Blohm + Voss Pipe Handling Equipment

BVE / BVS 750 Frame 1 air operated

4.1/2” – 14”

Technical Documentation

Original Instructions

Manual PN 710000-Y-A-D Rev 005, April 2014

Blohm + Voss Oil Tools

Blohm+Voss

GENERAL INFORMATION

Warnings and Note

WARNING: A "WARNING" 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.

NOTE: A "note" indicates that additional information is provided about the current topics.

WARNING: THIS TECHNICAL DOCUMENTATION CONTAINS INSTRUCTIONS ON SAFETY, INSTALLATION, OPERATION AND MAINTENANCE FOR THE BLOHM + VOSS OIL TOOLS TOOL . IT MUST BE STUDIED BEFORE WORKING WITH THE TOOL.

Improper / Unsafe Use

The tool must only be used for the designated purpose.
When using the tool, the rated load must never be exceeded.

Intended use of this manual

This manual is intended for use by field service, engineering, installation, operation, and repair personnel. Every effort has been made to ensure the accuracy of the information contained herein. Blohm + Voss Oil Tools, will not be held liable for errors in this material, or for consequences arising from misuse of this material. Anyone using service procedures or tools, whether or not recommended by Blohm + Voss Oil Tools, must be thoroughly satisfied that neither personal safety nor equipment safety will be jeopardized.

Intellectual property

All information contained in this manual is based upon the latest product information available at any time of printing.
Dependent on ongoing technical improvements (ISO 9001) "Blohm + Voss Oil Tools" reserves the right to change the design and specifications without announcement.
The values specified in this manual represent the nominal values of a unit produced in series. Slight deviations in the case of the individual devices are possible.

NOTE: In the event of problems that cannot be solved with the aid of this manual, please contact one of the addresses listed below.

CE Marking

The tool complies with the Machinery Directive 98/37/EC and 2006/42/EC

For machines containing any hydraulic or pneumatic powered parts, the Directive 94/9/EC "Equipment and protective systems in potentially explosive atmospheres" applies.
The marking is as follows: CE Ex II 2G T5 (hydraulic tools) or CE Ex II 2G T6 (pneumatic tools).

Limited Warranty

The warranty provided will be void if the tool is either:

1. Repaired or serviced by a service facility which was not authorised by Blohm + Voss Oil Tools.
2. Replacement parts not manufactured by Blohm + Voss Oil Tools are used.
3. Modifications were made to the tool which were not approved by Blohm + Voss Oil Tools.

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General safety issues

WARNING: One should avoid creating ignition sources, like heat, as a result of the use of the tool with other tools or equipment.

WARNING: Do not use the tool for any other purpose than given in this document within it`s specification.

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

WARNING: Wear personal protection equipment while working with the equipment.

WARNING: If any safety elements (like safety ropes, safety sheets, plates or washers) were disassembled due to maintenance work, do NOT re-use them. Always replace them with new safety elements.

WARNING: All warning plates, signs and labels attached to the equipment must be observed. The warning plates, signs and labels must be present on the tool. Do not remove the labels. If they are missing, replacing is mandatory.

WARNING: Any modification to the tool carried out without the approval of Blohm + Voss Oil Tools will void any warranty.

WARNING: Using the tool with damaged or worn parts can create serious incidents.

WARNING: It is not allowed to use any components which are of "non-B+V" origine, or use "non-OEM" parts which are not approved by B+V. It will void any warranty and may effect the correct functioning of the tool and it's safety features.

WARNING: The company operating the tool is responsible for evaluating safe and proper use of the tool in a hazard analysis.

WARNING: The operating company is obligated to issue working instructions for safe use and supervise observance of these working instructions.

20 WARNING: Every Employee, which operates, services, inspects or otherwise involved with the use of the tool in other areas has to ensure, that these actions are done by trained and by an Blohm + Voss Oil Tools authorized personnel,
and should complete regular courses of training, to ensure proper use as well as safe operation, correct maintainance and inspection.

WARNING: If necessary, a reasonable, additional supervisor should be appointed during operation.

WARNING: Stay away from the tool during operation. In case it is remote operated it may make movements without warning.

Safe handling

WARNING Handles/grip points are marked by green paint. During operations these grips are the only places the tool can be handled safely. In all NON-green marked places there is a risk for injury. Automatic/ remote operated tools may not have any green painted grip-points. In this case it is not allowed to touch the tool while operating.

Safe gripping points

Warning sign PN 671638
General warning

Warning sign PN 671642
Pay attention: Apply grease at least once a day.

Warning sign PN 611524
Danger: Do not touch.

Warning sign PN 671640-1
Pay attention: Do not place your hands between moving parts.

Warning sign PN 671641
Pay attention: Risk of crushing.

Safety issues Spiders/ Elevators

WARNING: Always ensure the slip segments are labelled with the same serial number. Never use segments with different numbers as they may cause the pipe to drop due to different wear patterns.

WARNING: Under no circumstances should the slip assembly be raised while supporting load.
If the slip assembly is lowered in place, the tool can bear the load of the tubular.
Before raising the slip assembly, make sure that the tubular load is supported. The slip assembly must be released from any load before raising it.

WARNING: You must neither assemble nor disassemble Slips, Guides, Inserts, etc. when the Tool is placed in the rotary table.

WARNING: Never use the Power Slip/Spider/ Elevator without guide plates. This can cause damage to the slips and lead to loss of pipes/ tubular.

WARNING: It must be ensured and controlled regularly that the back side of the slips are lubricated with enough grease. The quantity of grease must be related to the type of operation and type of mud. Failure to grease properly may lead to sticking slips.

WARNING: Do never unlatch/open the tool while a pipe is suspended in the tool; the pipe will be lost!

WARNING: The lifting of vertical pipes is to be performed carefullyand must be monitored. The picking up of horizontal or tilted pipes is dangerous and not permitted by the manufacturer.

WARNING:If the operator considers to use the elevator for other operations than the intended use (for example handling
of horizontal pipes), it is mandatory to make
an additional risk analysis.

WARNING: Make sure all slip segments are free in the up position when latching the elevator. If any of the segments are stuck in the down position, the elevator may not close properly.

Safety issues automatic Spiders/ Elevators

Warning: ensure the connectors are from a male and female type to prevent faulty connections.

Warning: hydraulic only before any maintenance work is carried out, make sure that no pressure is applied to the equipment and that the connecting lines are disconnected (if applicable).

Safety issues Spiders

Warning: you must neither assemble nor disassemble slips, guides, inserts, etc. When the tool is placed obove the well center.

EC-DECLARATION OF CONFORMITY

We,

Blohm + Voss Oil Tools
Hermann-Blohm-Strasse 2
20457 Hamburg
Phone:+49(0)40 3119-1139
Fax:+49(0)40 3119-3305

declare that the product

Air Operated Elevator / Spider BVE / BVS 750-1 PN 710000-Y-A
which is the subject of this declaration, is in conformity with the following standard(s) or normative documents

98/37/EC:	Machinery Directive
DIN EN ISO 12100 :	Safety of machinery, part 1 and 2
DIN EN ISO 14121-1:	Safety of machinery, Risk assessment
Directive 94/9/EC:	Devices and protection systems for intended use in explosive areas
DIN EN 13463-1:2009-07:	Non-electrical equipment for use in potentially explosive atmospheres
ISO 13535:2002/API 8C: Hoisting	Petroleum and natural gas industries-Drilling and production equipment-equipment

Marking:  II 2G T5

TABLE OF CONTENTS

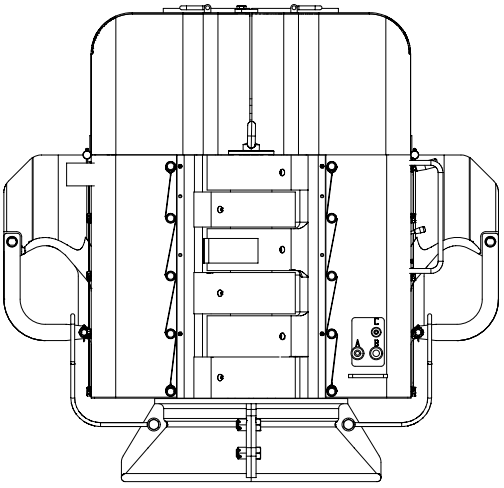
DESCRIPTION

1. DESCRIPTION

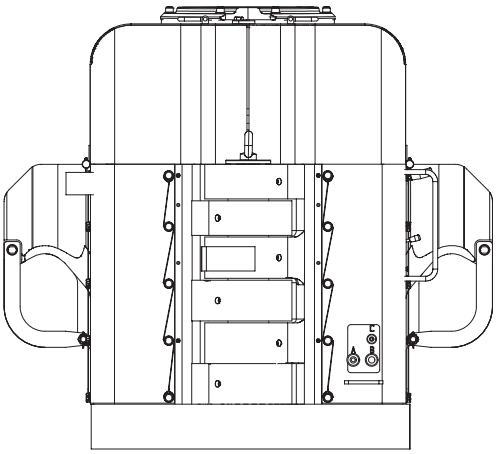
General

The Blohm + Voss 750 Tons Elevator/Spider will be used for handling long, heavy strings of casings. These tools are convertible for use as casing spiders or casing elevators, and are pneumatic operated.

When dressed as an elevator the tool includes a casing guide bell (which automatically centers the pipe for positive locking of the slips) and a bottom guide plate. Auxiliary equipment needed to use the tool as a spider includes a spider adapter plate, which sits at the well center to provide a secure platform for the tool, and an upper guide plate, which functions as a pipe centering device.



Elevator with casing guide bell



Spider with spider adapter plates

Improper / Unsafe Use

The BVE / BVS 750 must only be used for the designated purpose.
When using the BVE / BVS 750, the load of 750 sh tons must never be exceeded.

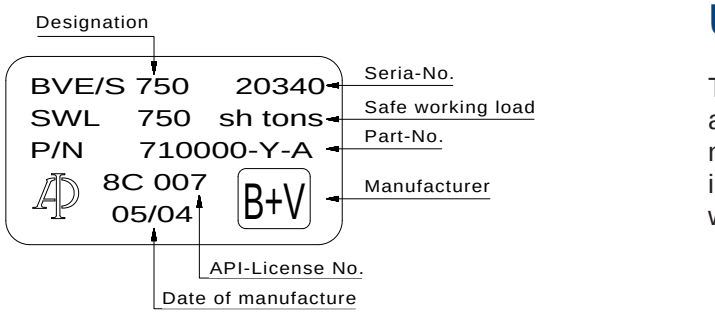
Limited Warranty

The warranty provided will be void if the BVE / BVS is either:

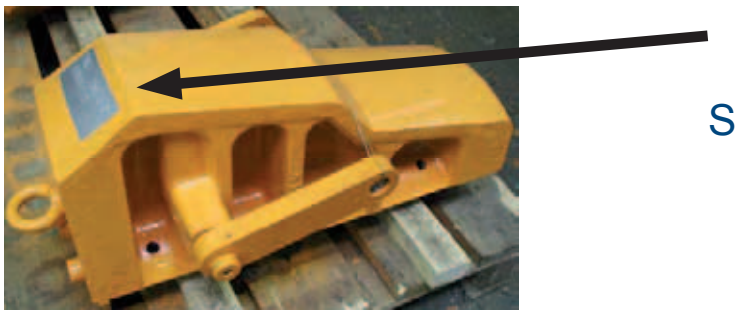
a) repaired or serviced by a service facility which was not authorised by Blohm+Voss Oil Tools.
b) replacement parts not manufactured by Blohm+Voss Oil Tools are used.
c) modifications were made to the BVE / BVS which were not approved by Blohm+Voss Oil Tools.

Unit Identification

The identification area clearly identifies the BVE / BVS area (manufacturer, type, material, part number, serial number, date of manufacture). It is important to keep this information ready for the purpose of servicing and repair work.



Slip Identification



Technical Data

Maximum allowable working load	750 sh tons
Pipe size range (i.e. Drill pipe, casing, tubing and drill collar)	4.1/2” to 14”
Weight (less Slips and Guide Plate)	5.400 kg (11.900 lbs)
Feedbacksignal	Pneumatic, shows slip assembly is set or raised
Working air pressure	Min 7 bar (100 Psi), max 10 bar (150 Psi)
Air Flow rate	6,8 m^3/min (1,8 Gpm)
Temperature working range ambient	- 20° C to + 40° C - 4° F to 104° F

Elevator Links

750t - 1000t

Work parameter

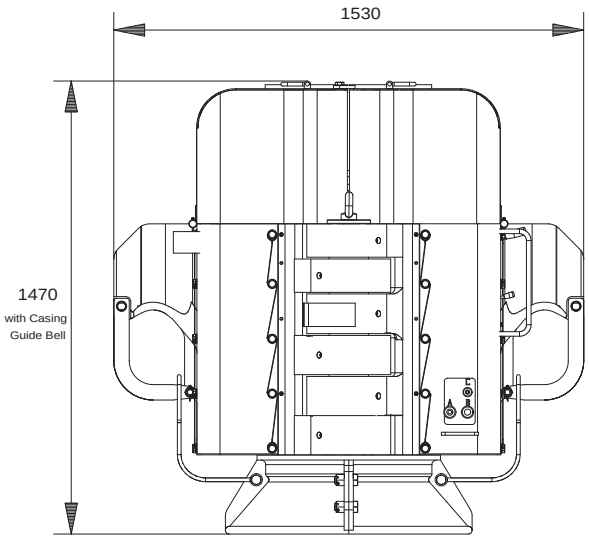
Set slip	7 bar - 6,8 m^3/min	5 sec.
Raise slip	7 bar - 6,8 m^3/min	5 sec.

Contents of delivery

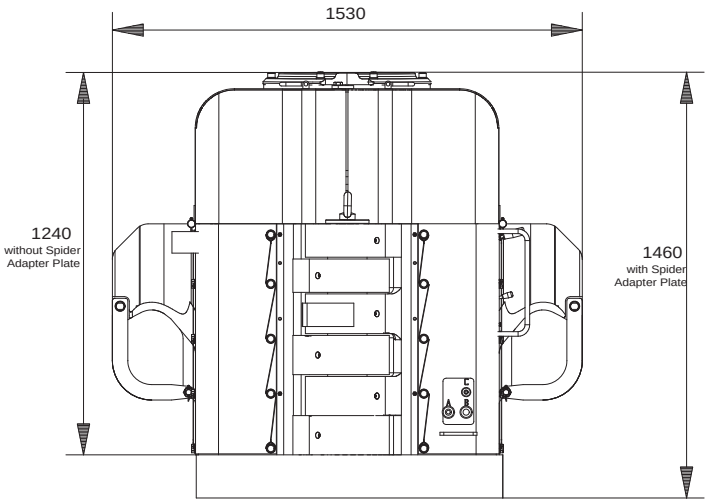
BVE 750 Frame 1 - Elevator		
	Qty	Part Number
Body Assembly	1	710000-Y-A
Slip Assembly	1	see chapter „Size Components“
Casding Guide Bell	1	752600
Bottom Guide Plate Assembly	1	see chapter „Size Components“
Elevator Air Hose Assembly 52‘	1	752822
BVS 750 Frame 1 - Spider		
	Qty	Part Number
Body Assembly	1	710000-Y-A
Slip Assembly	1	see chapter „Size Components“
Spider Adapter Plate	1	752765-1
Upper guide Assembly	1	see chapter „Size Components“
Spider Air Hose Assembly 26‘	1	752823

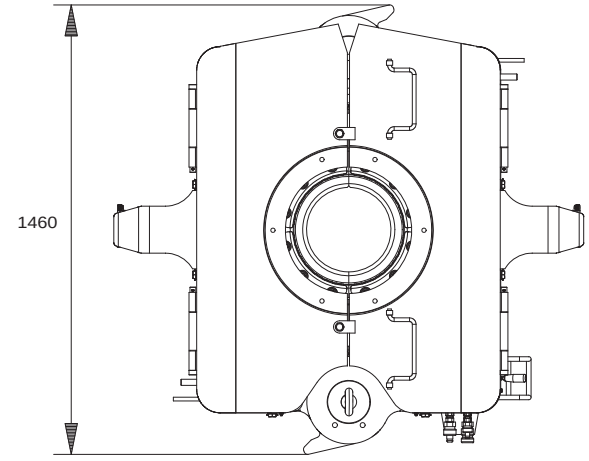
Main Dimensions

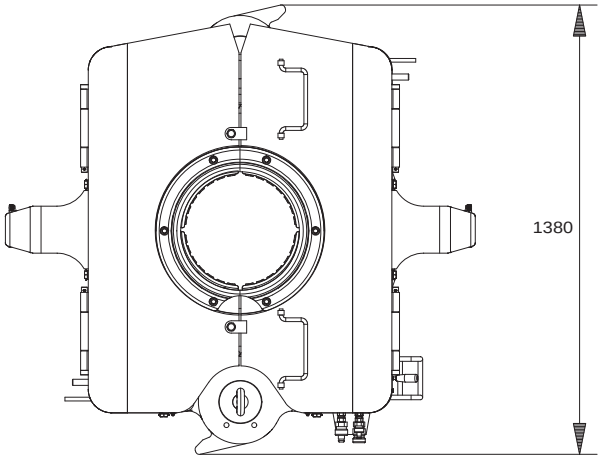
Elevator



Spider







COMMISSIONING

2. COMMISSIONING

Commissioning BVE / BVS 750

Blohm + Voss strongly recommends to accomplish the BVE / BVS commissioning with the Blohm + Voss Commissioning Service.

OK	☐	Operating personnel is aware of all danger that depends on handling the B+V tool (see manual first) !

Prior to use of the Blohm+Voss Elevator / Spider following checks must be carried out:

Scope of supply

OK	☐	Cross check of all delivered parts

Pneumatic Characteristics

OK	☐	Operating pressure	7-10 bar (100-150 PSI)
OK	☐	Volumetric flow	6,8 l/min (1,8 Gpm)

Lubrication

OK	☐	Check for correct seating of Door Hinge Pins
OK	☐	Apply grease to all greasing Points (see manual) until grease is visibly coming out of the bores
OK	☐	Check Bottom guide plate, casing guide bell and securing handle on the elevator are installed and fixed properly
OK	☐	Check Upper guide plates on spider are installed and fixed properly
OK	☐	Check slips are properly installed
OK	☐	Check slips are the correct size and same serial number

Functional Manually

OK	☐	Link blocks are closed
OK	☐	Slip Assembly opens, when Lock Lever stands in „LOCK ON“ Position and Slip Lever in „SLIP UP“ Position
OK	☐	Slip Assembly closes, when Lock Lever stands in „LOCK OFF“ Position and Slip Lever in „SLIP DOWN“

Functional Remote Control

For Operation of BVE/BVS 750 with Remote Control the Slip-control-lever must be in “SLIP DOWN”-Position and the Lock-control-lever must be in “LOCK OFF”-Position.

OK	☐	Slip Assembly raising, when Pressure apply at Connection B feedback signal indicates: Elevator is open
OK	☐	Slip Assembly setting, when Pressure apply at Connection A feedback signal indicates: Elevator is closed

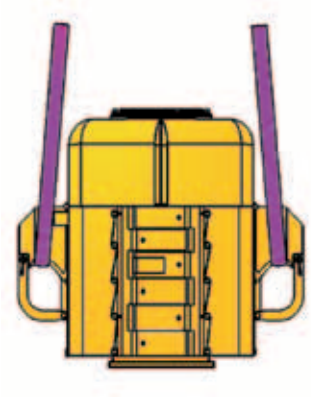
INSTALLATION

3. INSTALLATION

Lifting and transport

Use wire ropes with circular slings with a load carrying capacity appropriate to the weight of the elevator / spider.
Only use the ears of the main body to lift the elevator / spider as shown below.
The approximate weight including the slips is 5400 Kg or 11900 lbs.

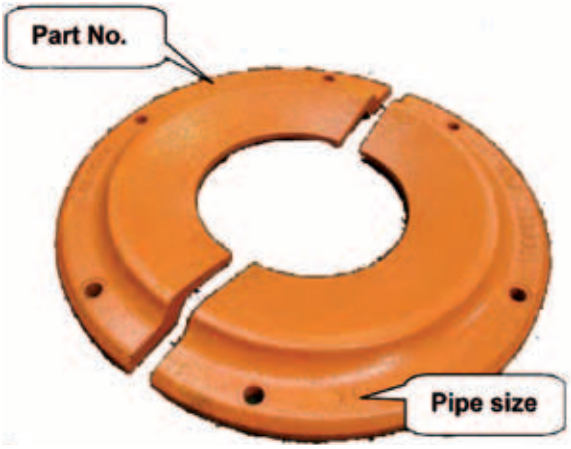
WARNING: LIFT THE BVE / BVS ON THE LIFTING EYES ONLY.



Checking Guide Plates

WARNING: BEFORE START OF WORK WEAR YOUR PERSONAL PROTECTION EQUIPMENT.

Prior to installation, inspect the Upper Guide Plate on the Spider and the Bottom Guide Plate and Casing Guide Bell on the elevator.
Making sure they are tightly secured to tool bodies or covers and are of the right size for the casings to be handled.
Also ensure that the inserts are properly installed and they are of the correct size for the slips.



Installing Elevator

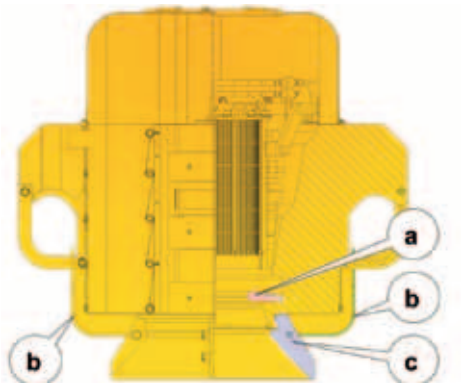
Mounting the elevator

Make sure that the Bottom Guide Plate a, Securing Handle b and the Casing Guide Bell c are installed and are of the correct size. The Upper Guide Plate must not be installed.

WARNING: KEEP DISTANCE FROM THE ELEVATOR DURING OPERATION AND TRIALS.

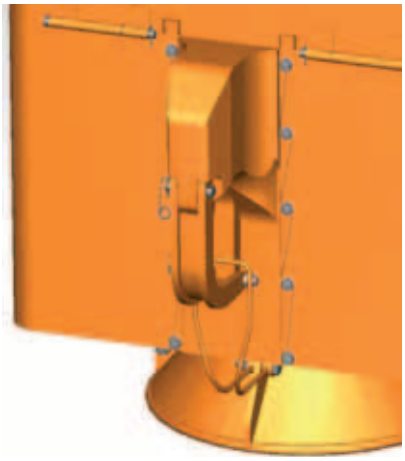
Installing elevator links

1. The BVE/BVS 750 fits for 4 ¾“ B+V 750t and 5 ½“ B+V 1000t Elevator Links.
2. Remove the link block pin d and safety spring e and allow the link block f to swing open.
3. Place the links in the now open assembly and secure by replacing the link block pin d and safety spring e removed in the previous step. Raise the elevator in the derrick to a height sufficient to allow installation of the spider.

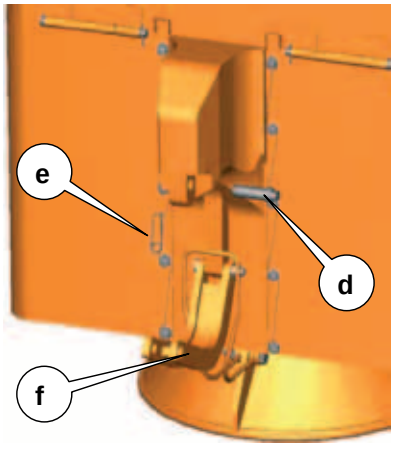


Elevator

A:



B:



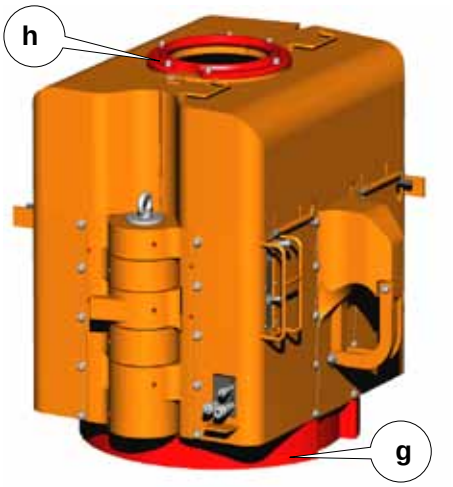
Open the link block

Installing Spider

Mounting the spider

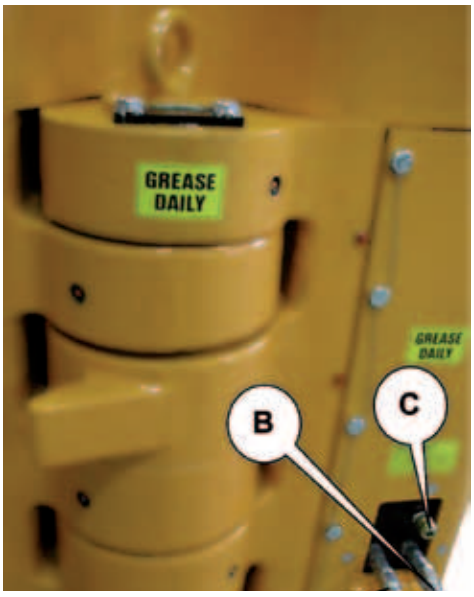
1. It is necessary to place the spider adapter plate g at the well center.
2. Make sure that the Upper Guide Plate h is installed. The Bottom Guide Plate and the Casing Guide Bell must not be installed.

WARNING: KEEP DISTANCE FROM THE ELEVATOR DURING OPERATION AND TRIALS.

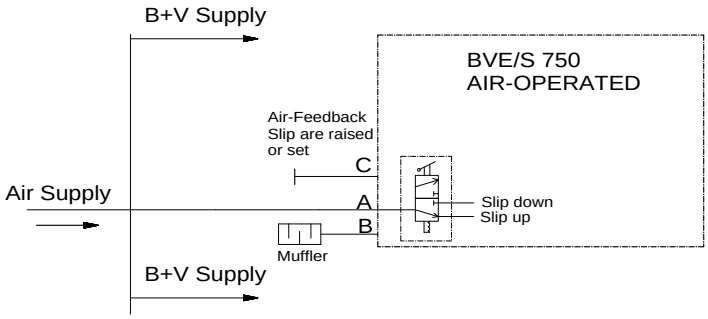


Air connection

A: Power supply
B: unassigned (or Muffler)
C: unassigned

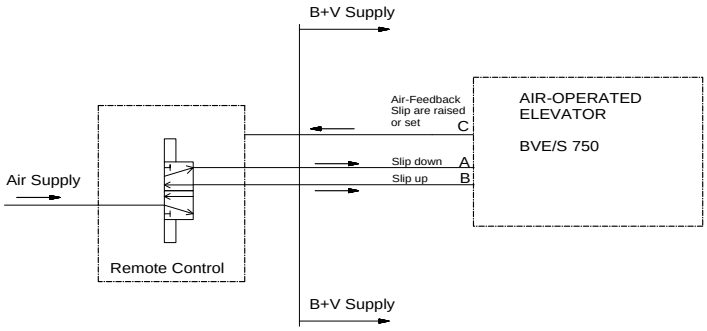


Connecting manually operated BVE/ BVS



Connecting remote controlled BVE/BVS

If the BVE/BVS 750 is operated by a Remote Control, the BVE/BVS is controlled with a 5/2-direction control valve.
The required Pneumatic Connections and Control-valve must be carried out according to the pneumatic schedule.



NOTE: For Operation with Top Drive a special Lever-position is required:

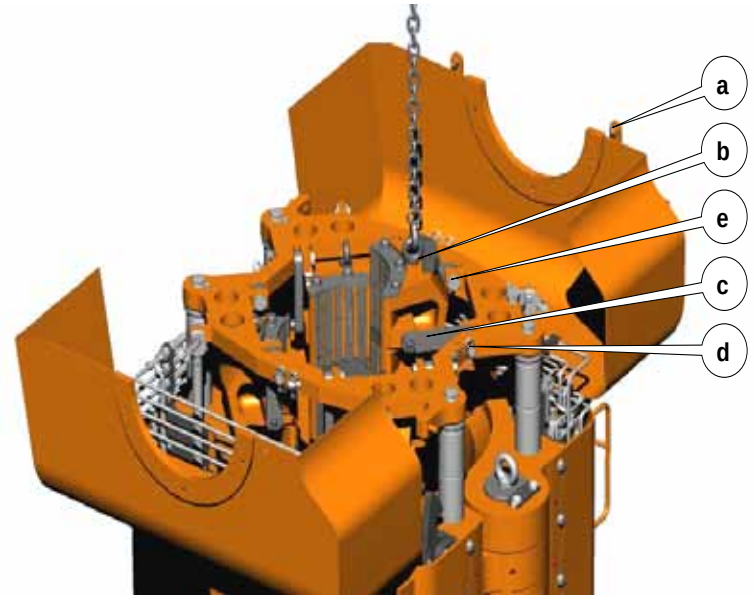
- Slip-lever “SLIP DOWN“
- Lock-lever “LOCK OFF“

Changing slips

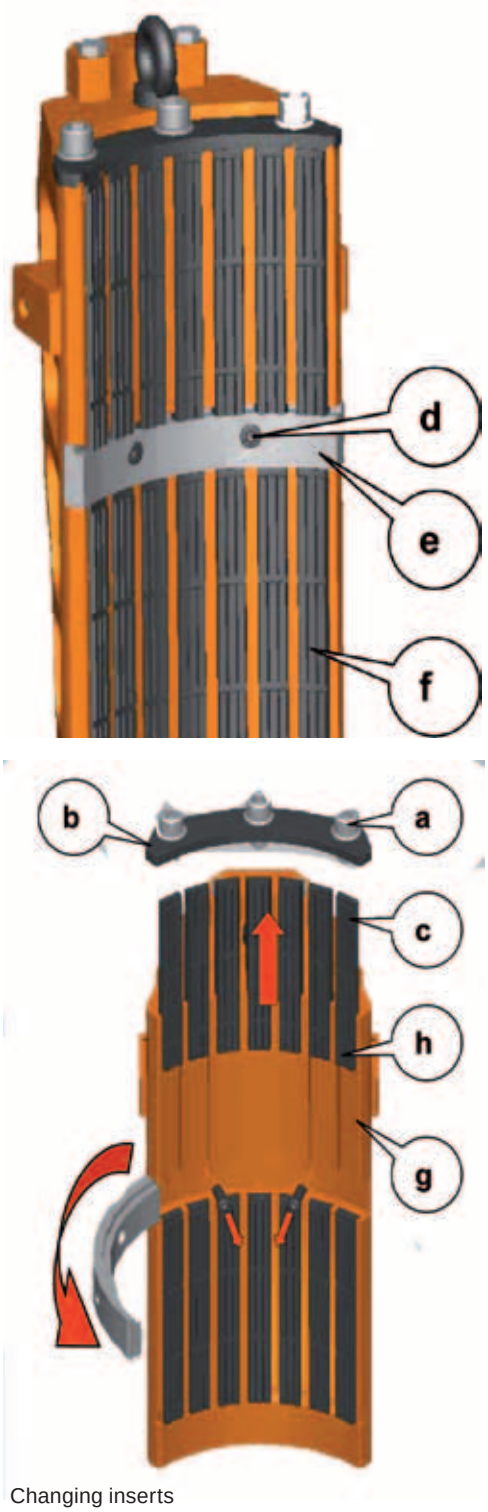
WARNING: For changing the Slips, the BVE/BVS 750 must be removed from the well center to avoid the risk of small parts falling into the bore hole.

WARNING: Under no circumstances the slip assembly may be lifted under load.

1. Remove the two screws (a) from the top of the Cover and open both Covers to expose the slip support plate.
2. Raise the slips and confirm that the slip locks are engaged.
3. Install a forged steel eyebolt (b) into the slip.
4. Support the weight of the slip by attaching an overhead lifting device (1 ton minimum capacity) to the eyebolt. Raise the slip by using the forged steel eyebolt (b) until the Slip Link (c) is horizontal.
5. Remove the Cotter Pins (d) from the slip support pins and while supporting the slip links remove the Slip Support Pins (e).
6. Lift the slip clear of the elevator/spider and place it aside.
7. Repeat for the remaining slips.



Changing slips



Changing inserts

Changing inserts

Use separate slip assemblies for each pipe size, so all slips can be installed and changed faster and the risk of using wrong slip assemblies for the handled pipe size will be minimized.

WARNING: FOR CHANGING THE INSERTS, THE SLIP ASSEMBLY MUST BE REMOVED OF THE BVE/BVS 750 TO AVOID THE RISK OF SMALL PARTS FALLING INTO THE BVE/BVS OR BORE HOLE.

1. Open the Cover and remove the slip assembly out of the BVE/BVS 750.
2. Unlock and remove the screws a then take off the Insert Retainer b.
3. Remove the upper inserts c.
4. Unscrew both screws d and pull out the load carrying ring e.
5. Remove the remaining Inserts f.
6. Grease the insert slots g with a lithium based grease.
7. Slide the new inserts f into the dovetail-shaped insert slots up to the load carrying ring, taking care to ensure that the inserts are oriented properly (the buttress-shaped tooth form must be oriented upwardly).
8. Install the load carrying ring e and both screws d Tightening torque min. 100Nm.
9. Continue to fill the slip with inserts c until all slots are filled. Begin with a half insert h per slot. If the inserts do not slide readily into the slots, it may be necessary to lightly tap them in using a brass or non-metallic rod. If more than a light force is required, do not use the insert.
10. Install the insert retainer b by using the screws a. Secure bolts with wire.
11. Change the designation of the slip assembly. The slip assembly must always have the right markings for the installed inserts.

WARNING: WHEN ASSEMBLING SLIPS, ALWAYS WEAR EYE PROTECTION AND NEVER STRIKE THE DIES WITH A HAMMER OR OTHER HARD OBJECT. FAILURE TO OBSERVE THESE SAFETY PRECAUTIONS COULD RESULT IN SERIOUS INJURY TO PERSONNEL.

WARNING: WHEN REINSTALLING INSERTS, MAKE SURE THE INSERT SLOTS ARE GREASED AND THE INSERTS TEETH ARE POINTING UPWARD. 1.

Installation

Basically the BVE / BVS has to be installed as shown in the manual.

OK	☐	Make sure the required slips are installed
OK	☐	Make sure the required Guide Plates are installed before first use
OK	☐	The Guide Plates are fixed with the screws
OK	☐	Cover is closed
OK	☐	Door is closed

Pneumatic Connections

OK	☐	The controls are connected to the Air Power Supply
OK	☐	All Pneumatic Lines are connected

Function test

There are two possibilities to carry out the function test:

1. Elevator/Spider standing on the floor
2. Elevator/Spider installed in the links

OK	☐	Close elevator / spider
OK	☐	Open elevator / spider
OK	☐	Check signal elevator / spider closed if present (if applicable)

OPERATIONS

4. OPERATIONS

Safety

- Make sure that ALL pneumatic lines are isolated before any work is carried out.
- It is recommended to have the BVE / BVS operated by the driller.
- For smooth operation, it is recommended to slightly lower the pipe with the elevator while setting the slips.
- For smooth operation, it is recommended to slightly raise the pipe with the elevator while releasing the slips.
- Do nog operate wthout Upper guide plate and covers in place.

Normal Operation

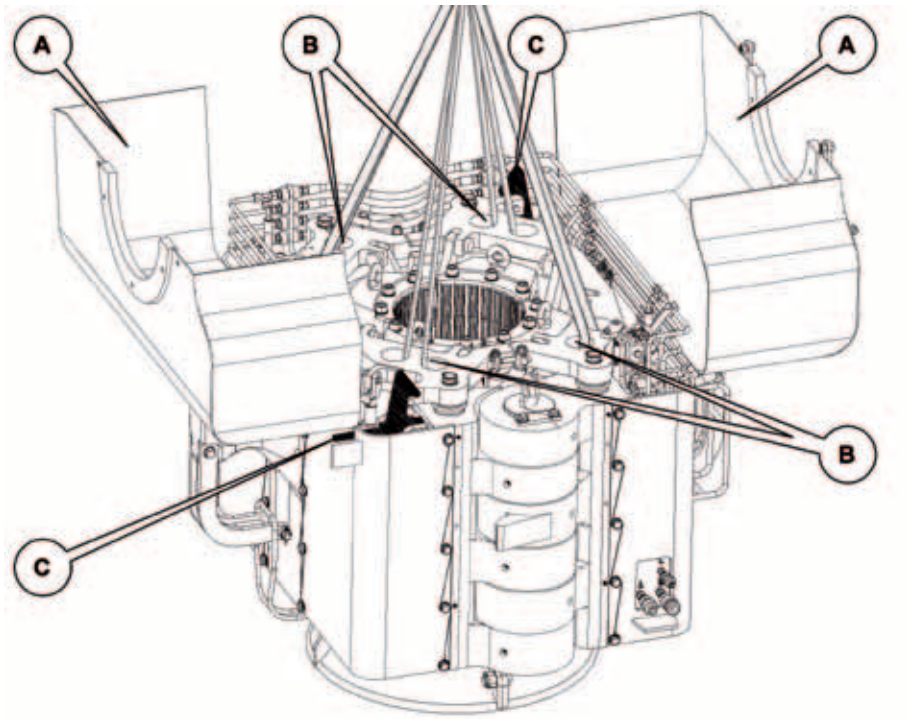
Raising slips without remote control

1. To raise the slips, the lock control lever is moved to the „LOCK ON“ position.
2. The slip control lever is moved to the „SLIP UP“ position .
3. Until the slips are raised the slip control lever must remain in the “LOCK ON” position.
4. The slips will automatically lock in the upper position, by a mechanical locking system.

Lowering slips without remote control

1. To lower the slips, throw the slip control lever to the „SLIP UP“ position.
2. When the slip is raised, the lock control lever must shift to the „LOCK OFF“ position and hold there.
3. Now the slip control lever must throw to the „SLIP DOWN“ position.
4. The slips will automatically lock in the lower position, by a mechanical locking system.

Manual control lever



Emergency operation

In case of air supply failure, the slips can be raised and lowered manually. The locks may be manually operated using the handles extending from the knuckles through the corner covers at the slip locks.

WARNING: To prevent accidents make sure that the elevator / spider is disconnected from the remote control or pneumatic power supply.

WARNING: In no case should the load on the center of the slip support plate exceed ½ Tons. Loads in excess of this may cause damage to the slip support plates, stanchions or other components. Such damage may cause damage to the pipe or associated equipment and could possible result in injury or death to rig personnel.

Raising slips

1. First it is necessary to open the cover A and attach four straps of a ½ tons capacity or more to the hole B of each slip support plate directly behind the slip.
2. Holding both above handles C down, ensuring that the latches pivot to allow the pin on the slip support plate to pass.
3. Raise the slips until the slip lock plungers are heard to seat.

Lowering slips

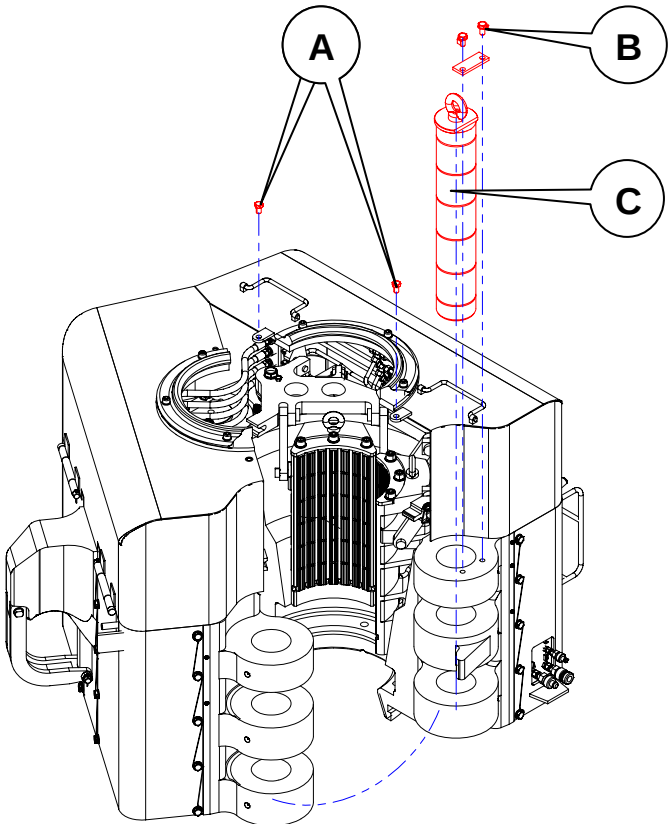
1. Hoisting upwardly on the straps supporting the slip support plates only enough to take the slip weight off of the slip lock plungers.
2. Pull upwardly on the lock handles and hold them in that position until the slips have been lowered at least 30mm before release.
3. Lower the slips until fully set around the pipe

Opening the BVE/BVS 750

If it becomes necessary ,the BVE/ BVS can be removed from the pipe from the side.

WARNING: To prevent accidents make sure that the elevator / spider is disconnected from the remote control or pneumatic power supply.

1. Raise the slips.
2. Disassemble the casing guide bell (if installed).
3. Remove the two screws from the cover A.
4. Unscrew the two screws and the hinge pin securing plate B.
5. Remove the exposed hinge pin by pulling upwardly on the eyebolt C.
6. Spread the body halves apart until the elevator/spider can be withdrawn from the pipe.



Operation of the Elevator and Spider

The driller, derrickman and floorman must coordinate operation of the slips in the elevator and spider so one tool is engaged around the casing before the other is disengaged. Thus, the casing is continuously suspended by one or both tools during all stages of casing handling operations.

After the first joint has been set in the spider, follow this operating procedure:

1. The floorman attaches the top end of the casing pick-up line to the lower locking arm of the hook. The pick-up line must be long enough to attach to the next joint in the V-door when the elevator is lowered to the spider.
2. In lifting the casing joint into the V-door, the floorman can use the catline or an air-wrench, or a crewman can use a hydraulic pick-up machine, if available.
3. The floorman attaches a single-joint elevator to the bottom end of the pick-up line, then he attaches the single-joint elevator to the joint in the V-door so the joint can be maneuvered to the spider for make-up.
4. The power tong operator then makes up the joint.
5. The derrickman removes the single-joint elevator or pick-up line from the top of the joint.
6. With the elevator slips locked in the up position, the derrickman guides the elevator over the top end of the joint while the driller lowers the elevator into position approximately six inches below the joint collar.
7. The derrickman then sets the elevator slips. Note: Step 2 is repeated each time Steps 5 - 7 take place.
8. Simultaneously, the driller picks up the elevator while the floorman raises the spider slips.
9. The driller then lowers the joint through the spider stopping the elevator guide bell approximately six inches above the spider.
10. The floorman sets the spider slips.
11. The driller slacks off on the elevator so its slips can be released.
12. The floorman raises the elevator slips.
13. The driller picks up the elevator to clear the next joint of casing while the floorman repeats Step 3 for the next joint.

WARNING: Be careful not to hit the spider top guard with the elevator guide bell. Doing so will create a hazard for personnel and could damage the equipment.

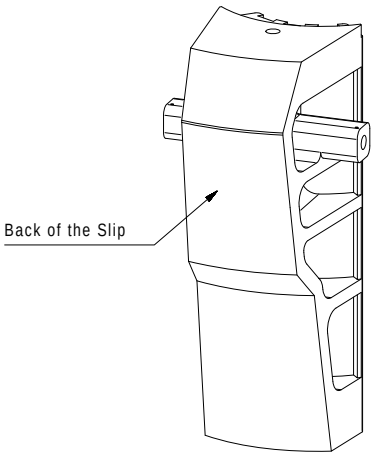
MAINTENANCE & INSPECTION

5. MAINTENANCE AND INSPECTION

General

If cracks, excessive wear etc. is recognised, contact Blohm + Voss Oil Tools or an authorised service company.
Weldings of the castings should be done only by Blohm + Voss Oil Tools or an authorised service company in according to Blohm + Voss welding procedure.

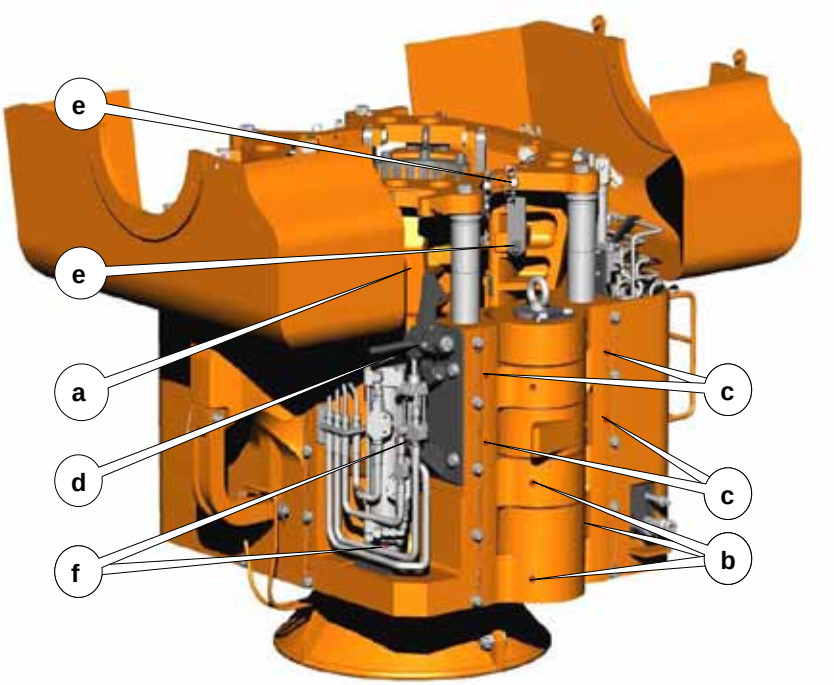
WARNING: FOR SERVICE AND MAINTENANCE DISCONNECT THE AIR SUPPLY.

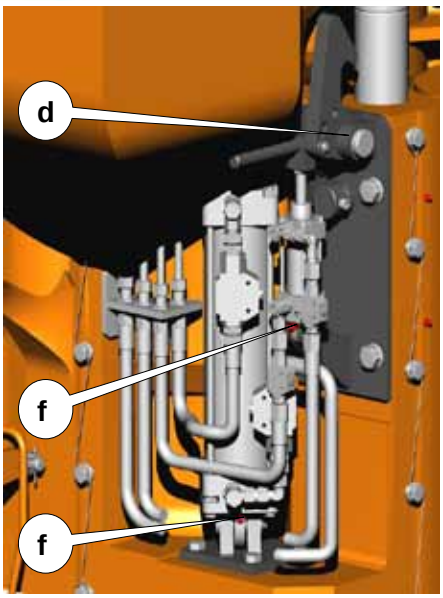


General Lubrication

When the tool is in use, the following lubrication procedure should be performed daily, or as inspection indicates:

1. Lubricate the back of the slips with heavy grease a.
2. Apply an extreme-pressure lubricant through the grease fittings on the two hinge pins b (12 greasing points).
3. Grease the four slip stanchions c (8 greasing points).
4. Grease all bolts, springs and all slides of the two latch-assemblies d once a month.
5. Grease all Bolts of Slip assembly e.
6. Grease the lower cylinder-eyes (4 greasing points) weekly f.
7. Inspect the dies periodically and replace them if necessary. Always grease the slots when installing dies. Failure to routinely grease the slots will cause the dies to stick.





GREASE
DAILY

Grease daily

All greasing points, which are labelled “Grease Daily“, must be greased at least once a day. It can be necessary to carry this out more often depending on use.

Grease quality

In order to achieve efficient greasing even at different environmental temperatures, we recommend the following grease types should be used (obtainable from Blohm + Voss Oil Tools): Low-Viscosity grease
Type AVIATICON Grease XRF
NLGI 0
Alternatively; use EP gear lubricating grease for greasing ”non-oil tight gear trains”
NESSOS SF0
NLGI 0
DIN 51 826 GPOF-25
DIN 51 502 GPOF-25

For higher ambient temperature up to 30° Celsius / 86° Fahrenheit we recommend to use NLGI 2

Inspection categories acc. to API RP 8B

Category I
This category involves observing the equipment during operation for indications of inadequate performance.
When in use, equipment shall be visually inspected on a daily basis for cracks, loose fits or connections, elongation of part, and other signs of wear, corrosion or overloading. Any parts found to show cracks, excessive wear, etc., shall be removed from service for further examination.
The equipment shall be visually inspected by a person knowledgeable in that equipment and its function.

Category II
This is Category I inspection plus further inspection for corrosion, deformation, loose or missing components, deterioration, proper lubrication, visible external cracks, and adjustment.
Category II may involve some disassembly to access specific components and to identify wear that exceeds the allowable tolerances.

Category III
This is Category II inspection plus further inspection, which should include NDT of critical areas and may involve some disassembly to access specific components and to identify wear that exceeds the allowable tolerances.
Prior to inspection, all foreign material such as dirt, paint, grease, oil, scale, etc. shall be removed from the concerned parts by a suitable method (e.g. paint-stripping, steam-cleaning, grit-blasting).

Category IV
This is Category III inspection plus further inspection for which the equipment is disassembled to the extent necessary to conduct NDT of all primary-load-carrying components.
Equipment shall be:
- disassembled in a suitable-equipped facility to the extent necessary to permit full inspection of all primary-load-carrying components and other components that are critical to the equipment.
- inspected for excessive wear, cracks, flaws and deformation.

Procedure:
- Corrections shall be made in accordance with the manufacturer's recommendations.
- Prior to inspection, all foreign material such as dirt, paint, grease, oil, scale, etc. shall be removed from the concerned parts by a suitable method (e.g. paint-stripping, steam-cleaning, grit-blasting)

Frequency

Periodic inspection

The recommended schedule for inspection of all kind of
- Elevators:

Ongoing	I
Daily:	II
6 Monthly:	III
1 Year:	IV

- Spiders:

Ongoing:	I
Weekly:	II
6 Monthly:	III
1 Year:	IV

The recommended frequencies apply for equipment in use during the specified period.
The inspection frequencies are only recommendations. The schedule of inspection heavily depends on the following factors:
- environment
- load cycles
- regulatory requirements
- operating time
- testing
- repairs
- re manufacture

Non-periodic inspection

A complete, on-job, shut-down inspection equivalent to the periodical Category III or Category IV should be made before (if anticipated) and after critical jobs (e.g., running heavy casing / drill strings, jarring, pulling on stuck pipes and/or operating at extreme low temperatures) <-20° C (<-4° F).

Inspection

A thorough inspection should be carried out periodically (every 3 months) or as special circumstances may require. Before starting an inspection disconnect any hydraulic/ pneumatic system and remove all foreign materials (dirt, paint, grease Oil, scale, etc.) from surface by a suitable method. After a field inspection, it is advisable to record the extent of testing and testing results. Conduct the periodic or critical load inspection in the field by the crew with the supervisor.
If cracks, excessive wear etc. is recognized, contact Blohm + Voss Oil Tools or an authorized service company.

Inspection of Hydraulic/ Pneumatic System

Check for leakage every day. Should internal or external leakage reach an unacceptable high level, contact Blohm + Voss Oil Tools or an authorized service company.

Critical Load Inspection

Critical loads may occur. For example: impact loads such as jarring, pulling on stuck pipe, etc. If critical loads occurred unexpectedly, conduct the inspection immediately.

Dismantling Inspection

Generally, when the equipment returns to base, warehouse, etc. Carry out the Tool inspection, immediately. Furthermore, control it prior to its being sent on the next job.

- The Tool should be dismantled and inspected in a suitably equipped facility for excessive wear, cracks, flaws or deformations.
- Corrections should be made in accordance with recommendations which can be obtained from Blohm + Voss Oil Tools.
- Weldings at the castings should be done only by Blohm + Voss Oil Tools or an authorized service company in according to Blohm+Voss welding procedure.
- When need is shown in a field inspection, dismantle the Tool and arrange an inspection in a suitably equipped facility.
- Springs should be carefully visually inspected for excessive wear and obvious weakness.

Inspection check lists

CHECK LIST FRONT PAGE

TYPE OF EQUIPMENT

SERIAL NUMBER

PART NUMBER

SUPERVISOR

DATE OF INSPECTION

INSPECTION CATEGORY

PLACE OF INSPECTION

Check List Category I

(During operation - Elevator-spider is placed at well center or hangs at the top drive, cover closed.

GENERAL		
DESCRIPTION		CHECKED SIGNATURE
1	Complete front page of check list for the records	OK
2	Check for correct size of slips, dies and guide plates	OK
3	Check correct function of slips	OK
4	Check function of feedback signal (slips set / raised) (if applicable)	OK
5	Check correct funtion of locking mechanism (latch assemblies)	OK
6	Check all visible greasing points	OK
	Remarks	

CHECK FOR LOOSE ITEMS, ESPECIALLY FOR:		
DESCRIPTION		CHECKED SIGNATURE
1	Hinges and bolts of cover assembly	OK
2	Hinge pin and securing plate	OK
3	Link blocks and screws	OK
4	Covers and screw	OK
5	Fixation of upper guide plate (for spider)	OK
6	Screws of casing guide bell securing handle (for elevator)	OK
7	Fixation of bottom guide plate (for elevator)	OK
	Remarks	

CHECK FOR CRACKS, ELONGATION, DAMAGE AND CORROSION, ESPECIALLY FOR:			
	DESCRIPTION	CHECKED	SIGNATURE
1	BVE/BVS Body - hinges	OK	
2	BVE/BVS Body - ears	OK	
3	Hinges and bolts of Cover Assembly	OK	
4	Cover assembly	OK	
5	Upper guide plate (for spider)	OK	
6	Casing guide bell (for elevator)	OK	
7	Bottom guide plate (for elevator)	OK	
	Remarks		

PNEUMATIC			
	DESCRIPTION	CHECKED	SIGNATURE
1	Check for loose fittings, pipes, valves	OK	
2	Check for pneumatic leaks (hoses, valves and cylinders)	OK	
3	Check condition of pneumatic couplings and connection hoses	OK	
	Remarks		

_____ _____

SUPERVISOR DATE

Check List Category II

BVE/BVS not placed at well center or hanging at top drive, cover and slip assembly are disassembled.

GENERAL		
DESCRIPTION		CHECKED SIGNATURE
1	Complete front page of check list for the records	OK
2	Check for correct size of slips and guide plates	OK
3	Check correct function of slips	OK
4	Check function of feedback signals (slips set / raised) (if applicable)	OK
5	Check function of lower and upper locking mechanism (latch assemblies)	OK
	Remarks	

CHECK FOR LOOSE ITEMS, ESPECIALLY FOR:		
DESCRIPTION		CHECKED SIGNATURE
1	Hinges and bolts of lifting assembly	OK
2	Link, screwa, bolts and other parts of slip assembly	OK
3	Hinge pin and securing plate	OK
4	Bolts, springs and screws of latch assemblies	OK
	Remarks	

CHECK FOR CRACKS, ELONGATION, DAMAGE AND CORROSION, ESPECIALLY FOR:		
DESCRIPTION		CHECKED SIGNATURE
1	Slip support plate	OK
2	Gliding areas for slip assemblies	OK
3	Slips stanchions	OK
4	Pins/bolts of lifting assembly	OK
5	Latches and plungers of latch assemblies	OK
6	Check the dies	OK
	Remarks	

GREASING

DESCRIPTION		CHECKED SIGNATURE
1	Check that grease system and grease points get grease to all needed areas (as far as observable) – especially for:	OK
2	Slip Assembly – back side	OK
3	Hinges at body (12 points)	OK
4	Slip stanchions (8 points)	OK
5	All bolts, springs and slides of latch assembly	OK
6	All bolts of slip assembly (8 points)	OK
7	All lower cylinder bolts (4 points)	OK
	Remarks	

PNEUMATIC

DESCRIPTION		CHECKED SIGNATURE
1	Check for loose fittings, pipes, valves	OK
2	Check for pneumatic leaks of all hoses, valves and cylinders	OK
3	Check condition of pneumatic couplings and connection hoses	OK
4	Check pneumatic fittings and hoses of power supply	OK
	Remarks	

_____ _____

SUPERVISOR DATE

Check List Category III

BVE/BVS not placed at well center or hanging at top drive, cover and slip assembly are disassembled.

USE CHECK LIST OF CATEGORY II WITH FOLLOWING ADDITIONAL ITEMS:

	DESCRIPTION	CHECKED	SIGNATURE
GENERAL			
1	Check completeness and condition of warning plates and labels	OK	
2	Check condition of identification plate (serial number, part number, date of manufacture etc.)	OK	
3	Clean tool thoroughly	OK	
NDT - INSPECTION			
	NDT all critical areas with die penetrant	OK	
	Remarks		

_____ _____

SUPERVISOR DATE

Check List Category IV

BVE/BVS is out well center, cover and slip assembly are disassembled.

USE CHECK LIST OF CATEGORY III WITH FOLLOWING ADDITIONAL ITEMS:

PNEUMATIC			CHECKED	SIGNATURE
1	Change all pneumatic hoses and fittings	OK		
2	Check condition of pneumatic valves and replace if necessary	OK		
3	Check condition of pneumatic pipes and replace if necessary	OK		
	Remarks			

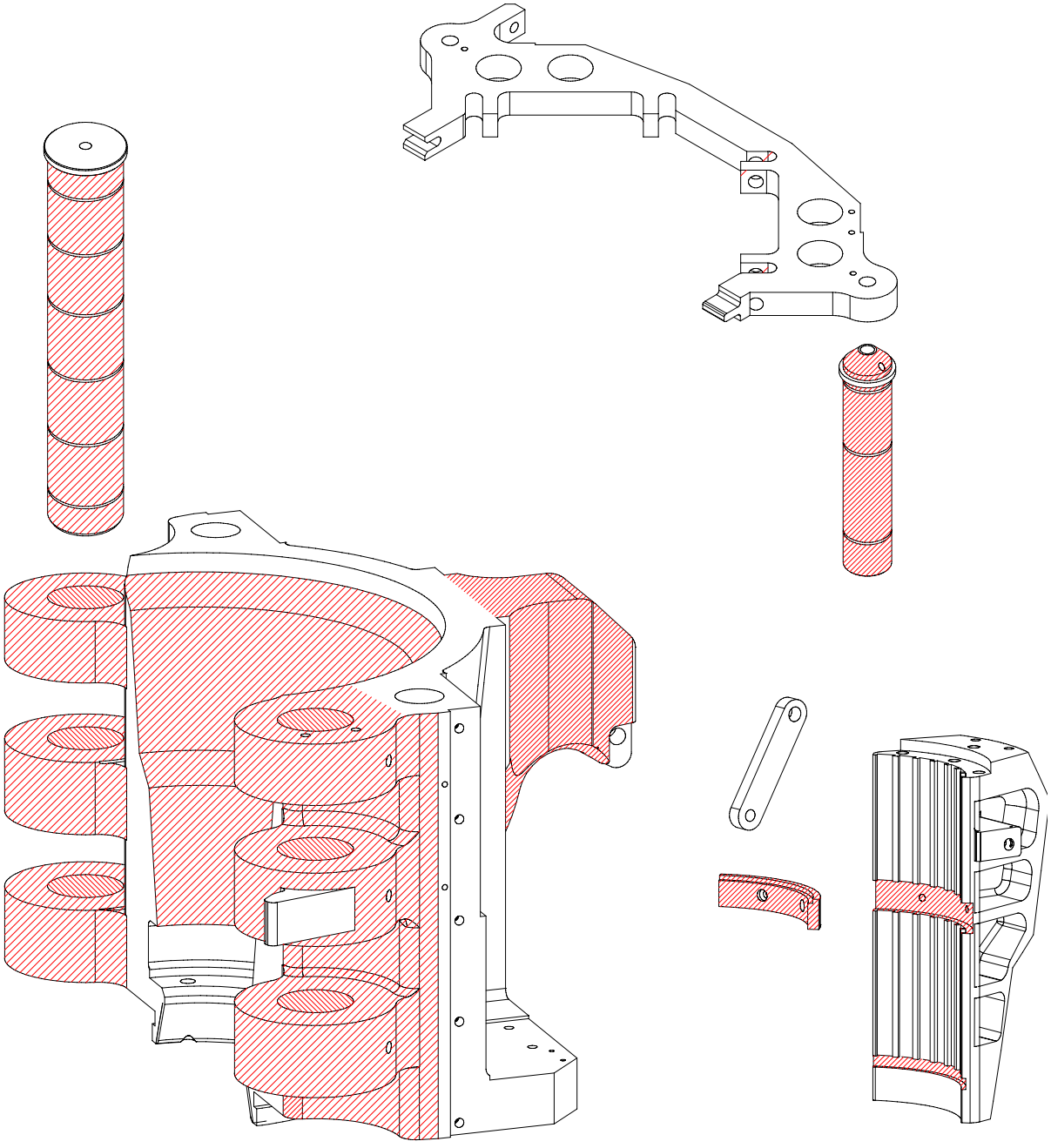
_____ _____

SUPERVISOR DATE

Wear data criteria

Part	Dimensions	Part	Dimensions
Hinge Pin Body/Door		**Lifting Ear**	
Hinge Pin Min. DIA new	127,6 mm / 5,024 inch	Min. new	275,3 mm / 10,84 inch
Bore Max. DIA new	128 mm / 5,039 inch	Max. worn	269,3 mm / 10,60 inch
Bore Max. DIA worn	128,7 mm/ 5,067 inch		
Hinge Pin Slips			
Hinge Pin Min. DIA new	81,5 mm / 3,209 inch		
Bore Max. DIA new	82,5 mm / 3,248 inch		
Bore Max. DIA worn	83,1 mm / 3,272 inch		

Critical Areas



Critical area's are hatched

Handling, storage and transport

Storage

Storage of the tool requires the following measures to be taken:

- Ensure the tool is protected from water ingress
- Ensure the tool is stored in such a way, that personnel cannot be wounded by moving parts or sharp edges. If needed, secure the tool with ropes or otherwise in order to protect it from sliding due to ship movements.

Short term storage after use and less then 3 months

Preserve the tool: Grease all blank surfaces with grease: Cylinders
Preserve all other blank surfaces with Tectyl Type 864 or equivalent
Storage: Store in a dry environment with humidity max 80%.
Commissioning: Not needed

Long term storage over 3 months

Preserve the tool: Grease all blank surfaces with grease: Cylinders

Preserve all other blank surfaces with Tectyl Type 864 or equivalent
Storage: Store in a dry environment with humidity max 80%
Commissioning: As per procedure in the User Manual

Handling

Lift the tool by its lifting ears only.

Transport

When the tool is in it's original crate, use a fork lift for lifting the crate only. The weight of the tool is indicated on the identification area of the tool, and also on its original transporting crate.

SIZE COMPONENTS

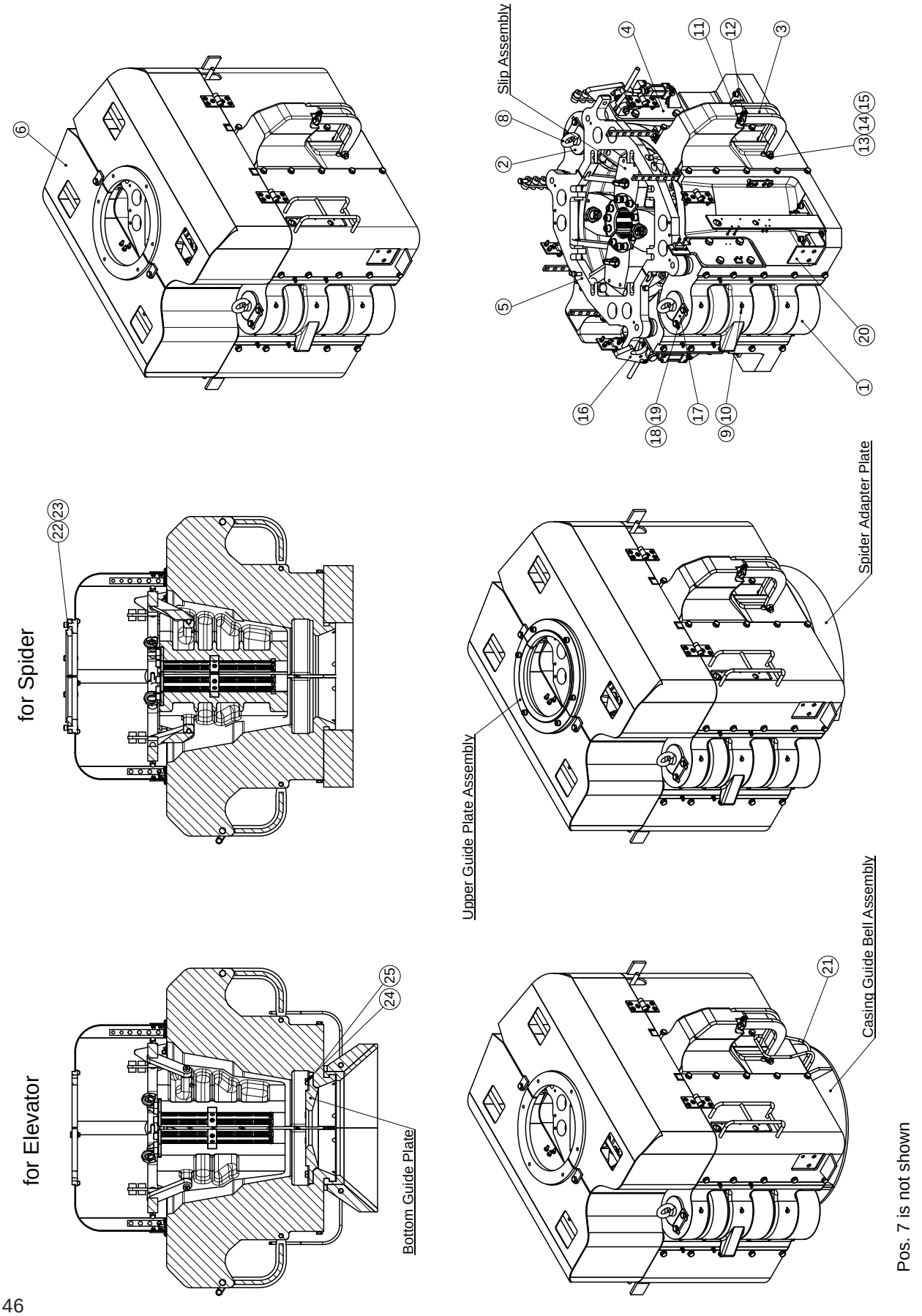
6. SIZE COMPONENTS

Pipe Size	Slip Assembly		Inserts		Bottom Guide Assembly P/N	Upper Guide Assembly P/N
	Size	P/N	P/N	Qty.		
4.1/2“	5.1/2“ x 4.1/2“	710100-221	350905	48	710034	752710
5“	5.1/2“ x 5“	710100-223	350506	48	710049	752715
5.1/2“	5.1/2“ x 5.1/2“	710100-224	350107	48	710049	752715
6.5/8“	7.5/8“ x 6.5/8“	710100-228	350909	72	710047	752720
7“	7.5/8“ x 7“	710100-229	350610	72		
7.5/8“	7.5/8“ x 7.5/8“	710100-231	350111	72	710048	752725
8.5/8“	9.5/8“ x 8.5/8“	710100-234	350911	96	710050	752730
9.5/8“	9.5/8“ x 9.5/8“	710100-236	350111	96	710042	752735
	10.3/4“ x 9.5/8“	710100-236-1	351011	120		
9.7/8“	10.3/4“ x 9.7/8“	710100-265	350811	120		
10.3/4“	10.3/4“ x 11.3/4“	710100-238-1	350112	120	710052	752740
	11.3/4“ x 10.3/4“	710100-238	350912	144		
11.3/4“	11.3/4“ x 11.3/4“	710100-239	350112	144	710054	752745
12.3/4“	14“ x 12.3/4“	710100-241	351112	168	710053	752755
13.3/8“	14“ x 13.3/8“	710100-243	350613	168	710055	752760
13.5/8“	14“ x 13.5/8“	710100-259	350413	168		
14“	14“ x 14“	710100-255	350113	168	710059	752770

DRAWINGS & SPARE PARTS

7. DRAWINGS AND SPARE PARTS

710000-Y-A B+V Type BVE/BVS 750 Pneumatic Elevator/Spider



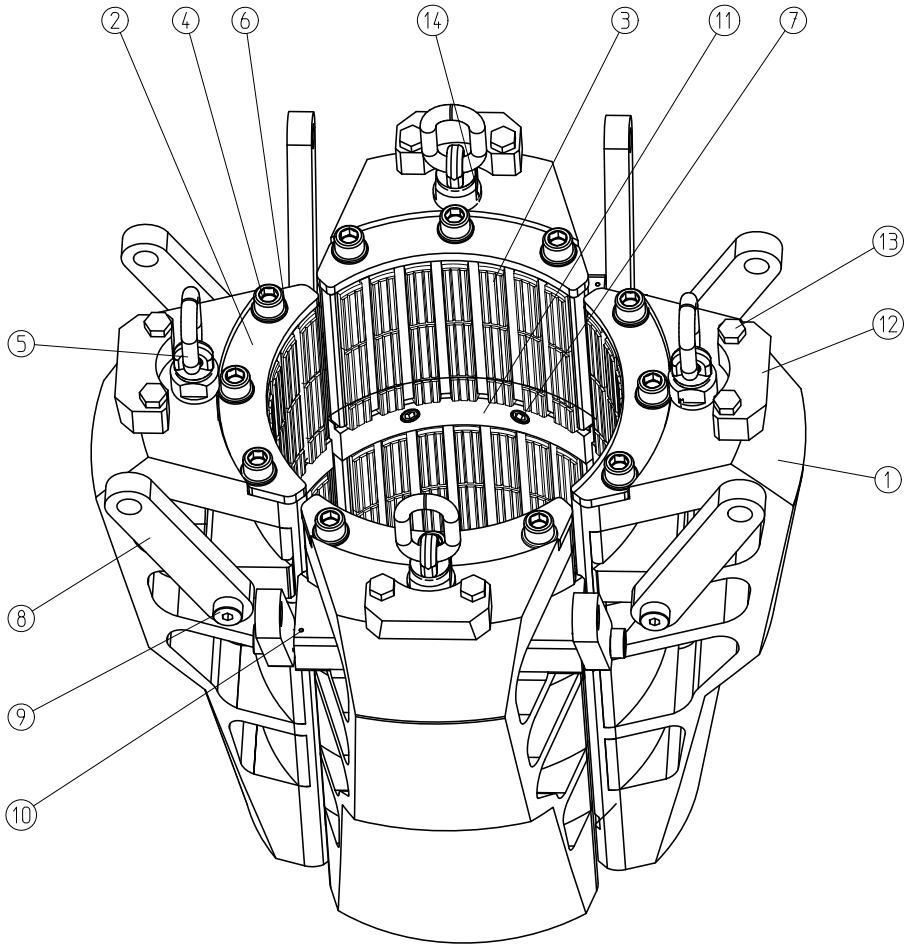
710000-Y-A Parts list

Pos.	Qty.	Part No.	Description
1	2	710010	Body
2	2	710013	Hinge Pin
3	2	710019	Link Block
4	1	710900	Latch Assembly
5	1	710200	Lifting Assembly
6	1	710800-1	Covering Assembly
7	1	710600	Pneumatic Assembly
8	2	710020	Lifting Screw
9	20	70064	Grease Fitting
10	20	612518	Protection Cap
11	2	752202	Link Block Pin
12	2	752301	Safety Spring
13	2	710025	Screw
14	2	613623	Nut
15	2	612699	Split Pin
16	1	710900-1	Latch Assembly
17	2	617518	Plate
18	4	617519	Screw
19	4	617520	Safety sheet
20	1	710660	Pneumatic Connection Assembly
21	2	752336	Security Handle
22	1	752333	Screw
23	1	755325	Lock Washer
24	8	710026	Screw
25	8	752327	Washer

for use as Elevator			
	1	752600	Casing Guide Bell Assembly
	1	table	Bottom Guide Plate Assembly
	1	752822	Elevator Air Hose Assembly

for use as Spider			
	1	752765	Spider Adapter Plate
	1	table	Upper Guide Plate Assembly
	1	752823	Spider Air Hose Assembly

Slip Assembly



Name	Pos.	Part No.	Qty.	Part No.	Qty.	Part No.	Qty.
Pin	14	641599	4	641599	4	641599	4
Screw	13	725464	8	725464	8	725464	8
End Stop	12	710152	4	710152	4	710152	4
Load carring ring	11	710144	4	710144	4	710144	4
Spring straight Pin	10	88240-4	8	88240-4	8	88240-4	8
Shoulder Screw	9	710431	8	710431	8	710431	8
Slip Link	8	710415	8	710415	8	710415	8
Screw	7	775056	8	775056	8	775056	8
Split Washer	6	752327	12	752327	12	752327	12
Lifting Eye	5	755116	4	755116	4	755116	4
Screw	4	710140	12	710140	12	710140	12
Insert	3	350905	48	350506	48	350107	48
Insert Retainer	2	710122	4	710122	4	710122	4
Slip	1	710160	4	710160	4	710160	4
Rohteil		710160R	4	710160R	4	710160R	4
Assembly		710100-221		710100-223		710100-224	
Size		5.1/2“ x 4.1/2“		5.1/2“ x 5“		5.1/2“ x 5.1/2“	

Name	Pos.	Part No.	Qty.	Part No.	Qty.	Part No.	Qty.
Pin	14	641599	4	641599	4	641599	4
Screw	13	725464	8	725464	8	725464	8
End Stop	12	710152	4	710152	4	710152	4
Load carring ring	11	710138	4	710138	4	710138	4
Spring straight Pin	10	88240-4	8	88240-4	8	88240-4	8
Shoulder Screw	9	710431	8	710431	8	710431	8
Slip Link	8	710415	8	710415	8	710415	8
Screw	7	775056	8	775056	8	775056	8
Split Washer	6	752327	12	752327	12	752327	12
Lifting Eye	5	755116	4	755116	4	755116	4
Screw	4	710140	12	710140	12	710140	12
Insert	3	350909	72	350610	72	350111	72
Insert Retainer	2	710125	4	710125	4	710125	4
Slip	1	710135	4	710135	4	710135	4
Rohteil		710135R	4	710135R	4	710135R	4
Assembly		710100-228		710100-229		710100-231	
Size		7.5/8“ x 6.5/8“		7.5/8“ x 7“		7.5/8“ x 7.5/8“	

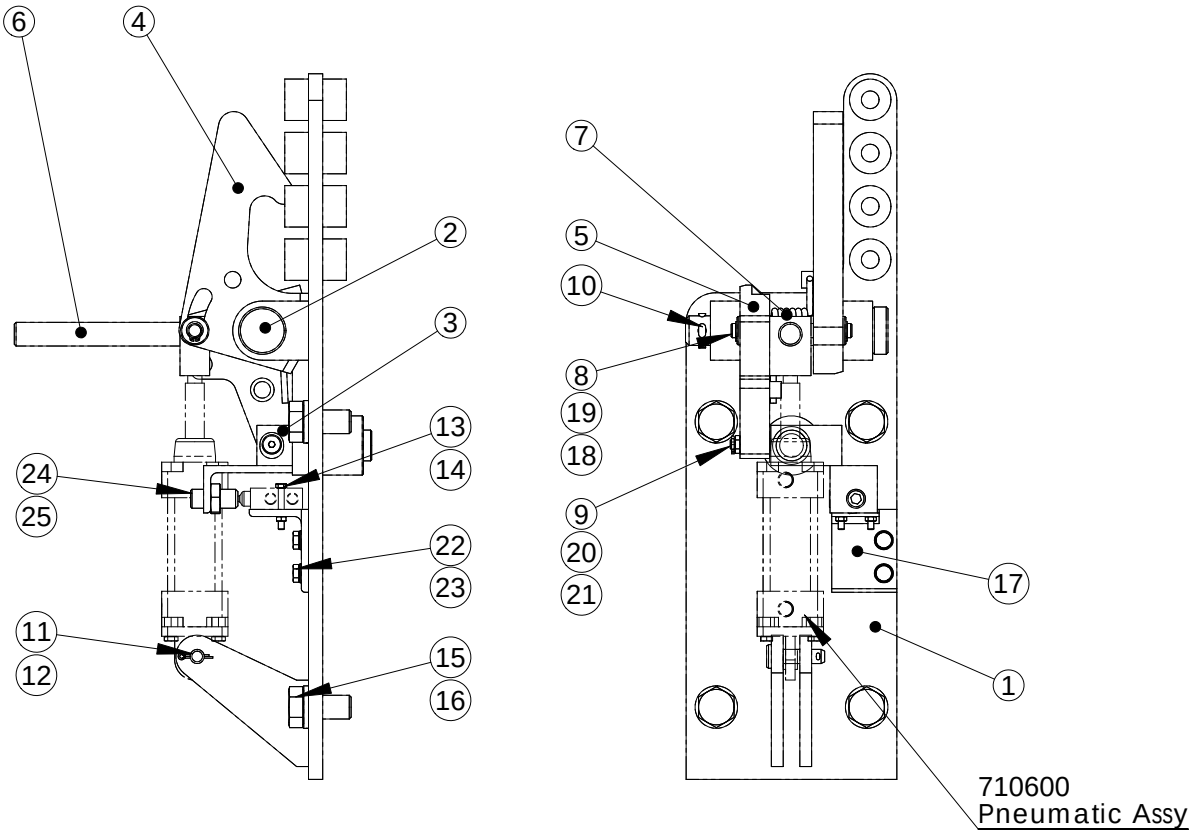
Name	Pos.	Part No.	Qty.	Part No.	Qty.	Part No.	Qty.
Pin	14	641599	4	641599	4	641599	4
Screw	13	725464	8	725464	8	725464	8
End Stop	12	710152	4	710152	4	710154	4
Load carring ring	11	710137	4	710137	4	710142	4
Spring straight Pin	10	88240-4	8	88240-4	8	88240-4	8
Shoulder Screw	9	710431	8	710431	8	710431	8
Slip Link	8	710415	8	710415	8	710415	8
Screw	7	775056	8	775056	8	775056	8
Split Washer	6	752327	12	752327	12	752327	12
Lifting Eye	5	755116	4	755116	4	755116	4
Screw	4	710140	12	710140	12	710140	12
Insert	3	350911	96	350111	96	351011	120
Insert Retainer	2	710124	4	710124	4	710127	4
Slip	1	710134	4	710134	4	710130	4
Rohteil		710134R	4	710134R	4	710130R	4
Assembly		710100-234		710100-236		710100-236-1	
Size		9.5/8“ x 8.5/8“		9.5/8“ x 9.5/8“		10.3/4“ x 9.5/8“	

Name	Pos.	Part No.	Qty.	Part No.	Qty.	Part No.	Qty.
Pin	14	641599	4	641599	4	641599	4
Screw	13	725464	8	725464	8	725464	8
End Stop	12	710154	4	710154	4	710155	4
Load carring ring	11	710142	4	710142	4	710143	4
Spring straight Pin	10	88240-4	8	88240-4	8	88240-4	8
Shoulder Screw	9	710431	8	710431	8	710431	8
Slip Link	8	710415	8	710415	8	710415	8
Screw	7	775056	8	775056	8	775056	8
Split Washer	6	752327	12	752327	12	752327	12
Lifting Eye	5	755116	4	755116	4	755116	4
Screw	4	710140	12	710140	12	710140	12
Insert	3	350811	120	350112	120	350912	144
Insert Retainer	2	710127	4	710128	4	710128	4
Slip	1	710130	4	710130	4	710131	4
Rohteil		710130R	4	710130R	4	710130R	4
Assembly		710100-265		710100-238-1		710100-238	
Size		10.3/4“ x 9.7/8“		10.3/4“ x 10.3/4“		11.3/4“ x 10.3/4“	

Name	Pos.	Part No.	Qty.	Part No.	Qty.	Part No.	Qty.
Pin	14	641599	4	641599	4	641599	4
Screw	13	725464	8	725464	8	725464	8
End Stop	12	710155	4	710151	4	710151	4
Load carring ring	11	710143	4	710136	4	710136	4
Spring straight Pin	10	88240-4	8	88240-4	8	88240-4	8
Shoulder Screw	9	710431	8	710431	8	710431	8
Slip Link	8	710415	8	710415	8	710415	8
Screw	7	775056	8	775056	8	775056	8
Split Washer	6	752327	12	752327	12	752327	12
Lifting Eye	5	755116	4	755116	4	755116	4
Screw	4	710140	12	710140	12	710140	12
Insert	3	350112	144	351112	168	350613	168
Insert Retainer	2	710128	4	710123	4	710122	4
Slip	1	710131	4	710133	4	710133	4
Rohteil		710130R	4	710133R	4	710133R	4
Assembly		710100-239		710100-241		710100-243	
Size		11.3/4“ x 11.3/4“		14“ x 12.3/4“		14“ x 13.3/8“	

Name	Pos.	Part No.	Qty.	Part No.	Qty.
Pin	14	641599	4	641599	4
Screw	13	725464	8	725464	8
End Stop	12	710151	4	710151	4
Load carring ring	11	710136	4	710136	4
Spring straight Pin	10	88240-4	8	88240-4	8
Shoulder Screw	9	710431	8	710431	8
Slip Link	8	710415	8	710415	8
Screw	7	775056	8	775056	8
Split Washer	6	752327	12	752327	12
Lifting Eye	5	755116	4	755116	4
Screw	4	710140	12	710140	12
Insert	3	350413	168	350113	168
Insert Retainer	2	710123	4	710123	4
Slip	1	710133	4	710133	4
Rohteil		710133R	4	710133R	4
Assembly		710100-259		710100-255	
Size		14“ x 13.5/8“		14“ x 14“	

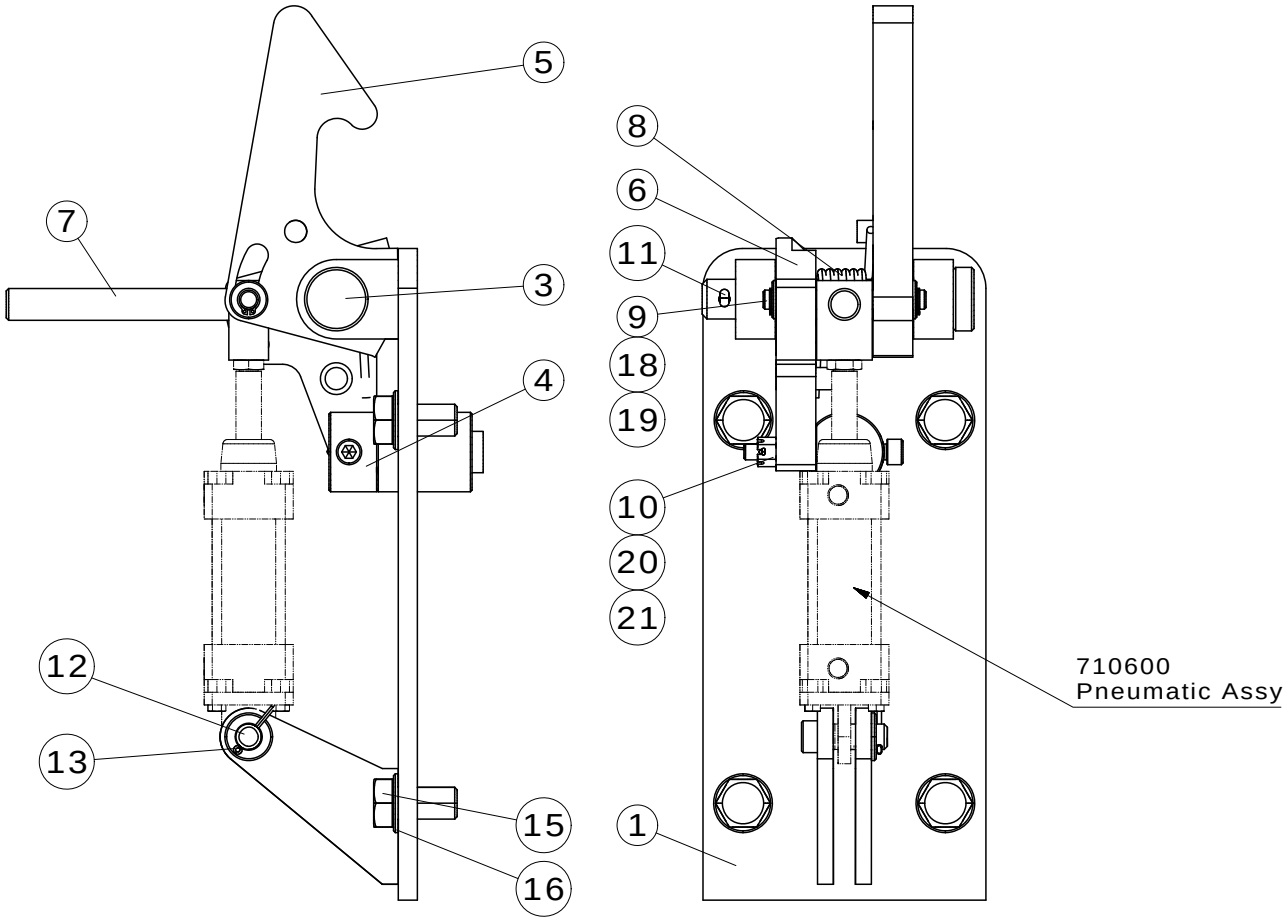
710900 Latch Assembly



710900 Parts list

Pos.	Qty.	Part No.	Description
1	1	710905-1	Plate Lock Mounting 1
2	1	710310	Latch Pin
3	1	710315	Plunger
4	1	710320	Latch
5	1	710325	Cam
6	1	710930	Knuckle
7	1	710335	Latch Spring
8	1	710350	Pin
9	1	710353	Shoulder Screw
10	1	710347	Cotter Pin
11	1	710931	Clevis Pin with head
12	1	710932	Cotter Pin
13	2	710934	Screw
14	2	710933	Nut
15	4	710349	Screw
16	4	752309	Split Washer
17	1	710902	Mounting Angle
18	2	650218-3	Washer
19	2	611523	Retaining Ring
20	1	710354	Castle Nut
21	1	620609	Cotter Pin
22	2	645028	Screw
23	2	645683	Washer
24	1	710906	Set Screw
25	1	752341	Nut

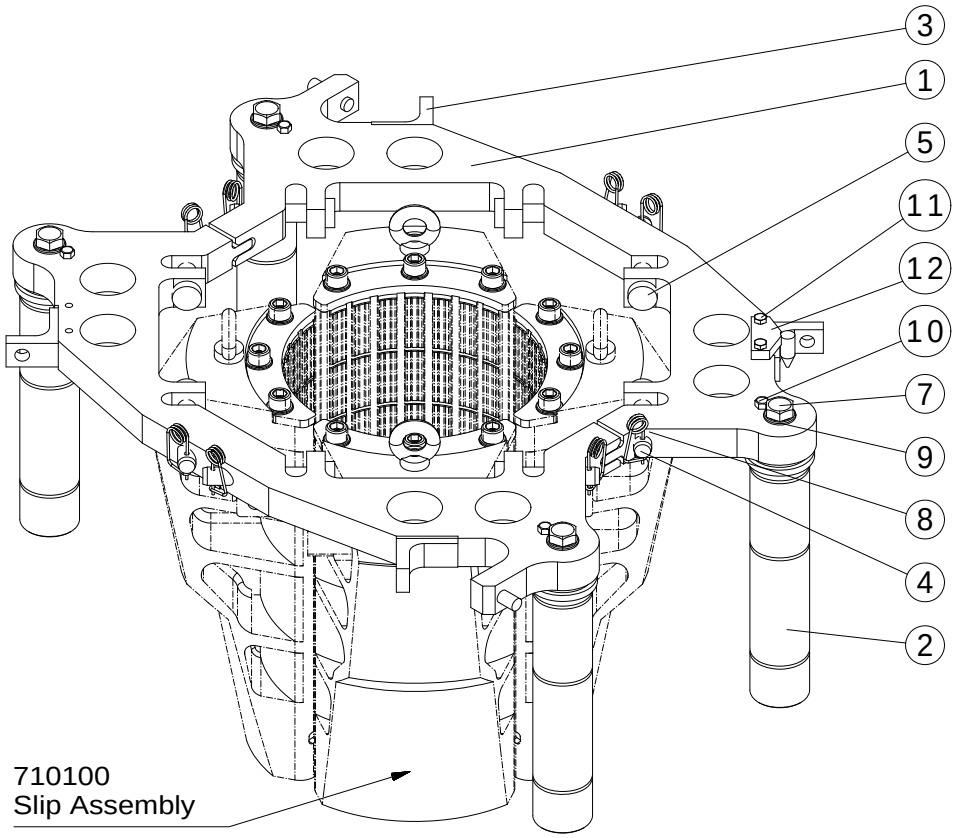
710900-1 Latch Assembly



710900-1 Parts list

Pos.	Qty.	Part No.	Description
1	1	710905-1	Plate Lock Mounting 1
3	1	710310	Latch Pin
4	1	710316	Plunger
5	1	710320	Latch
6	1	710325	Cam
7	1	710930	Knuckle
8	1	710335	Latch Spring
9	1	710350	Pin
10	1	710353	Shoulder Screw
11	1	710347	Cotter Pin
12	1	710931	Clevis Pin with head
13	1	710932	Cotter Pin
15	4	710349	Screw
16	4	752309	Split Washer
18	2	650218-3	Washer
19	2	611523	Retaining Ring
20	1	710354	Castle Nut
21	1	620609	Cotter Pin

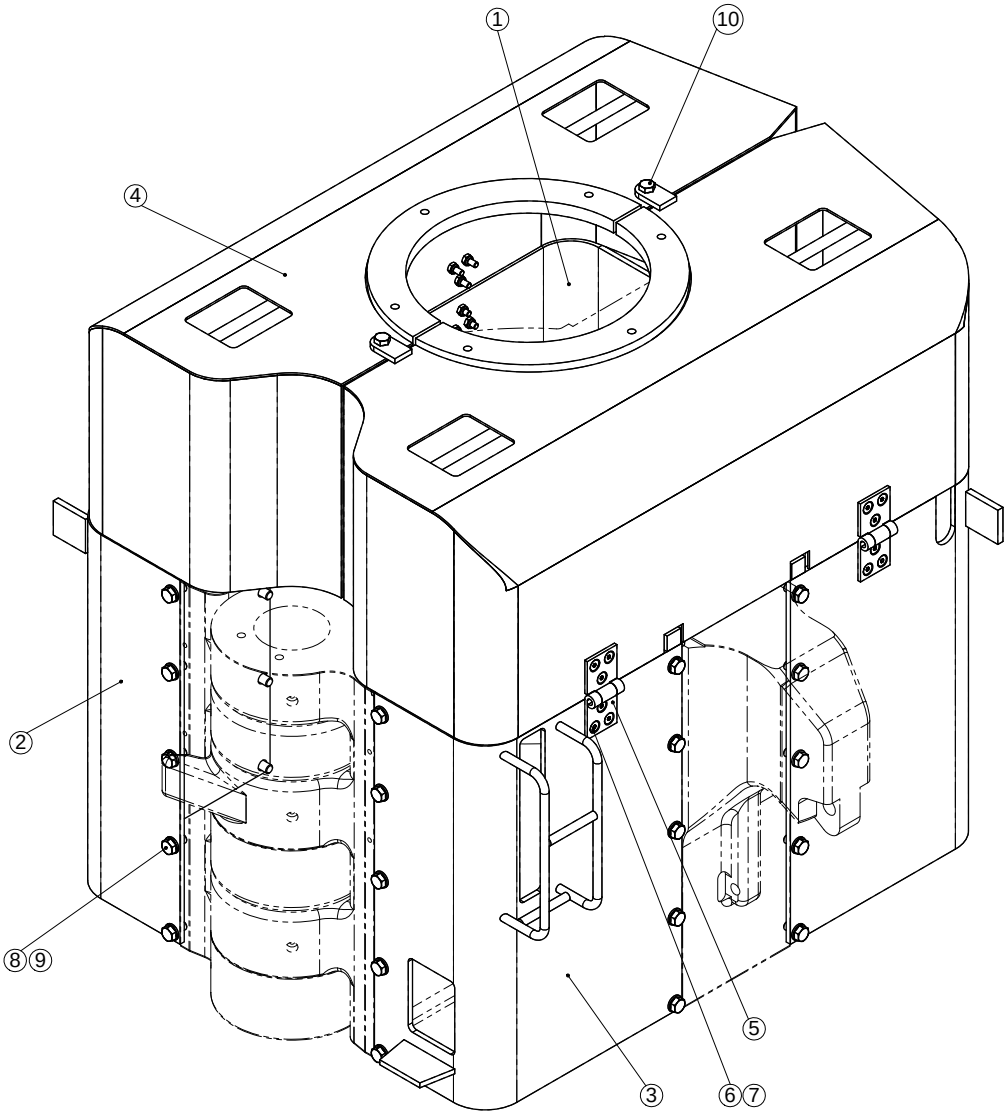
710200 Lifting Assembly



710200 Parts list

Pos.	Qty.	Part No.	Description
1	2	710405-1	Slip Support Plate
2	4	710410	Slip Stanchion
3	4	710205	Piston Rod Link
4	4	710420	Slip Support Pin
5	4	710425	Slip Support Pin
7	4	710432	Screw
8	8	622515	Safety Spring
9	4	710433	Split Washer
10	4	710427	Screw
11	2	615145	Screw
12	1	710426-1	Indexing Bolt

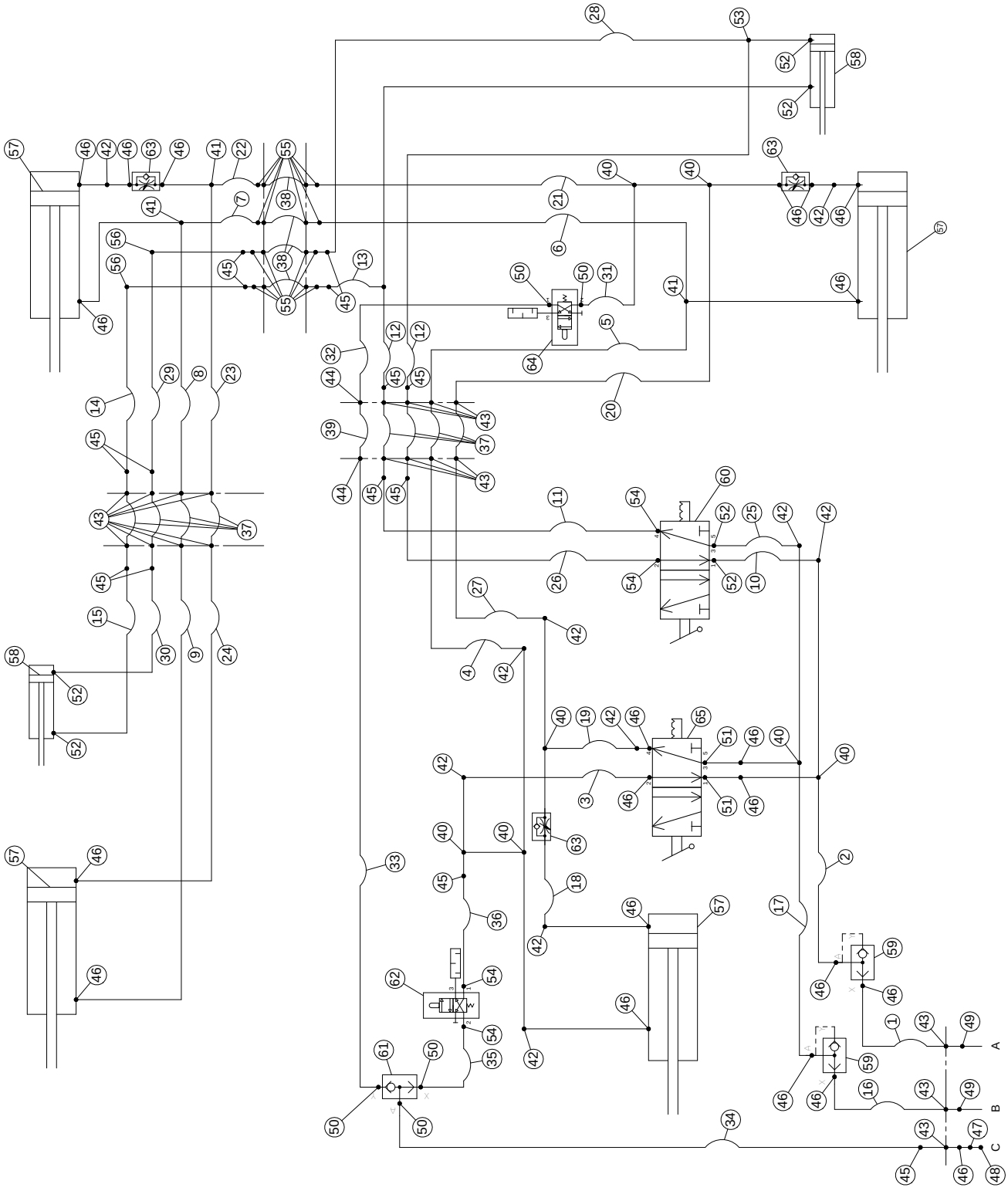
710800-1 Covering Assembly



710800-1 Parts list

Pos.	Qty.	Part No.	Description
1	1	710505	Corner Cover
2	2	710510	Corner Cover
3	1	710815	Corner Cover
4	1	710520	Cover
5	4	710801	Hinge Pin
6	24	82115	Screw
7	24	89125	Nut
8	40	710542	Screw
9	40	621432	Washer
10	2	710541	Screw

710600 Pneumatic Assembly

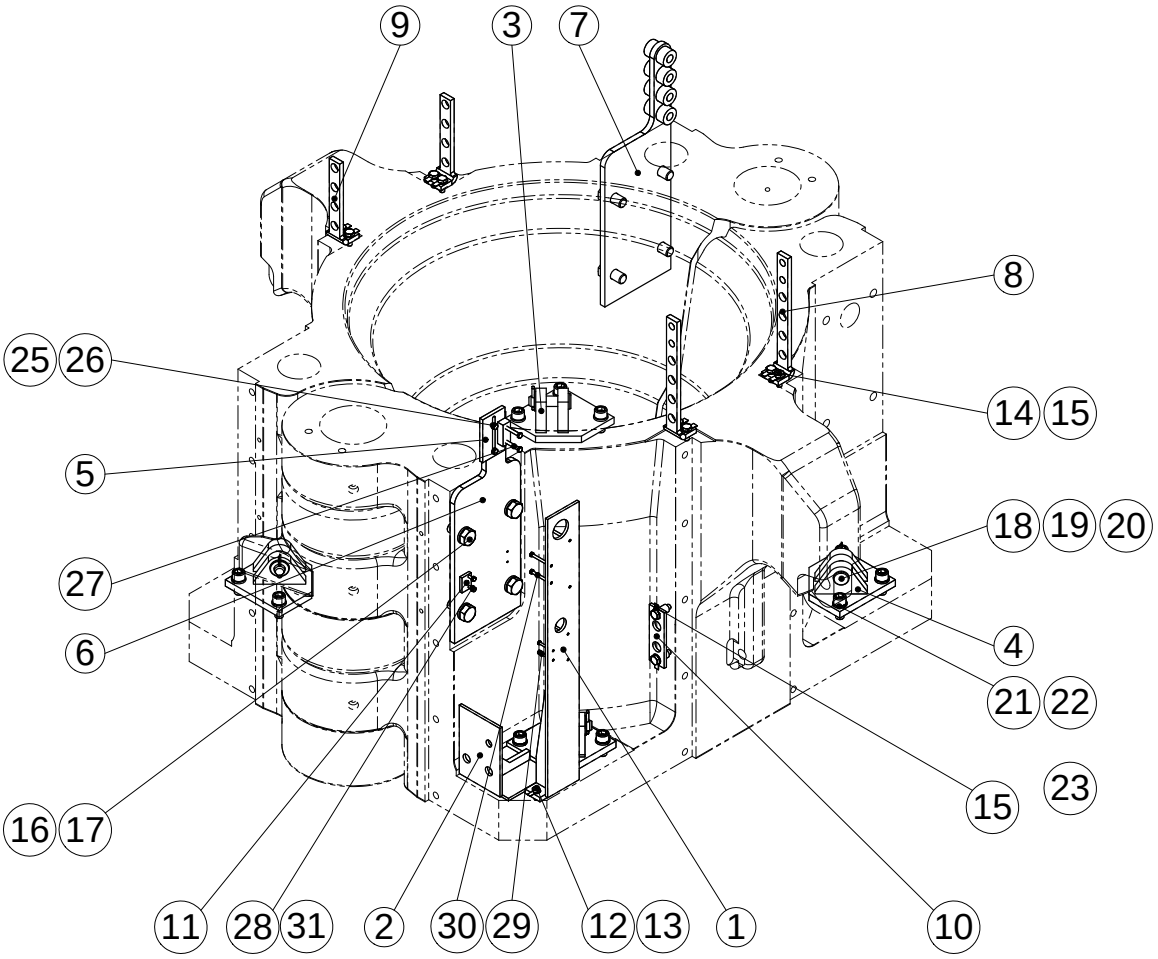


710600 Parts list

Pos.	Qty.	Part No.	Description
0	1	710600-50	Set of Pneumatic Hose Assembly for BVES 750-1
1	1	710600-51	Pneumatic Hose Assembly for Connection "A1"
2	1	710600-52	Pneumatic Hose Assembly for Connection „A2“
3	1	710600-53	Pneumatic Hose Assembly for Connection "A3"
4	1	710600-54	Pneumatic Hose Assembly for Connection „A4“
5	1	710600-55	Pneumatic Hose Assembly for Connection „A5“
6	1	710600-56	Pneumatic Hose Assembly for Connection „A6“
7	1	710600-57	Pneumatic Hose Assembly for Connection „A7“
8	1	710600-58	Pneumatic Hose Assembly for Connection „A8“
9	1	710600-59	Pneumatic Hose Assembly for Connection „A9“
10	1	710600-60	Pneumatic Hose Assembly for Connection „A10“
11	1	710600-61	Pneumatic Hose Assembly for Connection „A11“
12	1	710600-62	Pneumatic Hose Assembly for Connection „A12/B13“
13	1	710600-63	Pneumatic Hose Assembly for Connection "A13"
14	1	710600-64	Pneumatic Hose Assembly for Connection "A14"
15	1	710600-65	Pneumatic Hose Assembly for Connection "A15"
16	1	710600-66	Pneumatic Hose Assembly for Connection "B1"
17	1	710600-67	Pneumatic Hose Assembly for Connection "B2"
18	1	710600-68	Pneumatic Hose Assembly for Connection „B3“
19	1	710600-69	Pneumatic Hose Assembly for Connection "B4"
20	1	710600-70	Pneumatic Hose Assembly for Connection "B6"
21	1	710600-71	Pneumatic Hose Assembly for Connection "B7"
22	1	710600-72	Pneumatic Hose Assembly for Connection "B8"
23	1	710600-73	Pneumatic Hose Assembly for Connection "B9"
24	1	710600-74	Pneumatic Hose Assembly for Connection "B10"
25	1	710600-75	Pneumatic Hose Assembly for Connection "B11"
26	1	710600-76	Pneumatic Hose Assembly for Connection "B12"
27	1	710600-77	Pneumatic Hose Assembly for Connection "B5"
28	1	710600-78	Pneumatic Hose Assembly for Connection "B14"
29	1	710600-79	Pneumatic Hose Assembly for Connection "B15"
30	1	710600-80	Pneumatic Hose Assembly for Connection "B16"
31	1	710600-81	Pneumatic Hose Assembly for Connection "C6"
32	1	710600-82	Pneumatic Hose Assembly for Connection „C5“
33	1	710600-83	Pneumatic Hose Assembly for Connection "C4"
34	1	710600-84	Pneumatic Hose Assembly for Connection "C1"
35	1	710600-85	Pneumatic Hose Assembly for Connection "C2"
36	1	710600-86	Pneumatic Hose Assembly for Connection "C3"
37	8	710600-87	Pneumatic Hose Assembly for Connection "A/B1"
38	4	710600-88	Pneumatic Hose Assembly for Connection "A/B2"
39	1	710600-89	Pneumatic Hose Assembly for Connection "C7"
40	7	756318	Adjustable Stud Barrel Tee
41	3	755371	Adjustable Stud Branch Tee
42	10	755367	Adjustable Stud Elbow
43	19	755370	Straight Bulkhead Coupling
44	2	645105	Straight Bulkhead Coupling
45	14	755372	Standpipe Reducer

Pos.	Qty.	Part no.	Description
46	19	755374	Straight Male Stud Coupling
47	1	615703	Coupling
48	1	613812	Clutch Hose Coupling
49	2	752828	Plug Nipple
50	5	710643	Swivel Connection
51	2	615706	Swivel Connection
52	6	613945	Swivelling Screw Fitting
53	1	645104	T-Connection
54	4	612944	Straight Connection
55	16	755373	Straight Male Stud Coupling
56	2	645096	L-Adapter
57	4	710607	Air-Cylinder
58	2	712602	Lock Latch Cylinder Assembly
59	2	612642-1	Quick-Relief-Valve
60	1	710625	5/2 Way Valve
61	1	712617	Shuttle valve
62	1	612660	3/2-Way-Valve II
63	3	710602	Throttle
64	1	712618	3/2 Way Valve
65	1	710626	5/2 Way Valve

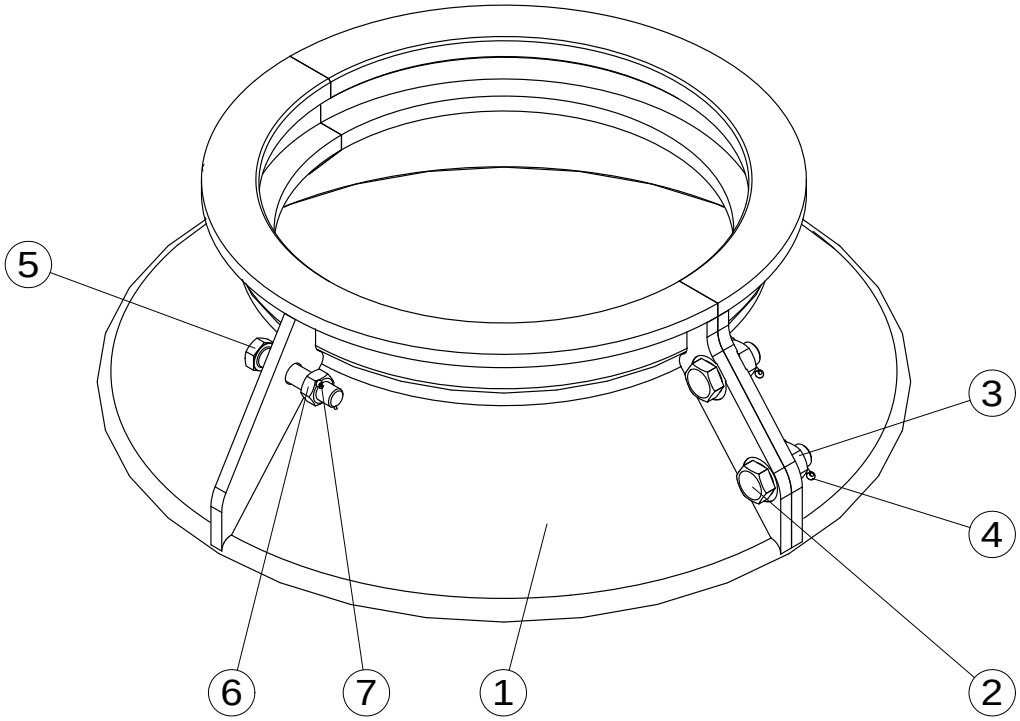
710660 Pneumatic Conection Assembly



710660 Parts list

Pos.	Qty.	Part No.	Description
1	1	710617	Accessories
2	1	710624	Cylinder Mounting
3	1	710611	Cylinder Mounting
4	2	710610	Cylinder Mounting
5	1	710627	Valve Mounting
6	1	710613	Pneumatic Plate
7	1	710717	Hydraulic Plate
8	2	712614	Distance Piece
9	2	712612	Distance Piece
10	1	710661	Plate
11	1	712616	Plate
12	2	643779-1	Screw
13	2	645059	Washer
14	8	725461	Screw
15	10	735854	Washer
16	8	752327	Lock Washer
17	8	710349	Screw
18	4	710639	Clevis Pin with Head
19	4	612679	Washer
20	4	752331	Cotter Pin
21	12	710543	Spring Washer
22	12	710541	Screw
23	2	87724	Screw
24	2	755251	Nut
25	2	617548	Screw
26	2	755248	Washer
27	2	726009	Screw
28	2	735309	Lock Washer
29	4	710648	Screw
30	4	710646	Screw
31	2	710647	Screw

752600 Casing Guide Bell Assembly



752600 Parts list

Pos.	Qty.	Part No.	Description
1	2	752601	Casing Guide Bell
2	4	752329	Screw
3	4	752330	Nut
4	4	752331	Cotter pin
5	2	752337	Screw
6	2	613556-41	Nut
7	2	752339	Cotter Pin

752765-1 Spider Adapter Plate