

Blohm + Voss Oil Tools

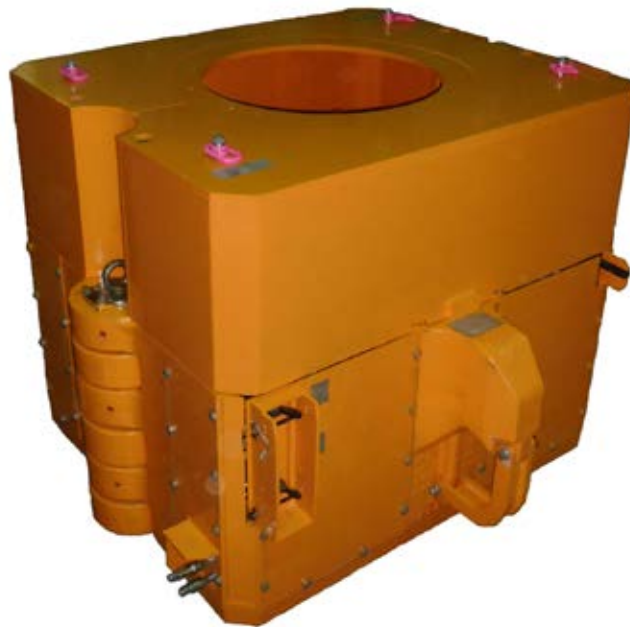
Operation Manuals • Hoisting Equipment

B+V Air Operated Elevator Spider

B+V BVE / BVS 750-2 16" – 24"

Operating Instructions

Original Operating Instructions



Manual PN 712000-Y-A-D Revision: 01, 11-2014
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Blohm + Voss Oil Tools GmbH

Blohm+Voss

Revision history

Version	Date	Author	Changes
00	2009-08	B+V OT,ROK, MH	Initial Release Air Operated Elevator Spider
01	2014-11	B+V OT,ROK, MH	Update Release Air Operated Elevator Spider

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Blohm + Voss Oil Tools GmbH
 D-20457 Hamburg (Germany)
 Hermann-Blohm-Strasse 2
 fon: +49-40 31 19 18 26
 fax: +49-40-31 19 81 94

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All data in this manual takes place using best knowledge. This manual is based on the latest product information that was available at the time of printing. Depending on ongoing technical improvements (ISO 9001), the Blohm + Voss Oil Tools GmbH reserves the right to make alterations to the design and specifications without notice. The values specified in this manual represent the nominal value of a unit produced in series. The values in individual units may have slight differences.

Only with written consent from Blohm + Voss Oil Tools GmbH the contents of this Instructions may be passed on to third persons. Especially procedure descriptions and explanations are not to be passed on to third persons.

Copying or multiplying for internal use is permitted.

We are grateful for suggestions and critic regarding this documentation or the product itself.

Printed in Germany.

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DESCRIPTION

COMMISSIONING

INSTALLATION

OPERATION

INSPECTION /
MAINTENANCESIZE
COMPONENTS

DRAWINGS

DESCRIPTION

COMMISSIONING

INSTALLATION

OPERATION

INSPECTION /
MAINTENANCE

SIZE
COMPONENTS

DRAWINGS

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 B+V

Improper / Unsafe Use

The tool must only be used for the designated purpose.

When using the tool, the rated load must never be exceeded.

TOOL . IT MUST BE STUDIED BEFORE WORKING WITH THE TOOL.

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 (herein after called B+V), 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 B+V, must be thoroughly satisfied that neither

Limited Warranty

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

Repaired or serviced by a service facility which was not authorised by B+V.

Replacement parts not manufactured by B+V are used.

Modifications were made to the tool which were not approved by B+V.

personal safety nor equipment safety will be jeopardized.

Intellectual property

All rights retained. No part of this document may be reproduced in any form (print, photocopy, microfilm or any other procedure) or be processed using an electronic system without written approval of B+V.

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) "B+V" 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

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).



This operating manual is a part of the technical documentation for the product.

The EC Declaration of Conformity is delivered together with the product.

Keep these instructions and the associated documents for later use

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 ITS SPECIFICATION.

WARNING: FAILURE TO CONDUCT ROUTINE MAINTENANCE COULD RESULT IN EQUIPMENT DAMAGE OR INJURY TO PERSONNEL.

WARNING: THE TOOL MUST ONLY BE SERVICED BY TRAINED AND BY AN BLOHM + VOSS OIL TOOLS AUTHORIZED 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" ORIGIN, 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 ANALYSES.

WARNING: THE OPERATING COMPANY IS OBLIGATED TO ISSUE WORKING INSTRUCTIONS FOR SAFE USE AND SUPERVISE OBSERVANCE OF THESE WORKING INSTRUCTIONS.

WARNING: EVERY EMPLOYEE, OPERATING, SERVICING, INSPECTING OR OTHERWISE INVOLVED WITH THE USE OF THE TOOL IN OTHER AREA'S, SHOULD COMPLETE REGULAR COURSES OF TRAINING TO ENSURE PROPER USE AS WELL AS SAFE OPERATION, CORRECT MAINTENANCE AND INSPECTION.

WARNING: IF NECESSARY, A REASONABLE, ADDITIONAL SUPERVISOR SHOULD BE APPOINTED DURING OPERATION.

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 Signs

WARNING: THE WARNING PLATES, SIGNS AND LABELS MUST BE PRESENT ON THE TOOL. Do NOT REMOVE THE LABELS. IF THEY ARE MISSING, REPLACING IS MANDATORY.

Safety issues elevators

WARNING: Do NEVER UNLATCH/OPEN THE ELEVATOR WHILE A PIPE IS SUSPENDED IN THE ELEVATOR; THE PIPE WILL BE LOST!

WARNING: WHEN PICKING UP HORIZONTAL PIPES, ALWAYS USE THE ELEVATOR WITH DOORS POINTING UPWARDS. USING THE ELEVATOR WITH THE DOORS POINTING DOWNWARDS MAY CAUSE DROPPING THE PIPE.

WARNING: VES ONLY THE ELEVATOR MUST NEVER BE USED WITHOUT BUSHINGS (EXCEPT 18° BORE ELEVATOR)

WARNING: VES ONLY BEFORE PLACING OR REMOVING BUSHING SEGMENTS, MAKE SURE THAT NO HYDRAULIC PRESSURE IS APPLIED TO THE ELEVATOR AND THAT THE CONNECTING LINES ARE DISCONNECTED.

WARNING: STAY AWAY FROM THE ELEVATOR. IT MAY OPEN OR CLOSE WITHOUT WARNING.

WARNING: STAY AWAY FROM THE ELEVATOR IN CASE IT IS PROVIDED WITH A ROTATION SYSTEM. IT MAY ROTATE FORWARD AND BACKWARD WITHOUT WARNING.

WARNING: Do NOT CLOSE THE ELEVATOR MANUALLY.



Fig. 1: Warning sign PN 671638
General warning



Fig. 2: Warning sign PN 671642
Pay attention: Apply grease at least once a day.



Fig. 3: Warning sign PN 611524
Danger: Do not touch.



Fig. 4: Warning sign PN 671640-1
Pay attention: Do not place your hands between moving parts.



Fig. 5: Warning sign PN 671641
Pay attention: Risk of crushing.

Safety issues pneumatic elevators

WARNING: VES ONLY
BEFORE PLACING OR REMOVING BUSHING SEGMENTS, MAKE SURE THAT NO HYDRAULIC PRESSURE IS APPLIED TO THE ELEVATOR AND THAT THE CONNECTING LINES ARE DISCONNECTED.

WARNING: Non-
APPROVED EXCHANGE OF ANY COMPONENT, OR USE OF "NON-B+V COMPONENTS", WILL VOID ANY WARRANTY. ESPECIALLY AS THIS MAY AFFECT THE CORRECT FUNCTIONING OF THE ELEVATOR AND SAFETY DEVICES (CLOSING SIGNAL).

WARNING: ALL BUSHING SEGMENTS MUST ALWAYS BE LABELLED WITH THE SAME SERIAL NUMBER AND PIPE SIZE. EVEN WHEN THE BUSHING SIZE IS THE SAME, BUSHINGS WITH DIFFERENT SERIAL NUMBERS MUST NEVER BE USED.

WARNING: VES ONLY
THE ELEVATOR MUST NEVER BE USED WITHOUT BUSHINGS.

WARNING: STAY AWAY FROM THE ELEVATOR. IT MAY OPEN OR CLOSE WITHOUT WARNING.

WARNING: STAY AWAY FROM THE ELEVATOR IN CASE IT IS PROVIDED WITH A ROTATION SYSTEM. IT MAY ROTATE FORWARD AND BACKWARD WITHOUT WARNING.

WARNING: Do NOT CLOSE THE ELEVATOR MANUALLY.

WARNING: VES ONLY
BEFORE PLACING OR REMOVING BUSHING SEGMENTS, MAKE SURE THAT NO PNEUMATIC PRESSURE IS APPLIED TO THE ELEVATOR AND THAT THE CONNECTING LINES ARE DISCONNECTED.

WARNING: ENSURE THE PNEUMATIC CONNECTORS ARE FROM A MALE AND FEMALE TYPE TO PREVENT FAULTY CONNECTIONS.

Slip issues

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 POWER SLIP IS PLACED IN THE ROTARY TABLE.

WARNING: DO NEVER UNLATCH/OPEN THE SLIP ASSEMBLY WHILE A PIPE IS SUSPENDED IN THE ELEVATOR; THE PIPE WILL BE LOST!

Sample of EC Declaration of Conformity





Blohm + Voss Oil Tools				
EC-DECLARATION OF CONFORMITY				
We,	Blohm + Voss Oil Tools GmbH Hermann-Blohm-Strasse 2 20457 Hamburg / Germany			
declare that the products:	Manually and Air Operated Elevator / Spider BVE / BVS			
which are the subject of this declaration, are in conformity with the following standard(s) or normative documents				
	2006/42/EC	Machinery Directive from 31 December 2009.		
	2014/34/EU	ATEX Directive of Equipment for use in hazardous areas		
	API 8C	Drilling and Production Hoisting Equipment (PSL1 and PSL2), 5. Edition, April 2012		
	ISO 13535:2002	Petroleum and natural gas industries-Drilling and production equipment-Hoisting equipment		
	DIN EN ISO 12100	Safety of machinery, part 1 and 2		
	DIN EN ISO 14121-1	Safety of machinery, Risk assessment		
	DIN EN 13463-1:2009-07	Non-electrical equipment for use in potentially explosive atmospheres		
Description of Product:				
The following named lifting accessory will be described in more detail in the accompanying Data Book and/or certificate and the associated Technical Documentation				
- Product:	B+V Type BVE/S-xxx Elevator/Spider			
- Device Type:	Body Assembly (API8C-PSL 1, air operated complete, less Slips, Guide & Air Hose Assy.			
- Rated Capacity	See Data Book			
- Part Number:	See Data Book			
- Serial Number:	See Data Book			
- Delivery Date:	See Data Book			
- B+V Order No.:	See Data Book			
- Marking:	  II 2G T6			
The Research and Development Manager of Blohm + Voss Oil Tools GmbH, Hermann-Blohm- Strasse 2, 20457 Hamburg, Germany is authorized to compile the technical files.				
Blohm + Voss Oil Tools has established a quality assurance system in accordance to ISO 9001 approved by GL System Certification, Hamburg / Germany, Certificate No. QS-8339 HH.				
Hamburg, issued on See Data Book				
Name:				
Position:	Jens Lutzhöft Managing Director			
<table border="0"> <tr> <td>Blohm + Voss Oil Tools GmbH Hermann-Blohm-Strasse 2, 20457 Hamburg P.O.Box 11 22 53, 20422 Hamburg, Germany Phone: +49 40 3119-1162, Fax: +49 40 3119-3440 E-Mail: oiltools@f-e-t.com Internet: www.blohmvooss-oiltools.com Registered Office: Hamburg <small>Blohm + Voss is a trademark of Blohm + Voss Shipyards GmbH®</small></td> <td>Managing Directors: Jens Lutzhöft, James W. Harris Commercial Register: District Court of Hamburg, HRB 125 890 Tax-No.: 46/708/02367, VAT-ID. No.: DE 294 745 990 Banking: HSBC Trinkaus & Burkhardt AG BIC / SWIFT: TUBD DE DD XXX EUR-Account / IBAN: DE73 3003 0880 0012 8350 19 USD-Account: 401 / 2835 / 006</td> </tr> </table>			Blohm + Voss Oil Tools GmbH Hermann-Blohm-Strasse 2, 20457 Hamburg P.O.Box 11 22 53, 20422 Hamburg, Germany Phone: +49 40 3119-1162, Fax: +49 40 3119-3440 E-Mail: oiltools@f-e-t.com Internet: www.blohmvooss-oiltools.com Registered Office: Hamburg <small>Blohm + Voss is a trademark of Blohm + Voss Shipyards GmbH®</small>	Managing Directors: Jens Lutzhöft, James W. Harris Commercial Register: District Court of Hamburg, HRB 125 890 Tax-No.: 46/708/02367, VAT-ID. No.: DE 294 745 990 Banking: HSBC Trinkaus & Burkhardt AG BIC / SWIFT: TUBD DE DD XXX EUR-Account / IBAN: DE73 3003 0880 0012 8350 19 USD-Account: 401 / 2835 / 006
Blohm + Voss Oil Tools GmbH Hermann-Blohm-Strasse 2, 20457 Hamburg P.O.Box 11 22 53, 20422 Hamburg, Germany Phone: +49 40 3119-1162, Fax: +49 40 3119-3440 E-Mail: oiltools@f-e-t.com Internet: www.blohmvooss-oiltools.com Registered Office: Hamburg <small>Blohm + Voss is a trademark of Blohm + Voss Shipyards GmbH®</small>	Managing Directors: Jens Lutzhöft, James W. Harris Commercial Register: District Court of Hamburg, HRB 125 890 Tax-No.: 46/708/02367, VAT-ID. No.: DE 294 745 990 Banking: HSBC Trinkaus & Burkhardt AG BIC / SWIFT: TUBD DE DD XXX EUR-Account / IBAN: DE73 3003 0880 0012 8350 19 USD-Account: 401 / 2835 / 006			

Fig. 6: CE-Declaration example

Contact **B+V** worldwide

In the event of problems that cannot be solved with the aid of this manual, please contact one of the following addresses.

B+V Oil Tools

<p>Europe B+V Oil Tools Hermann-Blohm-Straße 2 20457 Hamburg Federal Republic of Germany</p> <p>Phone: +49 40/3119-1162 Fax: +49 40/3119-8194 oiltools@blohmvooss.com www.blohmvooss-oiltools.com</p>	<p>USA B+V Oil Tools, LLC 7670 Woodway, Suite 266, Houston, Texas 77063 United States of America</p> <p>Phone: +1-713-952 0266 Fax: +1-713-952 2807 bvot@blohmvooss.com www.blohmvooss-oiltools.com</p>
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Drilling Division

<p>USA Drilling Sales Headquarters 10344 Sam Houston Park Dr., Suite 300 Houston, TX 77064 United States of America</p> <p>Phone: +1 713-351-7900 Fax: +1 713-351-7997</p> <p>ForumDP.Sales@f-e-t.com www.f-e-t.com</p>	<p>Middle East Drilling Regional Office Oilfields Supply Center Building B-45 Jebel Ali Free Zone Dubai United Arab Emirates</p> <p>Phone: +971-4-883-5266</p> <p>ForumDP.Sales@f-e-t.com www.f-e-t.com</p>	<p>Asia Drilling Regional Office No 51 Benoi Road #06-00 Liang Huat Industrial Complex Singapore 629908 Republic of Singapore</p> <p>Phone: +65 6465 4850 +65 91389812 Out of hours Fax: +65 6465 4851 ForumDP.Sales@f-e-t.com www.f-e-t.com</p>
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Information on the **B+V** homepage

Info



For further and actual information you can also visit our homepage.

A digital version of the operation instructions for this product as well as the operation instructions, safety- and update notes for other **B+V** products can be reached via the **B+V** homepage.

To join our internet Technical Documentation service with the latest updates on new technical documentation in a free and easy way, you must register to our service with your email-address and name in the customer-login area ① on www.blohmvooss-oiltools.com .

www.blohmvooss-oiltools.com



Fig. 8: Illustration Service - Homepage

DESCRIPTION

DESCRIPTION

1. DESCRIPTION

General

The Blohm + Voss 750 tons Elevator / Spider is designed with strength and safety factors in accordance with API Section 8C - Regulations and will be used for handling long, heavy strings of casings. These tools are convertible for use as casing spiders or casing elevators, and can be operated easily by one man due to unitized slip assemblies and a positive locking mechanism.

The unitized design of the slip assemblies allows the tool to grip casing with uniform radial pressure, ensuring a safe hold while minimizing the possibility of damage to the pipe. This model is available for pneumatic power slip operation.

It is possible to tie in on the pneumatic feedback signal in order to get an external Slips Up or Slips Down signal.

The slip assembly will be mechanically locked automatically in both UP and DOWN position, and must be unlocked by the pneumatic system.

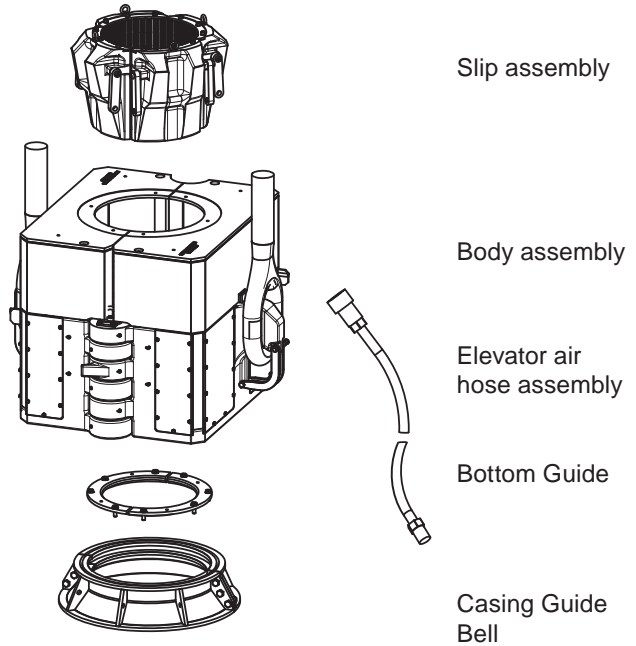
Both can handle pipes from 16" through 24" O.D. On all slip body sizes, reducing inserts are installed simply and rapidly, permitting the handling of pipes with an O.D. up to 1" smaller than the slip body size without changing slips.

When configured as an elevator, the tool includes a bottom guide plate and a casing guide bell, which automatically centers the pipe for positive locking of the slips. Auxiliary equipment needed to use the tool as a spider includes a spider adapter plate, which sits on the rotary table to provide a secure platform for the tool, and an upper guard guide assembly, which functions as a pipe centring device.

Both models feature double-hinges, which permits them to be rapidly installed on casing, or removed.

By locking the manual operation, the BE/S-750 can be operated by remote control.

ELEVATOR



SPIDER

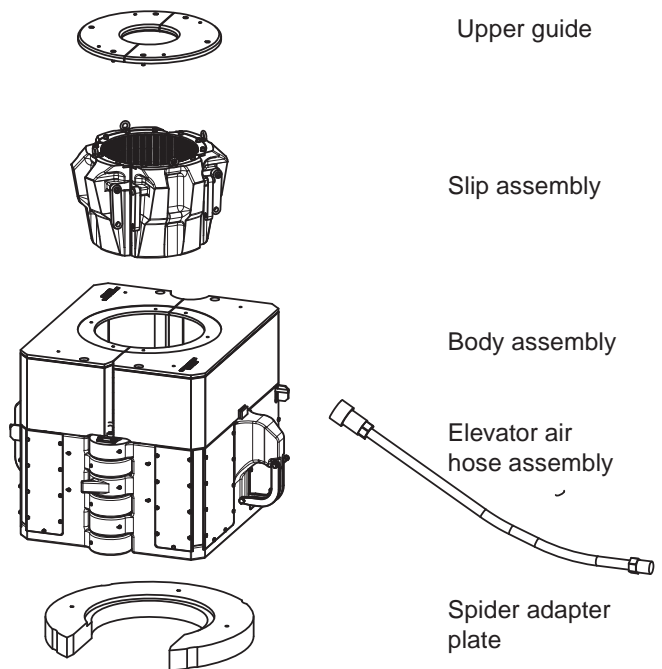


Fig. 9: Component overview

Rating

When using the BVE / BVS 750, the load of 750 sh tons must never be exceeded.

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.

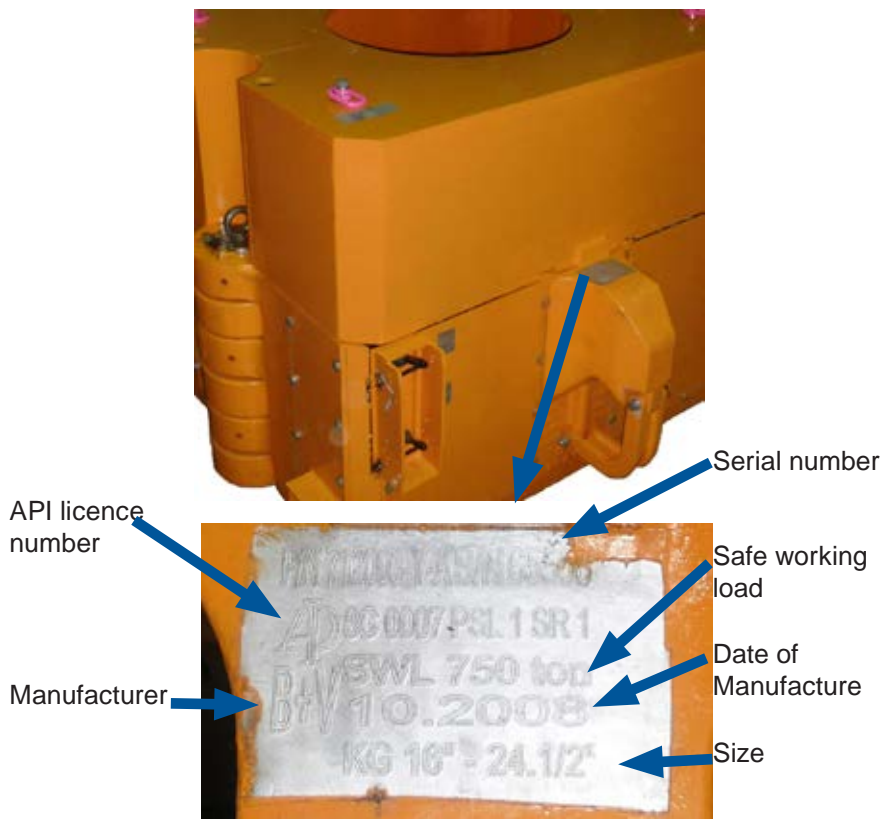


Fig. 10: Machine marking

Slip Identification

The slips identification is stamped in the slips

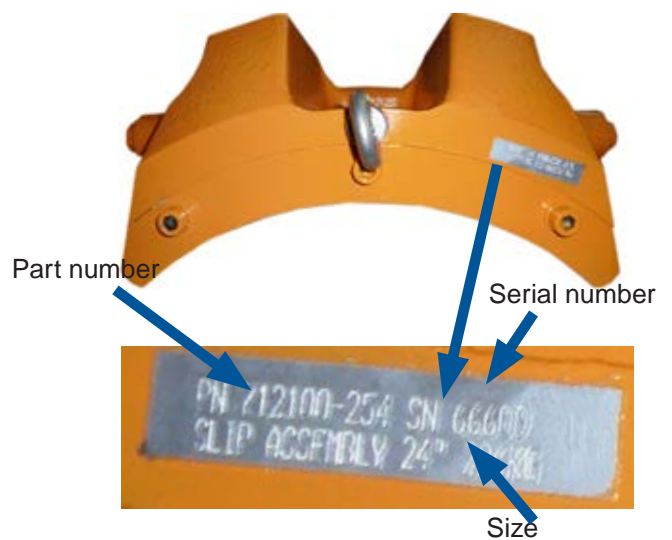


Fig. 11: Slip marking

Technical Data

Maximum allowable working load	750 sh tons
API test load	1,125 sh tons
Pipe size range (i.e. Drill pipe, casing, tubing and drill collar)	16" to 24"
Weight	5.400 kg (11.900 lbs)
Feedback signal	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
Temperature working range ambient	- 20° C to + 80° C - 4° F to 176° F

Elevator Links

Size	Rating
3/4"	750 t
1/2"	1000 t

Work parameter

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

Weights

Pipe size	16"	17"	18"	18.5/8"	20"	22'	24"
PN Slip ass.	712100-245	712100-267	712100-247	712100-248	712100-249	712100-261	712100-254
Body ass.	6,600 kg / 14.550 Lbs						
Slip ass.	-	-	-	1,850 kg / 2,314 Lbs	974 kg / 2,147 Lbs	-	910 kg / 2,005 Lbs
Casing Guide Bell	236 kg / 520 Lbs						
Bottom Guide	59 kg / 130 Lbs						25 kg / 55 Lbs
Upper guide ass.	-	-	-	125 kg / 276 Lbs	115 kg / 254 Lbs	-	83 kg / 183 Lbs
Spider adapter plate	745 kg / 1,642 Lbs						

Contents of delivery

BVE 750 Frame 2 - Elevator	Qty	Part Number
Body Assembly	1	712000-Y-A
Slip Assembly	1	see chapter „Size Components“
Casing Guide Bell	1	753600
Bottom Guide Plate Assembly	1	see chapter „Size Components“
Elevator Air Hose Assembly	1	752822

BVS 750 Frame 2 - Spider	Qty	Part Number
Body Assembly	1	712000-Y-A
Slip Assembly	1	see chapter „Size Components“
Spider Adapter Plate	1	753765
Upper guide Assembly	1	see chapter „Size Components“
Spider Air Hose Assembly	1	752823

Main Dimensions

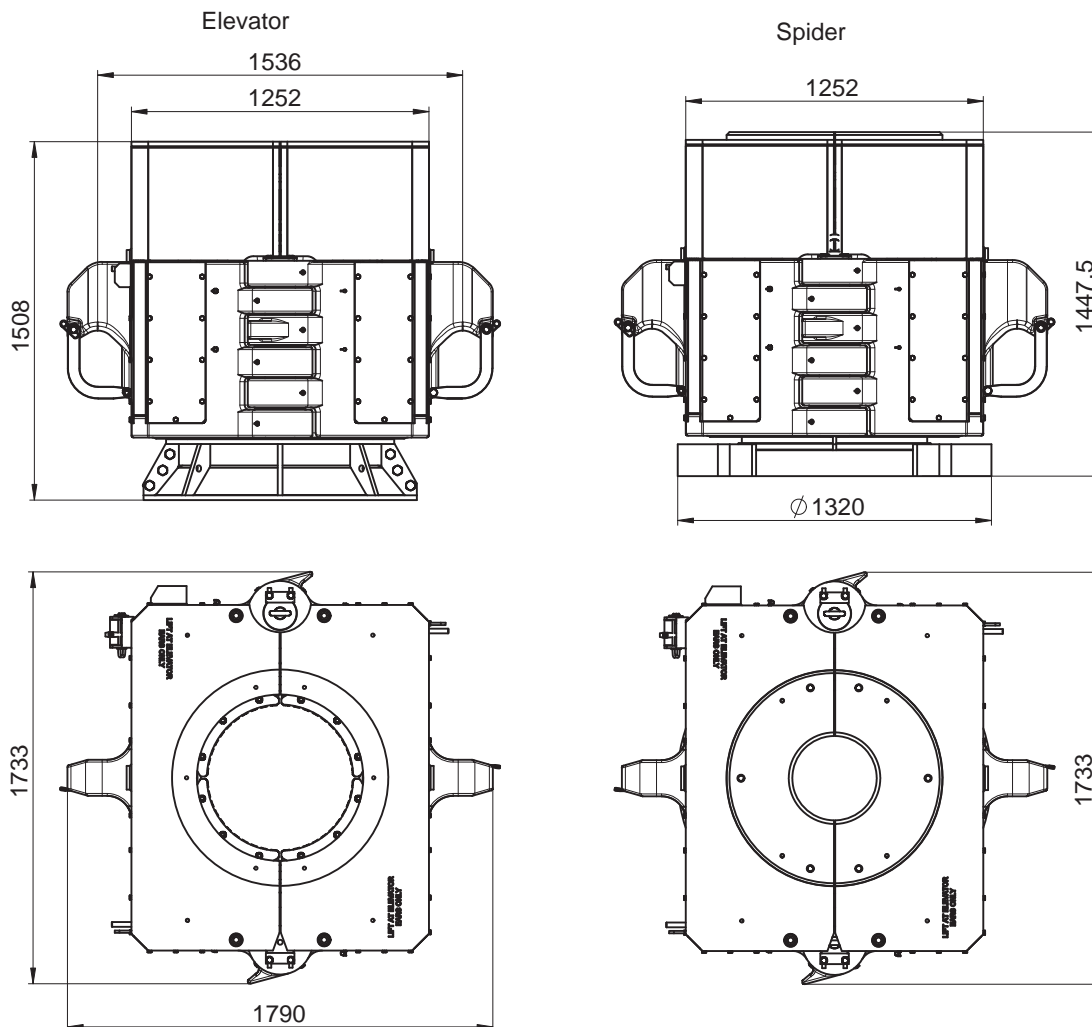


Fig. 12: Main Dimension

COMMISSIONING

2. COMMISSIONING

Commissioning BVE / BVS 750-2

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

OK	<input type="checkbox"/>	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	<input type="checkbox"/>	Cross check of all delivered parts.
----	--------------------------	-------------------------------------

Pneumatic Characteristics

OK	<input type="checkbox"/>	Operating pressure	7-10 bar (100-150 PSI)
----	--------------------------	--------------------	------------------------

OK	<input type="checkbox"/>	Volumetric flow	6,8 l/min
----	--------------------------	-----------------	-----------

Lubrication

OK	<input type="checkbox"/>	Check for correct seating of Hinge Pins.
----	--------------------------	--

OK	<input type="checkbox"/>	Apply grease to all greasing Points (see manual) until grease is visibly coming out of the bores.
----	--------------------------	--

OK	<input type="checkbox"/>	Check Bottom guide plate, casing guide bell and securing handle on the elevator are installed and fixed properly.
----	--------------------------	---

OK	<input type="checkbox"/>	Check Upper guide plates on spider are installed and fixed properly.
----	--------------------------	--

OK	<input type="checkbox"/>	Check slips are properly installed.
----	--------------------------	-------------------------------------

OK	<input type="checkbox"/>	Check slips are the correct size and same serial number.
----	--------------------------	--

Functional Manually

OK	<input type="checkbox"/>	Link blocks are closed.
----	--------------------------	-------------------------

OK	<input type="checkbox"/>	Slip Assembly opens, when Lock Lever stands in „LOCK ON“ Position and Slip Lever in „SLIP UP“ Position.
----	--------------------------	---

OK	<input type="checkbox"/>	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	<input type="checkbox"/>	Slip Assembly raising, when Pressure apply at Connection B feedback signal indicates: Elevator is open.
----	--------------------------	---

OK	<input type="checkbox"/>	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.



Fig. 13: Lifting and transport

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.

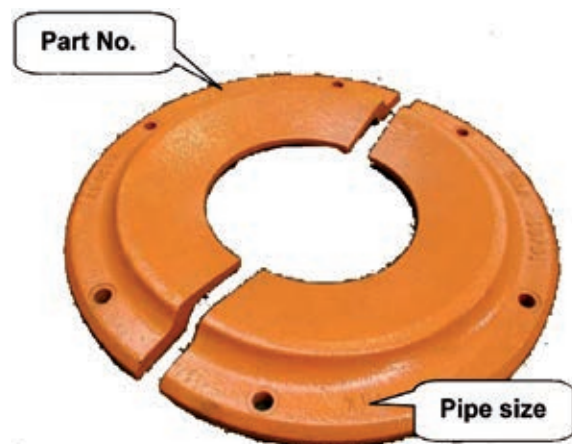


Fig. 14: Guide Plate Marking I

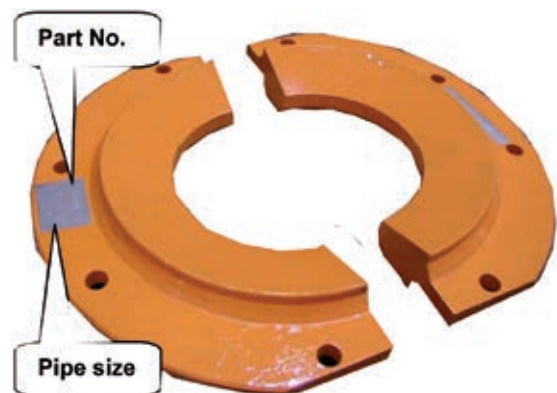


Fig. 15: Guide Plate Marking II

Installing and mounting the Spider

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.

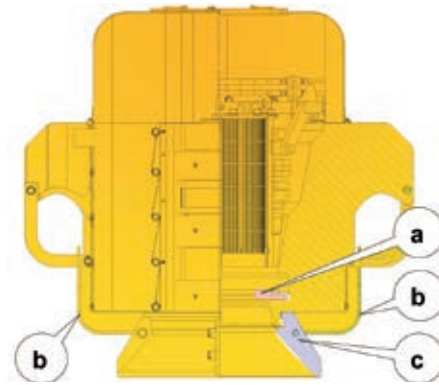


Fig. 16: Elevator Side view

Installing elevator links

The BVE/BVS 750 fits for 4 $\frac{3}{4}$ " B+V 750t and 5 $\frac{1}{2}$ " B+V 1000t Elevator Links.

Remove the link block pin d and safety spring e and allow the link block f to swing open.

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.

A:

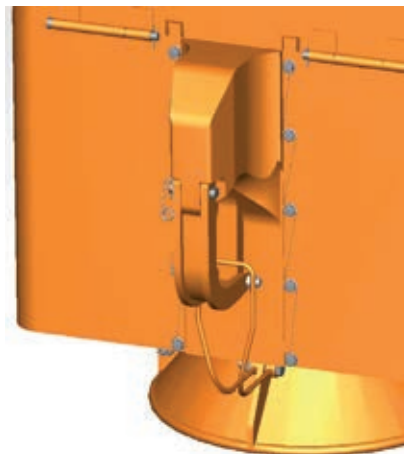


Fig. 17: Link Block - Opening

B:

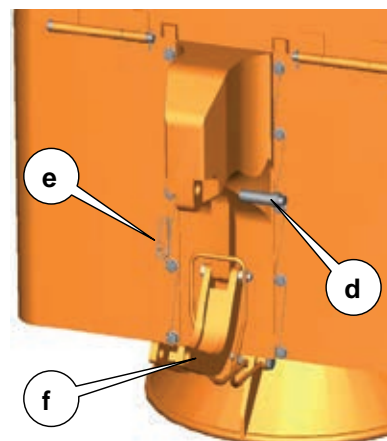


Fig. 18: Link Block - Opening

Installing and mounting the Spider

Mounting the spider

It is necessary to place the spider adapter plate G at well center.

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.

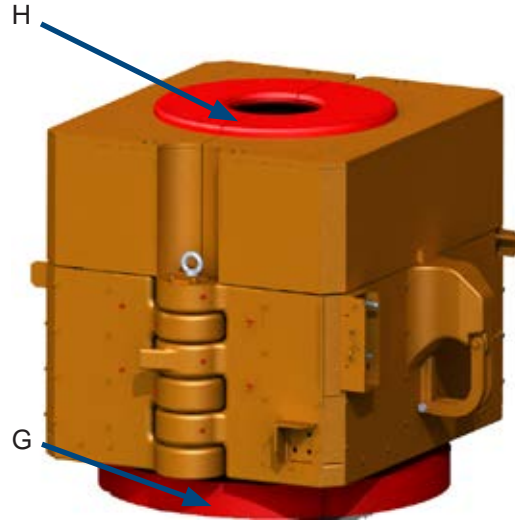


Fig. 19: Mounting Spider

INSTALLATION

Air connection

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

Connecting manually operated BVE/BVS

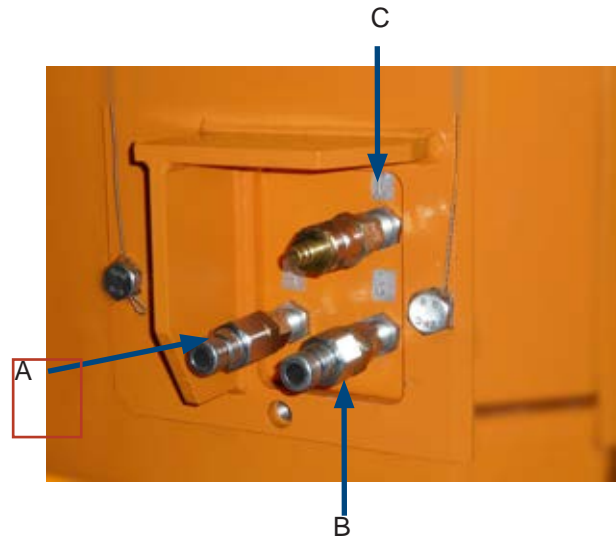
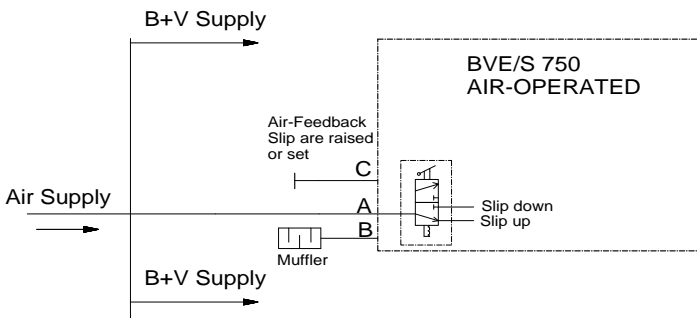
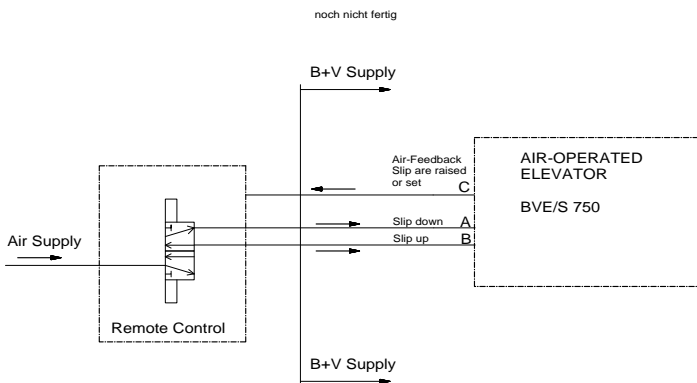


Fig. 20: Air connection

Connecting remote controlled BVE/BVS



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.

Remove the two screws from the top of the Cover and open both Covers to expose the slip support plate.

Raise the slips and confirm that the slip locks are engaged.

Install a forged steel eyebolt into the slip.

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 until the Slip Link is horizontal.

Remove the Cotter Pins from the slip support pins and while supporting the slip links remove the Slip Support Pins.

Lift the slip clear of the elevator/spider and place it aside. Repeat for the remaining slips.

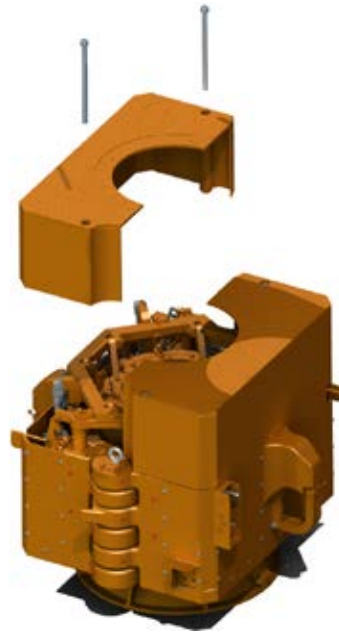


Fig. 21: Open cover



Fig. 22: Place Lifting eye and sling

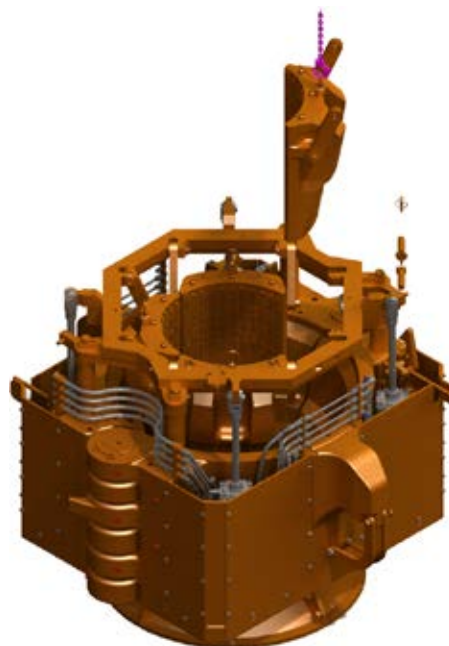


Fig. 23: Remove slip

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.

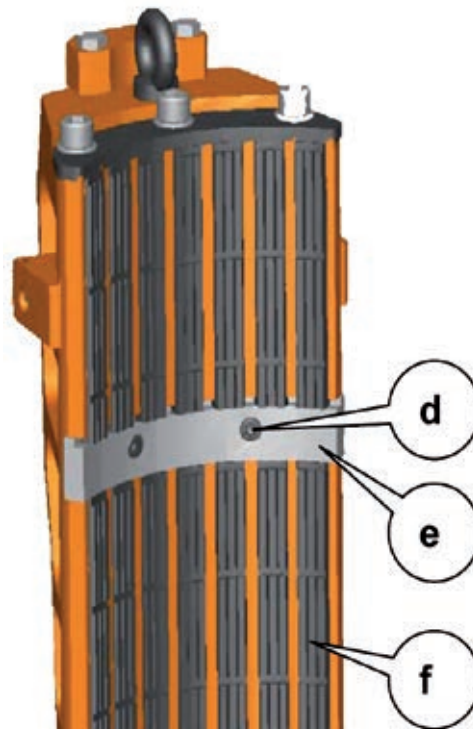


Fig. 24: Changing inserts I

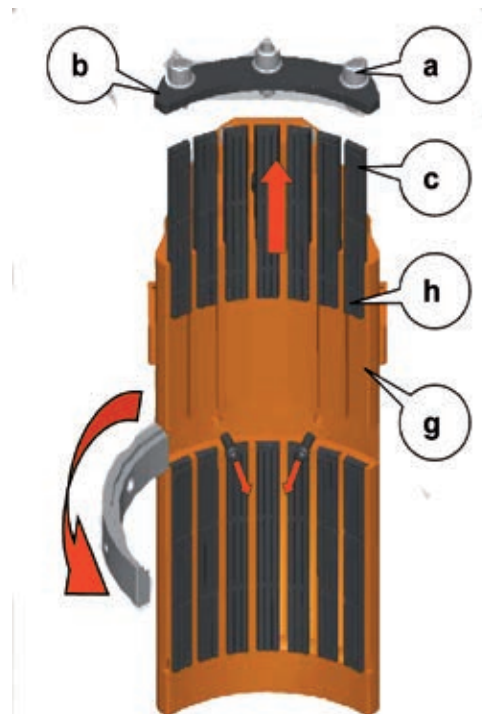


Fig. 25: Changing inserts II

Installation

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

OK	<input type="checkbox"/>	Make sure the required slips are installed.
OK	<input type="checkbox"/>	Make sure the required Guide Plates are installed before first use.
OK	<input type="checkbox"/>	The Guide Plates are fixed with the screws.
OK	<input type="checkbox"/>	Cover is closed.
OK	<input type="checkbox"/>	Door is closed.

Pneumatic Connections

OK	<input type="checkbox"/>	The controls are connected to the Air Power Supply.
OK	<input type="checkbox"/>	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	<input type="checkbox"/>	Close elevator / spider.
OK	<input type="checkbox"/>	Open elevator / spider.
OK	<input type="checkbox"/>	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 not operate without Upper guide plate and covers in place.

Normal Operation

Raising slips without remote control

To raise the slips, the lock control lever is moved to the „LOCK ON“ position.

The slip control lever is moved to the „SLIP UP“ position

Until the slips are raised the slip control lever must remain in the “LOCK ON” position.

The slips will automatically lock in the upper position, by a mechanical locking system.

Lowering slips without remote control

To lower the slips, throw the slip control lever to the „SLIP UP“ position.

When the slip is raised, the lock control lever must shift to the „LOCK OFF“ position and hold there.

Now the slip control lever must throw to the „SLIP DOWN“ position.

The slips will automatically lock in the lower position, by a mechanical locking system.



Fig. 26: Manual control lever position



Fig. 27: Manual control lever position

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:

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.

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.

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 manoeuvred to the spider for make-up.

The power tong operator then makes up the joint.

The derrickman removes the single-joint elevator or pick-up line from the top of the joint.

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.

The derrickman then sets the elevator slips. Note: Step 2 is repeated each time Steps 5 - 7 take place.

Simultaneously, the driller picks up the elevator while the floorman raises the spider slips.

The driller then lowers the joint through the spider stopping the elevator guide bell approximately six inches above the spider.

The floorman sets the spider slips.

The driller slacks off on the elevator so its slips can be released.

The floorman raises the elevator slips.

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.

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

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.

Holding both above handles C down, ensuring that the latches pivot to allow the pin on the slip support plate to pass.

Raise the slips until the slip lock plungers are heard to seat.

Lowering slips

Hoisting upwardly on the straps supporting the slip support plates only enough to take the slip weight off of the slip lock plungers.

Pull upwardly on the lock handles and hold them in that position until the slips have been lowered at least 30mm before release.

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.*

Raise the slips.

Disassemble the casing guide bell (if installed).

Unscrew the two screws and the hinge pin securing plate B.

Remove the exposed hinge pin by pulling upwardly on the eyebolt C.

Spread the body halves apart until the elevator/spider can be withdrawn from the pipe.

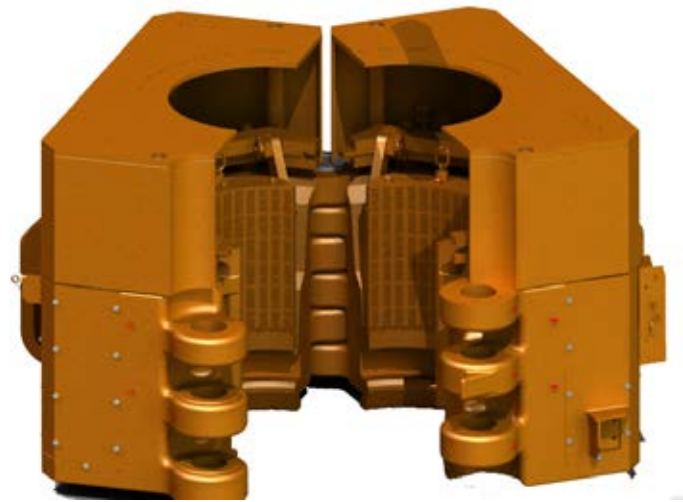
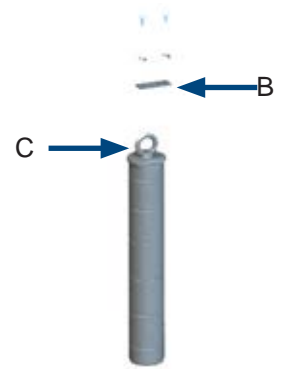


Fig. 28: Removing Hinge Pin

**MAINTENANCE
+ INSPECTION**

5. MAINTENANCE AND INSPECTION

General

If cracks, excessive wear etc. is recognised, contact B+V or an authorised service company.

Welding of the castings should be done only by B+V or an authorised service company in according to Blohm + Voss welding procedure.

WARNING: FOR SERVICE AND MAINTENANCE DISCONNECT THE AIR SUPPLY.



Fig. 29: Back of Slips

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. to routinely grease the slots will cause the dies to stick.

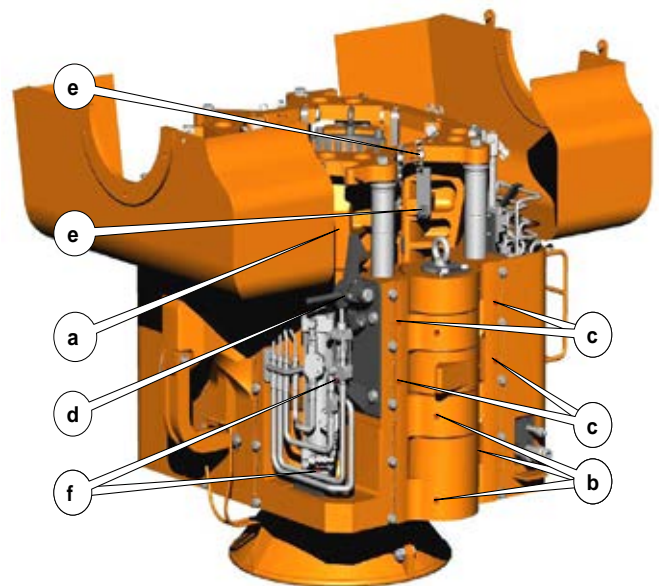


Fig. 30: Body Lubriocation

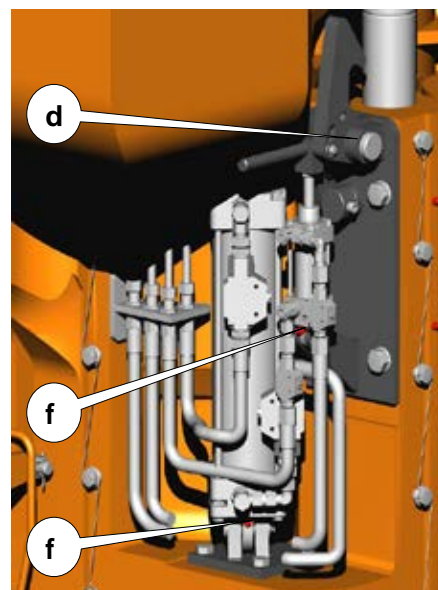


Fig. 31: Control Lubrication

GREASE DAILY

Instructions: Lubricate at Least
Once Daily (P/N 671642)



Fig. 32: Recommended Grease Gun
(P/N 775810)

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 B+V): Low-Viscosity grease

B+V recommends use of the following lubricants for effective lubrication under various ambient conditions:

Designation:	Temperature range*	Remarks
AVIATICON XRF Low-Viscosity Grease	-20 ... +29 °C (-4 ... +84.2 °F)	NLGI 0
NESSOS SF0 EP grease for non-oil tight gear trains	-20 ... +29 °C (-4 ... +84.2 °F)	NLGI 0 DIN 51826 GPOF-25 DIN 51502 GPOF-25

* For temperatures above +30 °C (+86 °F) **B+V** recommends using the specified lubricants in consistency class 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:

Daily: I+II

6 Monthly: III

1 Year: IV

Spiders:

Daily: 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 hydraulic 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 B+V or an authorized service company.

Inspection of Pneumatic System

Check for leakage every day.

Should internal or external leakage reach an unacceptable high level, contact B+V 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 B+V.

Welding at the castings should be done only by B+V or an authorized service company in accordance with 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 Intervals

Category	Interval	Preparatory measures
I	Daily	<ul style="list-style-type: none"> - BVE / BVS 750-2 in links - BVE / BVS 750-2 on rig floor
II	Weekly	<ul style="list-style-type: none"> - BVE / BVS 750-2 on rig floor - Slip assembly removed
III	Semiannually	<ul style="list-style-type: none"> - BVE / BVS 750-2 on rig floor - Slip assembly removed - Insert carrier removed - Hoisting Cylinder cover removed
IV	Every 2 years	<ul style="list-style-type: none"> - BVE / BVS 750-2 on rig floor - Slip assembly removed - Slip assembly removed - Insert carrier removed

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 function of locking mechanism (latch assemblies)	OK	
6 Check all visible greasing points	OK	

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	

SUPERVISOR

DATE

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	

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	

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	

CHECK FOR LOOSE ITEMS, ESPECIALLY FOR:

DESCRIPTION	CHECKED	SIGNATURE
1 Hinges and bolts of lifting assembly	OK	
2 Link, screws, bolts and other parts of slip assembly	OK	
3 Hinge pin and securing plate	OK	
4 Bolts, springs and screws of latch assemblies	OK	

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	

SUPERVISOR

DATE

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

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

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	

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	

SUPERVISOR

DATE

Critical Areas

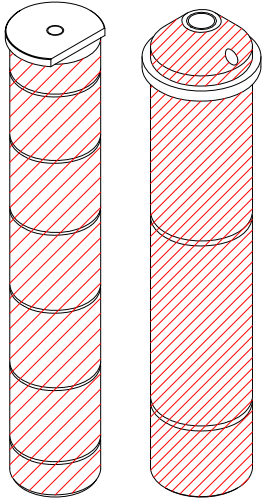


Fig. 33: Hinge Pin

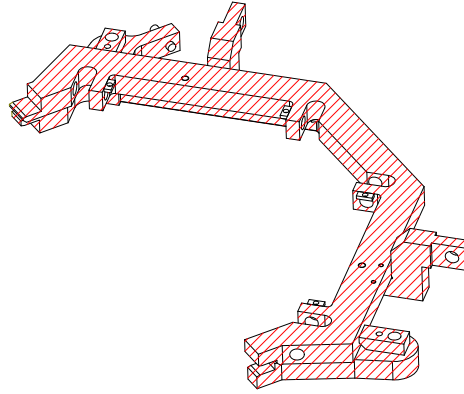


Fig. 34: Lifting assembly

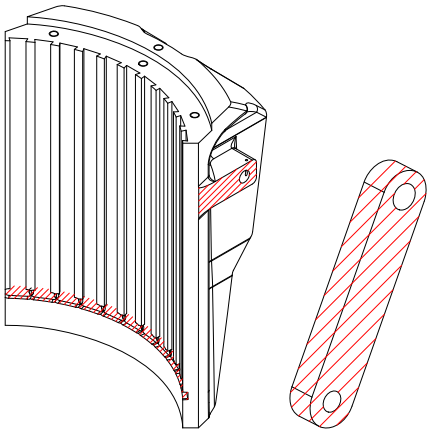


Fig. 35: Slip and hinge

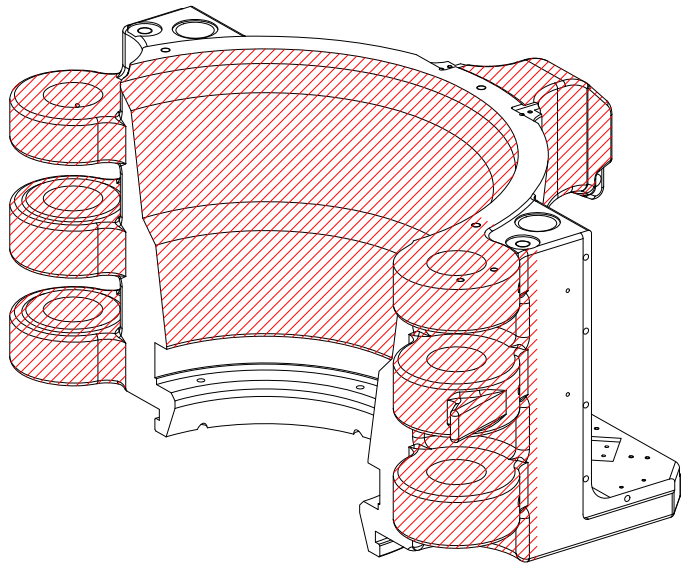


Fig. 36: Body

Critical area's are hatched

Wear data criteria

All kind of repairs not performed by **B+V**, should nevertheless be done in accordance with their methods and procedures or with their agents. Minor cracks or defects, which may be removed without reducing safety or operation of the elevator, can be removed by grinding (see critical areas).

Following the repair, the parts should again be inspected by an appropriate method to insure that the defect has been completely removed.

Hinge Pin

Hinge pin dia new:	79,70 mm
Nominal bore dia.:	80,00 mm
Bore dia. new max:	80,074 mm
Bore dia. worn max:	80,657 mm

Lifting ear

Min. new	285,3 mm
Max. worn	279,3 mm

Lock mechanism

Maximum allowed wear at the Lock cam is 1 mm.

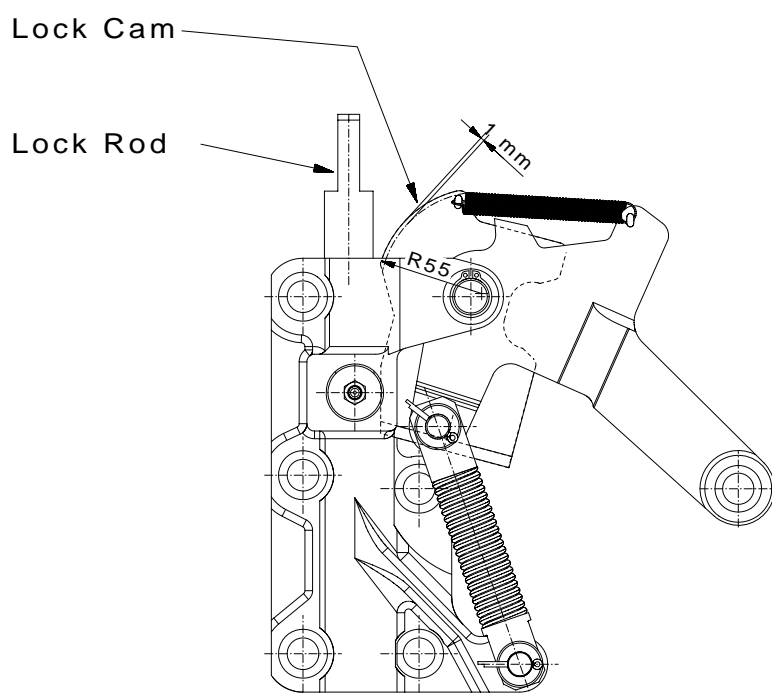


Fig. 37: Lock mechanism

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 than 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 its original crate, use a fork lift for lifting the crate only.

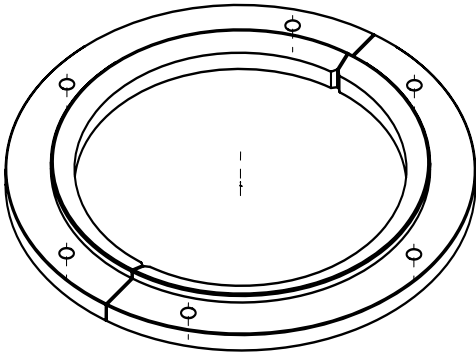
The weight of the tool is indicated on the identification area of the tool, and also on its original transporting crate.

SIZE COMPONENTS

SIZE
COMPONENTS

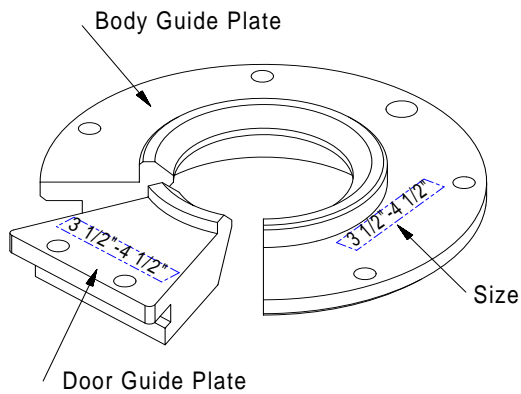
6. SIZE COMPONENTS

Upper guard guide plate / spider



Pipe size	Slip ass. PN	Insert		Elevator	Spider
		PN	Qty	Guide plate	Guide plate
18.5/8"	712100-248	351213	240	712044	753731
20"	712100-249	350113	240	712045	753736
24"	712100-254	350113	264	712047	753746

Guide plate assembly / elevator



DRAWINGS + SPARE PARTS

DRAWINGS +
SPARE PARTS

7. DRAWINGS AND SPARE PARTS

Info



Operational safety and readiness of the machine do not only depend on your skill, but also on maintenance and servicing of the machine.

Insist on using original spare parts when carrying out maintenance and repair work. This ensures operational safety and readiness of your machine, and maintains its value.

Malfunction

If a malfunction occurs or the BVE / BVS 750-2 does not operate as expected, trouble shoot as follows:

1. Check hydraulic connections and hydraulic lines.
2. Check whether the hydraulic unit is switched on.
3. Check whether the Slip, and Slip Adapter have been installed for the size/type of pipe used.
4. Check for proper lubrication of the BVE / BVS 750-2.
5. Check feedback (from slip) for proper function.
6. Collect all information on the malfunction and define the problem.
7. Attempt to find a quick solution to the problem.
8. Check the last changes/modifications.
9. Isolate the problem.
10. Replace any defective components.

If the cause of the malfunction cannot be determined and remedied, contact **B+V** Technical Support.

Info



In the event of problems, which cannot be remedied with the aid of this manual, please contact the **B+V** Technical Support or one of the authorized service companies specified in Chapter 1.9.

Repair

Repair by Customer

It is only permissible for the customer/company operating the machine to replace defective parts with OEM (Original Equipment Manufacturer) parts approved by **B+V** in conformance with the present operating instructions.

Use of parts not approved by **B+V** voids the guarantee.

Repair by Manufacturer

Ensure that any repair work required on the BVE / BVS 750-2 is performed only by **B+V** or an authorized service company.

Info



Please contact the **B+V** Technical Support or one of the authorized service companies specified in Chapter 1.9 to perform repair or maintenance work.

Securing Screws with Nord Lock washers

Nord Lock bolt securing systems use geometry to safely lock bolted joints in the most critical applications. The key is the difference in angles. Since the cam angle „ α “ is larger than the thread pitch „ β “, the pair of washers expands more than the corresponding pitch of the thread. Any attempt from the bolt/nut to rotate loose is blocked by the wedge effect of the cams.

When the pushed movements of the device will get in contact with the under surface of the securing plate, this surface contact will secure the plate and prevents any motion in the axial direction.

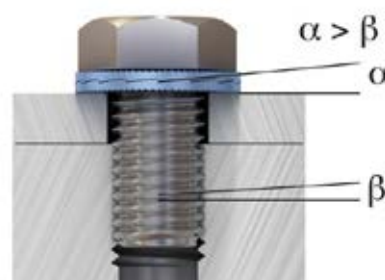


Fig. 38: Nord Lock Washer principle illustration

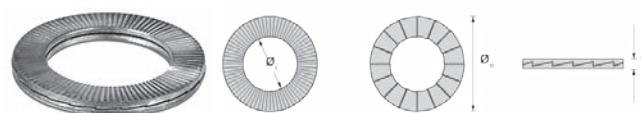


Fig. 39: Nord Lock Washer detailed illustration

Tightening torques for Nord Lock lock washers

Thread	d mm (")	D mm (")	T mm (")	Mv Nm (lb ft)
M6	6.5 (0.26)	10.8 (0.43)	1.8 (0.07)	12 (8.9)
M8	8.2 (0.32)	13.5 (0.53)	2.6 (0.10)	30 (22.1)
M10	10.3 (0.41)	16.6 (0.65)	2.6 (0.10)	59 (43.5)
M12	13.0 (0.51)	19.5 (0.77)	2.6 (0.10)	103 (76)
M14	14.5 (0.57)	23.0 (0.91)	3.7 (0.15)	160 (118)
M16	17.0 (0.67)	25.4 (1.00)	3.7 (0.15)	250 (184)
M18	19.5 (0.77)	29.0 (1.14)	3.7 (0.15)	350 (258)
M20	21.0 (0.83)	30.7 (1.21)	3.7 (0.15)	490 (361)
M22	22.9 (0.90)	34.5 (1.36)	3.7 (0.15)	660 (487)
M24	26.0 (1.02)	39.0 (1.54)	3.7 (0.15)	850 (627)
M27	28.5 (1.12)	42.0 (1.65)	4.6 (0.18)	1220 (900)
M30	30.5 (1.20)	47.0 (1.85)	4.6 (0.18)	1600 (1180)
M33	33.5 (1.32)	48.5 (1.91)	4.6 (0.18)	2200 (1623)
Dimensions with larger outside diameters (oblong bores)				
M6	6.5 (0.26)	13.5 (0.53)	2.6 (0.10)	13 (9.6)
M8	8.6 (0.34)	16.6 (0.65)	2.6 (0.10)	32 (23.6)
M10	10.3 (0.41)	21.0 (0.83)	2.6 (0.10)	64 (47.2)
M12	13.0 (0.51)	25.4 (1.00)	3.7 (0.15)	110 (81)
M16	17.0 (0.67)	30.7 (1.21)	4.0 (0.16)	260 (192)

Info



As a result from tests the NORD LOCK washers were safely secured even after reuse 30 times. Only a limited part of the clamp load was lost due to normal settlements between contact surfaces. The cam edges of the washers got rounded off but were still intact after the reuse test.

The best thing to do is to make ocular inspection of the washers during every maintenance.

Make sure that the cams (cam tops) look good and that the teeth are not worn off. Lubricate the joint and the mating surfaces if possible so that the friction conditions do not change. When reassembling, care should be taken that the two washer halves are mated correctly.

If all these criteria are met, the washers can be safely reused.

Drawing, Parts List and Spare Parts

Contact to Parts Department

Info



Please contact the **B+V** Technical Support or one of the authorized service companies specified in Chapter 1.9 to order replacement parts or in the event of any questions.

712000-Y-A BVE/S 750-2

Elevator

Spider

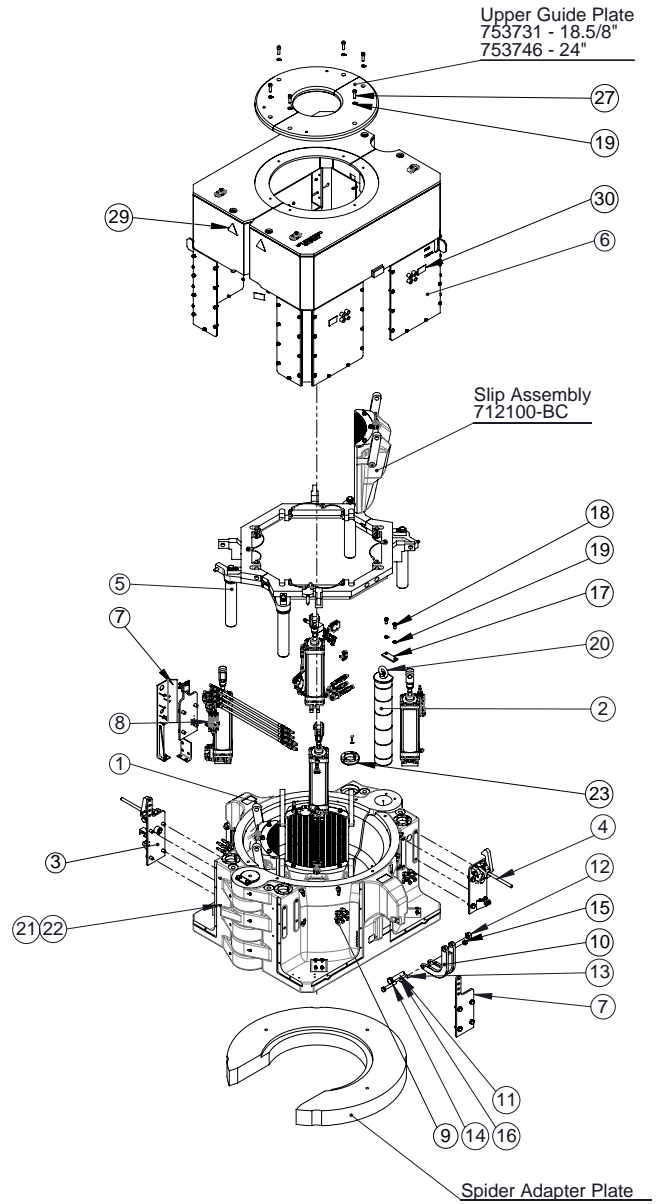
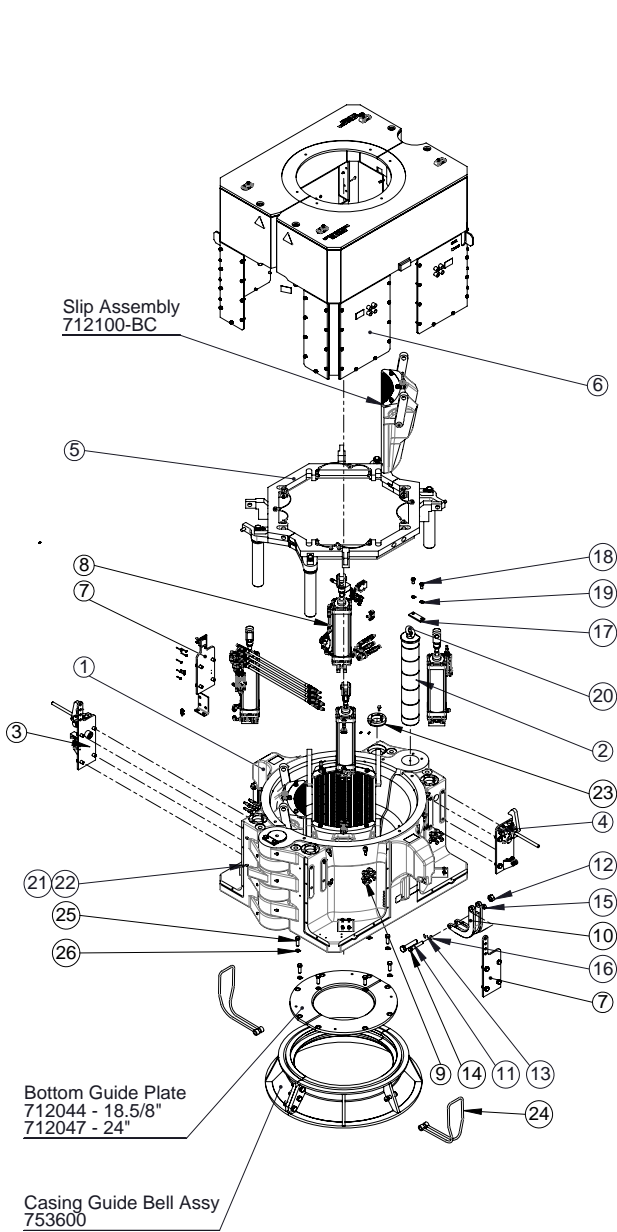


Fig. 40: 712000-Y-A BVE/S 750-2 - I

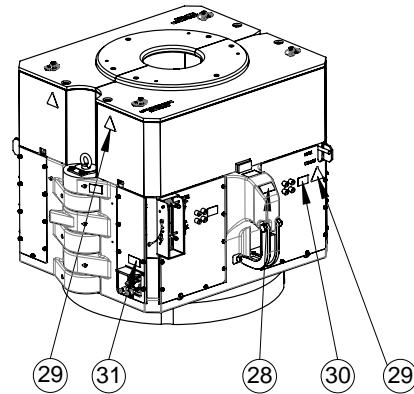
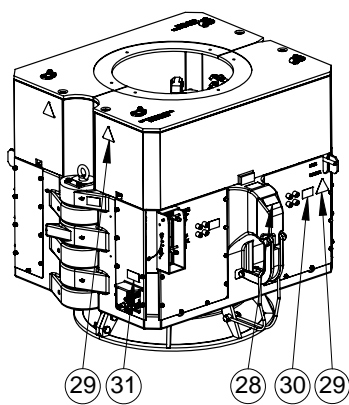


Fig. 41: 712000-Y-A BVE/S 750-2 - II

Part List 712000-Y-A

No.	Qty.	Part no.	Description
1	1	712010-BF	Body BVE/S 750-2
2	2	710013	Hinge Pin
3	1	712900-2	Latch Assembly ,pneumatic
4	1	712900-1	Latch Assy, pneumatic
5	1	712200	Lifting Assembly
6	1	712800	Covering Assembly, pneumatic
7	1	712650	Air Connection Assembly
8	1	712600	Air Assembly
9	8	710750	Grease Assembly
10	2	712019	Link Block
11	2	735111	Screw
12	2	735110	Nut
13	2	752331	Split Pin
14	2	710025	Screw
15	2	613556-41	Nut
16*	2	752339	Split Pin
17	2	617518	Plate
18	4	617519	Screw
19	10	792106	Washer
20	1	710020	Lifting eye bolt
21	16	70064	Grease Nipple
22	16	612518	Protection Cap
23	4	710760	Bushing Assembly
24	2	753602	Security Handle
25	8	710026	Screw
26	8	792172	Washer
27	6	752333	Screw
28	1	613129	Sticker Hotline
29	5	671640	Warning sign "Hands" - sticker
30	6	671642	Warning sign "GREASE DAILY"
31	1	671638	Warning sign Blohm + Voss

712900-1 Latch assembly, pneumatic

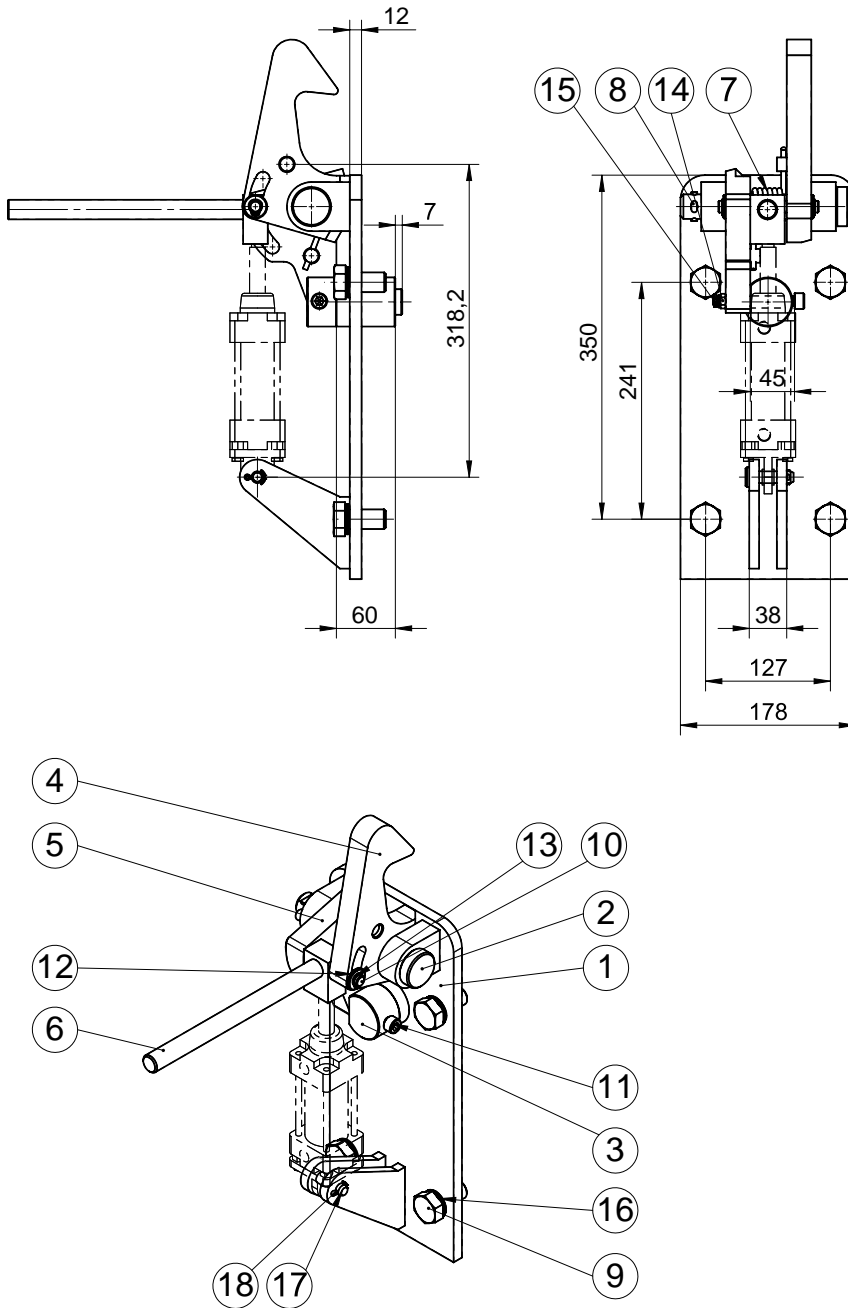


Fig. 42: 712900-1 Latch assembly, pneumatic

Part List 712900-1 Latch assembly, pneumatic

No.	Qty.	Part no.	Description
1	1	710905-2	Plate lock mounting
2*	1	710310	Latch Pin
3	1	710316	Plunger
4	1	712902	Latch Hook
5	1	710325	Cam
6	1	712901	Knuckle, pneumatic
7*	1	710335	Latch Spring
8*	1	710347	Split Pin
9*	4	710349	Screw
10*	1	710350	Pin
11*	1	710353	Shoulder Screw
12*	2	650218-3	Washer
13*	2	611523	Retaining ring
14*	1	675057	Nut
15*	1	620609	Split Pin
16*	4	792108	Washer
17*	1	710931	Clevis pin with head
18*	1	645196	Split Pin

* marked Items are recommended spare parts see 712900-1-RSP

712900-2 Latch assembly, pneumatic

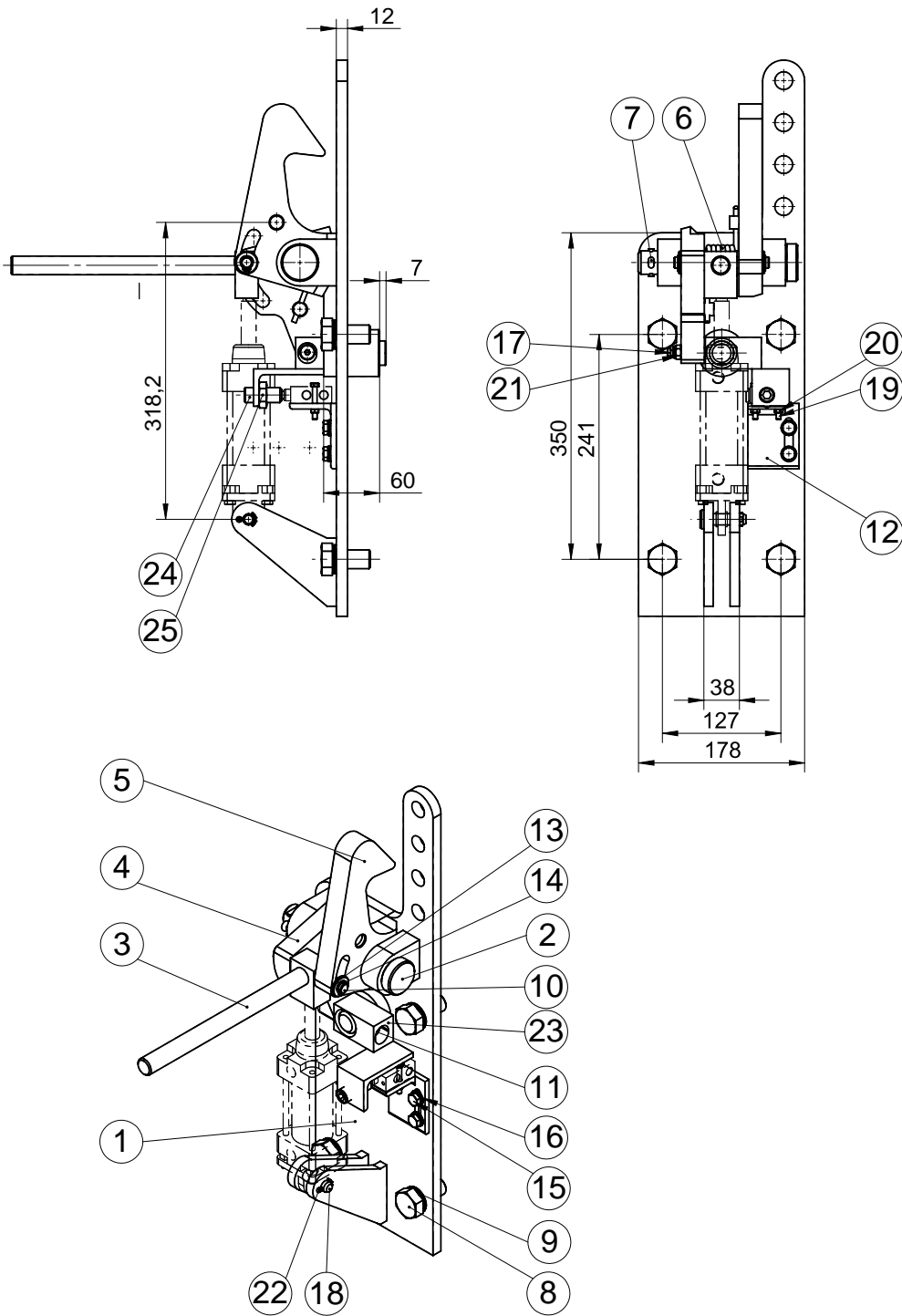


Fig. 43: 712900-2 Latch assembly, pneumatic

Part List 712900-2 Latch assembly, pneumatic

No.	Qty.	Part no.	Description
1	1	710905-1	Lock Mounting Plate
2*	1	710310	Latch Pin
3	1	712901	Knuckle, pneumatic
4	1	710325	Cam
5	1	712902	Latch Hook
6	1	710335	Latch Spring
7*	1	710347	Split Pin
8*	4	710349	Screw
9*	4	792108	Washer
10*	1	710350	Pin
11*	1	710353	Shoulder Screw
12*	1	710902	Mounting Angle
13*	2	650218-3	Washer
14*	2	611523	Retaining ring
15*	2	645028	Screw
16*	2	792112-1	Washer
17*	1	620609	Split Pin
18*	1	710931	Clevis pin with head
19*	2	710934	Screw
20*	2	710933	Nut
21*	1	675057	Nut
22*	1	645196	Split Pin
23*	1	710901	Plunger
24	1	710906	Set screw
25	1	710348	Nut

* marked Items are recommended spare parts see 712900-RSP

712200 Lifting assembly, pneumatic

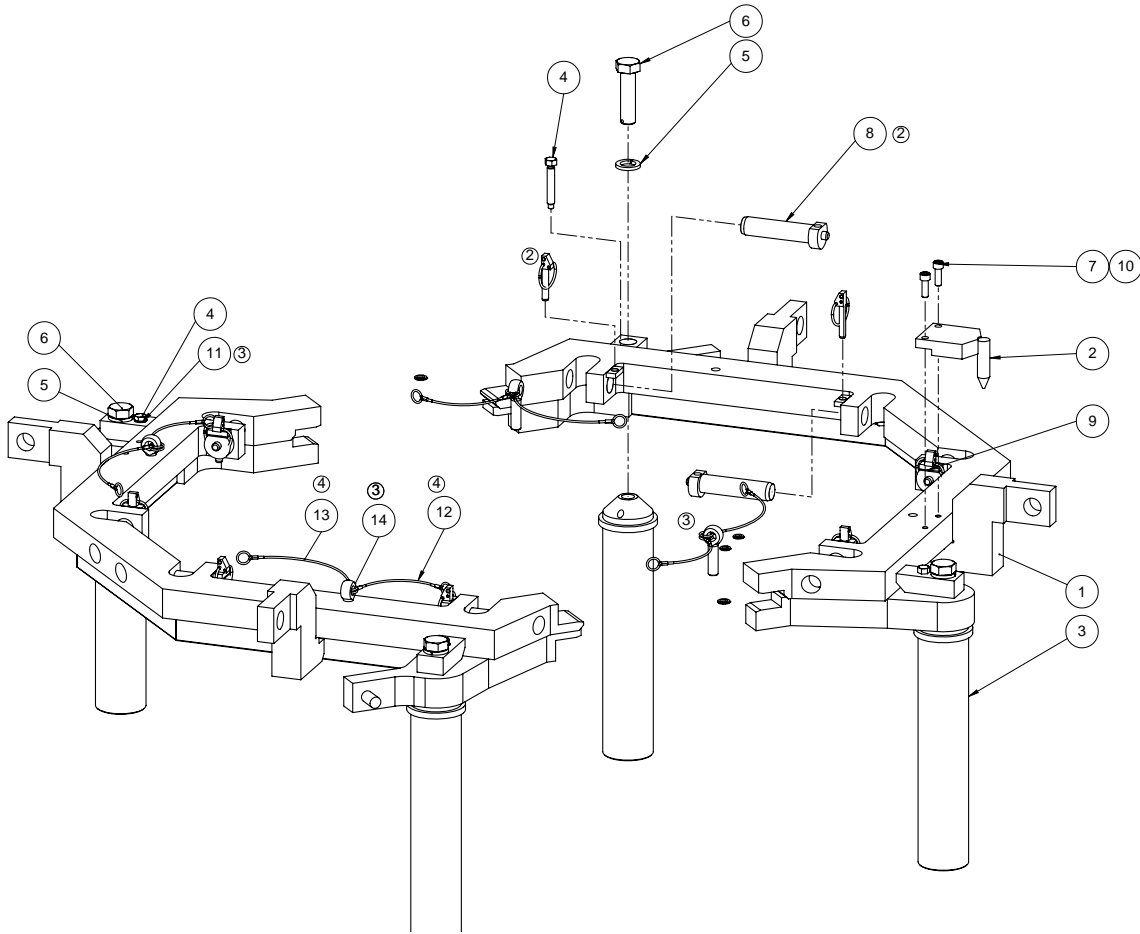


Fig. 44: 712200 Lifting assembly, pneumatic

Part List 712200 Lifting assembly, pneumatic

No.	Qty.	Part no.	Description
1	2	712201	Slip Support Plate
2	1	712204	Indexing bolt
3	4	710410	Slip Stanchion
4*	4	712205	Screw
5*	4	710433	Spring Washer
6*	4	712206	Screw
7	2	615145	Screw
8*	8	712202	Slip Support Pin
9*	8	712207	Linch Pin
10*	2	792103	Washer
11*	4	792104	Washer
12	4	712208	Safety Rope
13	4	712209	Safety Rope
14	4	621480	Eye Screw

* marked Items are recommended spare parts see 712200-RSP

712800 Covering assembly, pneumatic

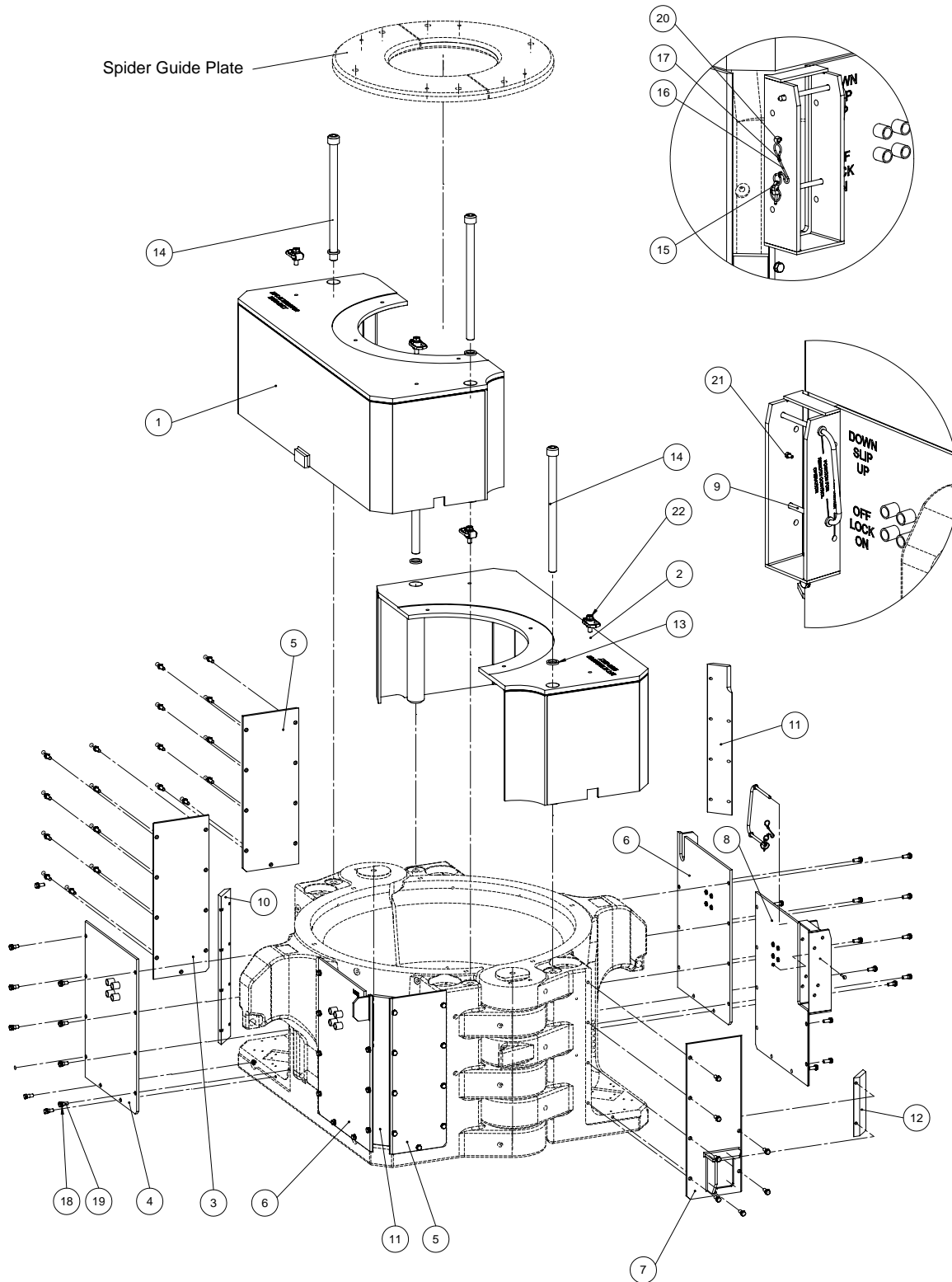


Fig. 45: 712800 Covering assembly, pneumatic

Part List 712800 Covering assembly, pneumatic

No.	Qty.	Part no.	Description
1*	1	712801	Top Cover left
2	1	712802	Top Cover right
3	1	712803	Cover sheet 1
4	1	712804	Cover sheet 2
5	2	712805	Cover sheet 3
6	2	712806	Cover sheet 4
7	1	712807	Cover sheet 5
8	1	712808	Cover sheet 6
9	1	712809	Stick Handle
10	1	712810	Connecting corner 1
11	2	712811	Connecting corner 2
12*	1	712812	Connecting corner 3
13	4	792198	Washer
14	4	712813	Screw
15*	1	645035	Linch Pin
16*	1	643801	Wire line
17*	2	643801-1	Rope Clamp
18*	70	792104	Washer
19	70	735326	Screw
20	1	660414-1	Eye Screw
21	1	755251	Nut
22	4	553468	Lifting eye

* marked Items are recommended spare parts see 712800-RSP

712600 Pneumatic assembly

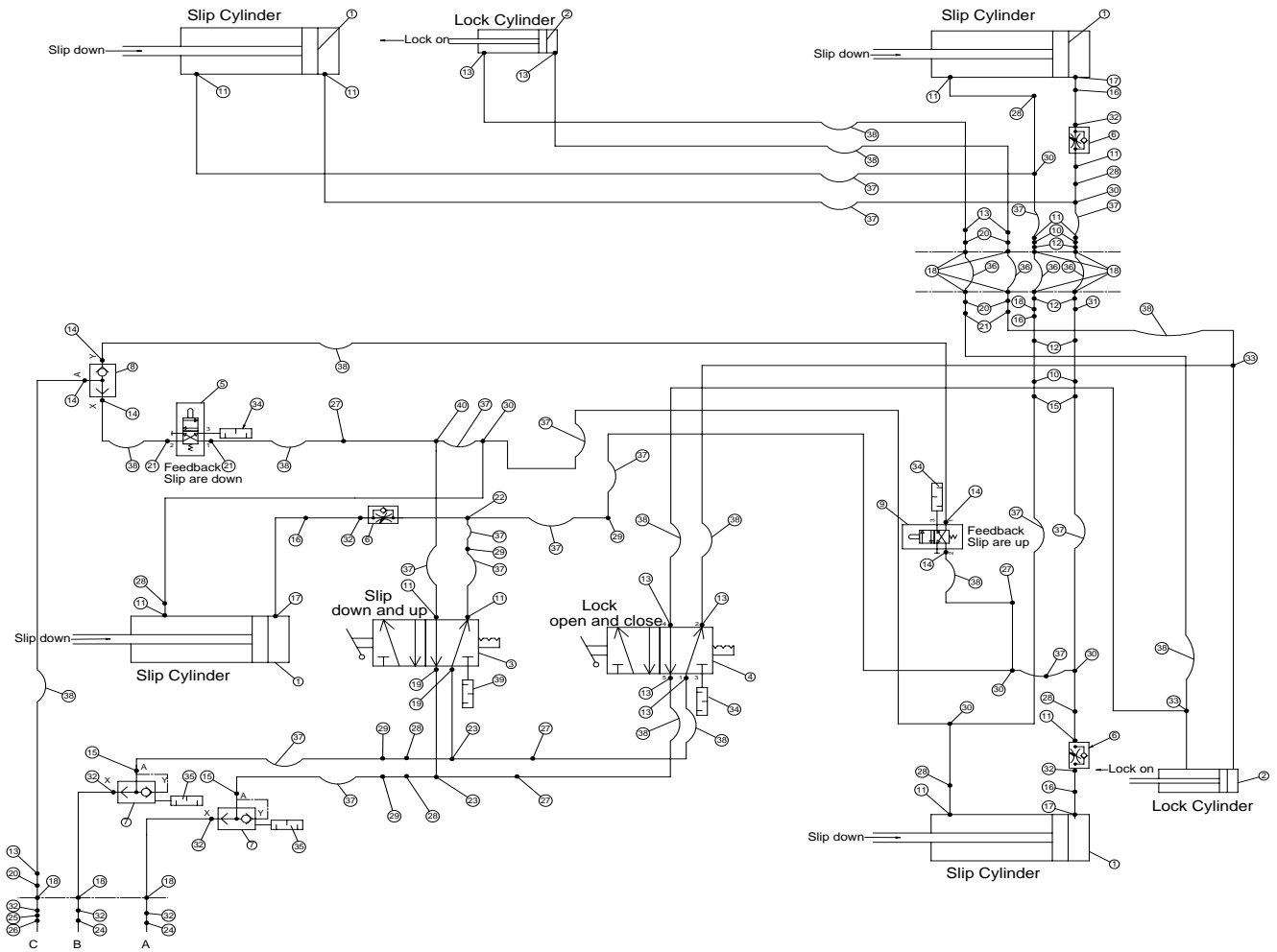


Fig. 46: 712600 Pneumatic assembly

Part List 712600 Pneumatic assembly

No.	Qty.	Part no.	Description
1	4	712601	Slip Cylinder Assembly
2	2	710620	Lock Latch Cylinder Assembly
3	1	710625	5/2 Way Valve
4	1	710626	5/2 Way Valve
5	1	612660	3/2-Way-Valve II
6	3	710602	Throttle
7	2	612642-1	Quick-Relief-Valve G 1/2"
8	1	712617	Shuttle valve
9	1	712618	3/2-Way-Valve
10	4	612059	Female Stud Coupling
11	11	613163	Elbow screw fitting MSV G 1/2" - 12
12	6	755364	Swivel Reducer
13	9	613148	Elbow Screw Fitting
14	5	613147	Elbow Screw Fitting;
15	4	613162	male stud coupling;G 1/2" - 12
16	4	755367	Adjustable Stud Elbow
17*	3	755374	Straight Male Stud Coupling
18*	12	755370	Straight Bulkhead Coupling
19	2	615706	Swivel Connection
20	5	612969	Pressure gauge connecting part, MVE NW10L
21	4	613146	Straight screw fitting
22	1	613168	T-Connector
23	2	613169	L-Connector
24	2	752828	Plug Nipple
25	1	615703	Coupling 1/2"
26	1	613812	Clutch Hose Coupling
27	4	613182	Straight reducing pin;
28	7	613183	Connector socket;
29	4	613185	Push-in L-connector;
30	6	613192	Push-in Y-connector;
31	1	755369	Elbow Bulkhead Coupling
32	8	645819	Reducing Socket
33	2	613189	Two-way multiple distributor
34	3	612877	Flat Muffler G1/4"
35	2	612879	Flat Muffler G1/2"
36	4	712600-50	Pneumatic Hose Assembly -ConnectionConnection for BVE/S 750-2 "A/B
36.1	1	712600-1	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A1"
36.2	1	712600-2	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A2"
36.3	1	712600-3	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A3"
36.4	1	712600-4	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A4"
36.5	1	712600-5	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A5"
36.6	1	712600-6	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A6"
36.7	1	712600-7	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A7"
36.8	1	712600-8	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A8"
36.9	1	712600-9	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A9"
36.10	1	712600-10	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A10"
36.11	1	712600-11	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A11"
36.12	1	712600-12	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A12"
36.13	1	712600-13	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A13"
36.14	1	712600-14	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A14"

No.	Qty.	Part no.	Description
36.15	1	712600-15	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A15"
36.16	1	712600-16	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B1"
36.17	1	712600-17	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B2"
36.18	1	712600-18	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B3"
36.19	1	712600-19	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B4"
36.20	1	712600-20	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B5"
36.21	1	712600-21	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B6"
36.22	1	712600-22	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B7"
36.23	1	712600-23	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B8"
36.24	1	712600-24	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B9"
36.25	1	712600-25	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B10"
36.26	1	712600-26	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B11"
36.27	1	712600-27	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B12"
36.28	1	712600-28	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B13"
36.29	1	712600-29	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B14"
36.30	1	712600-30	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "B15"
36.31	1	712600-31	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A/B"
36.32	1	712600-32	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A/B"
36.33	1	712600-33	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "C1"
36.34	1	712600-34	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "C2"
36.35	1	712600-35	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "C3"
36.36	1	712600-36	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "C4"
36.37	1	712600-37	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "C5"
36.38	1	712600-38	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "C6"
36.39	1	712600-39	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "C7"
36.40*	4	712600-40	Pneumatic Hose Assembly -Connection for BVE/S 750-2 "A/B"
37	15	613177	Pneumatic Hose 12L
38	10	613176	Pneumatic Hose 8L
39	1	612643	Absorber I
40	1	613191	T-Connector

* marked Items are recommended spare parts see 712600-RSP

712650 Pneumatic connection assembly

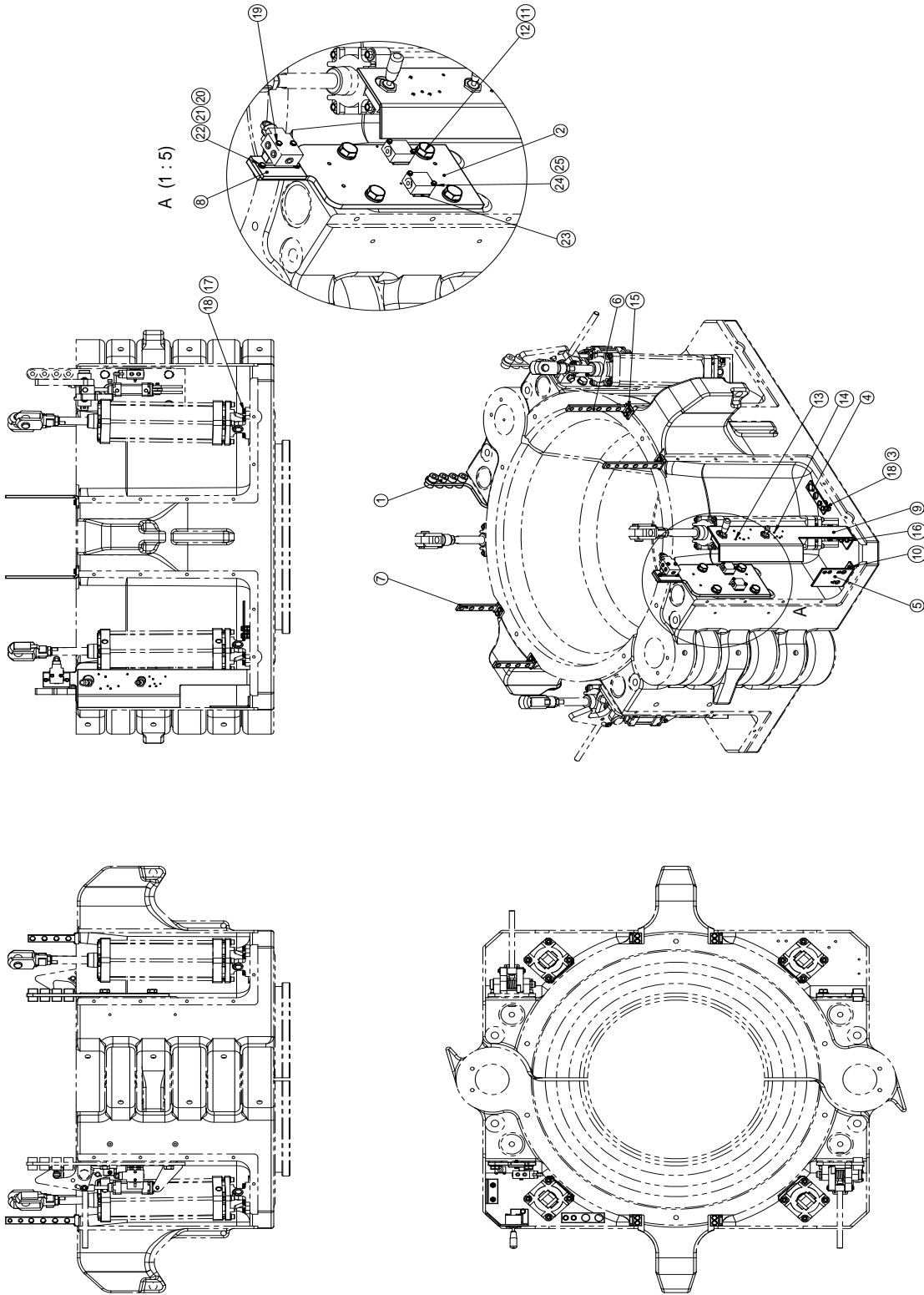


Fig. 47: 712650 Pneumatic connection assembly

Part List 712650 Pneumatic connection assembly

No.	Qty.	Part no.	Description
1*	1	710717	Hydraulic Plate
2	1	710613	Hydraulic Plate
3*	1	712613	Plate
4*	1	712610	Holder for Connection
5	2	712614	Distance piece
6	2	712612	Distance piece
7	1	710627	Valve Mounting
8*	1	712611	Valve Mounting Plate
9*	2	675047	Screw
10*	8	752309	Lock Washer
11*	8	710349	Screw
12*	3	710646	Screw
13*	3	710648	Screw
14*	2	645198	Screw
15*	16	752119	Lock Washer
16*	16	87836	Screw
17*	2	726009	Screw
18*	6	617548	Screw
19*	2	712616	Plate
20*	7	735309	Washer
21	4	710647	Screw
22	4	645028	Screw
23	4	752124	Spring Washer
24*	8	752835	Spring Washer
25*	8	612671	Screw
26*	3	710649	Spring Washer
27*	2	753049	Screw

* marked Items are recommended spare parts see 712650-RSP

753600 Bell Assembly (for Elevator)

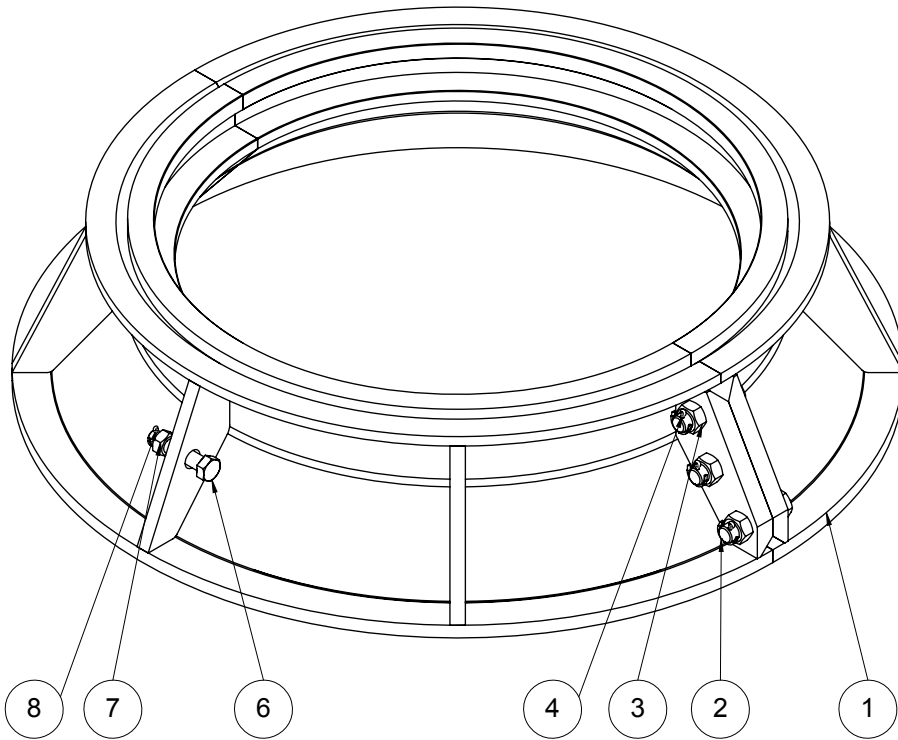


Fig. 48: 753600 Bell Assembly (for Elevator)

Part List 753600 Bell Assembly (for Elevator)

No.	Qty.	Part no.	Description
1	2	753601	Bell
2	6	753600-10	Screw
3	6	753600-11	Nut
4	6	753600-12	Cotter pin
5	2	753604	Screw
6	2	612976	Nut
7	2	752339	Cotter pin

753765 Upper Guard (for Spider)

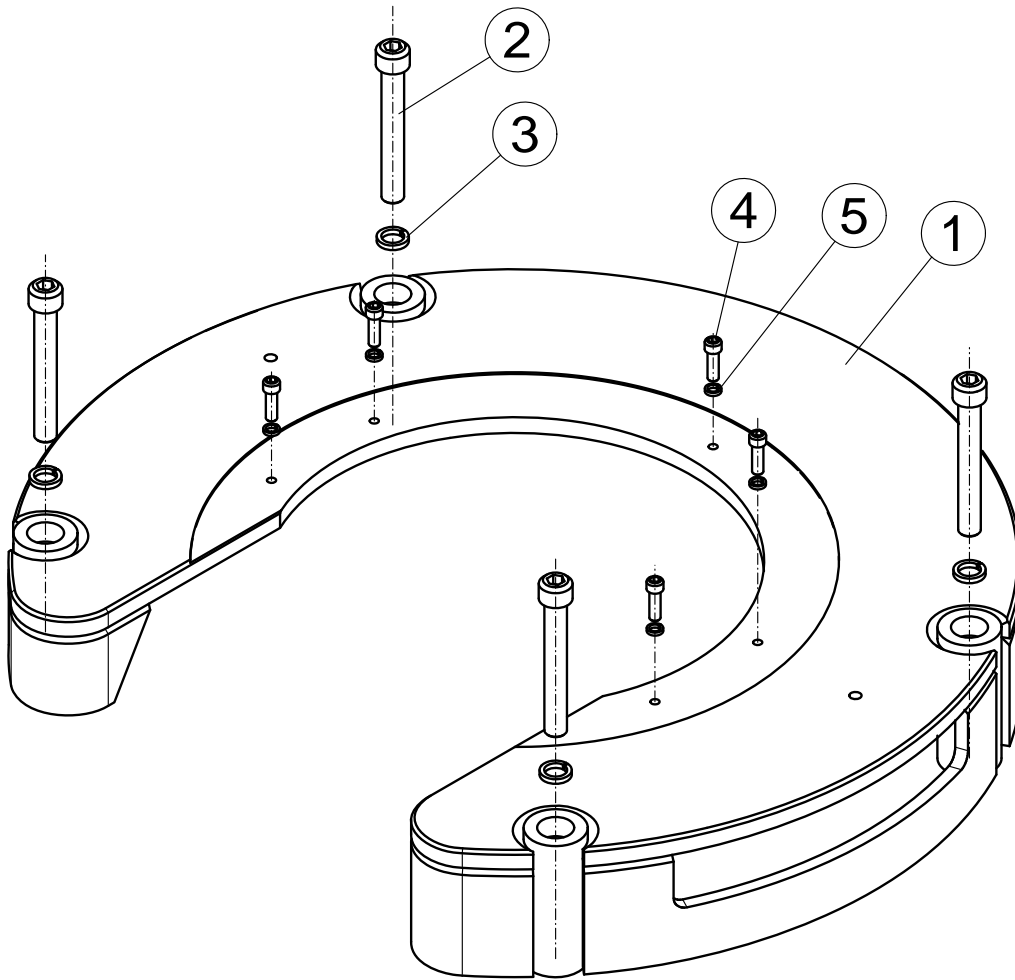


Fig. 49: 753765 Upper Guard (for Spider)

Part List 753765 Upper Guard (for Spider)

No.	Qty.	Part no.	Description
1	2	753601	Bell
2	6	753600-10	Screw
3	6	753600-11	Nut
4	6	753600-12	Cotter pin
5	2	753604	Screw
6	2	612976	Nut
7	2	752339	Cotter pin

Slip Assemblies

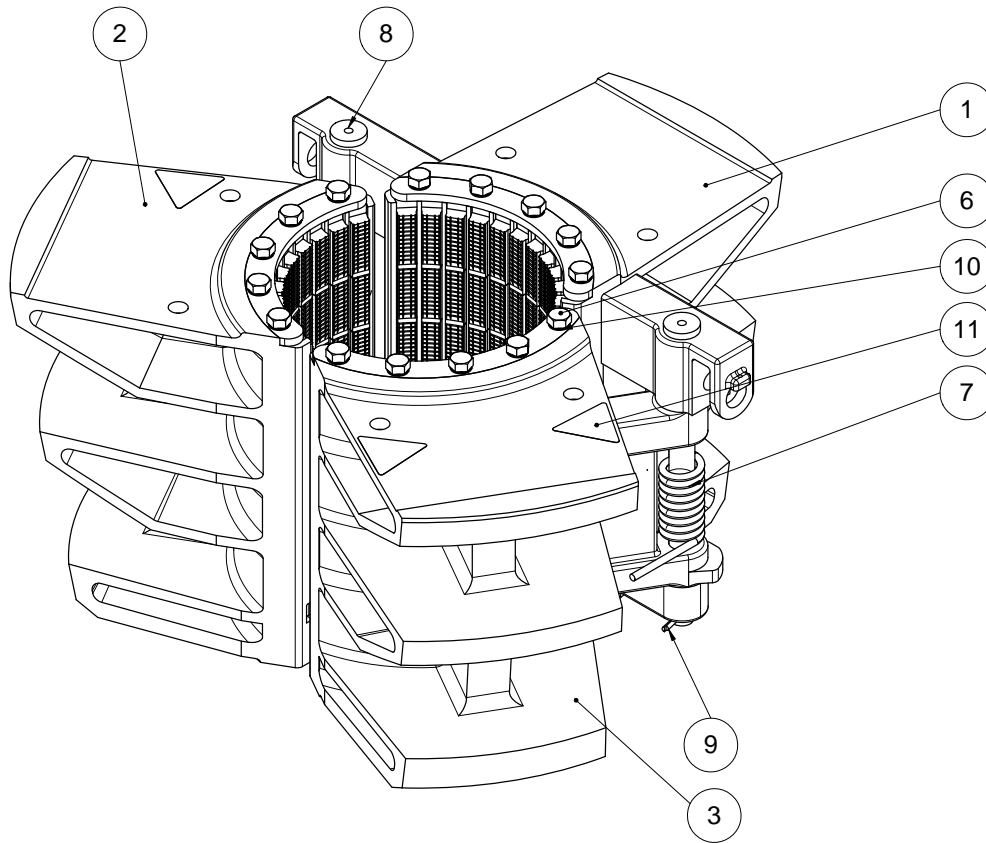


Fig. 50: 753765 Upper Guard (for Spider)

Part List Slip Assemblies

Pipe size	16"	17"	18"	18.5/8"	20"	22'	24"
PN Slip ass.	712100-245	712100-267	712100-247	712100-248	712100-249	712100-261	712100-254

No.	Qty.	Description
1	1	Center Slip Segment
2	1	Left Slip Segment
3	1	Right Slip Segment
4	2	Hinge Pin
5	2	Hinge Pin Cotter
6	2	Spring
7	135	Inserts
8	3	Insert Retainer
9	15	Screw
10	15	Lock Washer

Recommended Spare Parts

B+V recommended spare parts provide a list of potential wear items that may be beneficial to keep on hand for repair and maintenance.

712000-Y-A-RSP BVE/S 750-2

No.	Qty.	Part No.	Description
3	1	712900-RSP	RSP for Latch Ass., pneumatic
4	1	712900-1-RSP	RSP for Latch Ass. pneumatic
5	1	712200-RSP	RSP for Lifting Assembly
6	1	712800-RSP	RSP for Covering Assembly, pneumatic
9	2	752301	Safety Spring
10	2	710025	Screw
11	2	613556-41	Nut
12	2	752339	Split Pin
13	2	617518	Plate
14	4	617519	Screw
15	0	792106	Washer
16	1	710020	Lifting eye bolt
17	20	70064	Grease Nipple
18	20	612518	Protection Cap
19	1	712600-RSP	RSP for Pneumatik Assembly
20	1	712650-RSP	RSP for Pneumatik Connection Assembly
21	8	710026	Screw
22	8	752327	Spring Washer
23	8	752333	Screw
24	8	752325	Spring Washer
	4	792106	Washer
	2	735111	Screw
	2	735110	Nut
	2	752331	Split Pin
	4	712813	Screw

712900-RSP RSP for Latch Ass., pneumatic

No.	Qty.	Part No.	Description
2	1	710310	Latch Pin
7	1	710335	Latch Spring
8	1	710347	Split Pin
9	4	710349	Screw
10	1	710350	Pin
11	1	710353	Shoulder Screw
12	1	710902	Mounting Angle
13	2	650218-3	Washer
14	2	611523	Retaining ring
15	1	675057	Nut
16	2	752341	Washer
17	2	645683	Washer
18	2	645028	Screw
19	4	752309	Spring Washer
20	1	620609	Split Pin
21	1	710931	Clevis pin with head
22	1	645196	Split Pin
23	2	710933	Nut
24	2	710934	Screw

712900-1-RSP RSP for Latch Ass., pneumatic

No.	Qty.	Part No.	Description
2	1	710310	Latch Pin
7	1	710335	Latch Spring
8	1	710347	Split Pin
9	4	710349	Screw
10	1	710350	Pin
11	1	710353	Shoulder Screw
12	2	650218-3	Washer
13	2	611523	Retaining ring
14	1	675057	Nut
15	1	620609	Split Pin
16	4	752309	Spring Washer
17	1	710931	Clevis pin with head
18	1	645196	Split Pin

712200--RSP RSP for Lifting Assembly

No.	Qty.	Part No.	Description
4	12	792104	Washer
5	4	712205	Screw
6	6	792103	Washer
8	20	753600-12	Split Pin
9	12	792110	Washer
10	4	712206	Screw
11	8	87838-1	Clevis pin with head

712800-RSP RSP for covering Assembly

No.	Qty.	Part No.	Description
1	70	735326	Screw
12	4	712813	Screw
15	1	753049	Screw
16	1	660414-1	Eye Screw
17	1	755251	Nut
18	4	553468	Lifting eye

712600-RSP RSP Pneumatic Assembly

No.	Qty.	Part No.	Description
17	1	710612	Shuttle valve
18	1	612660	3/2-Way-Valve II
31	2	712600-40	Pneumatic Connection for BVE/S 750-2 "A/B

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712650-RSP RSP for Pneumatic Connection Assembly

No.	Qty.	Part No.	Description
1	1	710640	Nut
3	4	645028	Screw
4	4	752124	Spring Washer
8	8	710349	Screw
9	16	752119	Spring Washer
10	16	87724	Screw
11	4	726009	Screw
12	8	752835	Spring Washer
13	8	612671	Screw
14	2	645198	Screw
15	4	710646	Screw
16	1	710647	Screw
17	4	710648	Screw
18	3	710649	Spring Washer
19	8	735309	Spring Washer
20	6	617548	Screw
24	1	712613	Plate
25	2	753049	Screw
26	8	752309	Spring Washer
27	2	675047	Screw
28	2	712616	Plate