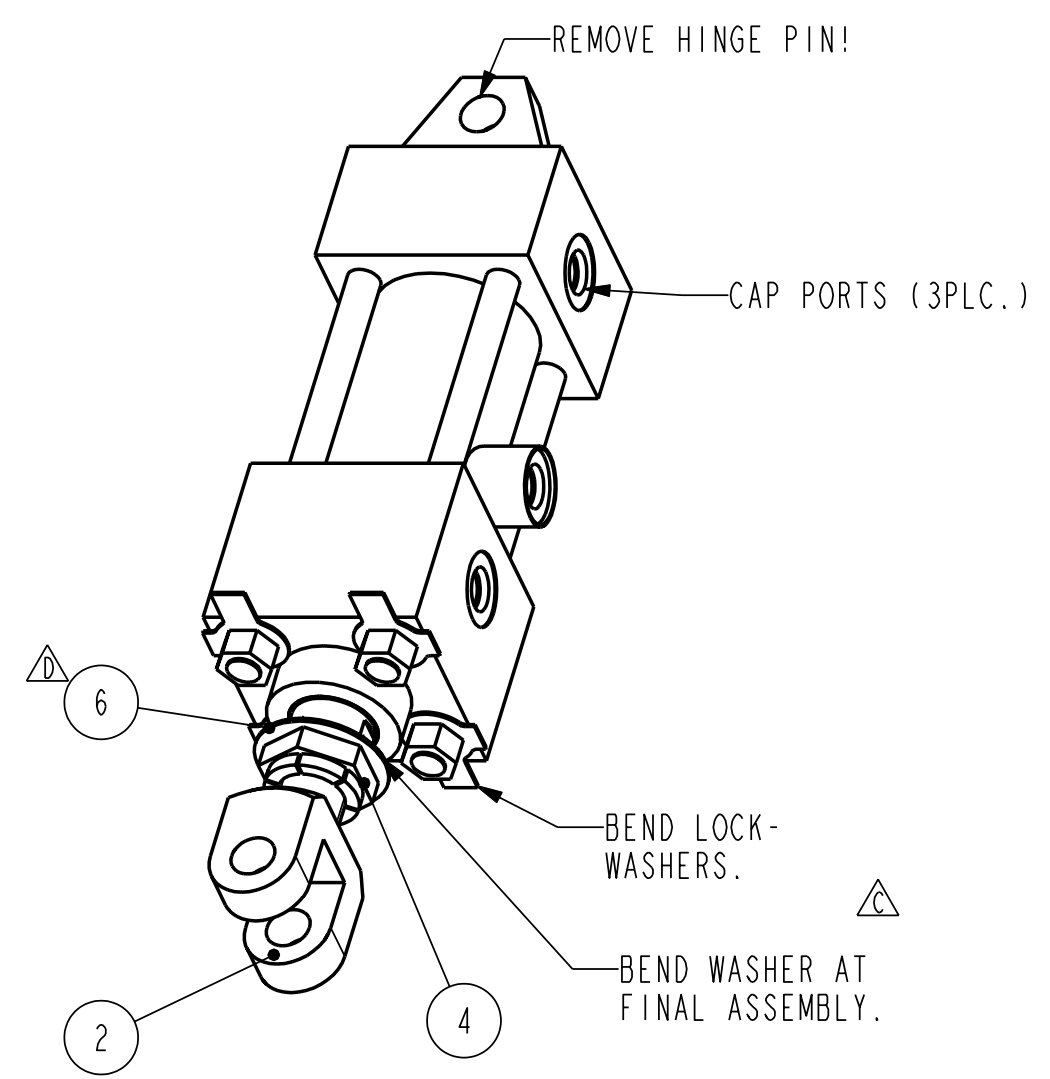
- CAP MOUNTING STYLE; BB 0.750"LENGTH.
- PORT SIZE 7/16-20 UNF-"SAE-4 'O'-RING"
- "Hi-Load" PISTON WITH:
  - PISTON SEAL RING; FS-18137 (GLASS-FILLED PTFE)
  - PISTON WEAR RING; GLASS FILLED NYLON
- TEST CYLINDER ACCORDING TSEL-0091
- SENSE PORT POSITION 0.120" BEFORE END-OF-STROKE OUT.
- CAP ALL PORTS PRIOR TO PAINTING.
- STAMP Varco PART NO. +REVISION ID. AT INDICATED LOCATION.

203221-5	QTY.	NEXT ASSY.	FINAL ASSY.	K	-	-	-	-
PART NO.				J	-	-	-	-
<b>Varco</b> OIL TOOLS ETTEN-LEUR, THE NETHERLANDS				I	-	-	-	-
UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .xxx ± .010 2 PLACE DECIMAL .xx ± .03 1 PLACE DECIMAL .x ± .1 ANGLES ± .5 DEGREE				H	-	-	-	-
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER				G	-	-	-	-
BREAK SHARP CORNERS .010 ± .005 MACHINED SURFACES 250/				F	-	-	-	-
APPROVED	NAME	DATE	PROJ.	E	-	-	-	-
CHECKED	A. K.	29-Nov-01	SCALE 1:1	D	-	-	-	-
PREPARED	P. D.	29-Nov-01	UNITS INCH (MM)	C	-	-	-	-
MATERIAL WEIGHT 11.169 LBS/ KG				B	600699	P. D.	23-May-02	A. K.
TITLE CYLINDER LATCH BX 3 & 4				A	600614	P. D.	29-Nov-01	A. K.
REDRAWN / REPLACED BY:				REV.	E. C. N	NAME	DATE	CHECKED
SIZE DRAWING NO. C 203221-5				SHEET 1 OF 1				
REPLACES 203221								

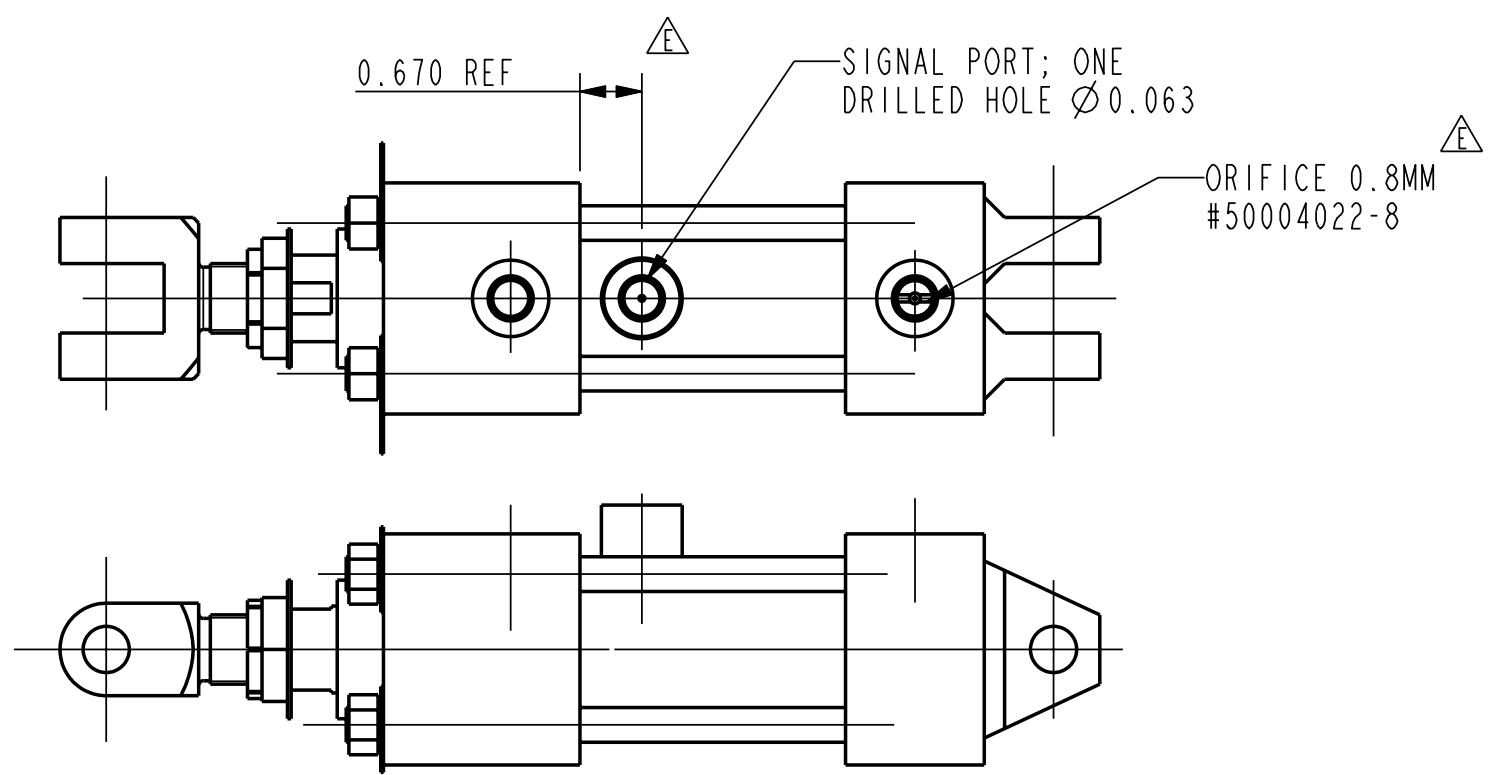


203221-1  
PART NUMBER

REV E:  
- ITEM 1 CHANGED TO #203221-5 (CYLINDER WITH REVISED PISTON & BARRELPORT CONFIGURATION.)  
- ITEM 5 REMOVED, IS NOW SUPPLIED WITH ITEM 1.

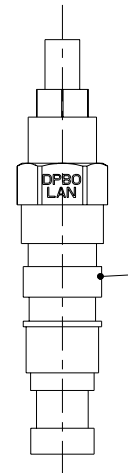
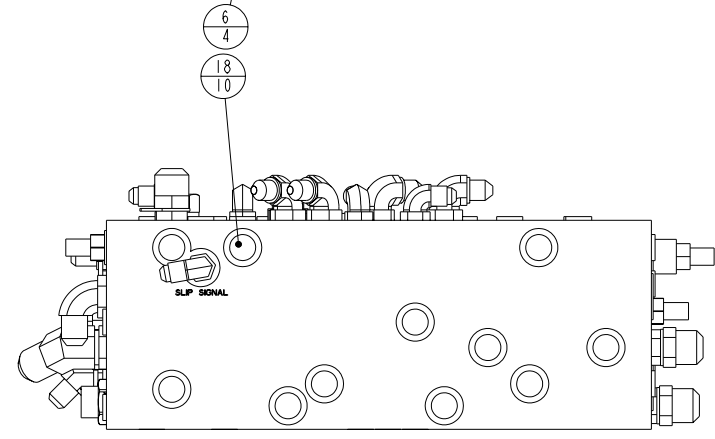
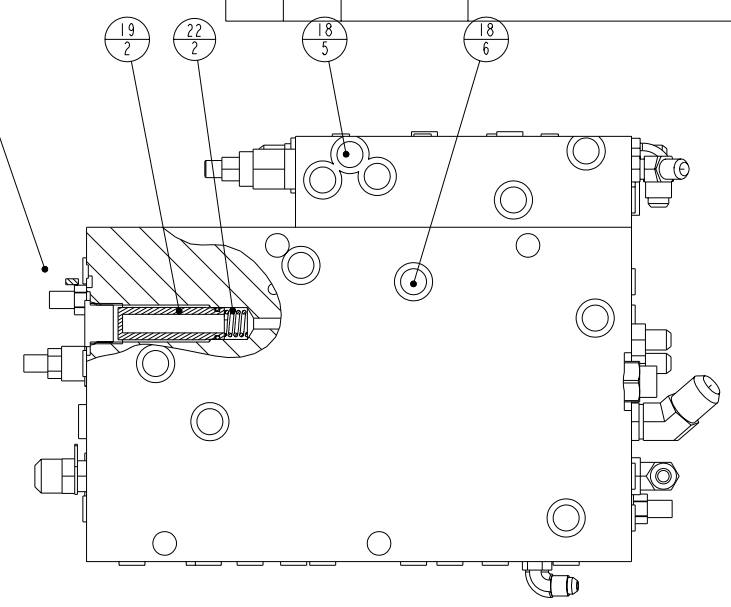
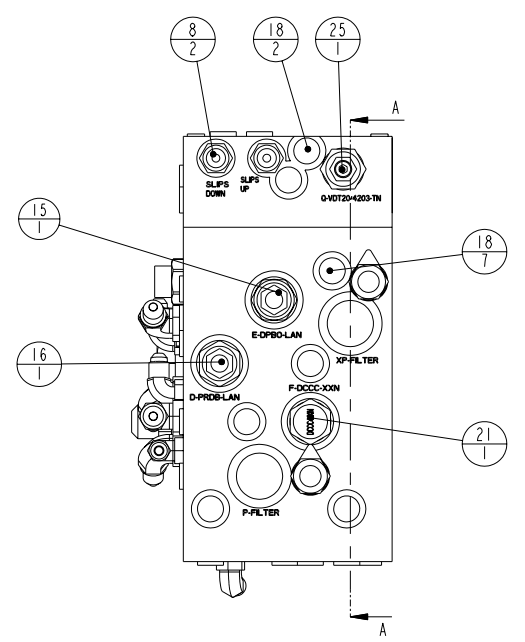
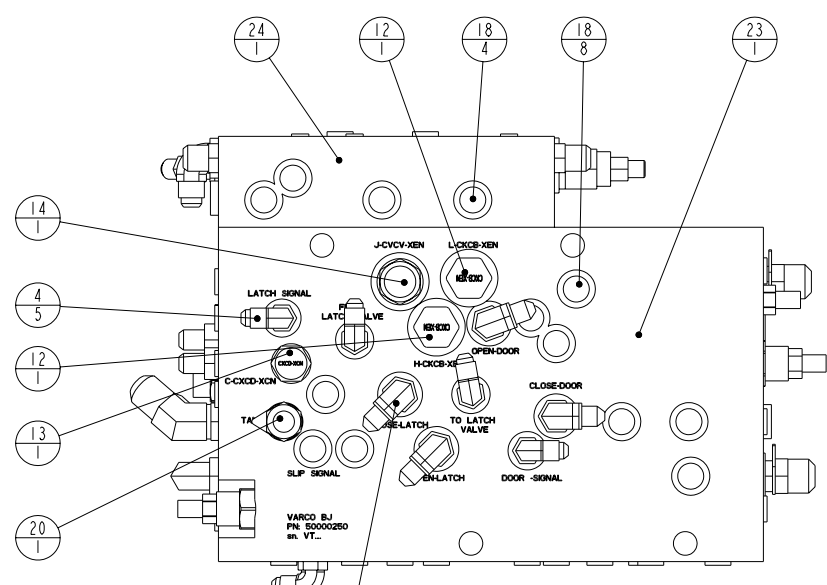
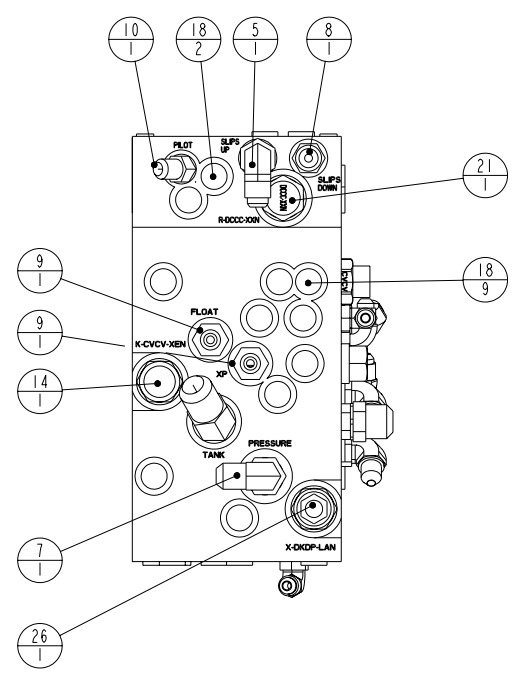
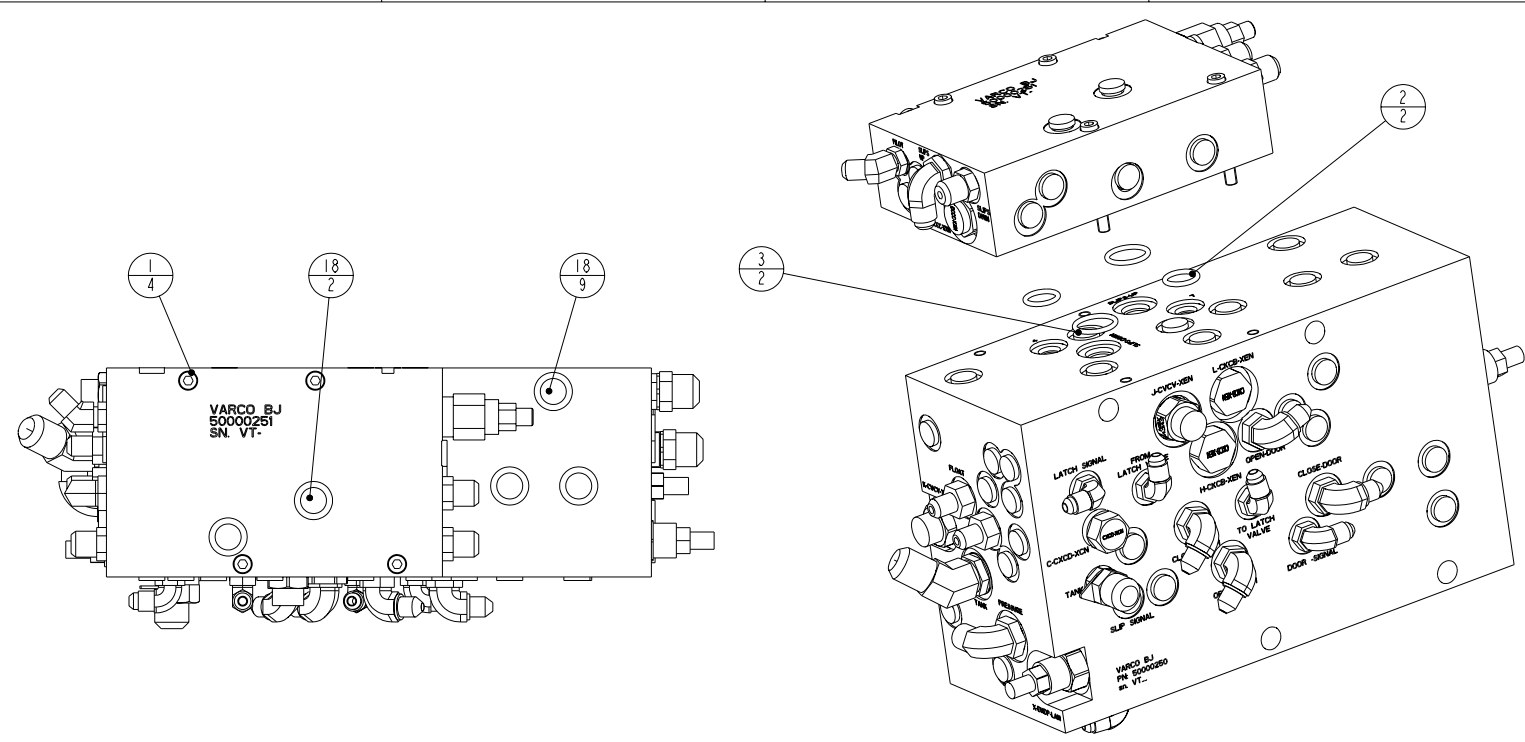


ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
1	1		203221-5	CYLINDER LATCH BX 3 & 4
2	1		203223	CLEVIS HEAD CYLINDER
4	1		944422-12	FLEXLOC NUT, 3/4"-16 UNF
6	1		203268	LOCK RING 0.75 X 1.50



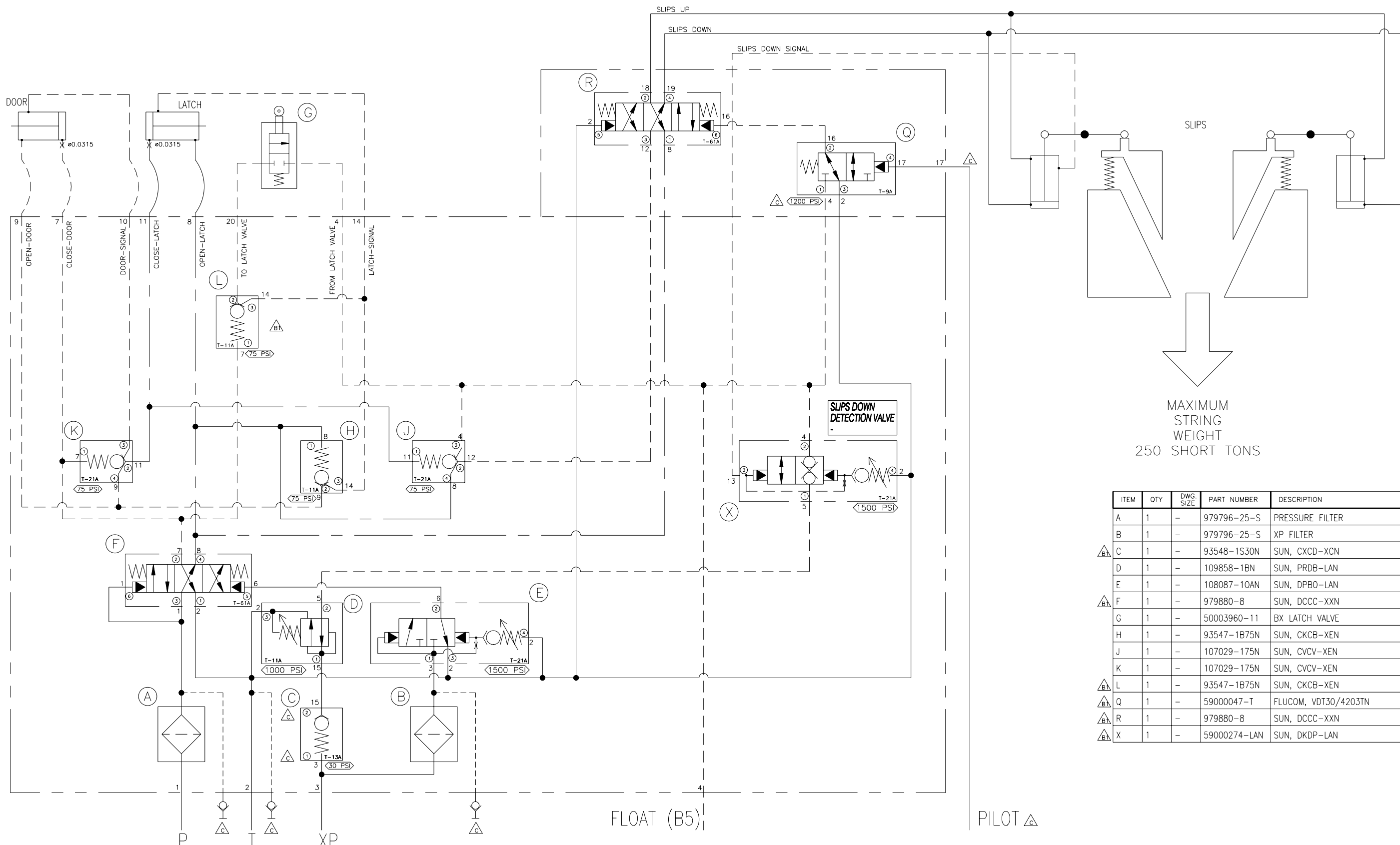
203221-1								K	-	-	-	-					
PART NO.	QTY.	NEXT ASSY.	FINAL ASSY.	J	-	-	-	-	-	-	-	-					
<b>Varco. BJ</b> <b>OIL TOOLS</b> ETTEN-LEUR, THE NETHERLANDS			UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE BREAK SHARP CORNERS .010 ± .005 MACHINED SURFACES 250/				I	-	-	-	-	-	-				
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER												H	-	-	-	-	-
APPROVED		NAME	DATE	PROJ.	MATERIAL		G	-	-	-	-	-					
CHECKED		AJ.	11-May-98	SCALE 1:2			F	-	-	-	-	-					
PREPARED		P.D.	11-May-98	UNITS INCH (MM)	WEIGHT	LBS/	KG	E	600613	P.D.	04-Dec-01	A.K.					
TITLE							SIZE	DRAWING NO.		SHEET							
LATCH CILINDER ASSY' BX III & IV							B	203221-1		OF							
REDRAWN / REPLACED BY:							REPLACES:										
									1								
									1								

ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	50104-18-C	SCREW,CAP-SOCKET HEAD 1/4" UNC x 2.25
2	2	51300-114-B	O RING O 2-114 PARKER
3	2	51300-117-B	O RING O 2-117 PARKER
4	5	56519-4-4-S	ELBOW 90° O-RING EXT. 7/16UNF TO EXT. 7/16UNF
5	1	56519-4-6-S	ELBOW
6	4	56519-6-4-S	ELBOW 90° O-RING BOSS
7	1	56519-8-6-S	ELBOW 90° O-RING EXT. 3/4UNF TO EXT. 9/16UNF ST. ST.
8	3	56529-4-6-S	CONNECTOR SAE O-RING #4 TO 37 JIC #6
9	2	56529-6-4-S	CONNECTOR SAE O-RING #6 TO 37 JIC #4
10	1	56557-4-4-S	ELBOW, 45° O-RING BOSS/37°
11	1	56557-8-8-S	ELBOW, 45° O-RING BOSS/37°
12	2	93547-1B75N	PILOT TO OPEN CHECK VALVE INT. DRAIN
13	1	93548-1S30N	SUN CHECK VALVE CSCD-XXN
14	2	107029-175N	PILOT TO OPEN CHECK VALVE . EXT DRAINED.
15	1	108087-10AN	3-WAY SEQUENCE VALVE
16	1	109858-1BN	DIRECT ACTING PRESSURE REDUCING VALVE
17	2	979512-10	PLUG 7/8" - UNF + 'O' RING
18	64	979512-3	PLUG 7/16" - UNF + 'O' RING
19	2	979796-25-S	FILTER CARTRIDGE 25 MICRON
20	3	979798-1	PRESSURE GAUGE CONNECTOR MEV20 - 7/16 UNF
21	2	979880-8	SUN 3/4 CARTRIDGE DCC-XXN
22	2	980252	COMPRESSION SPRING D-253
23	1	50000250	MANIFOLD BX.S
24	1	50000251	PILOT MANIFOLD BX.S
25	1	5900047-1	HYDRAULIC OPERATED 3/2 VALVE, 4 WAY, PILOT OPERATED, VDT30/4203-T-N
26	1	59000274-LAN	SUN CARTRIDGE DNDP-LAN



NOTE:  
PARTNUMBER: 108087-10AN, "DPBO-LAN"  
REMOVE SECOND O-RING AND  
BACK-UP RING COUNTING FROM  
CARTRIDGE ADJUSTMENT SCREW.  
PRIOR TO ASSEMBLY IN MANIFOLD.

PARTNUMBER 50000251-1		UNLESS OTHERWISE SPECIFIED		 NATIONAL OILWELL VARCO THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER.
MATERIAL		TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE		
SURF. FINISH 7 PAINTSPEC.		BREAK SHARP CORNERS .010 ± .005		DO NOT SCALE DOCUMENT THIS DOCUMENT IS DMS CONTROLLED
COLOR		MACHINED SURFACES 25% TORNCUT SURFACES 100%		
WEIGHT 118.2 lbs 53.6 kg		SCALE 1:2		PROJ.
ORIGINAL DOCUMENT	LATEST REVISION	SCALE 1:2		 UNITS INCH (mm)
NAME L.S.	NAME L.S.	REV. A		
DATE 01-Sep-04	DATE 01 SEP 04	E.C.N. 601225		TITLE ASS'Y SLIP CONTROL MANIFOLD BX-S SIZE D DRAWING NO. 50000251-1 SHEET 1 OF 1
CONTROLLED		DRAWING NO.		



ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
A	1	-	979796-25-S	PRESSURE FILTER
B	1	-	979796-25-S	XP FILTER
$\Delta$ C	1	-	93548-1S30N	SUN, CXCD-XCN
D	1	-	109858-1BN	SUN, PRDB-LAN
E	1	-	108087-10AN	SUN, DPBO-LAN
$\Delta$ F	1	-	979880-8	SUN, DCCC-XXN
G	1	-	50003960-11	BX LATCH VALVE
H	1	-	93547-1B75N	SUN, CKCB-XEN
J	1	-	107029-175N	SUN, CVCV-XEN
K	1	-	107029-175N	SUN, CVCV-XEN
$\Delta$ L	1	-	93547-1B75N	SUN, CKCB-XEN
$\Delta$ Q	1	-	59000047-T	FLUCOM, VDT30/4203TN
$\Delta$ R	1	-	979880-8	SUN, DCCC-XXN
$\Delta$ X	1	-	59000274-LAN	SUN, DKDP-LAN

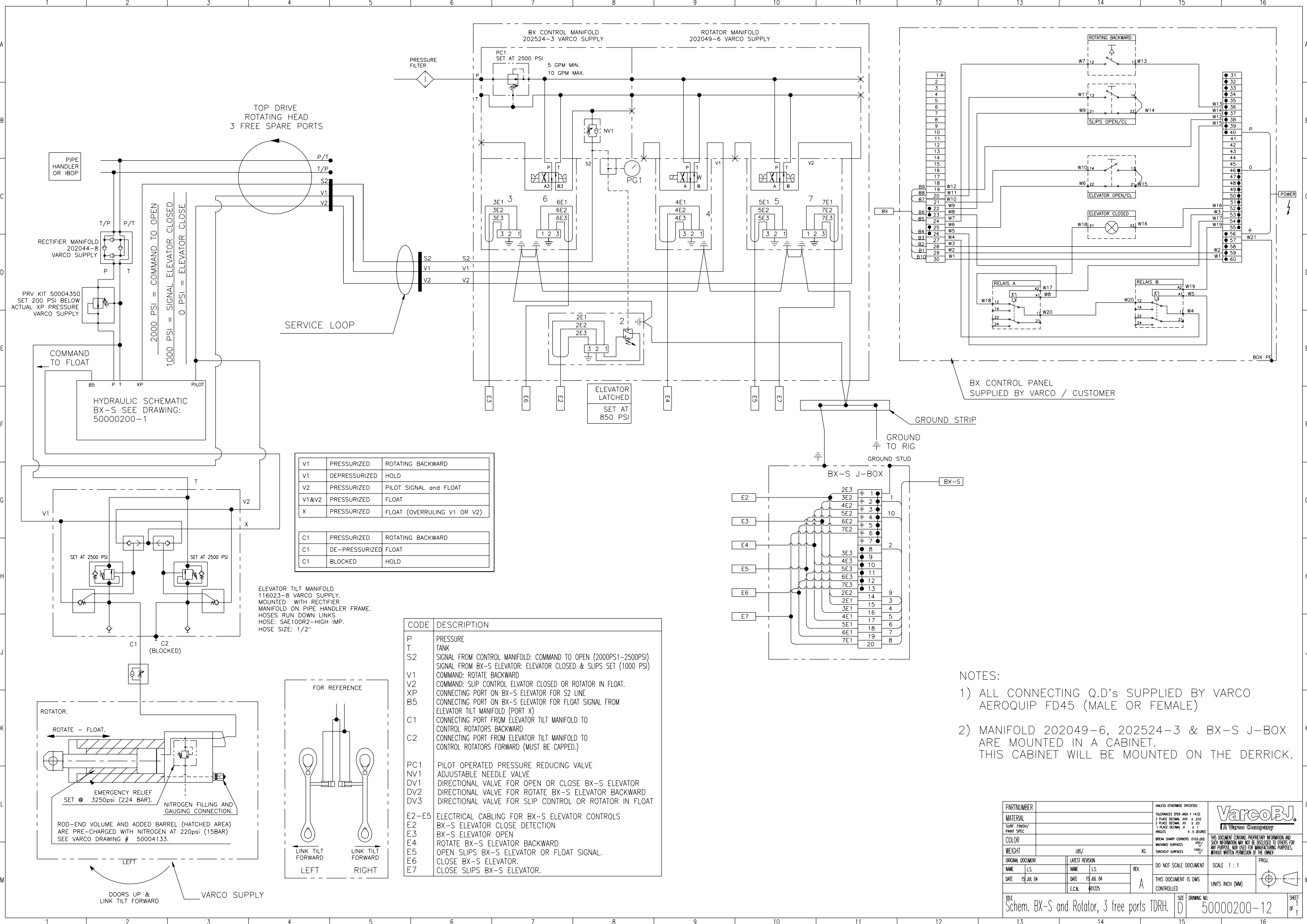
ADDING SYSTEM PRESSURE IS COMMAND TO OPEN  
 NO PRESSURE. START ELEVATOR CLOSE SEQUENCE.  
 1000PSI OUT IS "ELEVATOR-CLOSE SIGNAL"

ELEVATOR OPEN, SLIPS UP

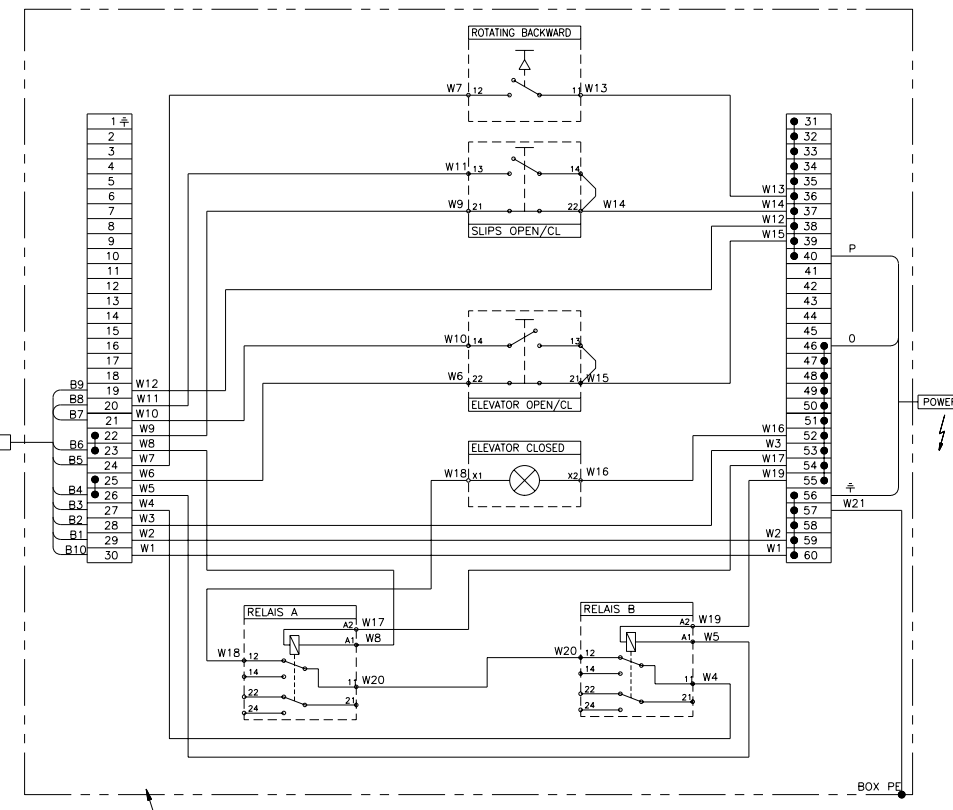
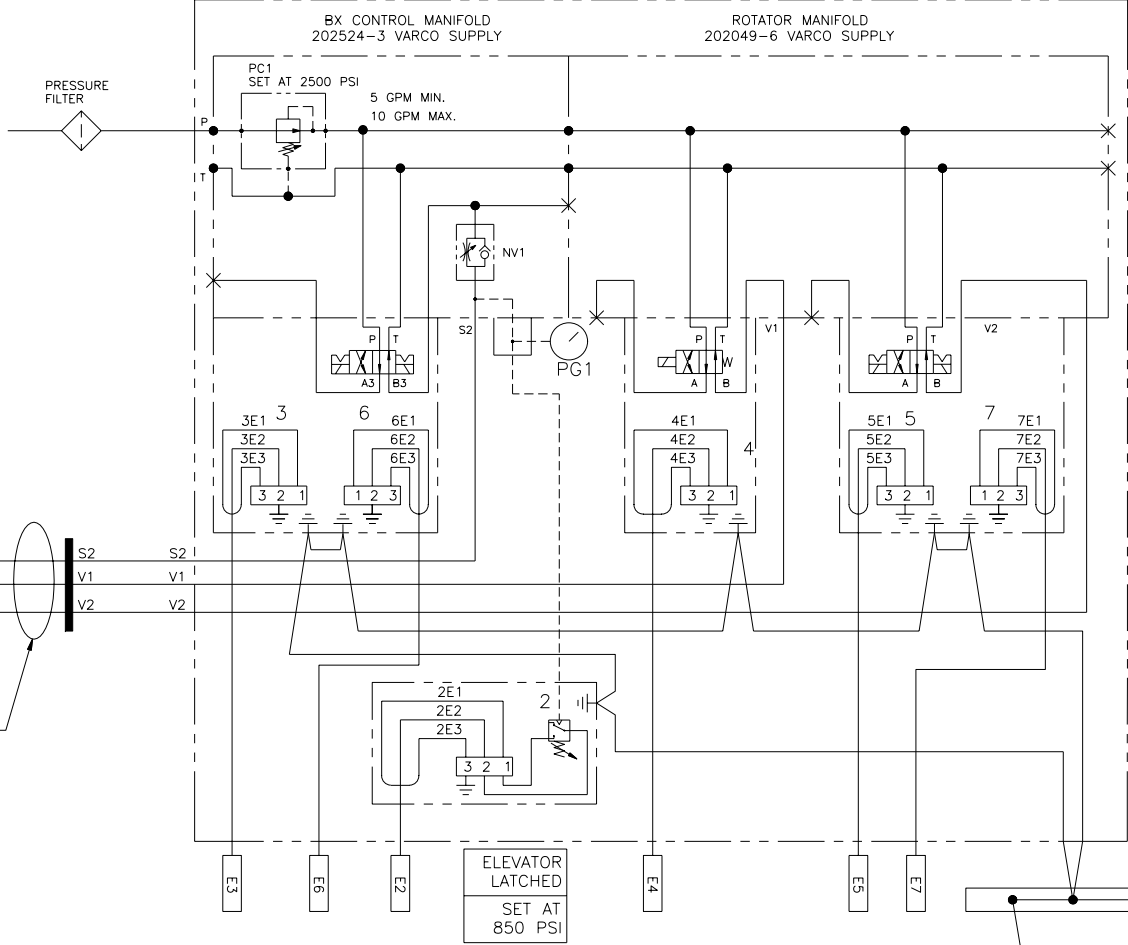
System pressure P: 2000-2300 PSI  
 XP: 2200-2500 PSI (XP=200 PSI > Sys. Pr.)  
 Flow 2-5 GPM

(A)	COMPONENT ID
(30 PSI)	VALVE SETTING
1	LINE NUMBERS
(1)	(SUN) CAVITY PORT NUMBER
T-11A	(SUN) CAVITY TYPE.

PART NO.	QTY.	NEXT ASSY	FINAL ASSY
<b>Varco. B.J.</b> OIL TOOLS			
ETIEN-LEUR, THE NETHERLANDS			
<small>UNLESS OTHERWISE SPECIFIED            3 PLACE DECIMAL .xxx ± .010            2 PLACE DECIMAL .xx ± .05            1 PLACE DECIMAL .x ± .1            ANGLES ± .5 DEGREE            BREAK SHARP CORNERS .010 ± .005            MACHINED SURFACES Ra/</small>			
<small>THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER.</small>			
NAME	DATE	PROJ.	MATERIAL
PREPARED	L.S. 17 MAR 04		
CHECKED	P.D. 17 MAR 04	SCALE	1:1
APPROVED	A.K. 17 MAR 04	UNITS	INCH (MM)
WEIGHT		LBS./	KG
ACAD FILE NO.:		REPLACES:	
TITLE HYDRAULIC SCHEMATIC BX-S WITH SLIPS CONTROL			SIZE DRAWING NO. D 50000200-1
REDRAWN / REPLACED BY:			SHEET 1 OF 1



TOP DRIVE  
ROTATING HEAD  
3 FREE SPARE PORTS

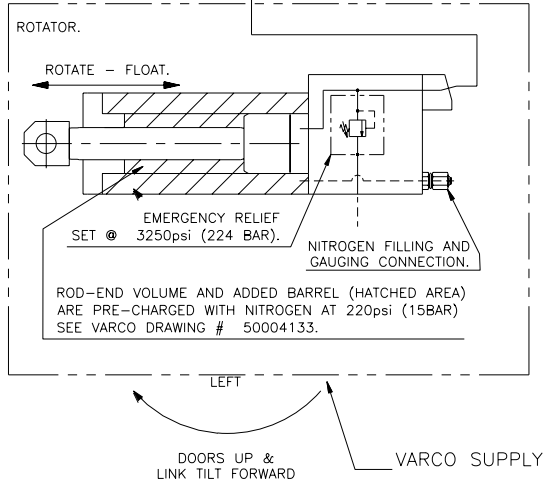
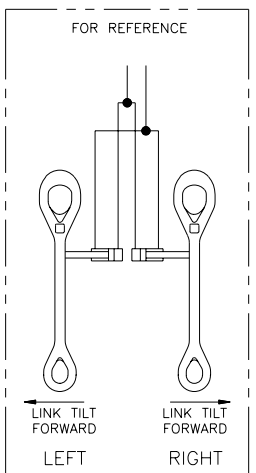


BOX CONTROL PANEL  
SUPPLIED BY VARCO / CUSTOMER

V1	PRESSURIZED	ROTATING BACKWARD
V1	DEPRESSURIZED	HOLD
V2	PRESSURIZED	PILOT SIGNAL and FLOAT
V1&V2	PRESSURIZED	FLOAT
X	PRESSURIZED	FLOAT (OVERRULING V1 OR V2)
C1	PRESSURIZED	ROTATING BACKWARD
C1	DE-PRESSURIZED	FLOAT
C1	BLOCKED	HOLD

ELEVATOR TILT MANIFOLD  
116023-8 VARCO SUPPLY.  
MOUNTED WITH RECTIFIER  
MANIFOLD ON PIPE HANDLER FRAME.  
HOSES RUN DOWN LINKS  
HOSE: SAE100R2-HIGH IMP.  
HOSE SIZE: 1/2"

CODE	DESCRIPTION
P	PRESSURE
T	TANK
S2	SIGNAL FROM CONTROL MANIFOLD: COMMAND TO OPEN (2000PSI-2500PSI) SIGNAL FROM BX-S ELEVATOR: ELEVATOR CLOSED & SLIPS SET (1000 PSI) COMMAND: ROTATE BACKWARD
V1	COMMAND: ROTATE BACKWARD
V2	COMMAND: SLIP CONTROL ELEVATOR CLOSED OR ROTATOR IN FLOAT.
XP	CONNECTING PORT ON BX-S ELEVATOR FOR S2 LINE
B5	CONNECTING PORT ON BX-S ELEVATOR FOR FLOAT SIGNAL FROM ELEVATOR TILT MANIFOLD (PORT X)
C1	CONNECTING PORT FROM ELEVATOR TILT MANIFOLD TO CONTROL ROTATORS BACKWARD
C2	CONNECTING PORT FROM ELEVATOR TILT MANIFOLD TO CONTROL ROTATORS FORWARD (MUST BE CAPPED.)
PC1	PILOT OPERATED PRESSURE REDUCING VALVE
NV1	ADJUSTABLE NEEDLE VALVE
DV1	DIRECTIONAL VALVE FOR OPEN OR CLOSE BX-S ELEVATOR
DV2	DIRECTIONAL VALVE FOR ROTATE BX-S ELEVATOR BACKWARD
DV3	DIRECTIONAL VALVE FOR SLIP CONTROL OR ROTATOR IN FLOAT
E2-E5	ELECTRICAL CABLING FOR BX-S ELEVATOR CONTROLS
E2	BX-S ELEVATOR CLOSE DETECTION
E3	BX-S ELEVATOR OPEN
E4	ROTATE BX-S ELEVATOR BACKWARD
E5	OPEN SLIPS BX-S ELEVATOR OR FLOAT SIGNAL.
E6	CLOSE BX-S ELEVATOR.
E7	CLOSE SLIPS BX-S ELEVATOR.



NOTES:

- 1) ALL CONNECTING Q.D's SUPPLIED BY VARCO AEROQUIP FD45 (MALE OR FEMALE)
- 2) MANIFOLD 202049-6, 202524-3 & BX-S J-BOX ARE MOUNTED IN A CABINET. THIS CABINET WILL BE MOUNTED ON THE DERRICK.

PARTNUMBER	UNLESS OTHERWISE SPECIFIED		
MATERIAL	TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL XXX ± .010 2 PLACE DECIMAL XX ± .005 1 PLACE DECIMAL X ± .1 ANGLES ± .5 DEGREE		
COLOR	BREAK SHARP CORNERS 0100,005 UNMACHINED SURFACES .250/ FINISHED SURFACES .1000		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER.
WEIGHT	LBS/	KG	
ORIGINAL DOCUMENT	LATEST REVISION	REV.	DO NOT SCALE DOCUMENT
NAME L.S.	NAME L.S.	REV.	SCALE 1 : 1
DATE 15 JUL 04	DATE 15 JUL 04	A	THIS DOCUMENT IS DMS CONTROLLED
E.C.N. 401225			UNITS INCH (MM)
TITLE	SIZE	DRAWING NO.	
Schem. BX-S and Rotator, 3 free ports TDRH.	D	50000200-12	
			SHEET 1 OF 1

204682

PART NUMBER

FOR PRESSURE AND RETURN LINE  
TO CONTROL MANIFOLD BX-ELEVATOR  
AND ROTATORS TEE IN FROM TOPDRIVE  
MANIFOLD

MANIFOLD CABINET FOR  
CONTROLLING BX-ELEVATOR  
WITH ROTATORS

TOPDRIVE MANIFOLD

FINGERBOARD LEVEL

204681  
ASS'Y SERVICE LOOP

204681  
ASS'Y SERVICE LOOP

T/P  
FROM PIPEHANDLER

P/T  
FROM PIPEHANDLER

TO TANK PORT BX-ELEVATOR

TO PRESSURE PORT BX

C1  
ROTATE FORWARD BX

V1  
FROM TOPDRIVE  
ROTATE FORWARD SIGNAL

V2  
FROM TOPDRIVE RO-  
TATE BACKWARD SIGNAL

C2  
ROTATE BACKWARD BX

B5  
FLOAT SIGNAL TO BX-ELEVATOR

MOUNTINGPLATE ASS'Y  
RECTIFIER & FLOAT MANIFOLD  
PART NO.: 203180  
WELDED ON PIPEHANDLER FRAME

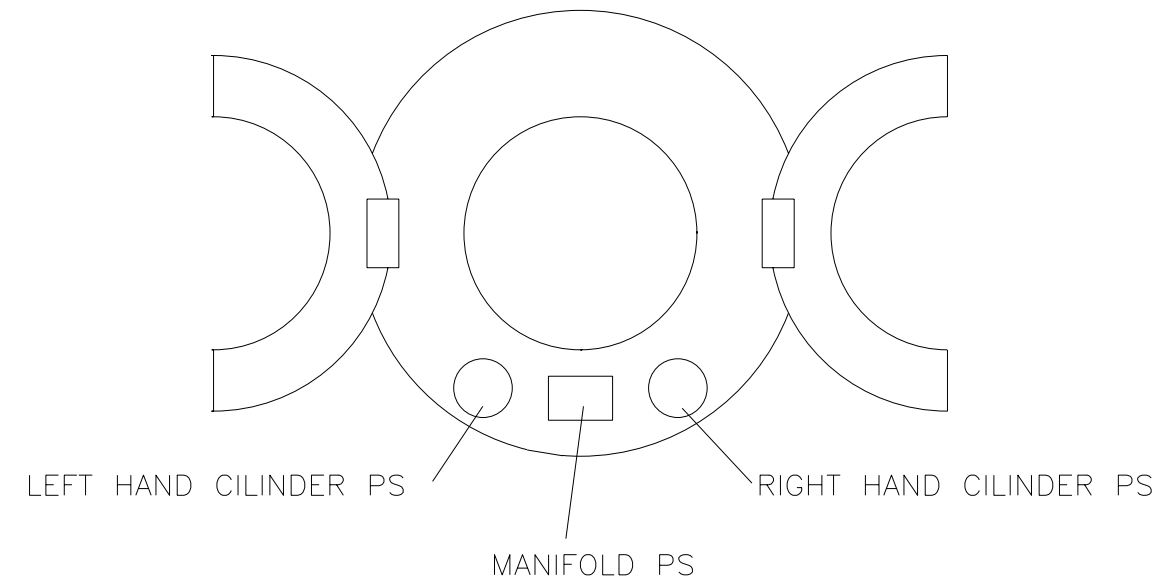
BX-ELEVATOR

PS-21/30 IN  
ROTARY TABLE

PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y	M	L	K	J	H	G	F	E	D	C	B	A	REV.	E.C.N.	NAME	DATE	CHECKED		
<b>Varco. BJ.</b> <b>OIL TOOLS</b> ETTEN-LEUR, THE NETHERLANDS UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE BREAK SHARP CORNERS .010 ± .005 MACHINED SURFACES 250																						
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PREPARED	L.S.	10 JUL 98	PROJ.																			
CHECKED	H.B.	10 JUL 98	SCALE	1 : 100																		
APPROVED	H.T.	10 JUL 98	UNITS	INCH (MM)																		
TITLE GENERAL HOOK-UP KIT DRAWING BX-ELEVATOR WITH ROTATORS				SIZE	DRAWING NO.		ACAD FILE NO. :		SHEET		OF											
REDRAWN / REPLACED BY:				SIZE	DRAWING NO.		ACAD FILE NO. :		SHEET		OF											
				C	204682				1		1											

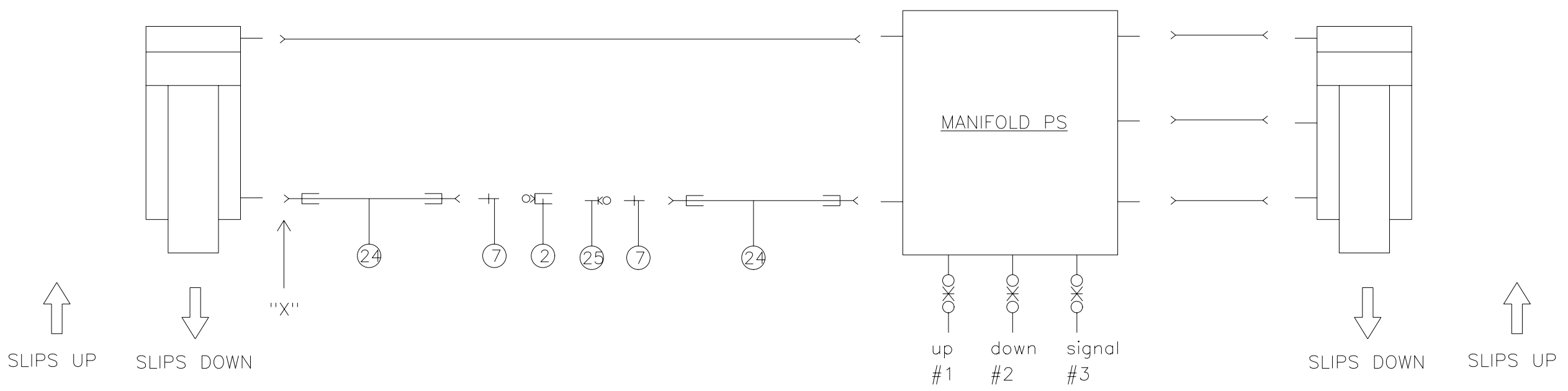
- WHEN SLIPS ARE SAGGING / PROPER FUNCTIONING OF ANTI SAGGING SYSTEM HAS TO BE CHECKED:
1. REMOVE PS FROM WELL CENTER
  2. SET THE SLIPS AND DISCONNECT HOSES #1, #2 AND #3 FROM MANIFOLD BLOCK.
  3. DISCONNECT BOTTOM TUBE FROM MANIFOLD TO LEFT HAND CILINDER
  4. CONNECT HOSES AND QD'S TO CILINDER AND MANIFOLD AS OUTLINED IN SKETCH BELOW.
  5. RE-CONNECT HOSES #1, #2 AND #3
  6. DE-AIR SYSTEM BY UNTIGHTENING NUT X UNTIL ALL AIR HAS ESCAPED.
  7. RETIGHTEN NUT X, THEN RAISE SLIPS UP
  8. DISCONNECT QD'S (POS 2-25) WHILE STILL PRESSURIZED.
  9. OPERATE SLIPS SET, SLIPS SHOULD STAY UP
  10. IF SLIPS STILL SAGG, THE PISTON SEALS IN THE LEFT HAND CILINDER HAVE TO BE REPLACED
  11. IF SLIPS DO NOT SAGG WITH QD'S 2 AND 25 DISCONNECTED, CHECK AND, IF NEEDED, REPLACE PILOT TO OPEN CHECKVALVE INSIDE MANIFOLD.  
(DISCONNECT HOSES #1, #2 AND #3 PRIOR TO REMOVAL OF P.O.C. VALVE AND/OR PISTON SEALS).

TOPVIEW PS



LEFT HAND CILINDER PS

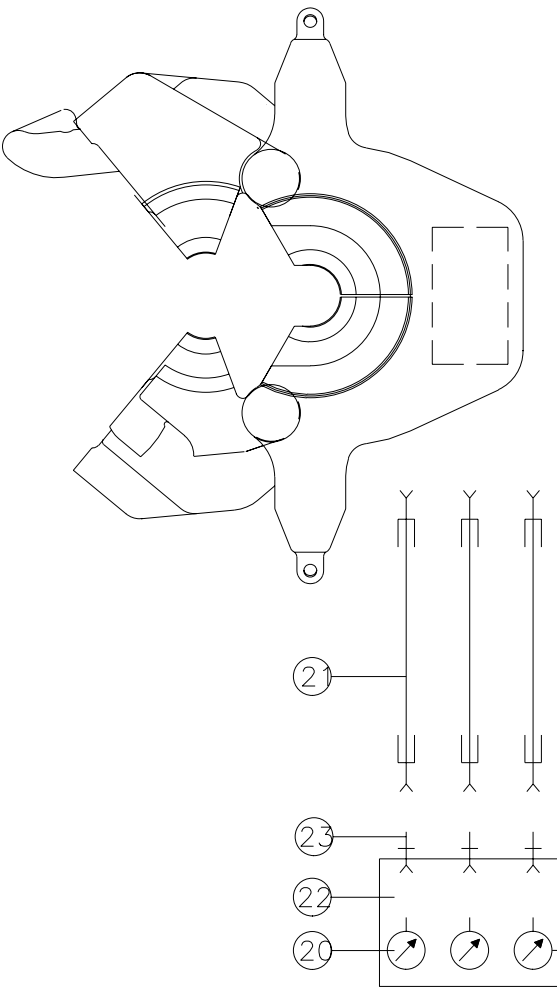
RIGHT HAND CILINDER PS



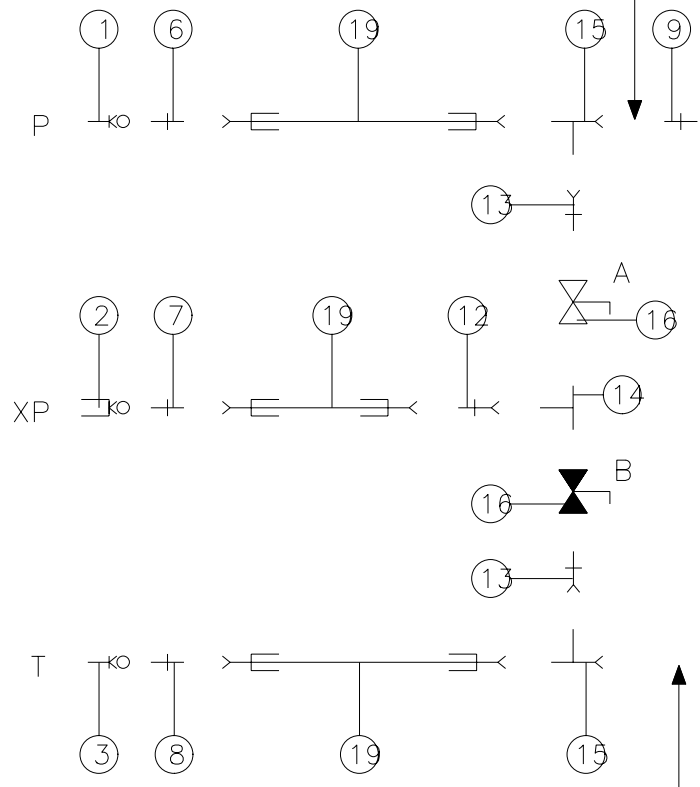
NOTE: TROUBLE SHOOTING IS DESCRIBED IN MANUAL

202539	1	-	-	M					
PART NO.	QTY.	NEXT ASSY	FINAL ASSY	L					
<b>Varco, B.J.</b> <b>OIL TOOLS</b> ETTEN-LEUR, THE NETHERLANDS				UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .05 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE BREAK SHARP CORNERS .010 ± .005 MACHINED SURFACES 250/					
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER.									
NAME	DATE	PROJ.	MATERIAL						
PREPARED ADE	24 JUN '99								
CHECKED PDE	24 JUN '99	SCALE NONE							
APPROVED LSP	24 JUN '99	UNITS INCH (MM)	WEIGHT	LBS/	KG	ACAD FILE NO. : 202539_2.DWG			
TITLE TEST KIT BX ELEVATOR + PS				SIZE D		DRAWING NO. 202539		SHEET 2 OF 2	
REDRAWN / REPLACED BY:				REPLACES:					

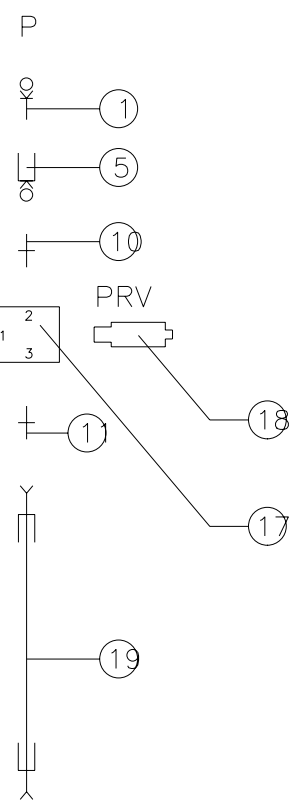
ELEVATOR



FOR STORAGE IN BOX DISCONNECT HERE AND PUT CAP (POS.30) AND PLUG (POS.29) ON ENDS.



HPU



P = PRESSURE (3/8" QD)  
 XP = SIGNAL (1/4" QD)  
 T = TANK (RETURN 1/2" QD)  
 A AND B = BALL VALVE (3/8")  
 PRV = PRESSURE REGULATING VALVE  
 HPU = HYDRAULIC POWER UNIT

- AFTER ASS'Y:
1. TURN IN SCREW OF PRV COMPLETELY
  2. CONNECT PRESSURE "P" HPU
  3. OPEN VALVE "A" AND CLOSE VALVE "B"
  4. PRESSURE TEST 3000 PSI FOR 5 MIN.
  5. SET HPU PRESSURE TO 2000 PSI
  6. OPEN VALVE "B"
  7. PRESSURE TEST 2000 PSI FOR 5 MIN.
  8. FIX LEAKS AND REPEAT UNTIL NO LEAKS
  9. FOR STORAGE DISCONNECT AT MARKED PLACES

HPU

FOR STORAGE IN BOX DISCONNECT HERE AND PUT CAP (POS.30) AND PLUG (POS.29) ON ENDS.

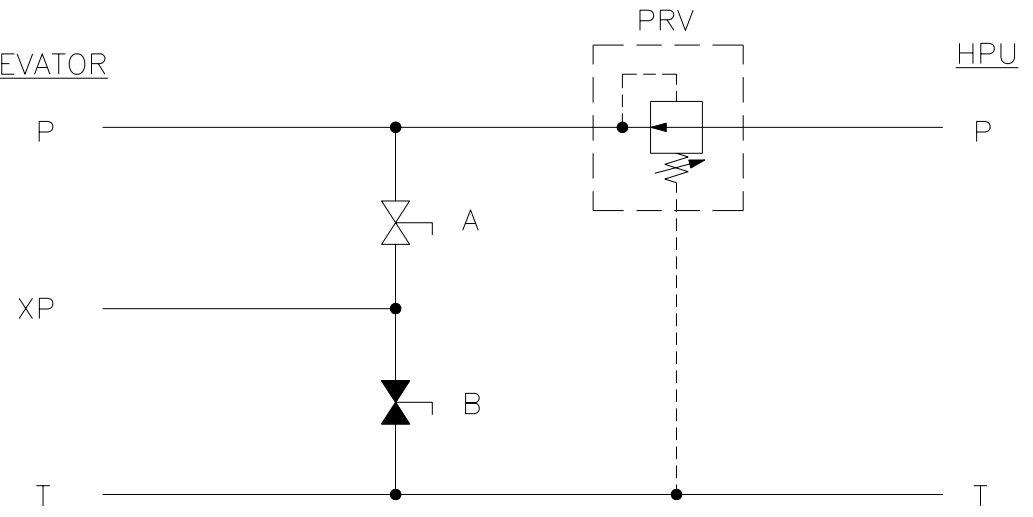
GAUGES FOR READOUT OF "P", "XP" AND "T"

- BEFORE OPERATION WHEN TESTING IS NEEDED:
1. SHUT DOWN HYDRAULIC POWER
  2. CONNECT HOSES TO HPU AND ELEVATOR
  3. CONNECT GAUGES TO MANIFOLD STANDARD CONNECTORS FOR READOUT OF "P", "XP" AND "T"
  4. OPEN VALVE "A" AND "B"
  5. TURN OUT SETSCREW "PRV" COMPLETELY
  6. TURN ON HYDRAULIC POWER
  7. CLOSE VALVE "A"
  8. TURN IN SETSCREW "PRV" UNTIL "P" READS 2000 PSI

- COMMAND TO OPEN IF ELEVATOR IS CLOSED:
1. CLOSE VALVE "B"
  2. OPEN VALVE "A"
  3. XP READS 2000 PSI AND ELEVATOR OPENS

- COMMAND TO CLOSE IF ELEVATOR IS OPEN:
1. CLOSE VALVE "A"
  2. OPEN VALVE "B", XP READS 0 PSI
  3. CLOSE VALVE "B"
  4. ACTIVATE TRIGGER AND ELEVATOR CLOSES
  5. XP READS 1000 PSI WHEN ELEVATOR IS CLOSED

ELEVATOR

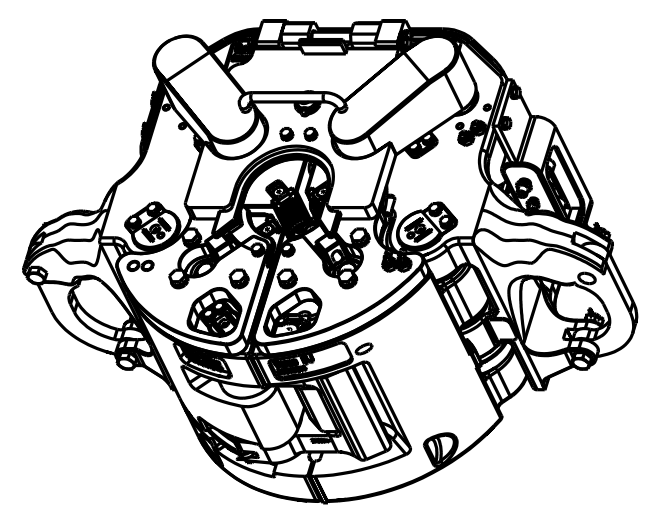
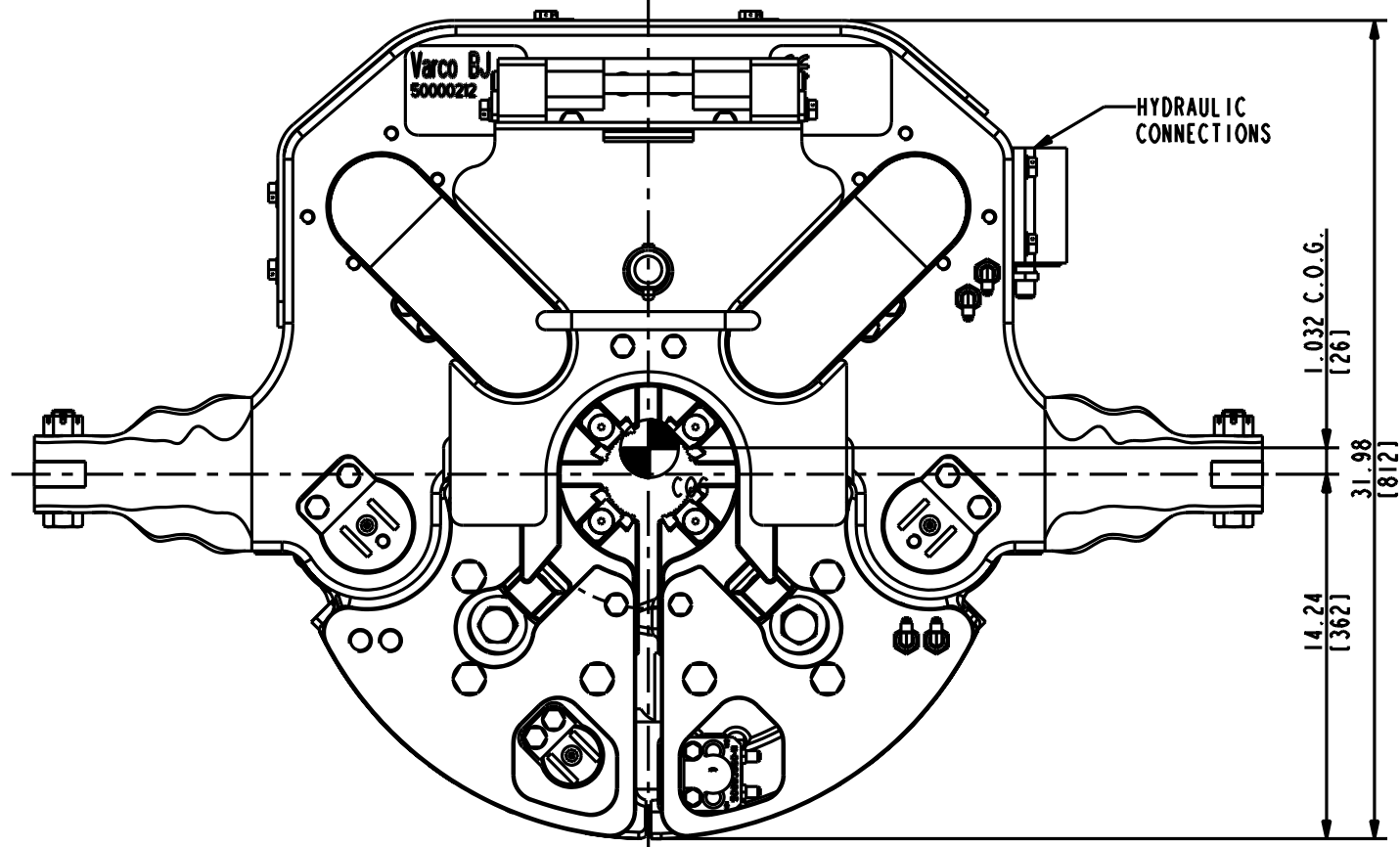


ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
1	2	-	55909-6-6	QCK DISC., MALE, 3/8"-18 NPT
2	2	-	55908-4-4	QCK DISC., FEMALE, 1/4"-18 NPT
3	2	-	55909-8-8	QCK DISC., MALE, 1/2"-14 NPT
4	1	-	55908-8-8	QCK DISC., FEMALE, 1/2"-14 NPT
5	1	-	55908-6-6	QCK DISC., FEMALE, 3/8"-18 NPT
6	1	-	56165-6-6	SEXT.PIPE/JIC, 3/8" NPT - 9/16 UNF
7	3	-	56165-4-6	SEXT.PIPE/JIC, 1/4" NPT - 9/16 UNF
8	2	-	56165-8-6	SEXT.PIPE/JIC, 1/2" NPT - 9/16 UNF
9	1	-	979532-8-6	BSP G1/2 MALE/ JIC 9/16 MALE
10	1	-	979861-8-6	BSP+SEAL/NPT, G1/2 TO 3/8" NPT
11	1	-	979532-4-6	BSP+SEAL/JIC, G1/4 TO 9/16 UNF
12	1	-	56521-6-6	SINT.PIPE/JIC, 3/8" NPT - 9/16 UNF
13	2	-	56566-6-6	SEXT.PIPE 3/8" NPT TO 9/16 JIC FEMALE
14	1	-	56716-6-S	TEE EXT.PIPE 3/8" NPT
15	3	-	56525-6-6	STEE JIC INT/EXT/EXT, 9/16 UNF
16	2	-	979552-1	BALL VALVE 3/8" NPT INT.PIPE
17	1	-	979940-ECV	SUN LINE MOUNT BODY, ECV
18	1	-	94817-1AN	PRESS. REG. CARTRIDGE PBDB-LAN
19	4	-	990065-11	HOSE 3/8" with JIC 9/16 UNF fem.
20	5	-	979849-2	PRESSURE GAUGE 0-3500 PSI
21	5	-	980479	HOSE PRESSURE GAUGE L=2M
22	1	C	202539-1	PLATE FOR 3 GAUGES
23	5	-	980481	M16x2 MALE TO GAUGE CONNECTOR
24	2	-	980482-20	HOSE 1/4" #6 ENDS MAX. 6250 PSI
25	1	-	55909-4-4	QCK DISC., MALE, 1/4"-18 NPT
26	2	-	56525-6-6	STEE JIC EXT/INT/INT, 9/16 UNF
27	2	-	56525-4-4	STEE JIC EXT/INT/INT, 7/16 UNF
28	1	-	T80600	LOCTITE 542-050 HYDR. SEALANT
29	5	-	56553-6-S	PLUG, MALE-37 SEAT 9/16 UNF
30	5	-	56544-6-S	CAP, FEMALE-37 SEAT 9/16 UNF
31	1	-	980478	STORAGE BOX TEST KIT BX ELEVATOR
32	2	-	980018-6	connector 9/16 unf fem/gauge conn
33	2	-	980018-4	connector 7/16 unf fem/gauge conn
34	1	A	202539-2	LABELS FOR BX
35	4	-	979798-1	GAUGE CONNECTOR MEV20-7/16 UNF
36	2	-	979798-3	GAUGE CONNECTOR MEV20-9/16 UNF
37	4	-	979512-3	PLUG 7/16" UNF + O-RING

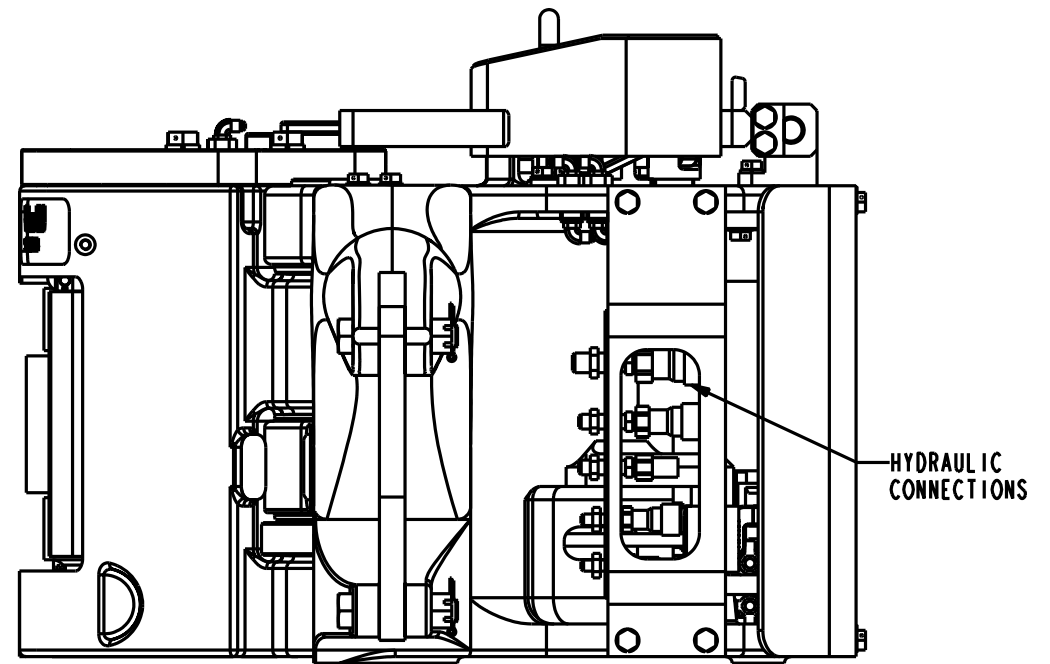
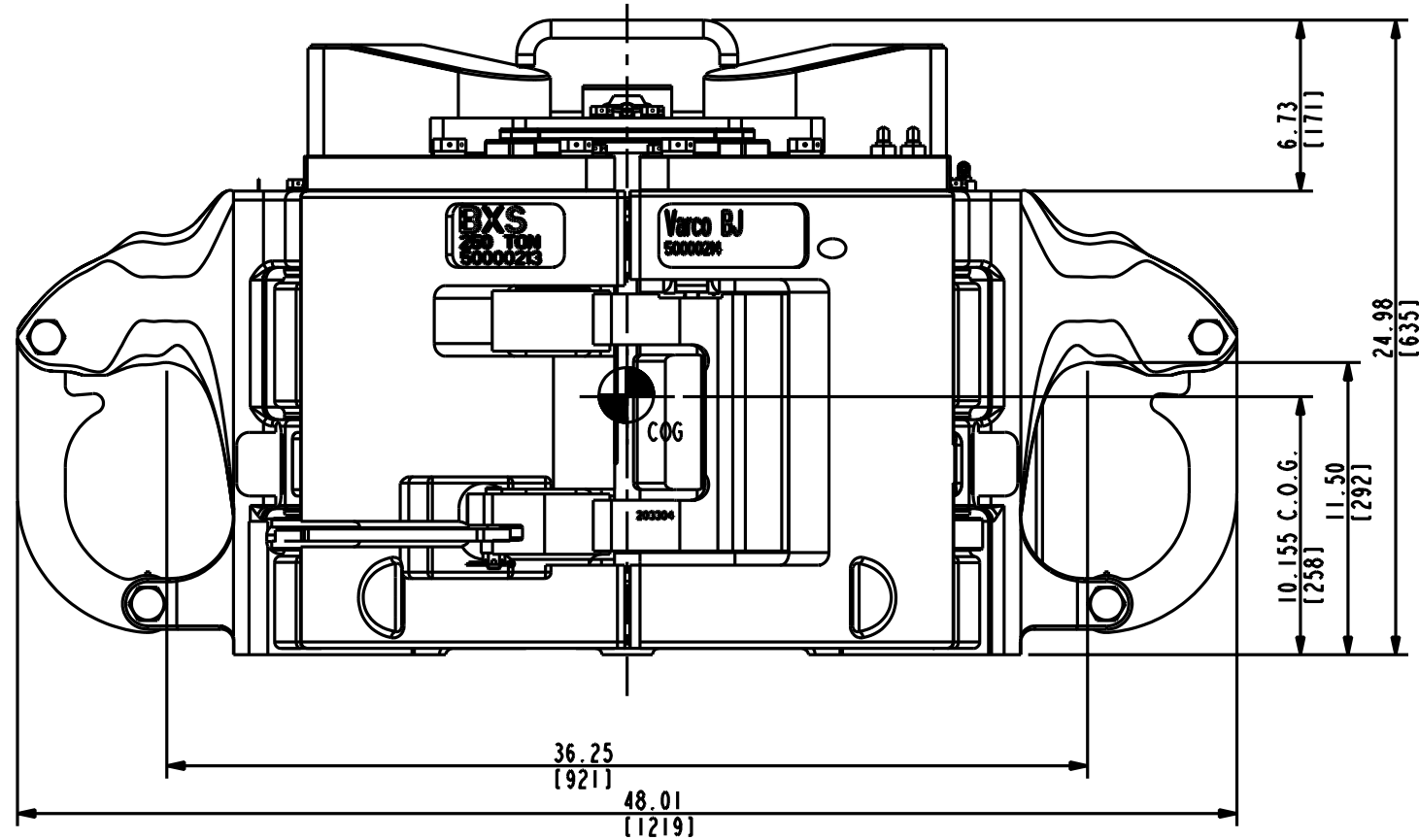
PARTS IN KIT THAT ARE NOT SHOWN ON DWG

NOTE: TROUBLE SHOOTING IS DESCRIBED IN MANUAL

202539	1	-	-	M					
PART NO.	QTY.	NEXT ASSY	FINAL ASSY	L					
<b>Vareo, B.J.</b> OIL TOOLS ETIEN-LEUR, THE NETHERLANDS				UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .xxx ± .010 2 PLACE DECIMAL .xx ± .05 1 PLACE DECIMAL .x ± .1 ANGLES ± .5 DEGREE BREAK SHARP CORNERS .010 ± .005 MACHINED SURFACES 25/					
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER.									
PREPARED	ADE	DATE	24 JUN '99	PROL.		MATERIAL			
CHECKED	PDE	DATE	24 JUN '99	SCALE	NONE				
APPROVED	LSP	DATE	24 JUN '99	UNITS	INCH (MM)	WEIGHT	LBS/	KG	ACAD FILE NO.: 202539_1.DWG
TITLE TEST KIT BX ELEVATOR + PS							SIZE	DRAWING NO.	SHEET
REDRAWN / REPLACED BY:								202539	1
REPLACES:									OF 2



SCALE 1:10

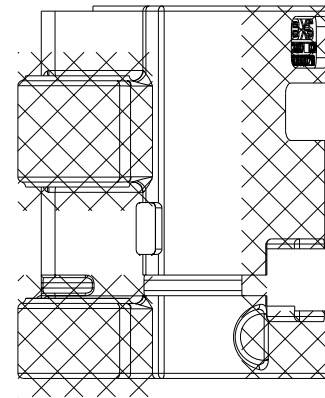
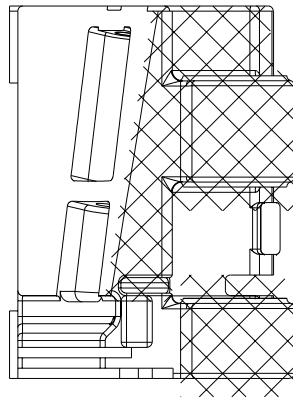
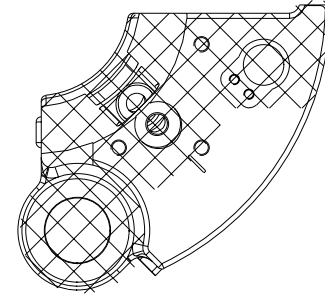


WEIGHT ELEVATOR WITHOUT SLIPS: 2721 LBS / 1234 KG  
 WEIGHT ELEVATOR WITH SLIPS: 2974 LBS / 1349 KG

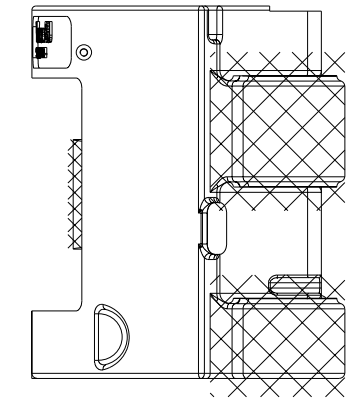
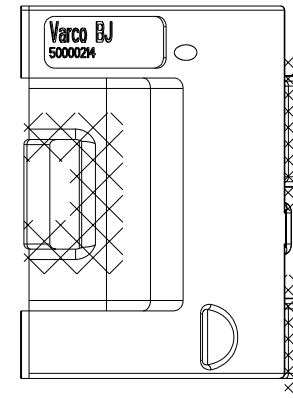
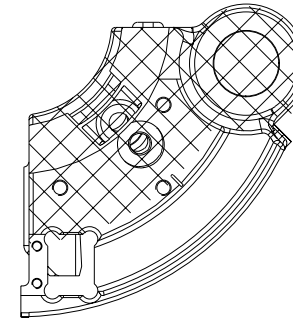
PARTNUMBER 50000202		UNLESS OTHERWISE SPECIFIED		<b>Varco BJ.</b> A Varco Company THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER	
MATERIAL		TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE			
SURF. FINISH / PAINTSPEC.		BREAK SHARP CORNERS .010 ± .005		DO NOT SCALE DOCUMENT THIS DOCUMENT IS DMS CONTROLLED	
COLOR		MACHINED SURFACES 250 ✓ TORNCUT SURFACES 1000 ✓			
WEIGHT 2974.3 Lbs 1349.1 kg		ORIGINAL DOCUMENT NAME L.S. DATE 12-Jul-04		PROJECT SCALE 1:5 UNITS INCH (mm)	
		LATEST REVISION NAME L.S. DATE 12 JUL 04 E.C.N. 601225		REV. A SHEET 1 OF 1	
TITLE ASS'Y BX SLIP TYPE ELEVATOR C		SIZE C		DRAWING NO. DD-50000202	




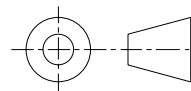
PART NUMBER	TYPE
50000213	MACHING LEFT DOOR BX-S



PART NUMBER	TYPE
50000214	MACHING RIGHT DOOR BX-S

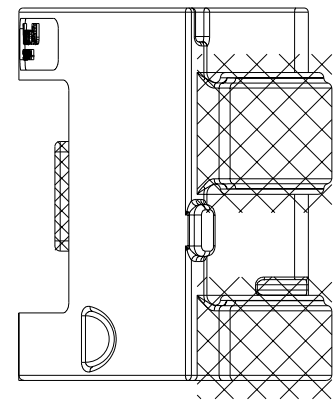
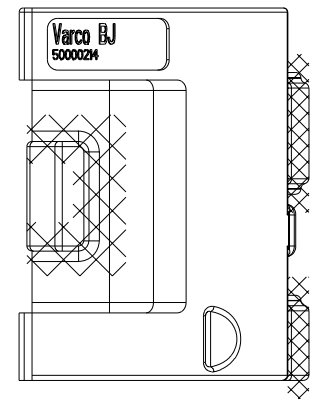
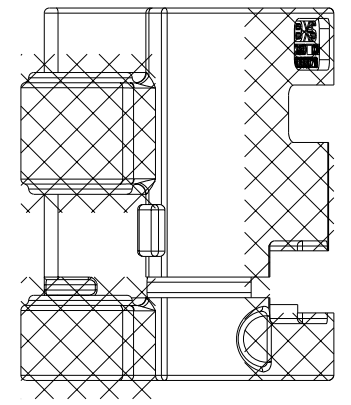
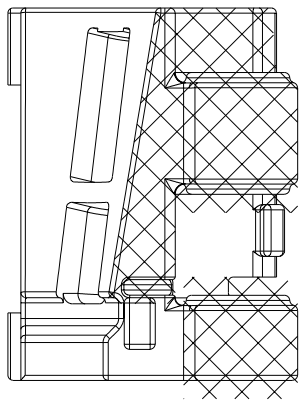
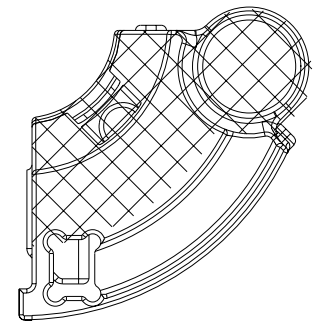
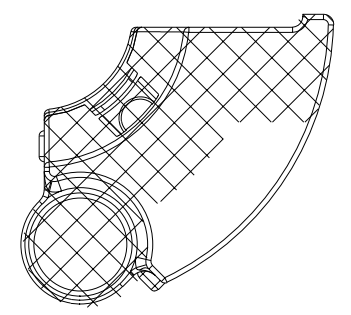


- NOTES:
1. HATCHED AREAS ARE CONSIDERED CRITICAL.
  2. NON HATCHED AREAS ARE CONSIDERED NON CRITICAL.
  3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE Varco BJ QUALITY ASSURANCE WORK INSTRUCTION QAW 8.11.1


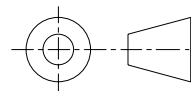
PARTNUMBER		UNLESS OTHERWISE SPECIFIED		 <p>A Varco Company</p>
MATERIAL		TOLERANCES (PER ANSI Y 14.5)		
SURF. FINISH/ PAINT SPEC		3 PLACE DECIMAL .XXX ± .010		
COLOR		2 PLACE DECIMAL .XX ± .03		
WEIGHT		1 PLACE DECIMAL .X ± .1		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER
ORIGINAL DOCUMENT		BREAK SHARP CORNERS .010±.005		
LATEST REVISION		MACHINED SURFACES 250		DO NOT SCALE DOCUMENT    SCALE NONE
NAME		TORCHCUT SURFACES 1000		
DATE		THIS DOCUMENT IS DMS CONTROLLED		UNITS INCH (MM)
DATE				
E.C.N.		DRAWING NO.		SHEET 1 OF 1
601225		CA-321-M		
TITLE		SIZE		
CRITICAL AREAS DOOR MACHININGS BX-S		B		

PART NUMBER	TYPE
50000213-C	CASTING LEFT DOOR BX-S

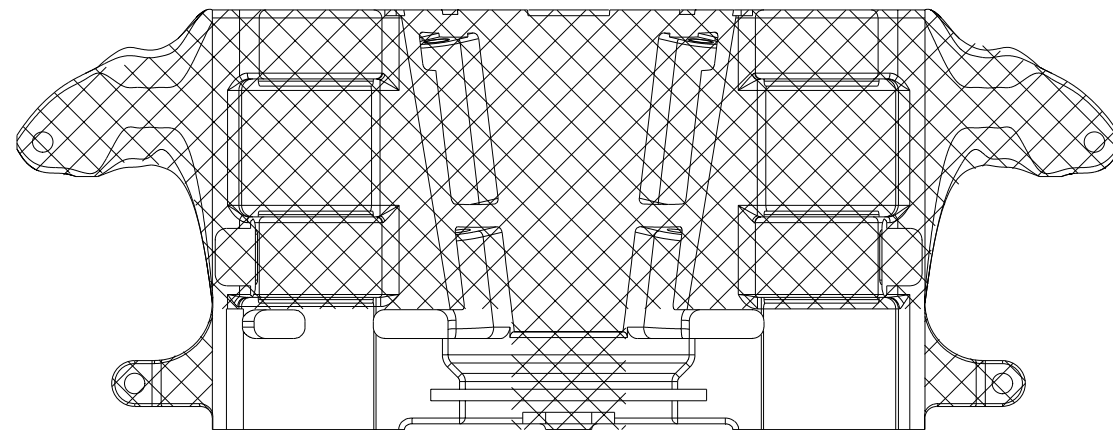
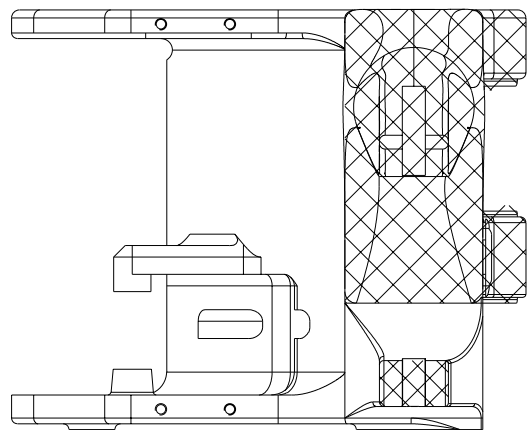
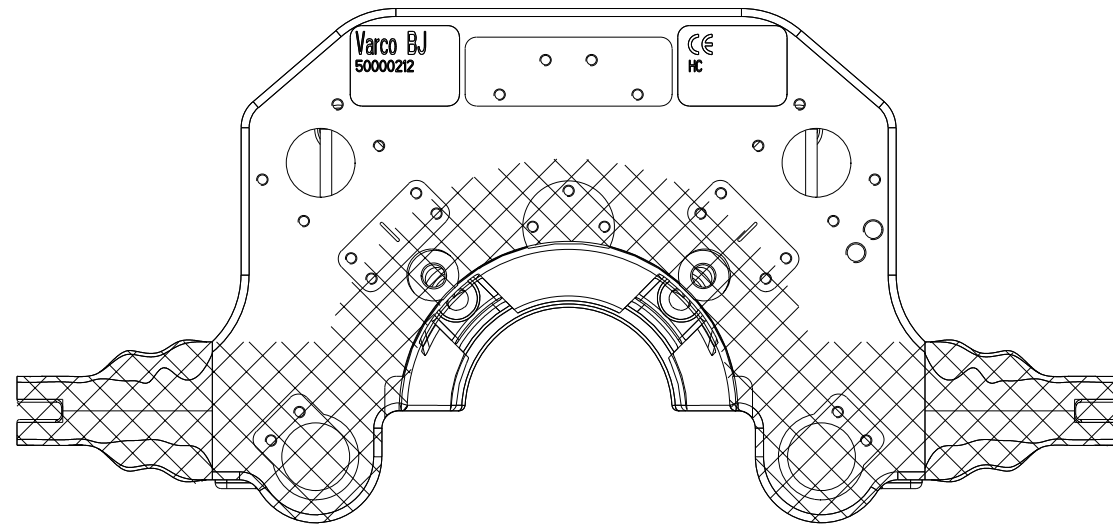
PART NUMBER	TYPE
50000214-C	CASTING RIGHT DOOR BX-S




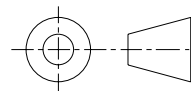
NOTES:  
 1. HATCHED AREAS ARE CONSIDERED CRITICAL.  
 2. NON HATCHED AREAS ARE CONSIDERED NON CRITICAL.  
 3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE Varco BJ QUALITY ASSURANCE WORK INSTRUCTION QAW 8.11.1

PARTNUMBER		UNLESS OTHERWISE SPECIFIED		 <b>A Varco Company</b>		
MATERIAL		TOLERANCES (PER ANSI Y 14.5)				
SURF. FINISH/ PAINT SPEC		3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE				
COLOR		BREAK SHARP CORNERS .010±.005 MACHINED SURFACES 250 TORCHCUT SURFACES 1000				
WEIGHT		LBS/	KG	THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER		
ORIGINAL DOCUMENT		LATEST REVISION				
NAME	L.S.	NAME	L.S.	DO NOT SCALE DOCUMENT	SCALE NONE	
DATE	9 JUL 04	DATE	9 JUL 04	THIS DOCUMENT IS DMS CONTROLLED	UNITS INCH (MM)	
		E.C.N.	601225			
TITLE			SIZE	DRAWING NO.	SHEET	
CRITICAL AREAS DOOR CASTINGS BX-S			B	CA-321-C	1 OF 1	

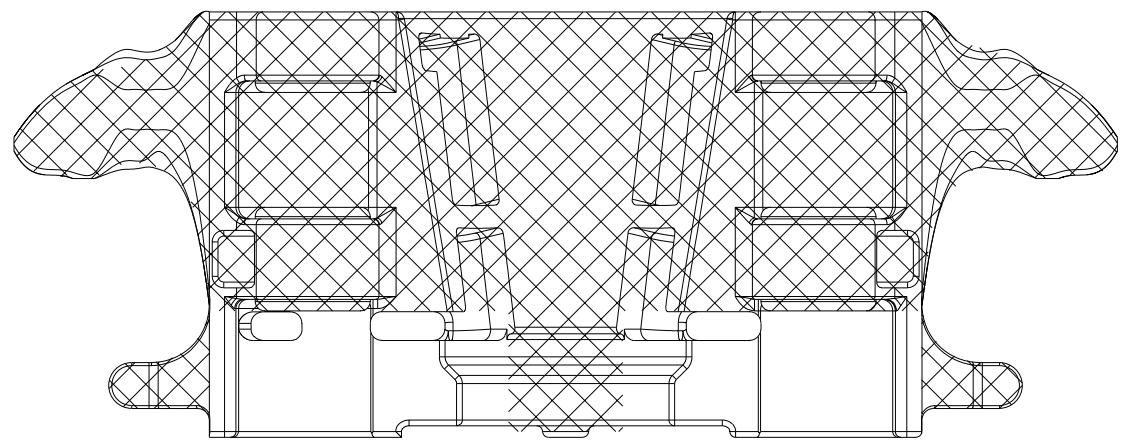
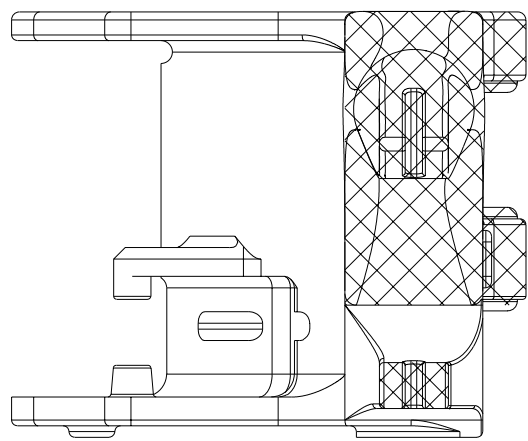
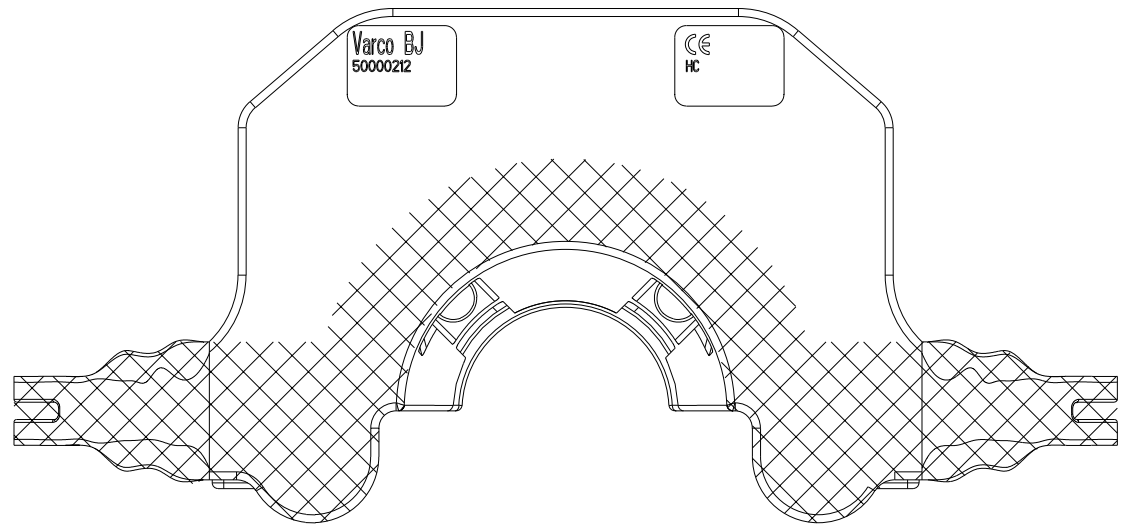
PART NUMBER	TYPE
50000212	MACHING BODY BX-S




- NOTES:
1. HATCHED AREAS ARE CONSIDERED CRITICAL.
  2. NON HATCHED AREAS ARE CONSIDERED NON CRITICAL.
  3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE Varco BJ QUALITY ASSURANCE WORK INSTRUCTION QAW 8.11.1

PARTNUMBER		50000212		UNLESS OTHERWISE SPECIFIED		 <b>A Varco Company</b>
MATERIAL		--		TOLERANCES (PER ANSI Y 14.5)		
SURF. FINISH/ PAINT SPEC		--		3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE		
COLOR				BREAK SHARP CORNERS .010±.005 MACHINED SURFACES 250✓ TORCHCUT SURFACES 1000✓		
WEIGHT		LBS/		KG		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER
ORIGINAL DOCUMENT		LATEST REVISION		DO NOT SCALE DOCUMENT		
NAME	L.S.	NAME	L.S.	REV.	SCALE 1 : 1	
DATE	9 JUL 04	DATE	9 JUL 04	A	THIS DOCUMENT IS DMS CONTROLLED	
		E.C.N.		601225	UNITS INCH (MM)	
TITLE				SIZE	DRAWING NO.	SHEET
CRITICAL AREAS BODY MACHINING BX-S				B	CA-320-M	1 OF 1

PART NUMBER	TYPE
50000212-C	CASTING BODY BX-S



- NOTES:
1. HATCHED AREAS ARE CONSIDERED CRITICAL.
  2. NON HATCHED AREAS ARE CONSIDERED NON CRITICAL.
  3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE Varco BJ QUALITY ASSURANCE WORK INSTRUCTION QAW 8.11.1

PARTNUMBER		50000212-C		UNLESS OTHERWISE SPECIFIED		 <b>A Varco Company</b>
MATERIAL		--		TOLERANCES (PER ANSI Y 14.5)		
SURF. FINISH/ PAINT SPEC		--		3 PLACE DECIMAL .XXX ± .010		
COLOR				2 PLACE DECIMAL .XX ± .03		
WEIGHT		LBS/	KG	1 PLACE DECIMAL .X ± .1		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE, NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION OF THE OWNER
ORIGINAL DOCUMENT		LATEST REVISION		BREAK SHARP CORNERS .010±.005		
NAME	L.S.	NAME	L.S.	REV.	DO NOT SCALE DOCUMENT	SCALE 1 : 1
DATE	9 JUL 04	DATE	9 JUL 04	A	THIS DOCUMENT IS DMS CONTROLLED	UNITS INCH (MM)
		E.C.N.	601225			
TITLE				SIZE	DRAWING NO.	SHEET
CRITICAL AREAS BODY CASTING BX-S				B	CA-320-C	1 OF 1