

Slip Lifter Type Series

Pneumatic and Hydraulic operated

Slip Lifter Type Series Pneumatic operated			Slip Lifter Type Series Hydraulic operated		
P/N	Pipe Range	Rotary Table	P/N	Pipe Range	Rotary Table
88920-A	2.3/8" - 7.5/8"	17.1/2"	88710-H	2.3/8" - 7.5/8"	27.1/2" - 37.1/2"
88710-A	2.3/8" - 7.5/8"	27.1/2" - 37.1/2"	88710-HD	2.3/8" - 7"	27.1/2" - 37.1/2"
88720-A	2.3/8" - 7.5/8"	27.1/2" - 37.1/2"	88720-H	2.3/8" - 7"	27.1/2" - 37.1/2"

Operation Maintenance Manual Original Operating Instructions



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Document Approval

Version	Author	Eng. Check	Appoval Check
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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), FORUM Handling Tools 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 FORUM Handling Tools may the contents of this instruction manual be passed on to third persons. 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 critique regarding this documentation or the product itself.

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Table of contents

A.	GENERAL	5	1	DESCRIPTION	16
I	BASIC INFORMATION	5	1.1	ASSEMBLIES AND COMPONENTS	16
II	INTENDED USE	5	1.2	SLIP LIFTER TYPE SERIES	17
III	IMPROPER USE	5	1.2.1	SLIP LIFTER WITH QUICK LOCK PIN	17
IV	POTENTIAL MISUSE	6	1.2.2	SLIP LIFTER WITH LOCKING ASSEMBLY	17
V	WARRANTY AND LIABILITY	6	1.2.3	SLIP LIFTER WITH DOWNFORCE	17
V-01	LIABILITY	6	1.3	HYDRAULIC ASSEMBLY	18
V-02	WARRANTY	6	1.4	PNEUMATIC ASSEMBLY	18
VI	OBLIGATIONS OF THE OPERATING COMPANY	7	1.5	TECHNICAL DATA	20
VI-01	PLANNING AND CHECKING SAFETY MEASURES	7	1.5.1	SCOPE OF DELIVERY	20
VI-02	MINIMIZING RISK OF INJURY	7	1.5.2	TYPE SERIES DIMENSIONS	21
VI-03	TROUBLE-FREE OPERATION	7	1.5.3	ADAPTER DIMENSIONS	23
VI-04	REQUIREMENTS FOR OPERATOR	7	1.5.4	FOOT-PEDAL DIMENSIONS	23
VI-05	TRAINING	7	1.6	OPTIONAL ACCESSORIES	24
VI-06	MINIMUM QUALIFICATIONS	7	1.6.1	RECOMMENDED HYDRAULIC FLUID	24
VII	USER GROUPS	8	1.6.2	RECOMMENDED LUBRICANTS	24
VIII	SPECIAL TECHNICAL KNOWLEDGE	8	1.7	OPERATIONAL ENVIRONMENT	25
IX	SAFETY SYMBOLS	9	1.8	EQUIPMENT MARKINGS	25
IX-01	PRELIMINARY SAFETY PRECAUTIONS	9	1.9	RFID-CHIP EQUIPPED HANDLING EQUIPMENT EQUIPMENT	26
IX-02	SAFETY PRECAUTIONS RELEVANT FOR ACTION	9	2	SAFETY	28
IX-03	INSTRUCTIONS FOR SAFE PROCEDURE	9	2.1	GENERAL SAFETY PRECAUTIONS	28
XI	LINGUISTIC CONVENTIONS	10	2.2	SAFETY EQUIPMENT	28
X	PERSONAL PROTECTIVE EQUIPMENT (PPE)	10	2.3	SAFETY PRECAUTIONS	29
XII	CONFORMITY	11	2.3.1	OPERATING MANUAL AND MACHINE	29
XIII	CONTACT FORUM HANDLING TOOLS WORLDWIDE	11	2.3.2	WARNING AND SAFETY INSTRUCTIONS ON MACHINE	30
XIV	ONLINE TECHNICAL DOCUMENT ACCESS	12	2.4	ORGANISATIONAL MEASURES	32
XIV-01	INFORMATION VIA HOMEPAGE	12	2.5	SAFETY PRECAUTIONS	32
XIV-02	INFORMATION VIA EXTRANET	13	2.5.1	RISK OF STUMBLING/TRIPPING	33
			2.5.2	DANGER OF PINCHING/CRUSHING	33
			2.5.3	NCORRECT HANDLING OF HYDRAULIC/PNEUMATIC EQUIPMENT	33
			2.5.4	HUMAN ERROR	34
			2.6	SAFETY INSTRUCTION CARD I	35
			2.7	SAFETY INSTRUCTION CARD II	36

DESCRIPTION
 SAFETY
 TRANSPORT
 COMMISSIONING / OPERATION
 SERVICE
 INSPECTION / MAINTENANCE
 STORAGE
 APPENDIX

DESCRIPTION
SAFETY
TRANSPORT
COMMISSIONING / OPERATION
SERVICE
INSPECTION / MAINTENANCE
STORAGE
APPENDIX

3	TRANSPORT / SET-UP	38			
3.1	DELIVERY	38			
3.1.1	UNPACKING AND DISPOSAL OF PACKING MATERIAL	38			
3.1.2	INTERMEDIATE STORAGE	38			
3.2	TRANSPORT	39			
3.3	LIFTING ARRANGEMENTS	40			
3.3.1	SLIP LIFTER LIFTING ON TRANSPORT GUIDES	40			
3.3.2	LIFTING ARRANGEMENT AND INSTALLATION OF BOWLS AND SLIPS	40			
3.4	INSTALLATION REQUIREMENTS	41			
3.5	SET-UP, INSTALLATION AND ARRANGEMENT	41			
3.5.1	ADAPTER INSTALLATION/REMOVAL	42			
3.5.2	SLIP INSTALLATION/REMOVAL	42			
3.6	INSTALLATION CHECKLIST	43			
4	COMMISSIONING AND OPERATION	46			
4.1	COMMISSIONING	46			
4.1.1	MOUNTING THE SLIP LIFTER TO ROTARY TABLE (MASTER BUSHING)	48			
4.1.2	LOCKING THE QUICK LOCK PIN ASSEMBLY	48			
4.1.3	LOCKING THE LOCKING PIN ASSEMBLY	49			
4.1.4	SLIP LIFTER - CONNECTING THE HYDRAULIC SYSTEM	50			
4.1.4.1	CONNECTING THE HYDRAULIC SYSTEM	50			
4.1.4.2	CONNECTING THE PNEUMATIC SYSTEM	51			
4.2	COMMISSIONING CHECKLIST	52			
4.3	OPERATING THE SLIP LIFTER	53			
4.3.1	HANDLING DRILL STRING	53			
4.3.2	PROPER SHUT DOWN	54			
4.3.3	EMERGENCY STOP	54			
4.3.4	INTERLOCK THE SLIP LIFTER	54			
4.3.5	HYDRAULIC ADJUSTMENT	55			
4.4	GENERAL OPERATIONAL INFORMATION ON HAND SLIPS	56			
4.5	TROUBLESHOOTING	58			
5	SERVICE	60			
5.1	MALFUNCTION	60			
5.2	REPAIR	60			
5.2.1	REPAIR BY CUSTOMER	60			
5.2.2	REPAIR BY MANUFACTURER	60			
5.2.3	SECURING SCREWS WITH WEDGE-LOCKING WASHERS	60			
5.3	DRAWING, PARTS LIST AND SPARE PARTS	61			
5.3.1	HYDRAULIC OPERATED SLIP LIFTER	62			
5.3.1.1	88710	62			
5.3.1.2	88710-H	64			
5.3.1.3	88710-HD	66			
5.3.1.4	88720	68			
5.3.1.5	88720-H	70			
5.3.2	PNEUMATIC OPERATED SLIP LIFTER	72			
5.3.2.1	88710-A	72			
5.3.2.2	88720-A	74			
5.3.2.3	88920	76			
5.3.2.4	88920-A	78			
5.3.3	HYDRAULIC AND PNEUMATIC CIRCUIT DRAWINGS AND PARTS LISTS	80			
5.3.3.1	88430-HD HYDRAULIC ASSEMBLY	80			
5.3.3.2	88430-A PNEUMATIC ASSEMBLY	82			
5.3.3.3	88229-1 PNEUMATIC CONTROL VALVE ASSEMBLY	83			
5.3.3.4	88269 HYDRAULIC VALVE MANIFOLD	84			
5.3.4	ASSEMBLY DRAWINGS AND PARTS LISTS	85			
5.3.4.1	88240 QUICK LOCK ASSEMBLY	85			
5.3.4.2	89208 LOCKING ASSEMBLY	86			
5.3.4.3	PROTECTION PLATE ASSEMBLY	87			
5.3.4.4	BASE PLATE WELDING ASSEMBLY	88			
5.3.5	SPARE PARTS LISTS	90			
5.3.5.1	88710-RSP ONE YEAR SPARE PARTS LIST	90			
5.3.5.2	88710-A-RSP ONE YEAR SPARE PARTS LIST	90			
5.3.5.3	88710-H-RSP ONE YEAR SPARE PARTS LIST	90			
5.3.5.4	88710-HD-RSP ONE YEAR SPARE PARTS LIST	90			
5.3.5.5	88720-RSP, 88920-RSP ONE YEAR SPARE PARTS LIST	90			
5.3.5.6	88720-A-RSP, 88920-A-RSP ONE YEAR SPARE PARTS LIST	91			
5.3.5.7	88720-H-RSP FOR PSH	91			
5.3.5.8	88430-HD-RSP ONE YEAR SPARE PARTS LIST	91			
6	INSPECTION / MAINTENANCE	94			
6.1	LUBRICATION	95			
6.2	INSPECTIONS	96			
6.2.1	INSPECTION OF AUTOMATIC OPERATED EQUIPMENT	96			
6.2.2	INSPECTION FOLLOWING CRITICAL LOADS	96			
6.2.3	INSPECTION FOLLOWING REMOVAL	96			
6.3	INSPECTION CATEGORIES	97			
6.3.1	INSPECTION CATEGORY I	97			
6.3.2	INSPECTION CATEGORY II	97			
6.3.3	INSPECTION CATEGORY III	97			
6.3.4	INSPECTION CATEGORY IV	97			
6.3.5	INSPECTION INTERVALS AND INSPECTION TASKS	97			
6.3.6	CHECK LIST FOR INSPECTION	98			
6.4	WEAR DIMENSIONS	99			
6.5	CLEANING	99			
7	STORAGE / DISPOSAL	102			
7.1	STORAGE	102			
7.2	DISPOSAL	103			
8	APPENDIX	106			
A.	THIRD PARTY DOCUMENTS	106			
I	SAFETY DATA-SHEET	106			
II	COMPONENTS	107			
B.	EC CERTIFICATE OF CONFORMITY - TEMPLATE I	108			
C.	EC CERTIFICATE OF CONFORMITY - TEMPLATE II	109			

A. General

I Basic Information

This operating manual refers to the Slip Lifter for 2.3/8" - 7.5/8" Rotary Standard Slips for use on oil and gas drilling platforms and rigs. The permissible range of application is specified in the technical data (see Appendix).

This manual covers several different FORUM Handling Tools models from the Slip Lifter Type Series, that are all common in use and operation. Most assembly, disassembly, and inspection procedures are the same for all models. If there are differences, they are called out separately within this manual.

When installed in potentially explosive atmospheres, the instructions that follow the Ex symbol must be followed. Personal injury and/or equipment damage may occur if these instructions are not followed.

This operating manual is intended for the operator of the Slip Lifter. It is intended to ensure safe operation and must be read carefully and kept where it is accessible for Slip Lifter users at all times.

This operating manual contains all information on safe and proper operation of the Slip Lifters. Observance of these instructions is required for safe operation.

In addition, it is necessary to observe all applicable national and local regulations [e.g. accident prevention regulations and environmental regulations as well as the company's own internal safety regulations].

For installation, maintenance and repair work and proper training of the operating personnel Forum recommends requesting service from FORUM Handling Tools itself.

II Intended Use

The FORUM Handling Tools Slip Lifter is designed to enhance safety by reducing personnel on the rig floor when operations require the use of Slips. The Slip Lifter is available as a hydraulic and pneumatic version. They can be operated by using a Control Unit at a safe distance from the Rotary Table.

The Slip Lifter accommodates FORUM Handling Tools Standard (Rotary) Slips in the range of 2.3/8" - 7.5/8" as well as most other brands.

The Slip Lifter type series offers tools designed to be installed into 17.1/2" - 37.1/2" Rotary Tables with pin drive Master Bushings made to API standard punch dimensions and to work with Slip Lifter standard Rotary Slips. In addition to observing all instructions in this operation maintenance manual, intended use also includes observing all prescribed assembly, disassembly, startup, operating, repair and maintenance work at the specified intervals as well as all safety precautions.

The operation is allowed for the intended use only. The permissible range of application are specified in the technical data.

INFO



In this documentation the abbreviation **t** and the word **tons** are used to describe short tons. If the metric ton is referred it will explicit be named in the text or the abbreviation ton.

1 sh ton	=	2000 lb	=	907,19 kg
1 metric ton	=	2204,62 lb	=	1000 kg

III Improper Use

INFO



Improper use of the Slip Lifter releases FORUM Handling Tools from any liability for personal injury or property damage resulting therefrom.

The Slip Lifter are intended exclusively for arresting and holding specified pipes. Always observe the Slip Lifter specifications (refer to section 1.5 "Technical Data" on page 20). Additionally, the intended use covers the compliance and observance of all procedures and safety notes of this manual as well as performing all necessary maintenance work in the given intervals.

The following is specifically prohibited:

- Holding pipe with diameter for which use is not specified.
 - Using the Slip Lifter with Insert Slips for Pipe sizes for which use is not intended.
 - Any use of the Slip Lifter which is not intended.
- Moreover operation of the Slip Lifter are prohibited under the following conditions:
- When the Slip Lifter is used for applications other than intended.
 - When the hydraulic/pneumatic equipment is not installed properly, if applicable.
 - When the Slip Lifter, or parts thereof, are damaged or when the additional equipment is not installed properly.
 - When protective or safety equipment is damaged, unusable, improperly installed or not present.
 - When the Slip Lifter is not operating properly.
 - When humans or foreign objects or personnel are located in the hazard area of the Slip Lifter.
 - When conversions or modifications have been performed without previous, written approval by FORUM Handling Tools .
 - When equipment not approved by FORUM Handling Tools is used.
 - When the prescribed maintenance intervals have been exceeded.
 - When replacement parts not approved by FORUM Handling Tools are used.
 - When repair or service work has been performed on the Equipment by companies not authorized by FORUM Handling Tools.

Observe also the section "Warranty and Liability".

IV Potential Misuse

This manual contains information and warnings on procedures that address hazardous conditions and could cause personal injury but cannot reflect all fashions in which hazardous consequences may occur due to service and/or operation. All personnel using this equipment or service procedures contained within this manual must be completely satisfied that personal and/or equipment safety will not be compromised.

Common methods of MISUSE include but are not limited to:

1. Use without ALL warning and identification labels present. This can cause operating personnel to misunderstand the areas of the equipment that can cause serious injury.
2. Use with insufficient and/or worn assemblies and parts. This can cause failure causing a suspended hazard which can result in serious injury or death.
3. Use of the Slip Lifter in methods not intended. The Slip Lifter should be used ONLY in the methods described in this manual.

V Warranty and Liability

V-01 Liability

The technical information, data and instructions for operation contained in this operating manual correspond to the status at the time of print and are provided according to the best of our knowledge in consideration of our previous experience and expertise. We reserve all rights to make technical modifications within the scope of technical development of the Slip Lifter treated in this operating manual. Claims or entitlements cannot be deduced or derived from information, illustrations and /or descriptions in this operating manual. FORUM Handling Tools is liable for all warranty obligations made within the scope of the contract for any faults or omissions on our part, excluding further claims. Claims for damages suffered are excluded regardless of the legal grounds. Translations are complete according to best knowledge. We cannot assume any liability for translation errors, even when the translation was performed at our order. Only the original text is binding. The original text language for FORUM Handling Tools documents and manual is English. The descriptions and illustrations do not necessarily reflect the scope of delivery or any parts orders. The drawings and illustrations are not to scale.

V-02 Warranty

FORUM Handling Tools general terms of purchase and delivery apply. Purchasers recognize these conditions on the day the contract is signed, at the latest.

The terms and duration of FORUM Handling Tools warranty are specified in the sales documents as well as the order confirmation. These will be submitted to the operating company as information at the time the contract is signed, at the latest.

The manufacturer assumes no warranty whatsoever for damage or interruptions in operation resulting from failure to observe the operating instructions.

The operating manual is to be supplemented by the operating company with operating instructions based on existing national regulations on accident and environmental protection, including information on supervisory and reporting obligations taking into consideration operating peculiarities, e.g. in regard to work organization.

Warranty claims/complaints within the scope of the guarantee and liability for personal injury and property damage are excluded, when such result from any of the following causes:

- Any use other than intended;
- Improper installation, operation, maintenance or repair;
- Operation with defective, improperly attached or non-operational safety and/or protective equipment;
- Failure to observe the instructions in the operating manual regarding safe conduct;
- Impermissible structural and/or functional modifications;
- Use of replacement parts not approved by FORUM Handling Tools;
- Normal wear or insufficient inspection of components subject to wear;
- External effects or force majeure;
- Lubricating the Slip Lifter with lubricants other than those recommended by FORUM Handling Tools.

INFO



Any structural or functional modification to the equipment by the operating company requires previous written approval by FORUM Handling Tools . Failure to obtain such approval voids the warranty as well as the declaration of conformity and releases FORUM Handling Tools from any product liability. Following modifications or installation of optional equipment, all safety equipment must be reinstalled and checked by the operator for proper function.

VI Obligations of the Operating Company

VI-01 Planning and Checking Safety Measures

The obligation of the operating company to due diligence includes planning safety measures and supervising their observance. All personnel performing work on and with the Slip Lifter must be trained by the operating company for the work performed on and with the Slip Lifter. All personnel must have read and understood the operating manual.

VI-02 Minimizing Risk of Injury

The following principles apply to minimize the risk of injury:

- Ensure that work on the Slip Lifter is performed only by qualified personnel.
- The personnel must be authorized for such work by the operating company.
- The personnel must wear the prescribed protective equipment.
- Procedures, competencies and responsibilities must be clearly defined and established in the area of the Slip Lifter. Proper behavior in the event of a malfunction must be clear for everyone. The personnel must be given regular training.
- All WARNING signs and information on the Slip Lifter must be complete and easily legible. For this purpose WARNING signs and information are to be cleaned regularly and replaced as required.

VI-03 Trouble-free Operation

The following principles apply for trouble-free operation:

- Keep the complete operating manual at the location where the Slip Lifter is in operation where it is easily accessible for everyone and in an easily legible condition.
- Use the Slip Lifter exclusively for its intended purpose.
- Use the Slip Lifter only when it is in a perfect operating state.
- Before starting work, check to ensure that it is in a safe operating state and functioning properly.

VI-04 Requirements for Operator

Basic knowledge of safe handling and use of the Slip Lifter includes knowledge of the general safety precautions.

Ensure that the Slip Lifter is operated only in compliance with the general safety precautions and other instructions in this manual.

VI-05 Training

The operating company is obligated to organize and hold regular training to ensure that all personnel involved with transporting, installing, operating and/or servicing the Slip Lifter is familiar with the required procedures and safety precautions.

VI-06 Minimum Qualifications

All work on the equipment requires special knowledge and qualifications on the part of the operating personnel.

All personnel working on Slip Lifter must have the following qualifications:

- Personal suitability for the work performed.
- Suitable qualifications for the work performed.
- Familiarity with the safety equipment and its function.
- Familiarity with this operating manual – particularly the safety precautions – and all sections relevant for the work to be performed.
- Familiarity with the elementary instructions on operating safety and accident prevention.

In general, all employees must have one of the following minimum qualifications:

- Technical training for independent work on the Slip Lifter.
- Sufficient qualifications for working on the Slip Lifter under supervision and at the instructions of a trained specialist.

VII User Groups

This operating manual is subdivided into the following user groups:

Personnel	Qualifications
Operating personnel	<p>Sufficiently trained in:</p> <ul style="list-style-type: none"> • Functional procedures on the equipment • Operating procedures <p>Knowledge:</p> <ul style="list-style-type: none"> • Competency and responsibility in regard to the work to be performed • Behavior in emergencies
Service personnel	<p>Basic knowledge of:</p> <ul style="list-style-type: none"> • Mechanics • Hydraulic • Pneumatic <p>Authorizations (according to standards of safety engineering):</p> <ul style="list-style-type: none"> • Starting up equipment • Grounding equipment • Marking of equipment • Basic knowledge of installation and operation of the Slip Lifter.

VIII Special Technical Knowledge

The following work should be performed only by specially trained personnel:

Work Performed	Qualifications
Work on hydraulic/pneumatic system	Special knowledge and experience with work on hydraulic/pneumatic systems.
Work on mechanical parts	Personnel qualified or trained in industrial mechanics; work is to be performed only under supervision and on instructions of a person qualified in accordance with generally accepted codes of practice in industrial mechanics.

IX Safety Symbols

The safety precautions in this document contain standardized depictions and symbols. Three hazard classes are distinguished depending on the probability of occurrence and severity of the consequences. Selection of the WARNING category depends on the probability of occurrence and the possible extent of damage.



⚠ CAUTION

Indication of recognizable hazard for humans or possible property damage.

Failure to observe can lead to reversible injuries or property damage!

The symbol as specified in ANSI Z535.6 emphasizes the cause.

» Measures for avoiding are listed.



⚠ WARNING

Indication of recognizable hazard for humans.

Failure to observe can lead to irreversible injuries!

The symbol as specified in ANSI Z535.6 emphasizes the cause.

» Measures for avoiding are listed.



⚠ DANGER

Indication of imminent hazard for humans.

Failure to observe can lead to irreversible or lethal injuries!

The symbol as specified in ANSI Z535.6 emphasizes the cause.

» Measures for avoiding are listed.

IX-01 Preliminary Safety Precautions

Safety precautions are given in the preceding form at the beginning of complete sections or sections. They apply for the entire section or the entire subsequent section.

IX-02 Safety Precautions Relevant for Action

If a safety precaution applies only for one single action or a short series of actions, it is integrated into the text preceding the possible hazard point.

For example:

1. Attach hoisting gear to eye bolts in cover.

⚠ CAUTION of pinching/crushing hands! The cover can fall shut when the retainer is not engaged. Never open the cover by hand.

2. Open the cover with a crane and suitable hoisting gear.
3. Unscrew the M10 bolts with a 17 mm box wrench.
4. ...

IX-03 Instructions for Safe Procedure

Special work steps to ensure Safe Procedure are depicted as follows (example):

Safe Procedure

1. Shut off Equipment.
2. Disconnect supply lines.
3. Attach Equipment to crane.
4. [...]

XI Linguistic Conventions

This documentation uses terms and symbols intended to help you find information more easily, perform work steps more effectively and recognize dangerous situations more quickly. These symbols and terms are explained below:

All important text sections are printed in bold face.

- Lists without any necessary sequence are marked with a dash (-) at the left side of the column.
- Individual activities to be performed are indicated by a dot (-) to the left of the column.

Relevant consequences of an action or work step are marked with an arrow (>) in the left margin.

Enumerations in a certain sequence (e.g. a series of work steps) are indicated by sequential numbers (1, 2, 3,..) in the left margin.

For example:

1. Unscrew nuts on Equipment feet.
2. Lift Equipment.

For greater clarity the illustrations are located in the right column with the text opposite or directly below the associated text section. Larger illustrations extending over the entire width of the page are located before the explanatory text. The illustrations are provided with captions in telegraph style.



Fig. 1: Illustration Example

INFO



Additional information and relationships requiring special attention are distinguished in this manner.

X Personal Protective Equipment (PPE)

The following symbols located at appropriate points in the operating manual indicate that it is mandatory to wear personal protective equipment:



WEAR PROTECTIVE GLOVES!



WEAR EYE PROTECTION!



WEAR SAFETY SHOES!



WEAR PROTECTIVE HELMET!



WEAR EAR PROTECTION!

XII Conformity

The Slip Lifter satisfies all requirements in applicable directives and standards. A sample of the EC Declaration of Conformity is given in the appendix.

INFO



This operating manual is a part of the technical documentation for the Slip Lifter. The EC Declaration of Conformity is delivered together with the Slip Lifter. Keep these instructions and the associated documents for later use.

XIII Contact FORUM Handling Tools worldwide

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

FORUM B + V Oil Tools GmbH	FORUM Handling Tools
Hermann-Blohm-Straße 2 20457 Hamburg Germany Tel: + 49.40.37022.6855 Fax: + 49.40.37022.6899 E-Mail: oiltools@f-e-t.com web: www.f-e-t.com www.blohmvooss-oiltools.com	1023 FORUM Drive Broussard, LA 70518 USA Tel: +1.337.373.1800 Fax: +1.337.369.6893

FORUM ENERGY TECHNOLOGIES Drilling-Service-Standorte

Email: ForumDP.Sales@f-e-t.com

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Nr. 106, 3903 - 75 Ave Leduc, Alberta T9E 0K3 Tel: + 1 780.980.0345 Fax: + 1 780.986.3278	Avenida Avante Monterrey N 300 Parqu Industrialxico Tel: + 52.81.8245.6800	Peregrine Road, Westhill Aberdeenshire, AB32 6JL Tel: + 44,1224.744000
United Arab Emirates	Singapore	
Oilfields Supply Center Building B-45 Jebel Ali Free Zone Dubai UAE Tel: + 971.4.883.5266	No 51 Benoi Road #06-00 Liang Huat Industrial Complex 629908 Tel: + 65.6465.4850 Fax: + 65.6465.4851 Out of hours + 65.913.898.12	

XIV Online Technical Document access

XIV-01 Information via homepage

INFO

i For further and actual information you can also visit our homepage in the Internet.

A digital version of the operation instructions for this product as well as the operation instructions, safety- and update notes for other FORUM Handling Tools products can be reached via the blohmvooss-oiltools 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.



Technical Documentations
Safety Notes and Product Updates

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The latest Technical Documentation for our Equipment is available for download.

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- ▶ Bushings
- ▶ Elevator Links
- ▶ Manual Tongs
- ▶ Manual Slips
- ▶ Power Slips
- ▶ Slip Lifter
- ▶ Safety Clamps
- ▶ Wrench , Pipe Spinner and Floorhands
- ▶ Control Units

Technical Documentations
Safety Notes and Product Updates
Logout **1**

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EXHIBITIONS
 Sep.08 – Sep.11, 2015 Offshore Europe / Aberdeen, UK

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Quality Engineering Service Sales	Products Links Elevators Elevator / Spiders	Slip Lifter Floorhand Pipe Spinner Power Slips Manual Tongs	Bushings Manual Slips Safety Clamps Dual Elevator System Spare Parts	Company Jobs Contact Imprint
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Fig. 2: Illustration Service–Homepage

XIV-02 Information via Extranet

INFO

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

A digital version of the operation instructions for this product as well as the operation instructions, safety – and update notes for other FORUM Handling Tools products can be reached via the Extranet.

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 on <https://www.accessoiltools.com/fx/>.



Technical Documentations
Safety Notes and Product Updates

GENERAL



Fig. 3: Illustration Service–Extranet

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DESCRIPTION

DESCRIPTION

1 Description

The Slip Lifter is designed to enhance safety by reducing personnel on the rig floor when operations require the use of Slips. The Slip Lifter is available as a pneumatic or hydraulic version.

Slip Lifter features and specifications

- Designed to be used for pipe ranges of 2.3/8" to 7.5/8".
- Adjustable speed control and safety device for hydraulic operated Slip Lifter.
- Designed not to interfere with iron roughneck operations.
- Lowers/Raises Drill Pipe Rotary Slips out of Bowl #3.
- Fits into various Pin Drive Master Bushings and Pin Drive Holes.

The FORUM Handling Tools Slip Lifter is designed with strength and safety factors. A description of the optional accessories is given in the following chapters and in the parts lists.

1.1 Assemblies and Components

The Slip Lifter consists of the assemblies described below. A parts catalogue with complete drawings and parts lists for the assemblies and parts of the Slip Lifter is given in Chapter 5 in this operation maintenance manual.

INFO



Please note that this illustration does not reflect the scope of delivery (refer to section V "Warranty and Liability" on page 6). FORUM Handling Tools offers accessories and tools to match the specific pipe diameters.

Slip Lifter Main Assemblies

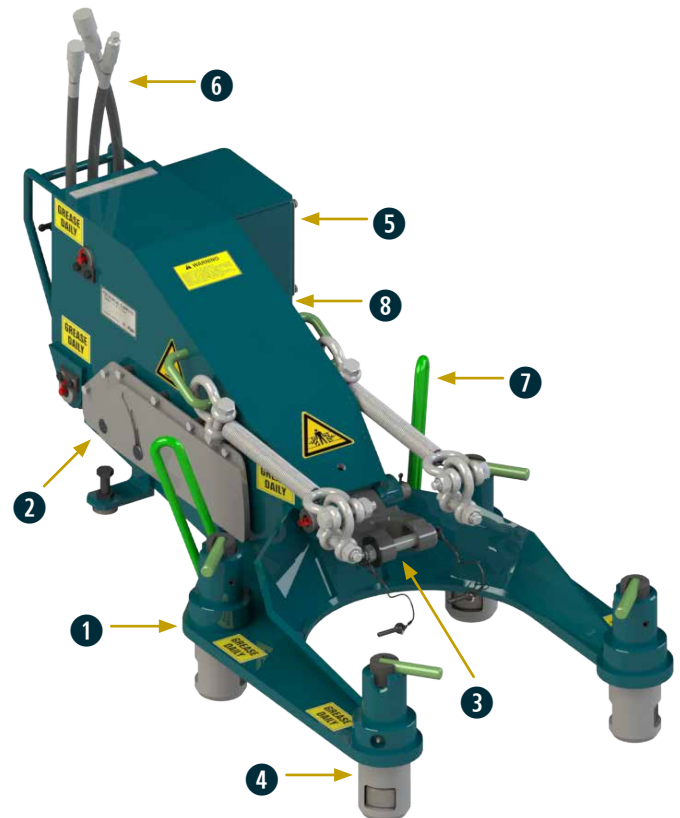


Fig. 4: Slip Lifter Main Assemblies

Pos.	Name	Pos.	Name
1	Base plate assembly	2	Cover assembly
3	Slip Adapter assembly	4	Lock Pin Assembly
5	Hydraulic or Pneumatic assembly	6	Hydraulic or Pneumatic connections
7	Transport guides	8	Body adjustment assembly

1.2 Slip Lifter Type series

1.2.1 Slip Lifter with Quick Lock Pin

Slip Lifters with Quick Lock Pins are fully automatic, remote controlled systems to lift up and set down Drill Pipe Slips. The Quick Lock Pin Assembly for plain bores eases the de- and installation of the Slip Lifter.

Name	P/N	Type
Slip Lifter with Quick Lock	88720-H	Hydraulic
Slip Lifter with Quick Lock	88720-A	Pneumatic
Slip Lifter with Quick Lock	88920-A	

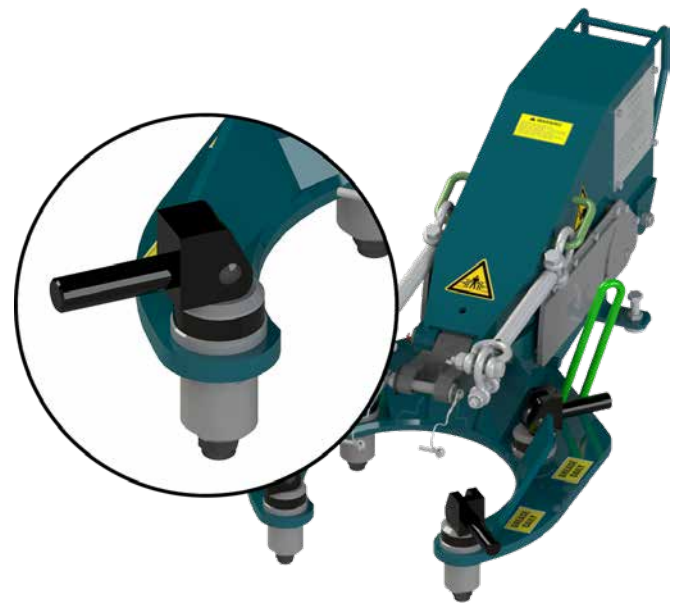


Fig. 5: Slip Lifter Quick Lock Pin Assembly (P/N88240)

1.2.2 Slip Lifter with Locking Assembly

The Slip Lifter with Locking Assembly is especially designed to be suitable for bores with groove.

NOTE For use inside master bushings with slot only.

Name	P/N	Type
Slip Lifter with Lock. Ass.	88710-A	Pneumatic
Slip Lifter with Lock. Ass.	88710-H	Hydraulic

INFO



Please note that the Locking Assembly for bores with groove (P/N89207) was replaced with the Locking Assembly (P/N89208) for the Type Series build after 08 / 2014.

As the older Groove Lock can be replaced with the Locking Assembly, FORUM Handling Tools recommends to change to Locking Assembly

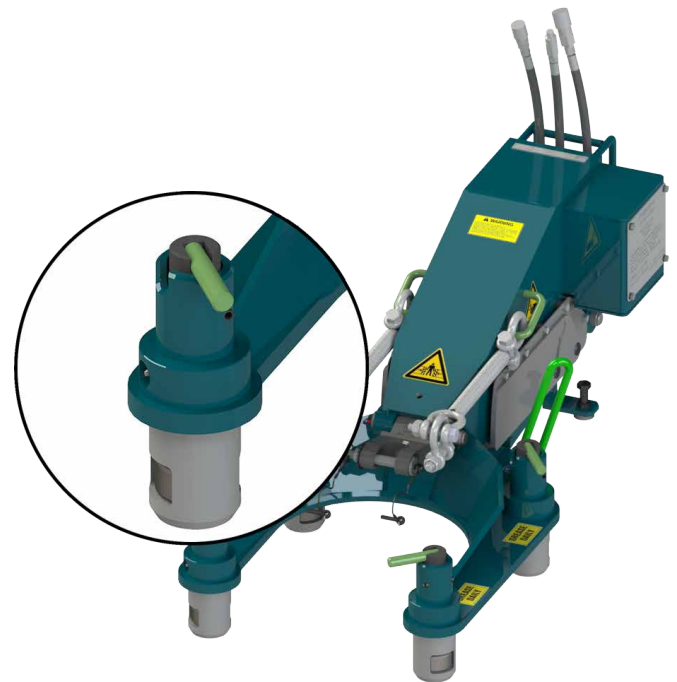


Fig. 6: Slip Lifter Locking Assembly (P/N89208)

1.2.3 Slip Lifter with Downforce

The Slip Lifter with Downforce enhances the Slip Lifter with the aid of an additional force while setting down the slip.

NOTE For use inside master bushings with slot only.

Name	P/N	Type
Slip Lifter with Quick Lock	88710-HD	Hydraulic

1.3 Hydraulic Assembly

The Slip Lifter is operated hydraulically. The hydraulic system is completely integrated into the body. For this purpose it is necessary to supply pressure alternately to hydraulic connections.

Hydraulic connection lines

To operate the FORUM Handling Tools Slip Lifter all lines have to be connected.

- A** Slips Down
- B** Slips Up
- C** Feedback line (Slips Set)

All hydraulic connections have a coupling bushing and a plug coupling with quick connection flat face couplings, $\frac{3}{8}$ " and $\frac{1}{4}$ ". The used coupling by FORUM Handling Tools meet the ISO 16028 standard and are ideal for interchangeability with other manufacturer. This features include the ability to connect with virtually no air inclusion or disconnect with little or no spillage. This enables the operator to easily clean the coupling surfaces to prevent contamination from entering the system.

- Push-to-connect
- Standard sleeve-locking device prevents accidental disconnection

1.4 Pneumatic Assembly

The Slip Lifter is operated by air. The pneumatic system is completely integrated into the body. For this purpose it is necessary to supply rig air pressure the connections.

NOTE For pneumatic devices the work flow direction is influenced by using PORT **A** or PORT **B** as Air IN or Air OUT.

INFO

The air supply must be equipped with a maintenance unit (Lubricator, Air Regulator, Filter) to ensure that devices are operated with clean compressed air. An air regulator ensures constant working pressure.



- » The air regulator guards the pneumatic parts against break down.
- » The maintenance unit must be operated with Antifreeze Oil to prevent freezing of air operated devices at temperatures down to -20°C or -4°F . This oil forms a film of lubrication on the plain surface and guarantees that all air operated devices connected are working to full capacity even at -20°C or -4°F .

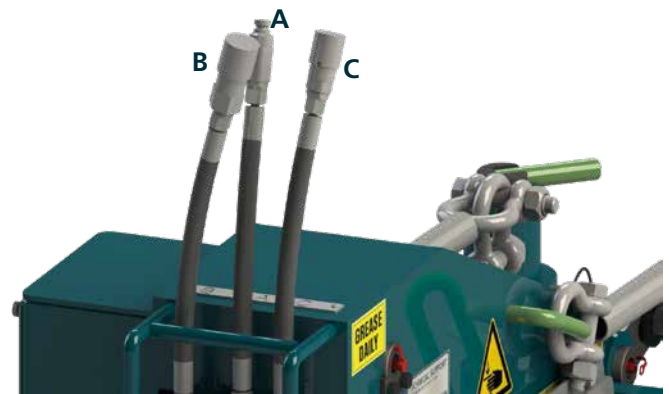


Fig. 7: Hydraulic connections - Slip Lifter backside view

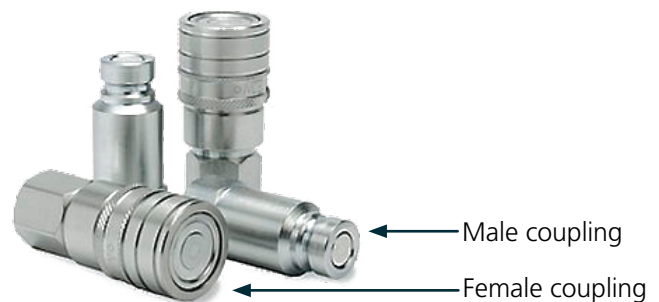


Fig. 8: Hydraulic connections

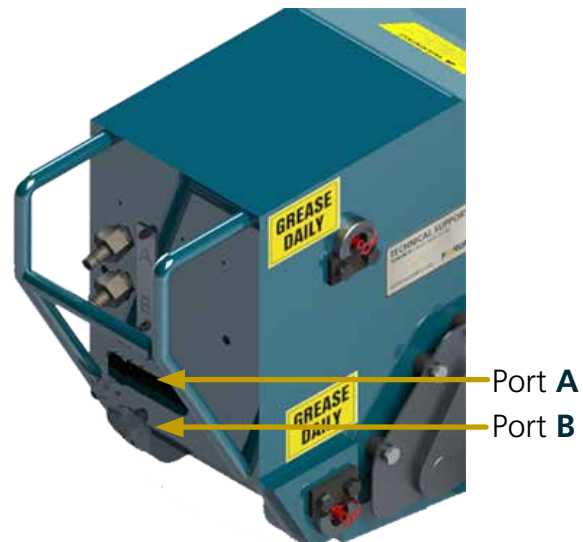


Fig. 9: Pneumatic connections - Slip Lifter backside view

Baseplate location in Rotary Table

The Baseplate is the basic element of the Slip Lifter. The Baseplate frame holds the cover frame with the hydraulic/pneumatic assembly and is the foundation for the Slip Lifter.

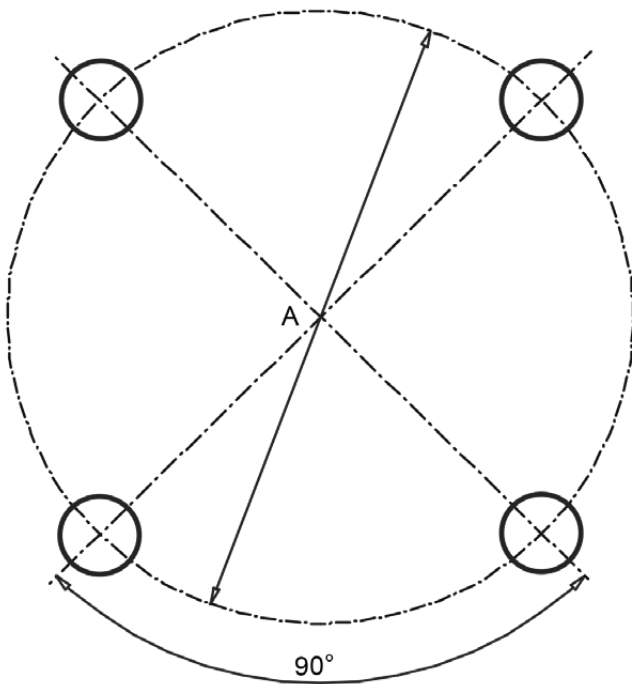


Fig. 10: Punch Diameter of Rotary Table

Nominal Table Size	A
17.1/2" [444,5 mm]	19" [482,6 mm]
20.1/2" [520,7 mm]	23" [584,2 mm]
27.1/2" [698,5 mm]	25.3/4" [654,05 mm]
37.1/2" [952,5 mm]	25.3/4" [654,05 mm]

1.5 Technical Data

General	
Rotary Table:	17.1/2" - 37.1/2" pin drive master bushing API Pin drive punch diameter 25.3/4
Pipe size range (i.e. Drill pipe, casing, tubing and drill collars)	2.3/8" to 7.5/8"
Ambient Conditions	
Temperature range	- 20° C to + 40° C - 4° F to 104° F
Weight	166 kg (365 lbs)
Pressure	
Hydraulic system	
Operating pressure	Min 120 bar (1.740 Psi) Max 210 bar (3.046 Psi)
Volumetric current	Min 22.7 l/m (6 Gpm) Max 37.9 l/m (10 Gpm)
Hydraulic lines for operation	A + B (P+T)
Hydraulic lines for feedback	C (XP)
Minimum purity class	NAS 9
Maximum permissible temperature	+60 °C (+140 °F)
Pneumatic system	
Operating pressure	7 bar (100 Psi)
Air Flow rate	1.8 Gpm (6.8 l/m)

1.5.1 Scope of Delivery

Standard Delivery	Part number	Description
Basic Device	see type series description	Slip Lifter - Hydraulic or Pneumatic operated.
Rotary Slips	On request.	As defined in customer order.
Remote Control		

Adapter available for delivery:

Type	Adapter Type	Part Number
Slip Lifter	FORUM Handling Tools RSX Slips - and LRS Slips	88208
	Access Slips	88208-A
	FORUM Handling Tools RSM	88208-5
Slip Lifter with Downforce	FORUM Handling Tools RSX - and LRS Slips	88408
	FORUM Handling Tools RSM Slips	88408-5
	Varco SDXL Slips	88408-C
	Varco SDML Slips	88408-D

1.5.2 Type series Dimensions

Main Dimensions for Slip Lifter with Quick Lock Pin Assembly

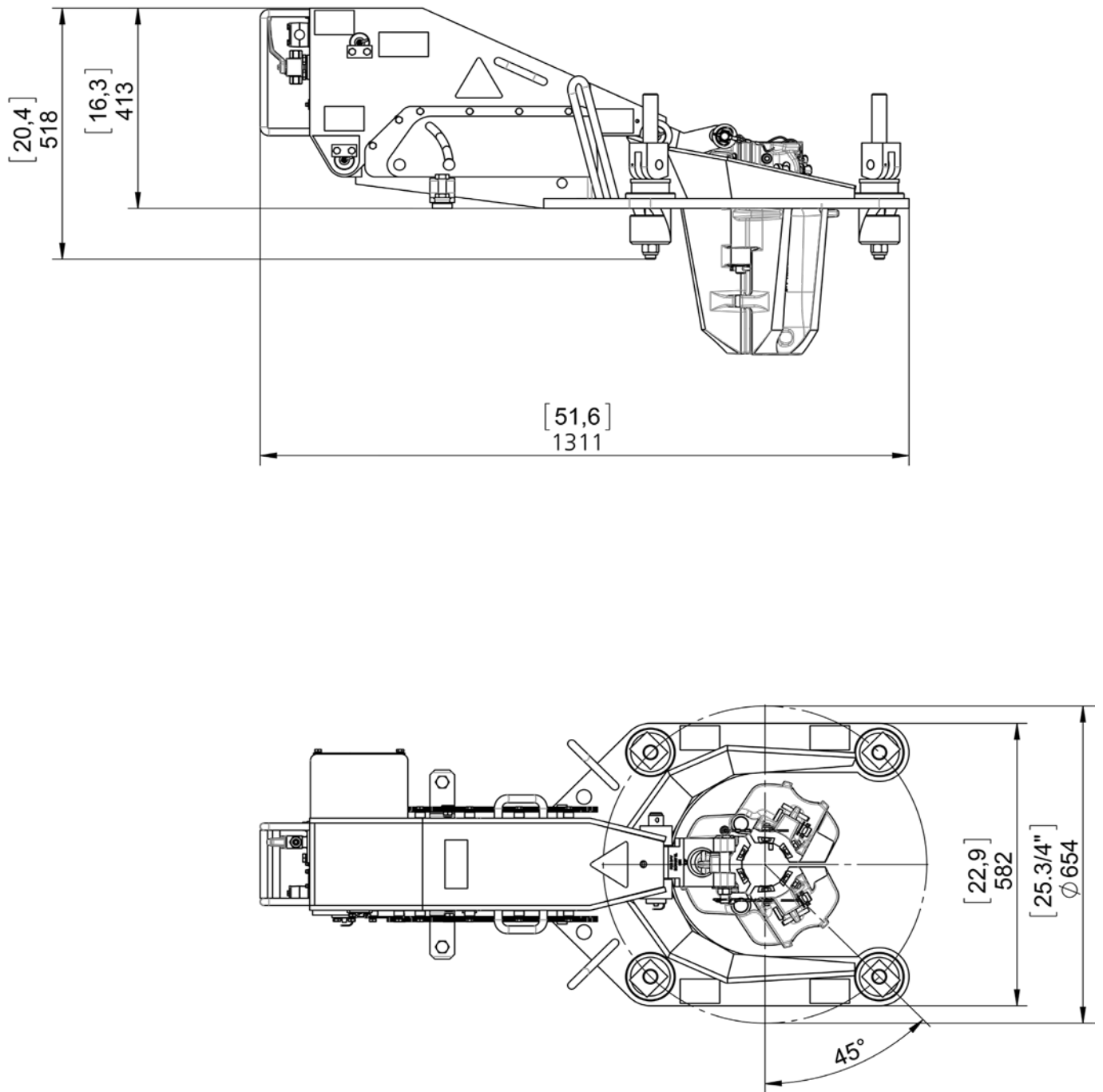


Fig. 11: Main Dimensions

DESCRIPTION

Main Dimensions for Slip Lifter with Locking Assembly

DESCRIPTION

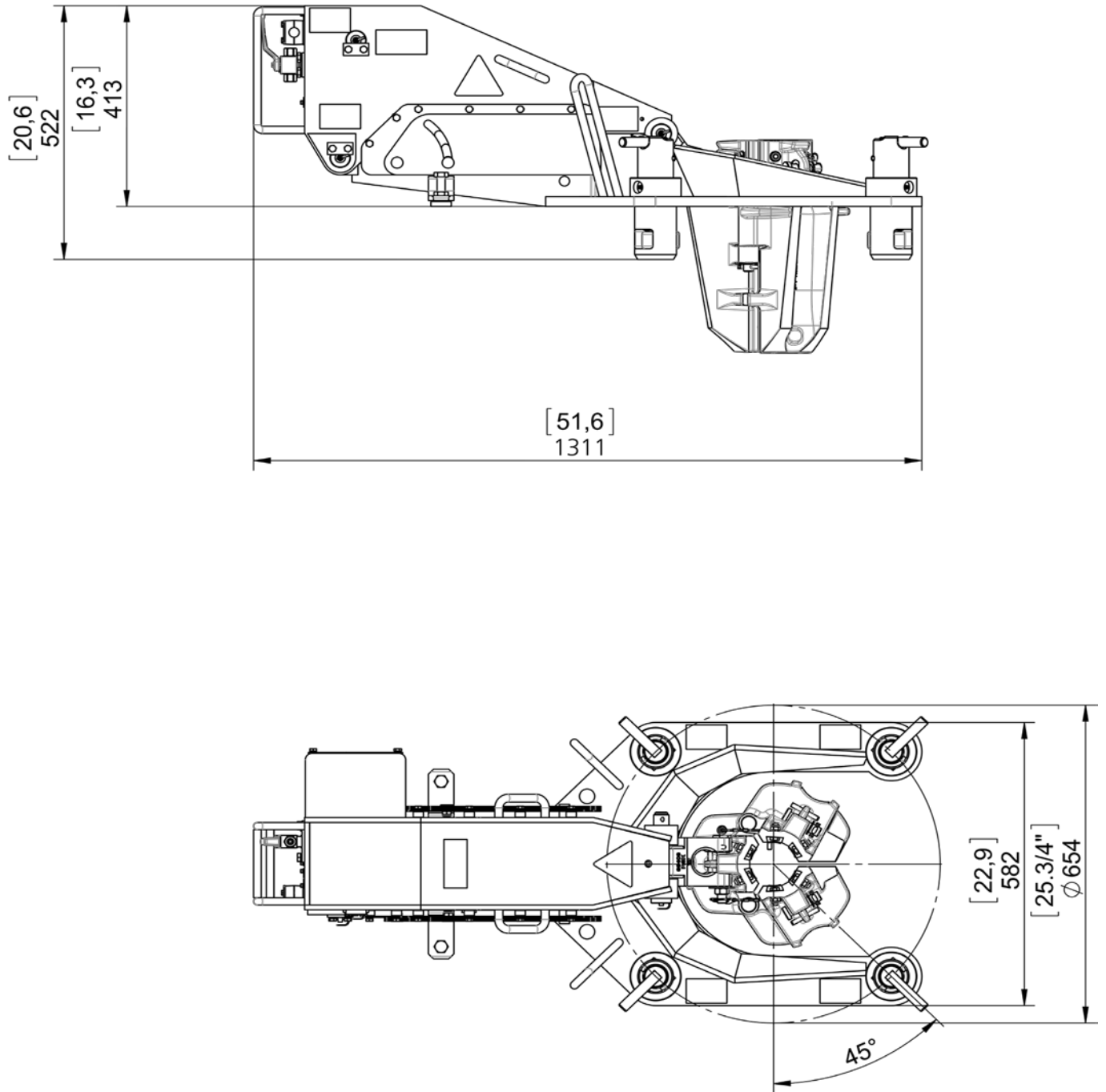


Fig. 12: Main Dimensions

1.5.3 Adapter Dimensions

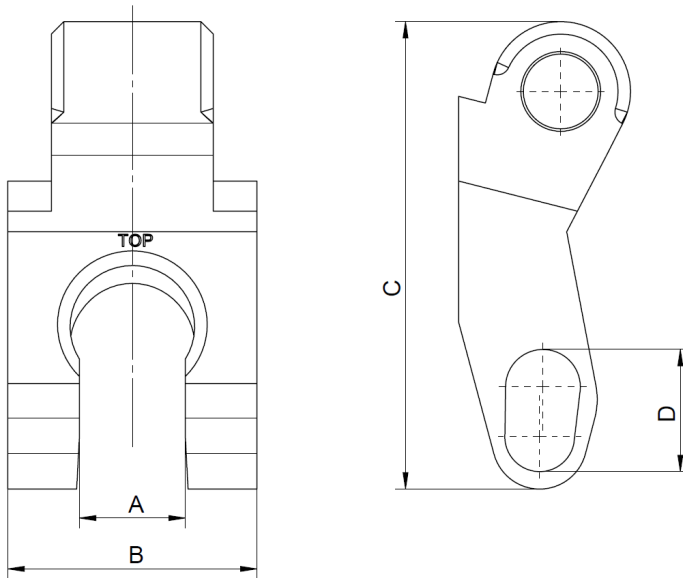


Fig. 13: Adapter Dimensions

P/N	Slip Type	Typ	Down Force	A [inch / mm]	B [inch / mm]	C [inch / mm]	D [inch / mm]
88208	RSX and LRS	PSA / PSH	No	1,67 / 42,5	3,94 / 100,0	7,38 / 187,5	1,92 / 49,0
88208-A	SDXL	PSA / PSH	No	1,67 / 42,5	3,94 / 100,0	8,07 / 205,0	2,24 / 57,0
88208-5	RSM	PSA / PSH	No	1,67 / 42,5	3,94 / 100,0	9,20 / 233,8	1,71 / 43,6
88408	RSX and LRS	PSH	Yes	1,67 / 42,5	3,94 / 100,0	7,32 / 186,0	1,28 / 32,6
88408-C	SDXL	PSH	Yes	1,67 / 42,5	3,94 / 100,0	8,13 / 206,6	0,87 / 22,0
88408-D	SDML	PSH	Yes	1,67 / 42,5	3,15 / 80,0	9,76 / 248,0	0,87 / 22,0
88408-5	RSM	PSH	Yes	1,67 / 42,5	3,94 / 100,0	9,60 / 244,0	1,28 / 32,6

1.5.4 Foot-pedal Dimensions

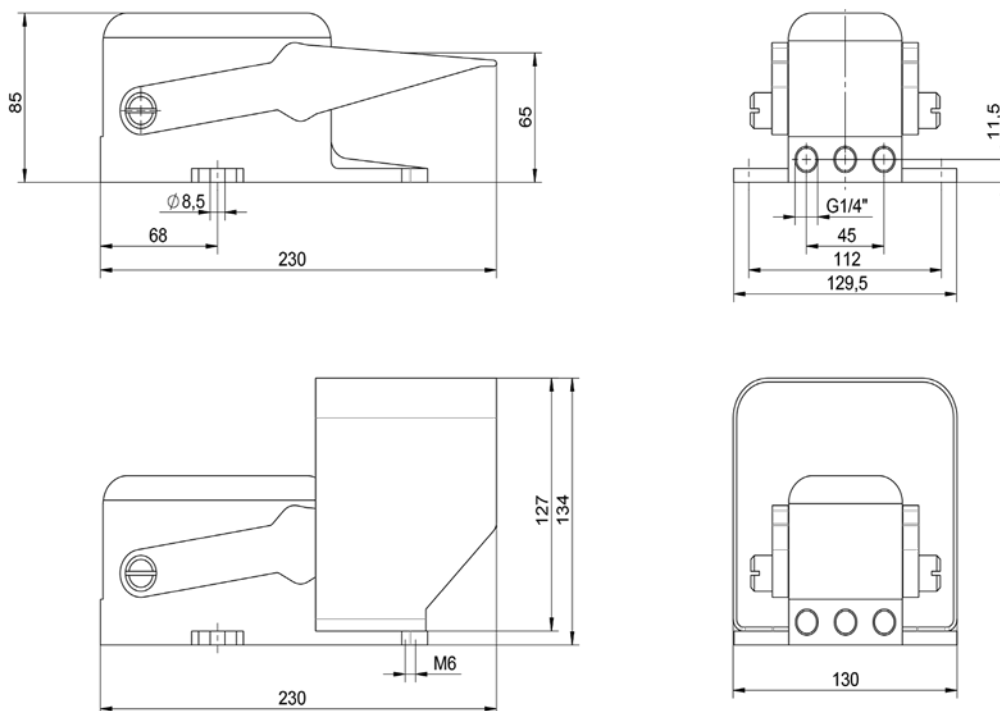


Fig. 14: Foot pedal Dimensions

1.6 Optional Accessories

To ease the handling and to support the device functions following accessories are available from FORUM Handling Tools for the Slip Lifter. Please contact your local FORUM Handling Tools representant for detailed information.

- **Grease Pump, manual** **P/N 755667-3**
Manual grease pump to apply grease on the device grease points.
- **Grease Pump, air operated** **P/N 775810**
Air operated grease pump to apply grease on the device grease points.
- **Foot-pedal** **P/N 88229-1**
The pneumatic foot-pedal allows simple and convenient control of the pneumatic Slip Lifter. It enables remote control of regulating elements required for operation of the machine.
- **Control Unit** **P/N 754510**
The hydraulic Control Unit allows simple and convenient control of the hydraulic Slip Lifter.
- **Hydraulic Switch for Slip Lifter** **P/N 88290**
The hydraulic Switch for pneumatic Slip Lifter allows to control the Slip Lifter via hydraulic pressure



Fig. 15: Manual Grease Pump



Fig. 16: 1 Air Operated Grease Pump



Fig. 17: Foot-Pedal

1.6.1 Recommended Hydraulic Fluid

FORUM Handling Tools recommends use of the following hydraulic fluids under various ambient conditions:

Brand	Flash point [°F/(°C)]	Above – 4 °F (-20 °C)	Flash point [°F/(°C)]
Aral	435.2 (224)	Aral Vitam GF 46	392 (200)
Castrol	392 (200)	Hyspin AWS-46	366.8 (186)
Gulf	410 (210)	Harmony 46AW	395.6 (202)
Shell	424.4 (218)	Tellus Tonna	408.2 (209)
Finke	572 (300)	Aviaticon HY-HE-46	509 (265)
Fuchs	428 (220)	Renolin MR 10	410 (210)

1.6.2 Recommended Lubricants

FORUM Handling Tools recommends use of the following lubricants for effective lubrication under various ambient conditions:

Brand	Name	Temperature range*	Remarks
Finke	Aviaticon XRF Low-Viscosity Grease	-20. . +29 °C (-4. . +84.2 °F)	NLGI 0
Fuchs	NESSOS SFO 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
Castrol	MP grease	-20. . +29 °C (-4. . +84.2 °F)	-
Chevron	Avi-Motive W	-20. . +29 °C (-4. . +84.2 °F)	-
Exxon	Lidok EP2	-20. . +29 °C (-4. . +84.2 °F)	-
Gulf	Gulfcrown EP@	-20. . +29 °C (-4. . +84.2 °F)	-
Mobil	Mobilux EP2	-20. . +29 °C (-4. . +84.2 °F)	-
Shell	Alvania EP2	-20. . +29 °C (-4. . +84.2 °F)	-
Texaco	Multifak EP2	-20. . +29 °C (-4. . +84.2 °F)	-
Union	Unoba EP2	-20. . +29 °C (-4. . +84.2 °F)	-

* For temperatures above +30 °C (+86 °F)
FORUM Handling Tools recommends using the specified lubricants in consistency class NLGI 2.

1.7 Operational Environment

The Slip Lifter is designed and constructed for use in the drilling industry on ships and platforms. The equipment is approved for operation in explosion hazard areas. For equipments containing any hydraulic powered parts, the directive 2014 / 34 / EU "Equipment and protective systems in potentially explosive atmospheres " applies. The corresponding ATEX certificates are present in the Data book. The Classification according to CE (with reference to the ATEX guideline) is as followed:

CE II 2G IIB T5 for hydraulic/pneumatic equipment

Explanation

CE	CE- marking (with reference to the ATEX guideline)
	Marking of the equipment for the Ex- range
II	Equipment Group (II)
2	Equipment Category
G	For explosive mixtures of air and combustible gases, mists or vapors (G)
IIB	Category for Gases
T6	Temperature class

1.8 Equipment Markings

The markings are generally used for traceability and provide general information about the component/ device. All markings are in compliance to the latest Machine Guide Line and at least include the following information:



Fig. 18: Machine marking

General Markings

- Manufacturer’s specifications (FORUM logo).
- Production Date (Month / Year).
- Part number (marking P/N before the part number).
- Serial number (marking S/N before the serial number).
- Own weight.
- Maximum weight in kg, if the weight increases by attachments.
- CE-ATEX marking (**CE** II 2G IIB T5 / T6).
- Country of manufacture.



Fig. 19: Contact with Technical Support

DESCRIPTION

1.9 RFID-Chip Equipped Handling Equipment

INFO



For further information, you may access the Forum/IC Database from the FET Website or at www.infochip.com.

FORUM Handling Tools outfits/supplies certain equipment with patent pending RFID Technology. This technology allows for easy real-time access to pertinent equipment information and technical documentation anytime, anywhere. The database is accessible via the internet or mobile application.

Tier I Access – General Access

As standard, the customer will be assigned and issued login information to the database provided for their assets/equipment. Once logged into the database, customers will be able to see all assets assigned to them. Attached to each asset is complete documentation including all contents of databook related to that specific asset. The customer will be able to view, download and print all documents associated with their particular assets.

Tier II Access – User Access

Customers opting for improved access as a system user will have the full functionality of Tier I Access but will be able to manipulate their assets. Additional functionality includes but is not limited to:

- Assigning Inspection and Certification due dates and reminders.
- Attaching Internal Inspection Checklists/Documentation.
- Managing Asset Locations.
- Assigning Internal Asset/Serial Numbers.

INFO



For detailed RFID instruction, please refer to Forum Document 1155081, FORUM RFID User Manual (refer to section XIV „Online Technical Document access“ on page 12).

Frequently Asked Questions (FAQ)

- How do I know if my equipment has RFID?
 - » RFID tags are embedded and clearly marked (“RFID”) on equipment in inconspicuous locations generally at the upper visible part of the equipment.
- What type of RFID tag are we using?
 - » The RFID tags used in FORUM equipment operate on the UHF Frequency.
- How can I scan the tag?
 - » Standard NFC UHF Frequency Reader (available through Forum).
- What is on the tag/chip?
 - » The chip identification number is the only information physically on the chip. All other information is stored on the cloud-based database associated with the chip identification number.
- Whom do I contact to get Tier I access or to inquire about Tier II access?
 - » Forum Sales personnel can help with basic access and upgrade information.

SAFETY

SAFETY

2 Safety

SAFETY IS EVERYONES RESPONSIBILITY BUT IT STARTS WITH YOU!

The Slip Lifter was designed and produced according to the state-of-the-art and in consideration of all required safety precautions.

Failure to observe the safety precautions and operating instructions specified in the present operating manual, can lead to hazardous situations when operating the machine. Notwithstanding the fact that it is not possible to completely exclude hazardous situations during operation.

Use the machine only for the intended purpose when it is in a technical safe state.

Rectify all faults immediately which could have a negative effect on the machine safety.

2.1 General Safety Precautions

Ensure that work on the machine, particularly installation, maintenance and repair work, is performed only by personnel with the necessary qualifications and who are familiar with the associated risks (refer to section VI "Obligations of the Operating Company" on page 7).

For safe and proper operation of the machine it is essential that all personnel working on the machine take the prescribed safety measures and observe the safety precautions specified in this operating manual.

Before switching on and before working on the machine always ensure that no one is put in a hazardous situation.

All safety features must be installed completely before switching on the machine.

Safety features may be released only when:

1. The entire machine is switched off and
2. switching back on unintentionally is not possible.

The machine contains components subject to wear (e.g. guide plates, inserts and hoisting equipment). After longer periods of operation the safety can be reduced due to wear. Service the machine regularly in compliance with the maintenance chart (refer to section 6.2 "Inspections" on page 96) to ensure that all safety requirements are always fulfilled. Check the specified wear limits regularly. Replace worn or defective parts immediately with new parts.

If safe operation is no longer guaranteed, switch off the machine and secure it against being switched back on unintentionally. Advise the responsible service organization. Rectify every fault, which affects the safety, immediately.

2.2 Safety Equipment

The Slip Lifter is equipped with various safety features for protection of the operating personnel:

- During operation all moving parts are secured against reaching in by screwed covers.
- The hydraulic lines are connected to the Slip Lifter with safety quick-release couplings.
- Hazard points on the machine are marked with signs (refer to section 2.3.2 "Warning and Safety Instructions on Machine" on page 30), indicating the type and consequences of a hazard as well as measures to prevent it.
- The slips cannot set when pulling the drill string.
- When the slips are in the end position, the entire force of the cylinder is transferred to the slip in the event of unforeseen incidents.
- All components, particularly parts requiring replacement during conversion work when changing pipe sizes, are equipped with threaded holes for screwing in load bolts or with fixed load bolts.
- The Slip Lifter is delivered in a transport crate to ensure secure transport and stable standing.
- External hoses are provided with a chafe guard.
- Never open the Slip Lifter when load is still suspended by the Slip Lifter.
- On the hydraulic Slip Lifter series the Slips are held in the open position by a load holding valve and can set by themselves when setting the drill string.
 - » Never remove the safety equipment or replace it with safety equipment not approved by FORUM Handling Tools. Failure to observe this instruction can lead to hazardous situations for which FORUM Handling Tools cannot be held responsible.
 - » Always keep all safety equipment in working condition and check integrity regularly.

Hazardous Locations

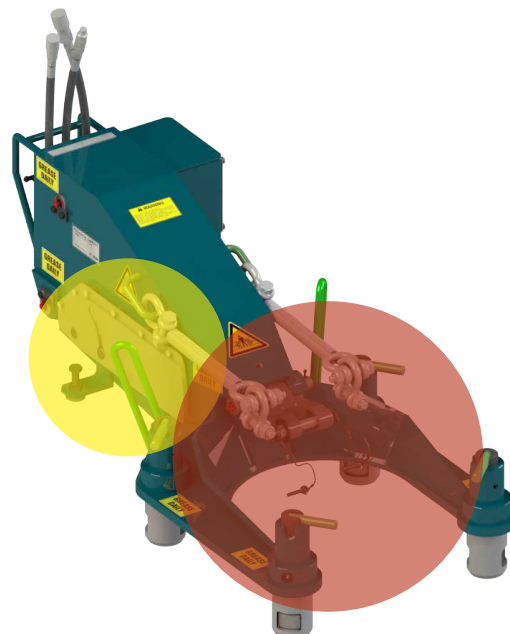


Fig. 20: General hazardous locations

2.3 Safety Precautions



⚠ WARNING

Reuse of safety components can cause accidents.

Never reuse safety - relevant parts (such as securing cables or plates, discs or washers).

- » Replace such components with new safety parts.

⚠ CAUTION

The operating company is responsible for ensuring safe and correct use of the equipment within the sense of the hazard and risk analysis.

The operating company is also obligated to issue and supervise observance of operating instructions on safe use as well as to observe the instructions in this operating manual.



2.3.1 Operating Manual and Machine

The safety precautions in this operating manual are indicated using standardized depictions and symbols. Chapter 1 describes general depiction of safety precautions.

Concrete examples of the symbols and terms used in this manual are explained below. These are used in the form shown wherever possible hazards are present.



⚠ DANGER

Suspended load!

This indicates injury risks from transporting heavy components.



⚠ DANGER

Tipping hazard for components!

This indicates injury risks from tipping components.



⚠ WARNING

Danger of pinching/crushing hands!

This indicates injury risks from moving parts, which pose a hazard of pinching or crushing hands.



⚠ WARNING

Danger of pinching/crushing feet!

This indicates injury risks from moving parts, which pose a hazard of pinching or crushing feet.



⚠ WARNING

Danger of pinching/crushing body!

This indicates injury risks from moving parts, which pose a hazard of pinching or crushing the body.



⚠ WARNING

Separated hydraulic/pneumatic lines pose an injury hazard!

This symbol is used to mark areas where injuries are possible from disconnecting hydraulic lines in which the pressure has NOT been relieved.



⚠ WARNING

Defective hydraulic/pneumatic lines pose an injury hazard!

This symbol is used to mark areas where injuries are possible from defective hydraulic lines.



⚠ WARNING

Health hazards from service products!

This symbol warns of health hazards resulting from contact of service products (e.g. lubricants, hydraulic fluids) with the skin, mucous membranes, eyes and respiratory paths.



⚠ CAUTION

Risk of stumbling/tripping!

This symbol warns of tripping hazards, which can lead to stumbling resulting in injuries.

2.3.2 Warning and Safety Instructions on Machine

Hazard points are indicated by special stickers on the machine. Ensure that these are always kept in an easily legible state and replaced as required.

SAFETY

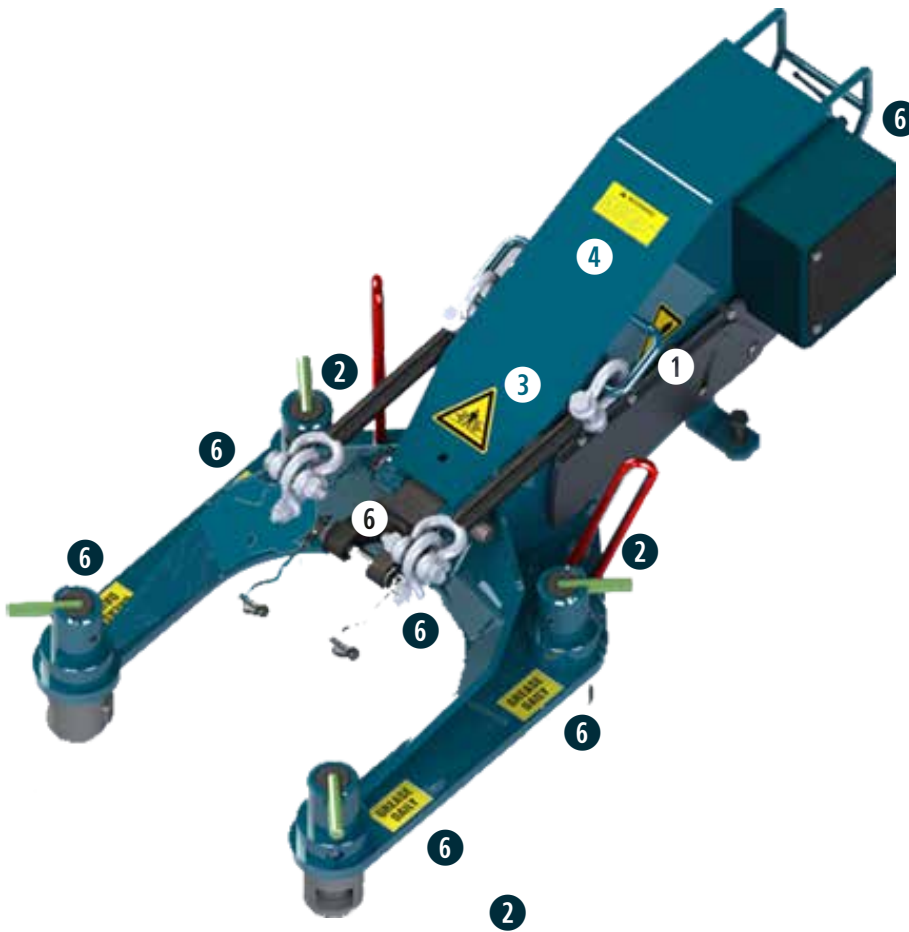


Fig. 21: Safety Precautions on Machine I

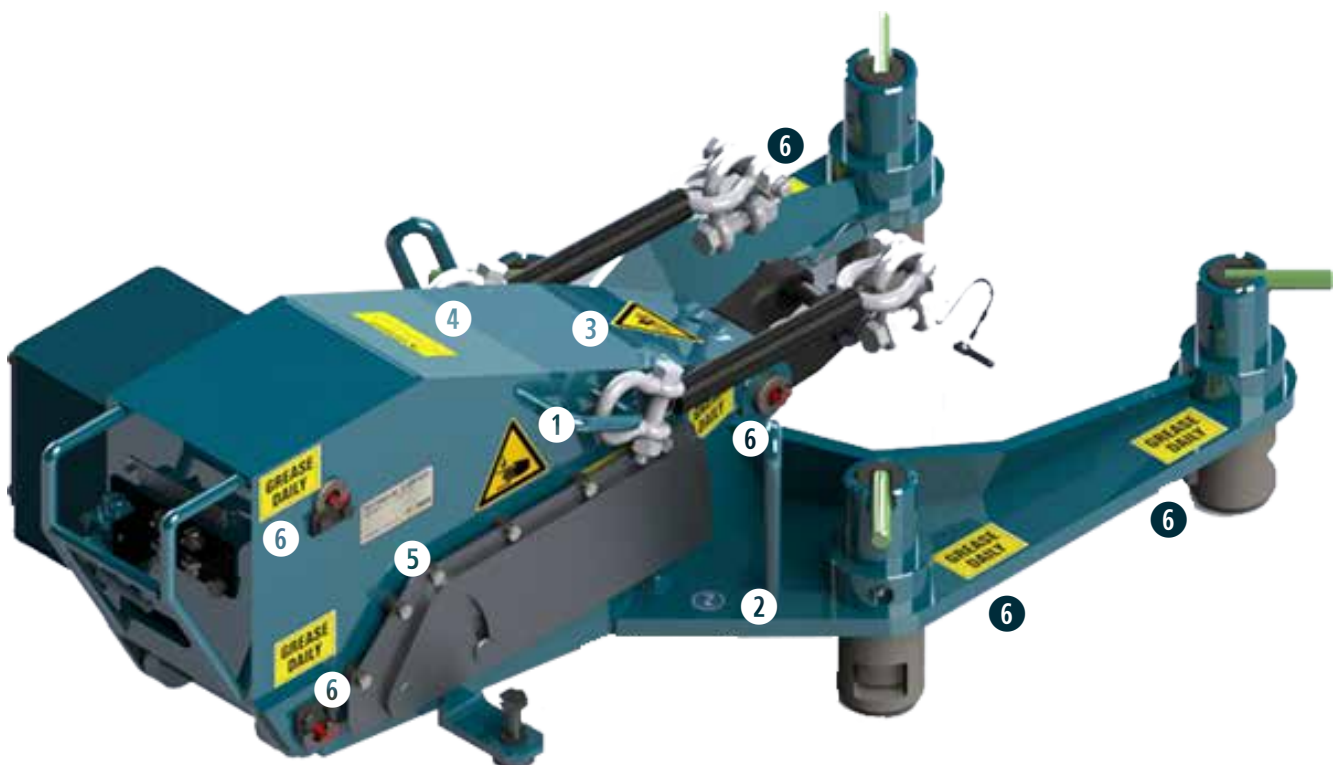


Fig. 22: Safety Precautions on Machine II



Fig. 23: WARNING sign
"Hazard – Hand Injury"
ANSI Z535.4
PN 671640-1

Fig. 24: Lifting point
ANSI Z535.4
PN 671639

Fig. 25: WARNING sign
"Body crushing"
ANSI Z535.4
PN 671641

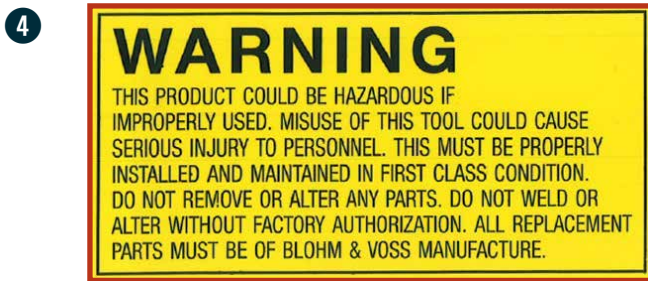


Fig. 26: WARNING sign - General WARNING (PN 671638)

Fig. 27: Support sticker (PN 613129)



Fig. 28: Instructions: Lubricate at Least Once Daily (P/N 671642)

2.4 Organisational Measures

The operating company is responsible for ensuring that all legally and officially prescribed approvals for operation of the machine are present in compliance with national laws and regulations.

The required personal protective equipment (refer to section X "Personal Protective Equipment (PPE)" on page 10) must be provided by the company operating the machine.

All safety features present must be checked regularly in compliance with national and local requirements.

Warning signs and safety notices on the machine must be easily legible at all times and replaced as required.

The operating instructions must be kept so that they are available to those operating the machine at all times.

Personal Protective Equipment

The required Personal Protective Equipment (PPE) must be used when operating the machine. This is to be provided by the operating company.

The following PPE is recommended:

- Oil resistant protective clothing,
- Protective gloves,
- Eye protection,
- Safety shoes,
- Protective helmet.

All parts of the protective equipment must be checked regularly for damage in compliance with the specific national regulations and replaced as required.

2.5 Safety Precautions

This machine was designed and produced according to the state-of-the-art in consideration of the safety precautions specified in EC Directive 2006/42/EC on Machinery.

The machine may be used only for:

- Its intended purpose (refer to section 1 "Description" on page 16).
- When it is in a technically safe state.

Nevertheless it is not possible to completely exclude all hazardous situations which could arise when the machine is used. Reference is made to these remaining risks at the beginning of each chapter and at the corresponding points in the description and measures for avoiding these risks are explained.

⚠ WARNING

Mechanically generated sparks

In the processing of incidents such as clamping components, sparks can be generated with the use of metal hammers.

- The use of metallic hammers in hazardous areas has therefore be prohibited by the operating company.
- » For loosening of clamping components only non-metallic (plastic) hammer, which are approved for use in hazardous areas, may be used.



INFO



The operating company is responsible for ensuring that all personnel working on the machine is familiar with the remaining risks and observe the appropriate safety precautions.

2.5.1 Risk of Stumbling/Tripping



⚠ Caution

Risk of stumbling/tripping!

When the Slip Lifter is installed and lines are routed openly.

- » DO NOT run.

- incoming and outgoing hydraulic/pneumatic lines pose a stumbling/tripping hazard.
- Never run during work.

2.5.2 Danger of Pinching/Crushing



⚠ WARNING

Danger of pinching/crushing hands!

Moving parts pose a hazard during assembly, set-up and conversion work as well as during operation.

- » NEVER reach between moving components.



⚠ WARNING

Danger of pinching/crushing feet!

Moving parts pose a hazard during assembly, set-up and conversion work as well as during operation.

- » NEVER stand below moving components.



⚠ WARNING

Danger of pinching/crushing body!

Moving parts pose a hazard during assembly, set-up and conversion work as well as during operation.

- » NEVER stand between moving components.

During assembly, set-up and conversion work as well as during operation pinching/crushing hazards can be posed by

- Opening the body,
- Inserting the Slip Lifter into the drilling table,
- Installing and removing slips.

Pay attention to hands, feet and body when performing the work specified. Always ensure that no one is in a hazardous position.

Always wear your personal protective equipment.

2.5.3 Incorrect Handling of Hydraulic/Pneumatic Equipment



⚠ WARNING

Defective hydraulic lines pose an injury hazard!

- » Route hydraulic lines safely and check regularly for damage.
- » Provide lines with chafe protection.
- » Replace defective lines immediately.

⚠ WARNING

Separated hydraulic lines pose an injury hazard!

- » Hydraulic/Pneumatic fluid can escape under high pressure.
- » Always relieve pressure in hydraulic equipment before working on Equipment.
- » Check hydraulic connections regularly to ensure that they are properly fastened.



⚠ WARNING

Hydraulic/Pneumatic fluid can pose a health hazard!

- » Hydraulic/Pneumatic fluids can lead to skin and eye injury and poisoning symptoms upon contact.
- » Avoid direct contact with hydraulic fluids.



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!

Hydraulic/Pneumatic lines which are weakened due to incorrect routing or damage can burst under load. The hydraulic fluid then escapes under pressure resulting in a powerful jet, which can lead to skin or eye injury.

For this reason always

- Lay hydraulic lines so that they are not kinked or pinched.
- Check regularly for damage and replace as required.

Always wear your personal protective equipment.

SAFETY

Hydraulic/Pneumatic system safety instructions

1. Release the pressure in all lines carrying hydraulic oil prior to any maintenance and repair work.
 - Lower all hydraulically controlled components to the ground.
 - Move all control levers of the hydraulic control valves several times.
2. Hydraulic/Pneumatic oil escaping under high pressure can penetrate the skin and cause serious injuries. Always consult a doctor immediately even if the wound seems insignificant – otherwise serious infections could set in!
3. Replace the hose or line if one of the problems mentioned below is detected.
 - Damaged or leaky hydraulic seals.
 - Worn or torn shells or uncovered reinforcement branches.
 - Expanded shells in several positions.
 - Foreign bodies jammed or stuck in protective layers.
4. Re-tighten leaking screwed fittings and hose connections only when the system is not under pressure; i.e. release the pressure before working on pressurized lines!
5. Never weld or solder damaged or leaking pressure lines and screw connections.
Replace damaged parts with new ones!
6. Never search for leaks with your bare hands or eyes, always wear protective gloves and eye protection!
 - Use paper or wood to check for minor leaks.
7. Leaks and damaged pressure lines must be immediately repaired or replaced.

2.5.4 Human Error

Ignorance of hazards, inattentiveness and limited reactions can lead to hazard situations while working with the Slip Lifter.

Safe Work

1. All personnel working on the machines are responsible for paying attention to their colleagues.
2. Consumption of alcohol and drugs is prohibited.
3. Work on the Slip Lifter is not permissible after taking medication which reduces reactions.
4. AT LEAST visual contact must exist between the operator in the doghouse and the personnel at the Slip Lifter, to allow communication via hand signals.
5. The personal protective equipment must always be kept and used in perfect condition.
6. All personnel working on the Slip Lifter must be familiar with and observe the safety precautions in this instruction manual and on the machine.
7. The instructions for handling and maintenance intervals specified in this operating manual must be observed.
8. Keep a copy of this operating manual in the vicinity of the machine, where it is accessible at all times.

SAFETY INSTRUCTIONS

for Slip Lifter



WARNING

To reduce the risk of injury, everyone using, installing, performing maintenance, changing accessories on, or working with this tool must read and understand these instructions before operation.

*OUR goal is to produce tools that help you work safely and efficiently.
The most important safety device for this tool is **YOU**.
YOUR good judgement is the best protection against injury.*

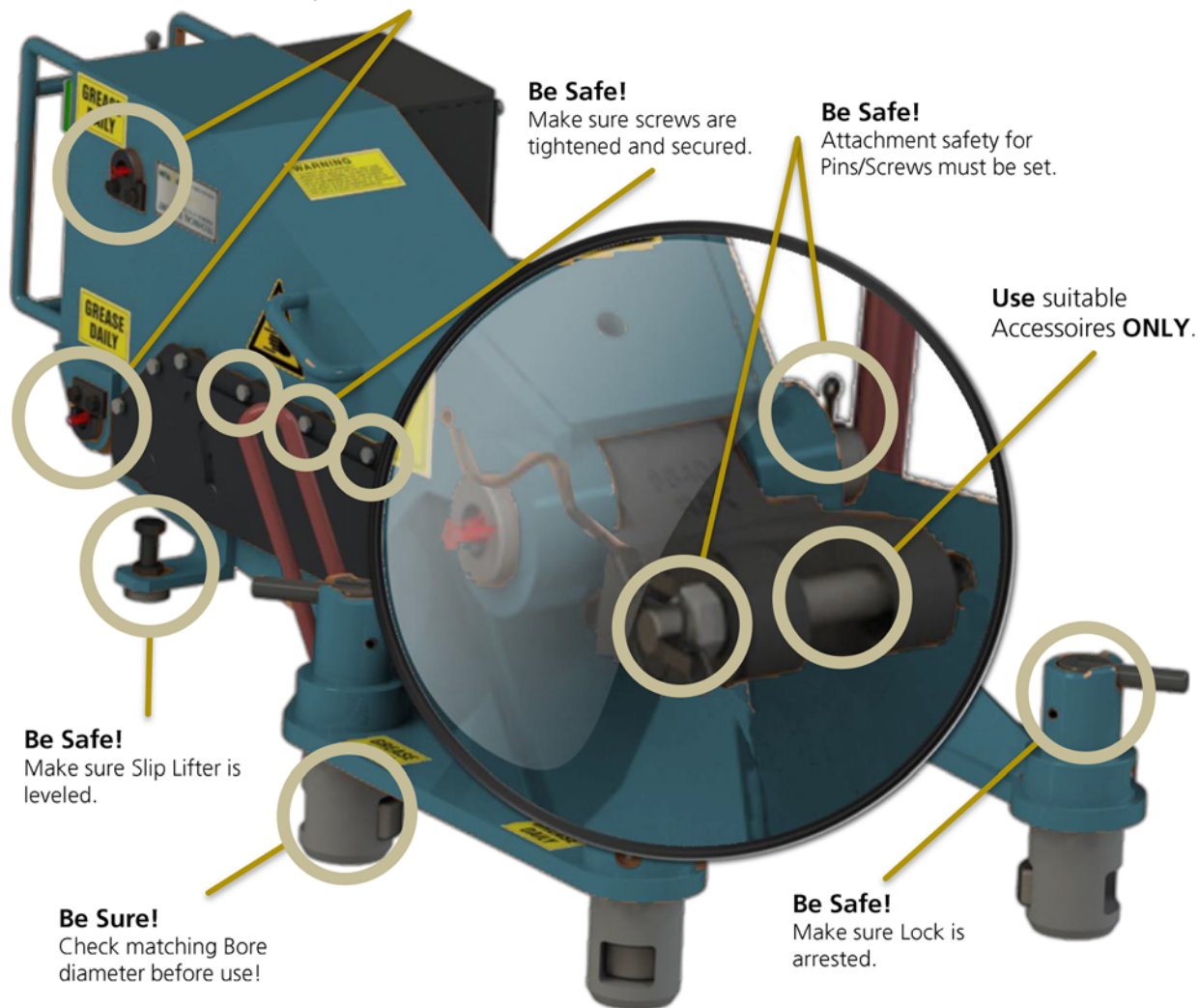
The **FORUM Handling Tools** Slip Lifter were designed and produced in consideration of all required safety precautions. For safe and proper use it is essential that all personnel working on the machine take the prescribed safety measures and observe the safety precautions specified when operating the machine.

► Inspection Guide

- ⚠ **Use the equipment** only for the intended purpose in a safe state.
- ⚠ **Rectify all faults** immediately which could have a negative effect on the safety.
- ⚠ **All safety features** must be **installed** completely before operation.
- ⚠ The equipment contains components **subject to wear** (e.g. Hinge Pins).
- ⚠ **Check the specified wear limits regularly.**
- ⚠ **Replace worn or defective parts** immediately with new parts.

Use Maintenance!

Always lubricate machine



Be Safe!
Make sure Slip Lifter is leveled.

Be Sure!
Check matching Bore diameter before use!

Be Safe!
Make sure Lock is arrested.

FORUM™ Pipe Handling Tools

DO NOT DISCARD = GIVE TO OPERATOR

SAFETY INSTRUCTIONS

for Slip Lifter



WARNING

To reduce the risk of injury, everyone using, installing, performing maintenance, changing accessories on, or working with this tool must read and understand these instructions before operation.

*OUR goal is to produce tools that help you work safely and efficiently.
The most important safety device for this tool is **YOU**.
YOUR good judgement is the best protection against injury.*

▶ Your Safety Notes:

FORUM™ Pipe Handling Tools

DO NOT DISCARD - GIVE TO OPERATOR

TRANSPORT / SET-UP

TRANSPORT /
SET-UP

3 Transport / Set-up



Ensure that set-up and installation work are accomplished only by sufficiently qualified and trained personnel.



Read these instructions carefully before setting up the machine and putting it into service.

3.1 Delivery

The Slip Lifter and all accessory parts are shipped in a transport crate. Instructions for safe transport are marked on or attached to the transport crate.

- » Transport the packed machine as specified in these instructions.
- » Scope of Delivery.

INFO



The contract documents and shipment papers specify the precise scope of delivery. Check these documents carefully on delivery. In the event of any discrepancies please contact the FORUM Handling Tools representative specified in Chapter refer to section XIII "Contact worldwide" on page 11 immediately.

The scope of delivery includes all components required for the intended operation of the Slip Lifter as described in Chapter refer to section 1.7 "Operational Environment" on page 25.

3.1.1 Unpacking and Disposal of Packing Material

Remove the transport packaging and transport aids before hoisting the machine to final site.

INFO



Do not remove transport retainers. The transport retainers should be removed only at the installation site just before start-up.

Check scope of delivery

1. Is any transport damage visible?
2. Is the shipment complete? Compare the scope of delivery with the specifications in the shipping documents.

3.1.2 Intermediate Storage

If intermediate storage of the machine is necessary, observe the following:

- » Leave the machine in its transport packaging. This provides sufficient protection against external influences.
- » Secure the machine to prevent it from Slipping or falling due to motion.

TRANSPORT/
SETUP

3.2 Transport

⚠ DANGER



Suspended load!

The falling load can cause severe, even lethal injuries.

- » NEVER stand beneath or in the swing area of lifted loads or loads suspended from a crane.



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!



WEAR EYE PROTECTION!

INFO

Safe Lifting Points!



- Lifting point locations, especially load hooks attachments are marked on the Slip Lifter.
- » Make sure all load hooks are fully installed to the attachment points. Thus, the safe transport of FORUM Handling Tools equipment is ensured.



Internal transport on site!

- » It is advised to use pallets for longer component transports.
- » Use a pallet and place Slip assembly front side down for transport.
- » Use a pallet and place body assembly upright for transport.

Principles for transport

1. Ensure that transport routes are sufficiently dimensioned and marked.
 - » Ensure that all persons are aware that a transport takes place.
2. Always use pallets for longer transport distances.
3. The total weight (object to be transported + means of transport, e.g. forklift) must not exceed the supporting capacity of the subsurface.
4. Ensure that such work is performed only by sufficiently qualified personnel.
5. Always shut off machine before transport and secure against starting back up unintentionally.
 - » Start de-installation only after residual energy has been dissipated.
6. Ensure that visual and audio contact exists between the crane operator and operating personnel.
7. Secure the area against unauthorized entry.
 - » If necessary mark the area with information signs to warn of maintenance and repair work.
8. Secure moving parts in suitable manner
9. Use only approved slinging and transport equipment, which is in perfect condition and suitable for the intended purpose.
 - » Observe specified load limits.
10. Secure machine against slipping/sliding.
 - » Observe machine weight.
 - » Observe center of gravity.
11. Never stand under suspended loads.
12. Transport the machine carefully.
 - » Do not fasten, lift or pull machine on parts, that could be damaged.
 - » Avoid sudden stops.
13. Always use hoisting equipment (slings, hoisting cables, shackles, etc.), which has been inspected and is sufficiently dimensioned.
14. Ensure that all installation and hoisting procedures are accomplished in compliance with recognized rules of practice and industrial standards.

» Detailed weight specifications are given in the chapter refer to section 1.5 "Technical Data" on page 20.

3.3 Lifting arrangements

Hoist the Slip Lifter safely

1. Use the transport crate for transporting the Slip Lifter to the location for use.
2. Attach the Slip Lifter only at the transport guides provided for transport or using the transport crate.
3. Attach the hoisting cables so that they are tensioned straight without kinks.
4. Use hoisting cables and load hooks with sufficient supporting capacity.



⚠ DANGER

Safe Lifting!

- » Always make sure that the load hooks are fully installed in the lifting points before lifting the Slip Lifter.



⚠ DANGER

Suspended load!

- » Always use the marked lifting points to lift the Slip Lifter.

3.3.1 Slip Lifter lifting on transport guides

1. Fasten the lifting ropes to Slip Lifter transport guides.
2. Lift the Slip Lifter slightly to tension the hoisting ropes.

⚠ WARNING Danger of collision with swinging loads!
Ensure that no one is present in the swing are of the Slip Lifter.

3. Lift the Slip Lifter.
4. Move the Slip Lifter to the installation location.
5. Set the Slip Lifter down carefully on a suitable subsurface.



Fig. 29: Lifting the Slip Lifter with ropes

3.3.2 Lifting arrangement and installation of Bowls and Slips

The lifting arrangement and installation of Bowls and Slips are not part of these Manual. Refer to the operation maintenance manual of the Bowls or Slips.

TRANSPORT/
SETUP

3.4 Installation Requirements

Supply Connection requirements

Hydraulic operating pressure	120 bar (1.740 Psi)
------------------------------	---------------------

(refer to section 1.5 "Technical Data" on page 20)

Pneumatic operating pressure	7 bar (100 Psi)
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(refer to section 1.5 "Technical Data" on page 20)

Space Requirement

Following space requirements are needed during operation, maintenance and storage:

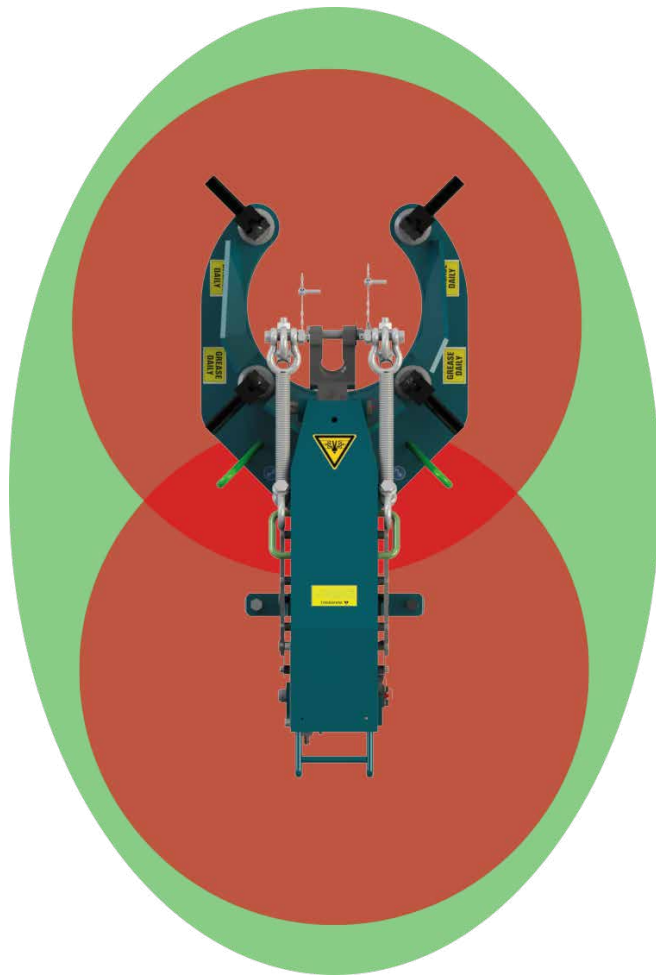


Fig. 30: Space requirements

Maintenance work

- Make sure there is enough space around the Slip Lifter.

Lifting and Operation

- Always ensure a sufficient distance to the Slip Lifter during operation.

3.5 Set-up, Installation and Arrangement

⚠ DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

- » NEVER stand under suspended loads.
- » NEVER stand in the swing area of suspended loads.



⚠ WARNING

Pinching/crushing hazard from lowering!

Severe pinching/crushing up to loss of limbs.

- » NEVER step over edge of Rotary Table with feet.



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!

3.5.1 Adapter Installation/Removal

Preparation

- The Slip Lifter has been removed from the well to prevent any parts from falling into it.

Procedure

1. Select appropriate Slip Adapter.

INFO



Ensure that the correct Slip-Adapter is installed!

- » Never operate the Slip Lifter without suitable Slip adapter!
- » Refer to Chapter Technical data for a complete list of available Slip adapter for the Slip Lifter type series.

2. Remove cutter pin from Adapter Pin and linch pin from Slip Pin ①.
3. Remove Adapter Pin ② from Slip Lifter to release the Slip adapter.
4. Position and secure appropriate Slip Adapter ③.
5. Secure the Slip Pin with a linch pin and the adapter pin with a cotter pin.

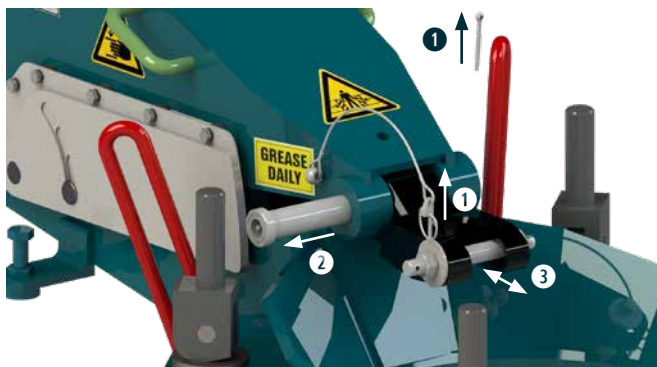


Fig. 31: Slip Lifter - Slip Adapter installation removal

3.5.2 Slip Installation/Removal

⚠ WARNING Under no circumstances the Slip Assembly may be changed under load.

Preparation

- The Slip Lifter has been removed from the well to prevent any parts from falling into it.
- The correct adapter has been properly installed.
- All Hand Slip handles have been removed.

Procedure

1. Remove linch pin and nut ① from Slip bolt.
2. Remove Slip bolt ② from Slip Lifter to release Slip.
3. Position appropriate Slip.
4. Reinstall Slip Pin ③.
5. Secure the Slip Pin with the linch pin and the nut.
6. Mount the Retaining-Spring Assembly by attaching a shackle to a green handle and one to the side slipper segment ④.

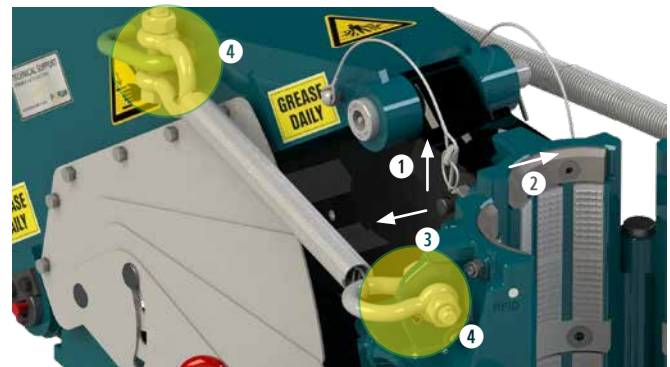


Fig. 32: Slip Lifter - Slip Adapter installation removal

TRANSPORT/
SETUP

3.6 Installation Checklist

After installation or maintenance work following checks must be carried out :

- OK The right size Slip has been installed.
- OK The right size Slip Adapter has been installed.
- OK The Hand Slip and the Slip Adapter have been mounted as described in chapter 3.5.1 and 3.5.2.
- OK All lubrication points have been lubricated as recommended.
- OK There are no loose screws, nuts or securing elements on the Slip Lifter.
- OK Signs of corrosion, wear or other damage are not visible.

Supply Connections

- OK All hydraulic connections of the Slip Lifter are connected to the hydraulic supply of the rig.
- OK All hydraulic connections are made properly.
- OK Leaks on hoses and other hydraulic components are not visible.

Function Test

⚠ WARNING Only perform the function test, when the Slip Lifter has been installed securely.

- OK The Slip Lifter can be easily raised and lowered.
- OK The feedback signal appears when the Slip has been set.

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COMMISSIONING / OPERATION

COMMISSIONING /
OPERATION

4 Commissioning and Operation



Ensure that the Slip Lifter is operated only by personnel trained for this work and familiar with the risks involved in operating the machine.



Read these instructions carefully before setting up the machine and putting it into service.

INFO



FORUM Handling Tools recommends having the Slip Lifter put into service by FORUM Handling Tools .

4.1 Commissioning



⚠ WARNING

Danger of pinching/crushing feet!

Transporting and setting down heavy components.

- » NEVER step below moving machine parts.



⚠ WARNING

Separated hydraulic lines pose an injury hazard!

- » Hydraulic fluid can escape under high pressure.
- » Always relieve pressure in hydraulic equipment before working on Slip Lifter.
- » Check hydraulic connections regularly to ensure that they are properly fastened.



⚠ WARNING

Defective hydraulic lines pose an injury hazard!

- » Route hydraulic lines safely and check regularly for damage.
- » Provide lines with chafe protection.
- » Replace defective lines immediately.



⚠ WARNING

Hydraulic fluid can pose a health hazard!

- » Hydraulic fluids can lead to skin and eye injury and poisoning symptoms upon contact.
- » Avoid direct contact with hydraulic fluids.



⚠ DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

- » NEVER stand under suspended loads.
- » NEVER stand in the swing area of suspended loads.



⚠ WARNING

Danger of pinching/crushing body!

- » DO NOT step between the in Slip Lifter front.



⚠ WARNING

Danger of pinching/crushing hands!

Moving parts pose a hazard during assembly, set-up and conversion work as well as during operation.

- » NEVER reach between moving components.

Safety checks before initial operation

Safety checks before initial operation

1. All covers attached and completely screwed down.
2. All screw connections tightened properly.
3. All screw retainers and safety pins present.
4. Slip corresponds to type/size of pipe used and used Slip adapter.
5. Slip is installed correctly and secured.
6. All supply connections correctly connected and securely laid.
7. No supply lines damaged.
8. All lubrication points lubricated properly (refer to section 6.1 "Lubrication" on page 95).



WEAR EYE PROTECTION!



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!

Safety check Procedure

» Remedy all defects noted during installation.

⚠ Caution Never attempt to start up when defective.

» Activate hydraulic [pneumatic] system.
Ensure that required operating data is observed:

Hydraulic

Operating pressure	120 .. 210 bar (2,175 .. 3,046 PSI)
Volumetric flow	37.85 l/min (10 GPM)

Pneumatic

Operating pressure	7 bar (100 Psi)
Air Flow rate	1.8 Gpm (6.8 l/m)

Functional checks before initial operation

Raise and lower the Slips.

- » Are end positions reached smoothly and properly?
- » Is feedback signal present in end position? [hydraulic operated type series only]

COMMISSIONING / OPERATION

4.1.1 Mounting the Slip Lifter to Rotary Table (MasterBushing)

Preparations

1. Tilt the Locking Pin into **OPEN** position
2. Make sure that the machine is hoisted safely.

⚠ WARNING Keep distance from the Slip Lifter during lifting operation.

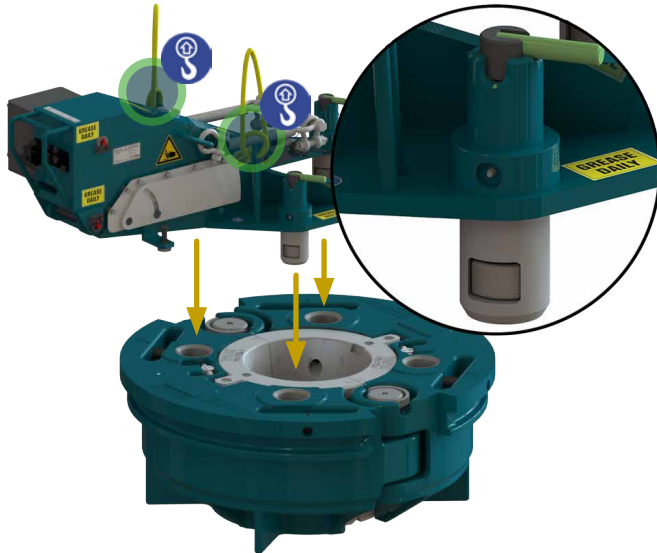


Fig. 33: Slip Lifter installation

Installing Slip Lifter

1. Position the Slip Lifter over the Rotary Table.
2. Move Slip Lifter down with crane in a way that all 4 attachment locks fit in the Rotary table.
3. Lock Slip Lifter in Rotary Table.
4. Remove lifting equipment.

⚠ WARNING Pinching hazard! Do not guide the machine manually when lowering. Use cables to align Slip Lifter.

4.1.2 Locking the Quick Lock Pin Assembly

The Quick Lock Pin assembly provides two status:

Open



Closed



Fig. 34: Quick Lock Pin Assembly status

1. To install the Slip Lifter Quick Lock Pin Assembly must be in **Open** (vertical) position.
2. To Close (Lock) the Quick Lock Pin Assembly move the lever in horizontal position (downwards).

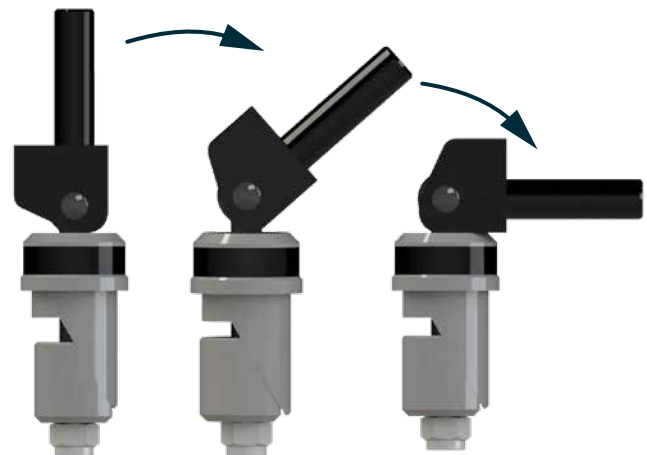


Fig. 35: Slip Lifter - Closing the Quick Lock Pin assembly

INFO



Fitting of the Quick Lock Pin!

If the one of the four mounting holes in master bushing are oversized for example by abrasion, it's possible to regulate the fitting of the Quick Locking Pin Assembly manually.

- » Tighten the lower screw with an appropriate wrench to increase the locking pressure.

4.1.3 Locking the Locking Pin Assembly

The Locking Pin assembly provides two status:

Open

Closed



Fig. 36: Locking Pin Assembly status

1. To install the Slip Lifter Locking Pin must be in **Open** (lifted) position.
2. To Close (Lock) the Locking Pin move the lever to the reinforcement in lock assembly body.
3. The correct locking took place, if the lock pin lever moves downwards.



Fig. 37: Slip Lifter - Locking Pin sequence

4.1.4 Slip Lifter - Connecting the Hydraulic System



Ensure that work on the hydraulic system is performed only by personnel trained for such work and conscious of the risks involved.

⚠ WARNING

Hydraulic fluid can pose a health hazard!

Hydraulic fluid can injure the skin, mucous membranes or eyes on contact.

- » Do NOT touch hydraulic fluids.
- » ALWAYS wear appropriate protective equipment.
- » Never exceed the maximum permissible working pressures.
- » Never disconnect hoses and / or their connections when they are under pressure.
- » Avoid direct contact with hydraulic fluids and compressed air.



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!

4.1.4.1 Connecting the Hydraulic System

INFO

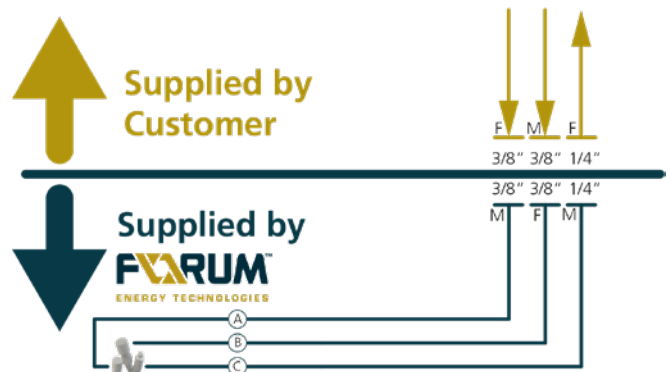
Bleeding
The hydraulic system in the Slip Lifter is bled at the factory. Ensure that the rig's own supply connections are bled before connecting the Slip Lifter.

Pre-Adjustment
The hydraulic system of the Slip Lifter is adjusted at the factory.

FORUM Handling Tools Connections

Connection	Function
A [P]	Lowering [Pressure Line]
B [T]	Lifting [Tank Line]
C [XP]	Feedback [Feedback Line]

Installation Schematics



- M** Male Coupling
- F** Female Coupling

Couplings 1/4" for Ø 8 mm
3/8" for Ø 12 mm
1/2" for Ø 15 mm

Connections A and B - NPT 3/8" M
C - NPT 1/4" F

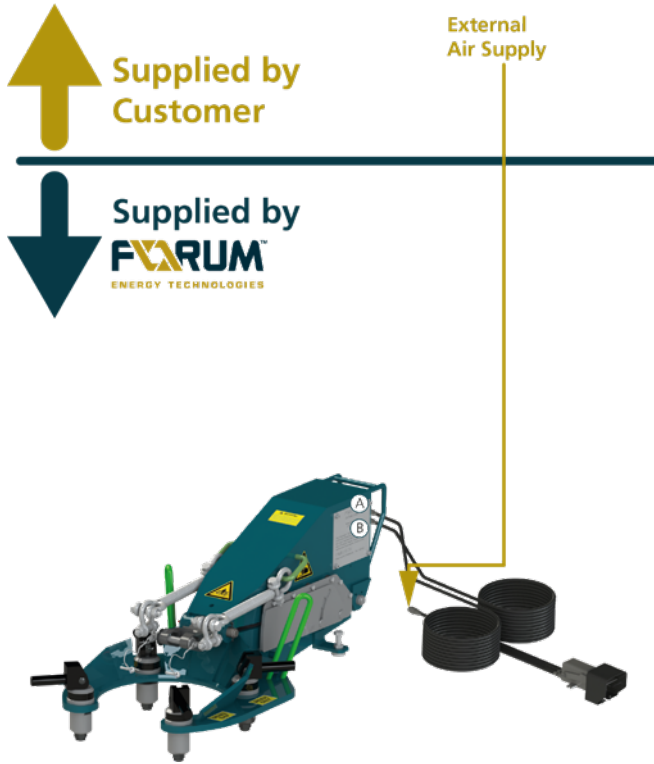
COMMISSIONING / OPERATION

4.1.4.2 Connecting the Pneumatic System

FORUM Handling Tools Connections

Connection	Function
A	Lowering [Air-In]
B	Lowering [Air-Out]

Installation Schematics



COMMISSIONING /
OPERATION

4.2 Commissioning Checklist

FORUM Handling Tools strongly recommends accomplishing the commissioning with the FORUM Handling Tools Commissioning Service.

NOTE Read manual before first use!

General

- OK Check crew is aware of all danger regarding handling the FORUM Handling Tools tool.
- OK Go through manual with crew.
- OK All components, which are necessary for safe operation have been installed properly.

Hydraulic Characteristics

- OK Operating Pressure 150 - 210 bar (2030 - 3046 PSI)
- OK Volumetric Flow 6 Gpm (22 l/m) to 10 Gpm (37 l/m)
- OK Hydraulic oil clearness min. NAS 9

Pneumatic Characteristics

- OK Operating Pressure 7 bar (100 Psi)
- OK Volumetric Flow 1.8 Gpm (6.8 l/m)

Funktionstest

- OK Move Slip to lower extend
- OK Move Slip to upper extend
- OK Check signal feedback „Slips SET“
Check signal feedback „Slips UP“ [hydraulic operated type series only]

COMMISSIONING / OPERATION

4.3 Operating the Slip Lifter

⚠ WARNING

Use of Slip Lifter in conjunction with manual Hand Slips on floating rigs!



Pipe string might loose grip and get lost if pipe is not centred before slips are set.

- » Always centre pipe before Slips are set.
- » Keep safe distance of Slip Lifter during operation.

⚠ WARNING

Danger of pinching/crushing feet!



Transporting and setting down heavy components.

- » NEVER step below moving machine parts.

⚠ WARNING

Separated hydraulic lines pose an injury hazard!



- » Hydraulic fluid can escape under high pressure.
- » Always relieve pressure in hydraulic equipment before working on Slip Lifter.
- » Check hydraulic connections regularly to ensure that they are properly fastened.

⚠ WARNING

Defective hydraulic lines pose an injury hazard!



- » Route hydraulic lines safely and check regularly for damage.
- » Provide lines with chafe protection.
- » Replace defective lines immediately.

⚠ WARNING

Hydraulic fluid can pose a health hazard!



- » Hydraulic fluids can lead to skin and eye injury and poisoning symptoms upon contact.
- » Avoid direct contact with hydraulic fluids.

Safety precautions

1. Be particularly careful in during operation.
2. Ensure that visual contact is always present between the deck personnel, and the operator in the doghouse.

Operational Safety

1. Do not touch the Slip Lifter while in operation.
2. Never raise the slips when the pipe load is still suspended by the slips
3. All screw retainers present.
4. Make sure that ALL pressure lines are isolated before any work is carried out in the Slip Lifter.
5. It is recommended to have the Slip Lifter operated by the driller.
6. The Slip Lifter is set when the Slips SET feedback signal comes on.
7. Pick up the weight of the pipe string before raising the Slip Lifter slip

4.3.1 Handling Drill String

Operational Safety

1. NEVER raise the Slip under load. Before raising the slip assembly, make sure that an Slip Lifter suspends the weight of the pipe.
2. The slip assembly can bear the load of the pipe if the slips are set.

Setting Slip

1. Move the drill string through the Slip Lifter, until it is held by the Slip.
2. Activate hydraulic line A [P] or Pneumatic foot-pedal
3. Slips SET feedback indicates that the lower end position has been reached. [hydraulic operated type series only]
 - » The drill string is held.

Opening Slip

1. Secure drill string from falling in hole.
2. Activate hydraulic line B or Pneumatic foot-pedal.
3. Move until upper end position has been reached.
 - » The drill string is released and operation can continue.

NOTE It is recommended by FORUM Handling Tools to slightly raise/lower the pipe before setting the Slips to proof smooth operation.

4.3.2 Proper Shut down

Proceed as follows to shut down the machine for maintenance work or breaks in operation.

1. Relieve the Slip Lifter.

NOTE Ensure that the drill string is held securely (e.g. by Slip Lifter).

2. Move the slip to the upper end position.
3. Move the drill string out of the Slip Lifter.
4. Switch off pressure to the Slip Lifter.

4.3.3 Emergency Stop

No provisions have been made for equipping the Slip Lifter with its own emergency stop switch. For safe operation it is necessary to incorporate it into the emergency stop circuit in the rig's own hydraulic control.

4.3.4 Interlock the Slip Lifter

[FOR HYDRAULIC OPERATED SLIP LIFTER ONLY]

The Slip Lifter can be interlocked in the actual operation by actuating the stopcock-valve.

- » Ball Tap in operation position.



Fig. 38: Ball Tap in operation position.

- » Ball Tap in interlock position.



Fig. 39: Ball Tap in interlock position.

4.3.5 Hydraulic Adjustment

⚠ WARNING

Separated hydraulic lines pose an injury hazard!

- » Hydraulic fluid can escape under high pressure.
- » Always relieve pressure in hydraulic equipment before working on Slip Lifter.
- » Check hydraulic connections regularly to ensure that they are properly fastened.



⚠ WARNING

Hydraulic fluid can pose a health hazard!

- » Hydraulic fluids can lead to skin and eye injury and poisoning symptoms upon contact.
- » Avoid direct contact with hydraulic fluids.



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!

Adjustment of valves

A valve can be adjusted by releasing the lock nut and secondly, by rotating the adjusting screw counter-clockwise.

- » If valve adjustment is needed, start carefully with ¼ rotation and test the valve function first.
- » Make sure adjustment screw and lock nut are pulled tight.

Procedure:

1. Disconnect the 4 screws ❶ and remove the protection cover of hydraulic block.

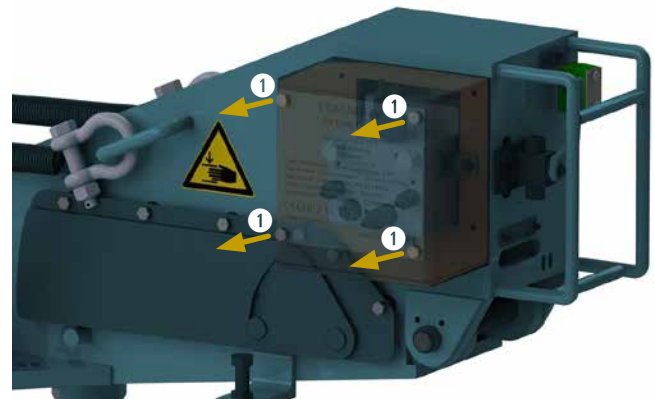


Fig. 40: Remove Protection Cover



Fig. 41: Adjustment for Cylinder Power

Valve ❶ - Pressure Control Valve

Pressure for downforce.

- ↺ Enhances pressure.
- ↻ Reduce pressure.

Valve ❷ - Counter-Balance Valve

- ↺ Enhances pressure (load to be hold).
- ↻ Reduce pressure (load to be hold).

Valve ❸ - Pressure Control Valve

Adjustment of cylinder speed (Extension).

- ↺ Enhances cylinder speed.
- ↻ Reduces cylinder speed.

Valve ❹ - Pressure Control Valve

Adjustment of cylinder speed (Retraction).

- ↺ Enhances cylinder speed.
- ↻ Reduces cylinder speed.

COMMISSIONING / OPERATION

4.4 General operational information on Hand Slips

1. The manual slips must only be used for the designated pipe size.
2. If the slips are used on smaller pipe sizes, the inserts are only gripping with their middle section and the slip segments are not set on smaller pipe sizes, the inserts are only gripping with their middle section and the slip segments are not set properly around the pipe. These causes could result in significant equipment and pipe damage.
3. After the slips were used on the wrong pipe size, the slip segments and inserts could get deformations and cracks or could break.
4. While setting the slips on the designated pipe size, pay especially attention that the slips are set properly around the pipe and not set partially on the tool joint. These causes result in bending of the slip segments, insert damage and in pipe damage. Pay also especially attention while setting drill collar slips on collars with recessed areas.
5. If the drill collar slips are not set properly around the pipe or set partially on the upset area, it could result in significant equipment and pipe damage.
6. In case of a wrong slip setting, raise the string and set the slip again properly around the pipe.

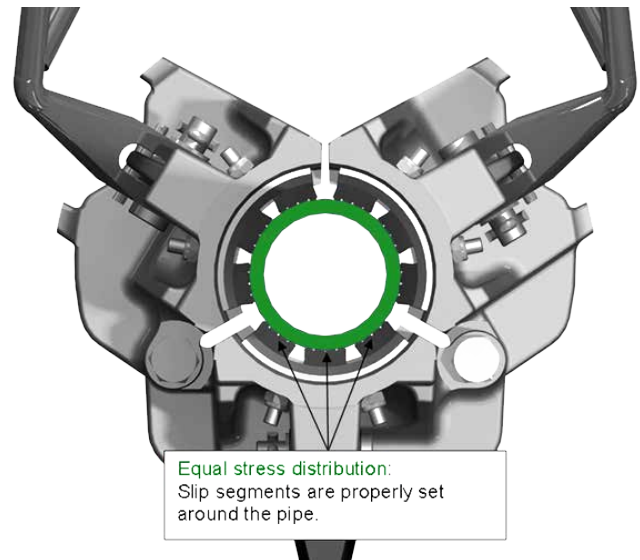


Fig. 42: Slip with designated pipe size

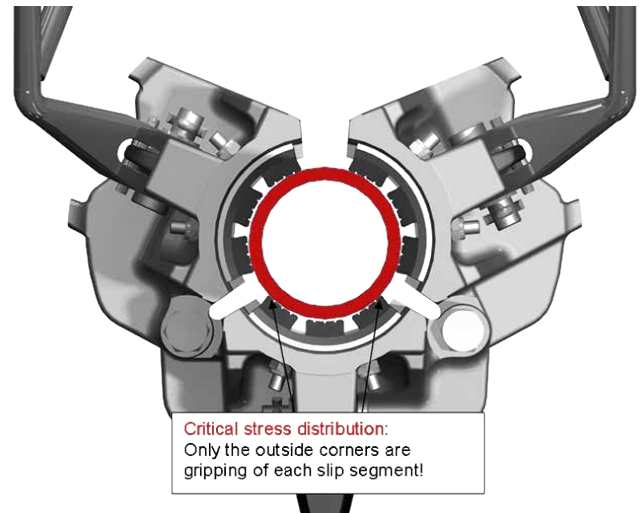


Fig. 43: Slip used is smaller than pipe size

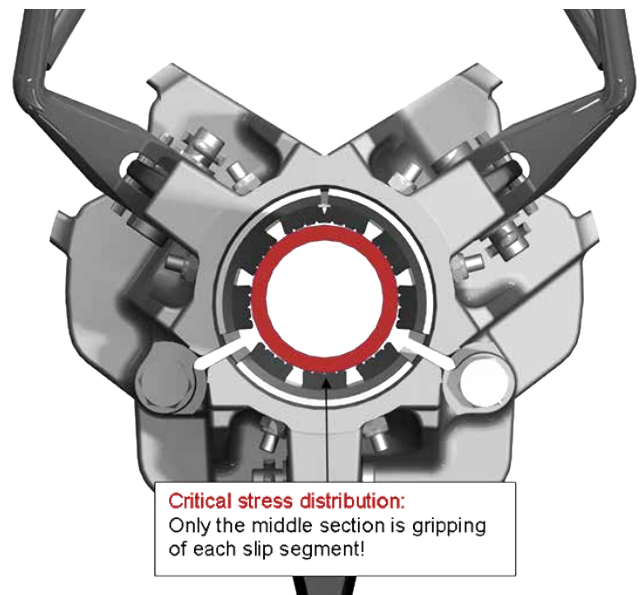


Fig. 44: Slip used is larger than pipe size

Correct Installation

Equal stress distribution. Slip segments are properly set around the pipe and properly set in the bowl.

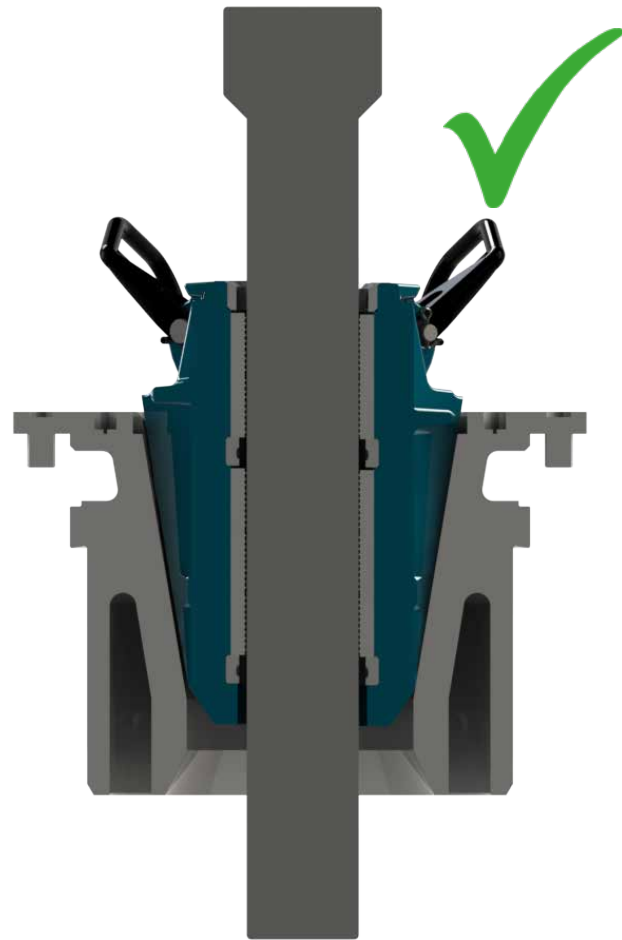


Fig. 45: Slip used is larger than pipe size

Incorrect Installation

Critical stress distribution. Slip segments set partially on upset area of the tool joint/ drill collar and bowl (red circles). Excessive stress on pipe, inserts, slip segments and bowl are the consequences.

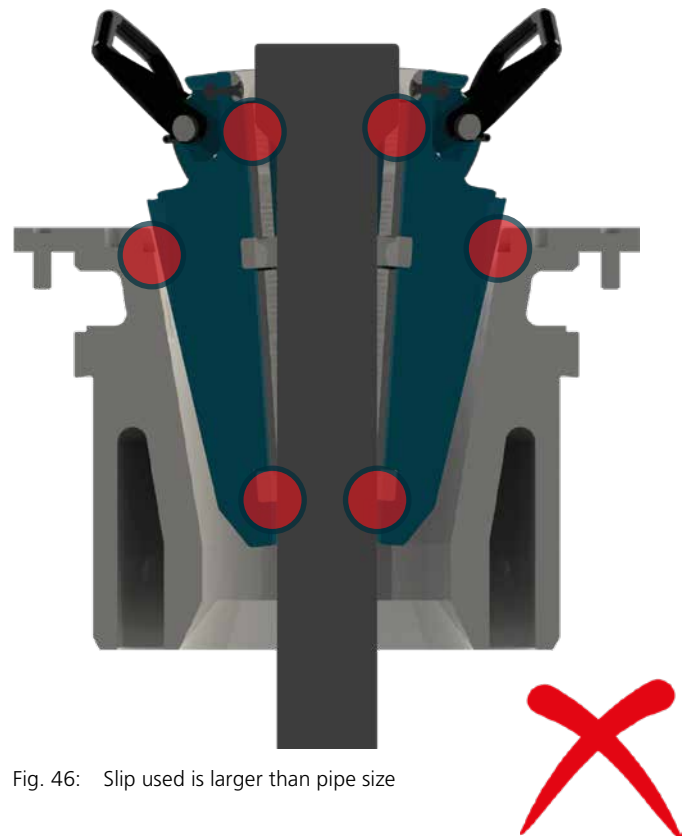


Fig. 46: Slip used is larger than pipe size

COMMISSIONING / OPERATION

4.5 Troubleshooting

Common Symptoms	Useful steps for troubleshooting										Further Help		
	Is the correct working pressure set?	Is the respective valve set correctly?	Are there loose, unfastened, caved or damaged hoses?	Is dirt or other objects in the work area?	Are there damaged, loose or unfastened valves or fittings?	Has the correct required slip size been selected?	Are there damages on inserts?	The Slip Lifter corresponds to the Master-Bushing?	Inserts are installed in the correct direction?	Hinge pins and other lubrication points are lubricated as recommend by Forum B + V Oil Tools?		Are there loose, unfastened or damaged components except hydraulic components?	Are there blocked grease nipples?
Locking Assembly can not be set.				✓				✓			✓		!
Lifting Cylinder does not retract/ extend.	✓	✓	✓	✓	✓								!
No feedback signal.	✓	✓	✓	✓	✓								!
Hinge pins can not be drawn.				✓					✓	✓			!
Minor pipe slip down.				✓		✓	✓	✓		✓			!
Device is grease dry unless lubrication has been performed.											✓		!
Slip is not completely set (up/ down).	✓	✓	✓	✓	✓	✓			✓	✓			!

! FORUM Handling Tools recommends to follow this step in case of unsolvable problems!

✓ FORUM Handling Tools recommends to follow this shown step.

NOTE Due to the complexity of the lifting system of Slip Lifters, this table does not show all possible fault symptoms. As different symptoms may occur in combination, it is necessary to go through troubleshooting in a useful order.

WARNING Due to the complexity of this type of equipment, FORUM Handling Tools recommends that the operator contact FORUM Technical Support prior to lengthy troubleshooting activity. Contact technical support, even if there are only single components or assemblies which have to be replaced!

WARNING Always follow the recommend safety notes while troubleshooting.

- Do not perform any troubleshooting while the equipment is under load.
- Do not forget to switch off and relieve pressure before installing new components or manometer.
- Do not make any form of reparation, expansion or changes which are not recommend and supported by FORUM Handling Tools.

COMMISSIONING / OPERATION

SERVICE

SERVICE

5 Service

INFO



Operational safety and readiness of the Slip Lifter do not only depend on your skills, but also on maintenance and servicing of the Slip Lifter. Insist on using original spare parts when carrying out maintenance and repair work. This ensures operational safety and readiness of your Equipment, and maintains its value.

5.1 Malfunction

If a malfunction occurs or the Slip Lifter does not operate as expected, troubleshoot as follows:

If the cause of the malfunction cannot be determined and remedied, contact FORUM Handling Tools Technical Support.

1. Check hydraulic connections and hydraulic lines.
2. Check the present necessary hydraulic pressure.
3. Check that the required components correspond to the used pipe size.
4. Check for proper lubrication of the Slip Lifter.
5. Check feedback 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.

INFO



In the event of problems, which cannot be remedied with the aid of this manual, please contact the FORUM Handling Tools Technical Support or one of the authorized service companies (refer to section XIII "Contact worldwide" on page 11).

5.2 Repair

5.2.1 Repair by Customer

It is only permissible for the customer/company operating the Equipment to replace defective parts with OEM (Original Equipment Manufacturer) parts approved by FORUM Handling Tools in conformance with the present operating instructions. Use of parts not approved by FORUM Handling Tools voids the warranty.

5.2.2 Repair by Manufacturer

Ensure that any repair work required on the Slip Lifter is performed only by FORUM Handling Tools or an authorized service company.

INFO



Please contact the FORUM Handling Tools Technical Support or one of the authorized service companies to perform repair or maintenance work (refer to section XIII "Contact worldwide" on page 11).

5.2.3 Securing Screws with Wedge-Locking washers

Wedge-Lock style 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 equipment 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.

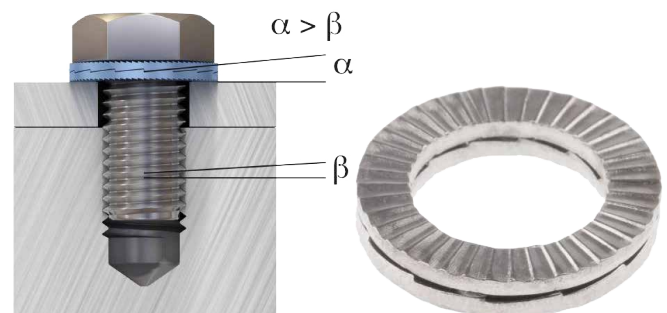


Fig. 47: Wedge-Locking Washer principle and detailed illustration

Wedge-Locking Washer specified torques

Several Wedge-Locking style bolt securing systems are used on the Slip Lifter to generate safely locked bolted joints. Regarding the fact that different sizes and grades are used detailed information is given in the annex (refer to section A "Third Party Documents" on page 106) to generate safe maintenance by the user.

If the tightening torque needed to fasten a screw/nut is not explicitly written in this manual, please check the screw/nut head and refer to the annex in order to find the required fastening torque.

The grade and make of the bolt can be seen on top or on the side of the bolt / nut. The tightening torques can be found via third party document in the annex.

⚠ WARNING Please pay extra attention to the method of tightening as the tightening torques may vary on the methods.

INFO



As a result from tests, the Wedge-Locking style washers were safely secured even after reuse 30 times. Make visual inspection of the washers during every maintenance. Make sure that the cams (cam tops) are not damaged or rounded 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.

5.3 Drawing, Parts List and Spare Parts

INFO



Please contact the FORUM Handling Tools 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.

5.3.1 Hydraulic Operated Slip Lifter

5.3.1.1 88710

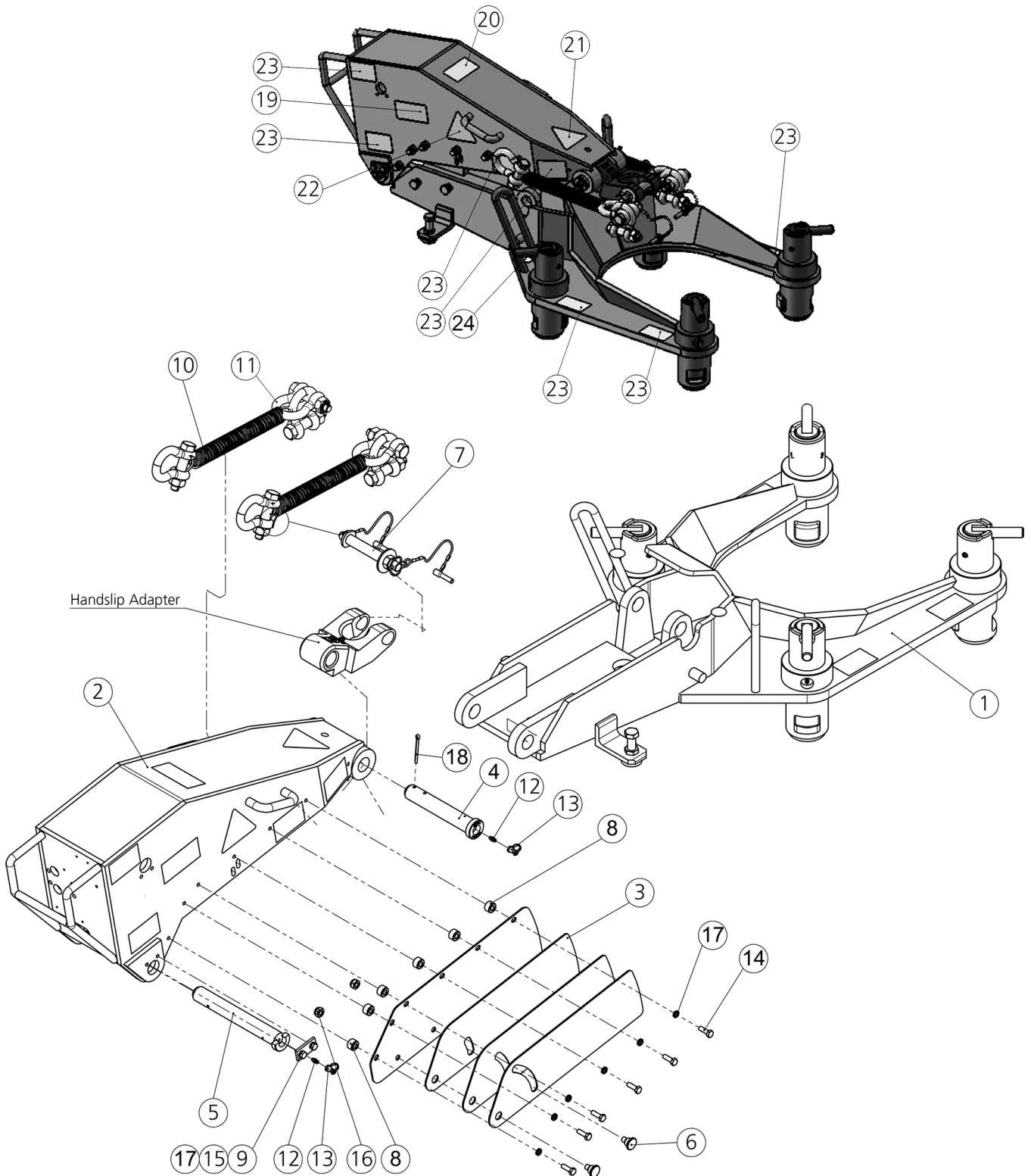


Fig. 48: 88710 Basic Slip Lifter

Parts List

Pos.	Qty.	P/N	Description
1	1	88465	Base Plate Welding Assembly for PSH
2	1	88466-F	Jib
3	1	88334	Protection Plate Assembly
4	1	88213	Pin
5	1	88212-1	Pin Type 1
6	4	88224-7	Pin
7	1	88220	Slip Pin Assembly
8	12	88224-6	Bushing
9	1	88214	Locking Plate
10	2	88209	Spring
11	6	88201-2	Shackle
12	2	756790	Lubricating nipples
13	2	612518	Protection Cap
14	12	735852	Screw
15	2	645028	Screw
16	4	89125	Nut
17	14	792112	Washer
18	1	70263	Split Pin
19	1	613129	Sticker Hotline
20	1	671638	Warning sign - Warning
21	1	671641	Warning sign - Squeeze Danger
22	2	671640	Warning sign - Hands
23	8	671642	Warning sign - Grease Daily
24	2	671646	Sign - Lifting Point

5.3.1.2 88710-H

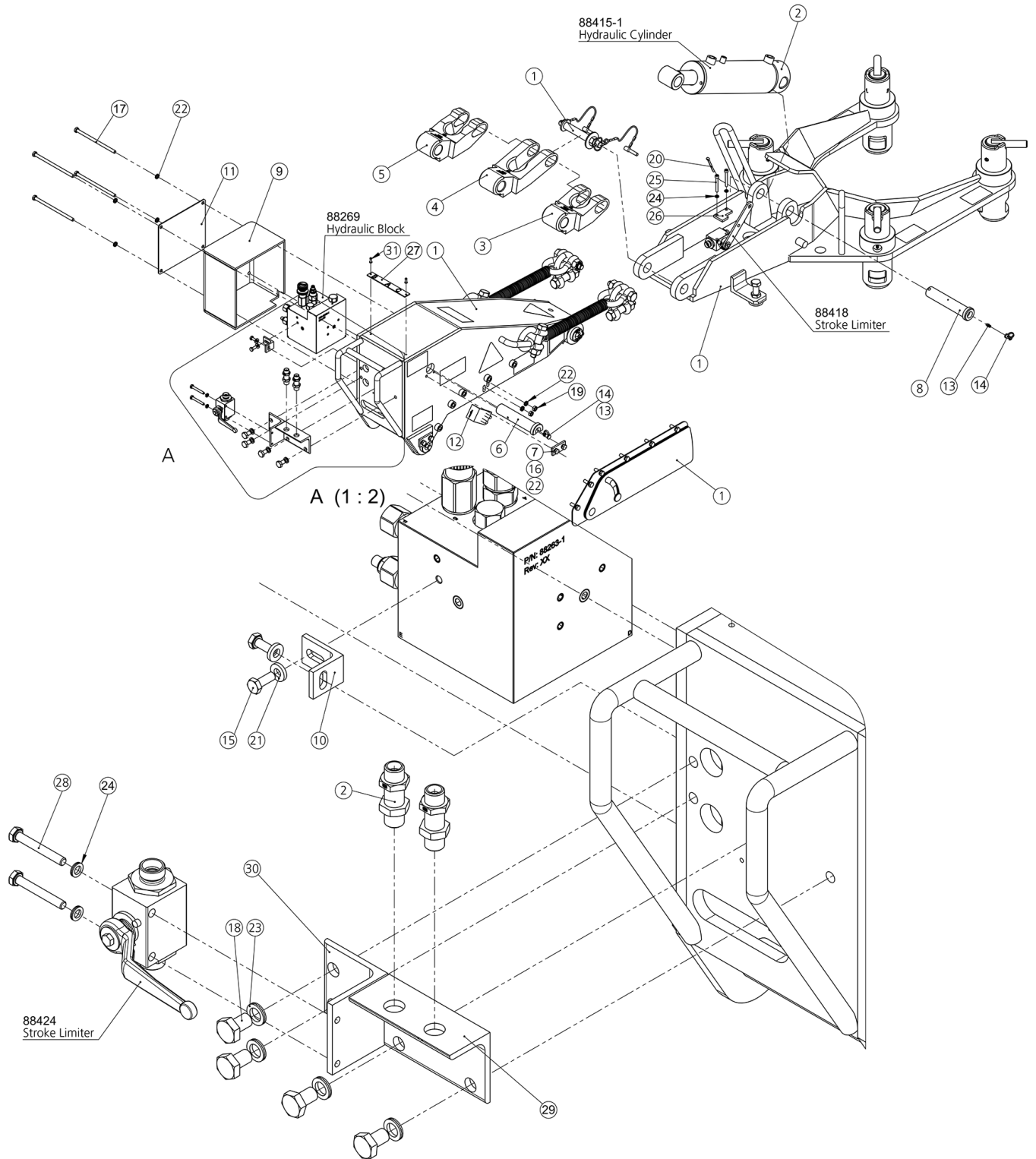


Fig. 49: 88710-H Hydraulic Slip Lifter

Parts List

Pos.	Qty.	P/N	Description
1*	1	88710	Case of PSA /PSH
2**	1	88430-HD	Hydraulic Assembly
3	1	88208	Adapter for RSX & LRS
4	1	88208-5	Adapter for RSM
5	1	88208-A	Adapter for Access
6	1	88412-5	Pin Typ 5
7	1	88214	Locking plate
8	1	88462	Bolt for Hydraulic Cylinder
9	1	88265	Protection cover
10	3	88264	Angle plate
11	1	88482-3	Manufacturer Plate
12	1	88474	Angle
13	2	756790	Grease Fitting
14	2	612518	Protection Cap
15	6	612671	Screw
16	2	645028	Screw
17	4	621111	Screw
18	4	613894	Hexagon screws
19	2	613633	Nut
20	1	70263	Cotter Pin
21	6	792111-1	Washer
22	8	792112	Washer
23	4	792103	Washer
24	4	792111	Washer
25	2	613714	Screw
26	1	88461	Plate 2
27	1	88468-1	Hydraulic Sign
28	2	87805	Screw
29	1	88422	Angle
30	1	88421	Angle
31	2	645631-5	Blind rivets

* Refer to Page 68 Chapter 5.3.1.1.

** Refer to Page 86 Chapter 5.3.3.1.

5.3.1.3 88710-HD

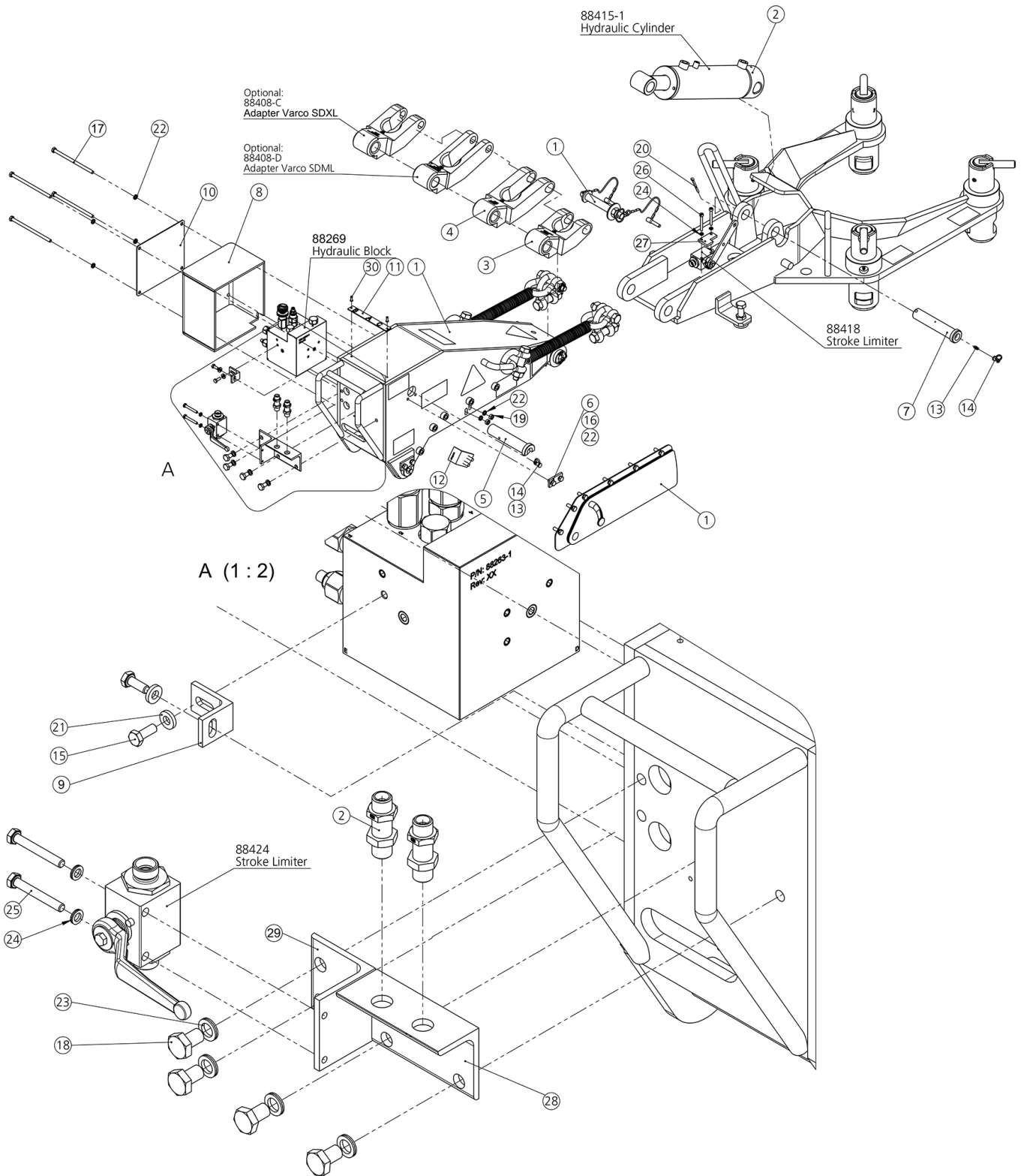


Fig. 50: 88710-HD Hydraulic Slip Lifter

SERVICE

Parts List

Pos.	Qty.	P/N	Description
1*	1	88710	Case of PSA /PSH
2**	1	88430-HD	Hydraulic Assembly
3	1	88408	Adapter for
4	1	88408-5	Adapter for
5	1	88412-5	Pin Typ 5
6	1	88214	Locking plate
7	1	88462	Bolt for Hydraulic Cylinder
8	1	88265	Protection cover
9	3	88264	Angle plate
10	1	88482-3	Manufacturer Plate
11	1	88468-1	Hydraulic Sign
12	1	88474	Angle
13	2	756790	Grease Fitting
14	2	612518	Protection Cap
15	6	612671	Screw
16	2	645028	Screw
17	4	621111	Screw
18	4	613894	Screw
19	2	613633	Nut
20	1	70263	Cotter Pin
21	6	792111-1	Washer
22	8	792112	Washer
23	4	792103	Washer
24	4	792111	Washer
25	2	87805	Screw
26	2	613714	Screw
27	1	88461	Plate 2
28	1	88422	Angle
29	1	88421	Angle
30	2	645631-5	Blind rivets

* Refer to Page 68 Chapter 5.3.1.1.

** Refer to Page 86 Chapter 5.3.3.1.

5.3.1.4 88720

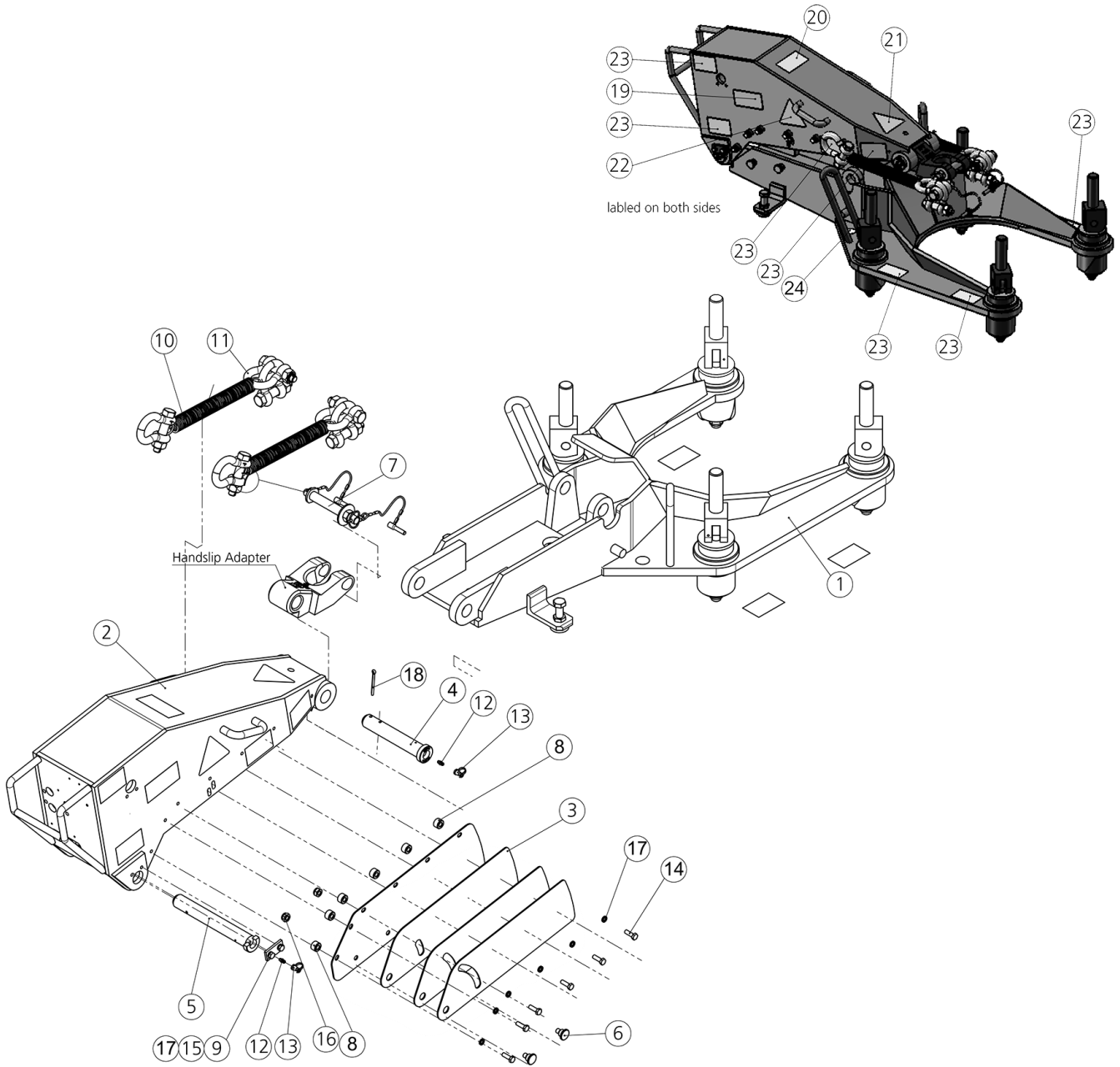


Fig. 51: 88720 Basic Slip Lifter

Parts List for 88720

Pos.	Qty.	P/N	Description
1	1	88345	Base Plate Welding Assembly
2	1	88466-F	Jib
3	1	88334	Protection Plate Assembly
4	1	88213	Pin
5	1	88212-1	Pin Type 1
6	4	88224-7	Pin
7	1	88220	Slip Pin Assembly
8	12	88224-6	Bushing
9	1	88214	Locking Plate
10	2	88209	Spring
11	6	88201-2	Shackle
12	2	756790	Lubricating nipples
13	2	612518	Protection Cap
14	12	735852	Screw
15	2	645028	Screw
16	4	89125	Nut
17	14	792112	Washer
18	1	70263	Split Pin
19	1	613129	Sticker Hotline
20	1	671638	Warning sign - Warning
21	1	671641	Warning sign - Squeeze Danger
22	2	671640	Warning sign - Hands
23	8	671642	Warning sign - Grease Daily
24	2	671646-3	Sign - Lifting Point

SERVICE

5.3.1.5 88720-H

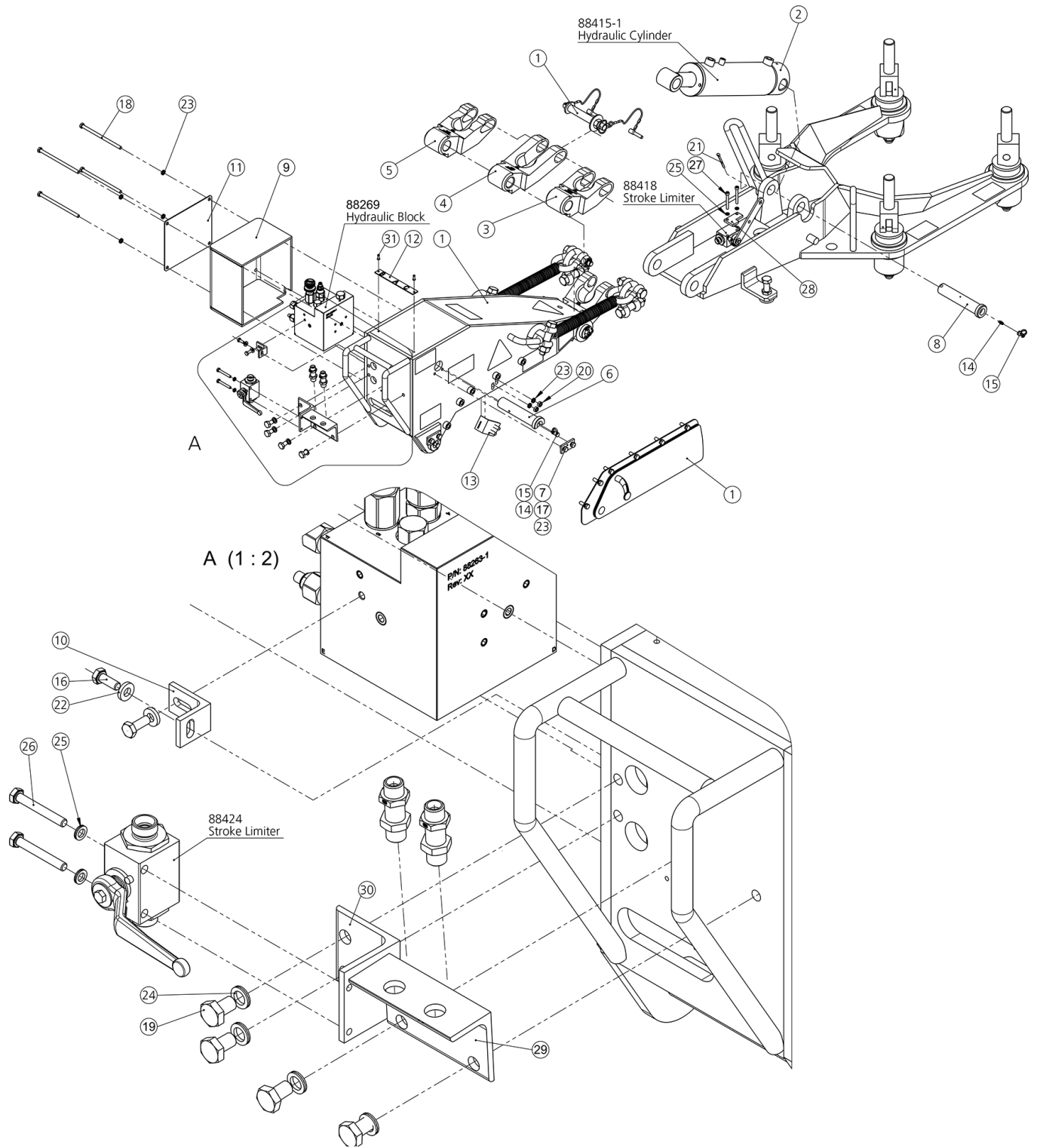


Fig. 52: 88720-H Hydraulic Slip Lifter

SERVICE

Parts List

Pos.	Qty.	P/N	Description
1*	1	88720	Case of PSA / PSH
2**	1	88430-HD	Hydraulic Assembly
3	1	88208	Adapter
4	1	88208-5	Adapter
5	1	88208-A	Adapter
6	1	88212-5	Pin Type 5
7	1	88214	Locking Plate
8	1	88462	Bolt for Hydraulic Cylinder
9	1	88265	Protection Cover
10	3	88264	Angle Plate
11	1	88482-3	Manufacturer Plate
12	1	88468-1	Hydraulic Sign
13	1	88474	Angle
14	2	756790	Lubricating nipples
15	2	612518	Protection Cap
16	6	612671	Screw
17	2	645028	Screw
18	4	621111	Screw
19	4	613894	Screw
20	2	613633	Nut
21	1	70263	Split Pin
22	6	792111-1	Washer
23	8	792112	Washer
24	4	792103	Washer
25	2	792111	Washer
26	2	87805	Screw
27	2	613714	Screw
28	1	88461	Plate 2
29	1	88422	Angle
30	1	88421	Angle
31	2	645631-5	Blindniet

* Refer to Page 74 Chapter 5.3.1.4.

** Refer to Page 86 Chapter 5.3.3.1.

5.3.2 Pneumatic Operated Slip Lifter

5.3.2.1 88710-A

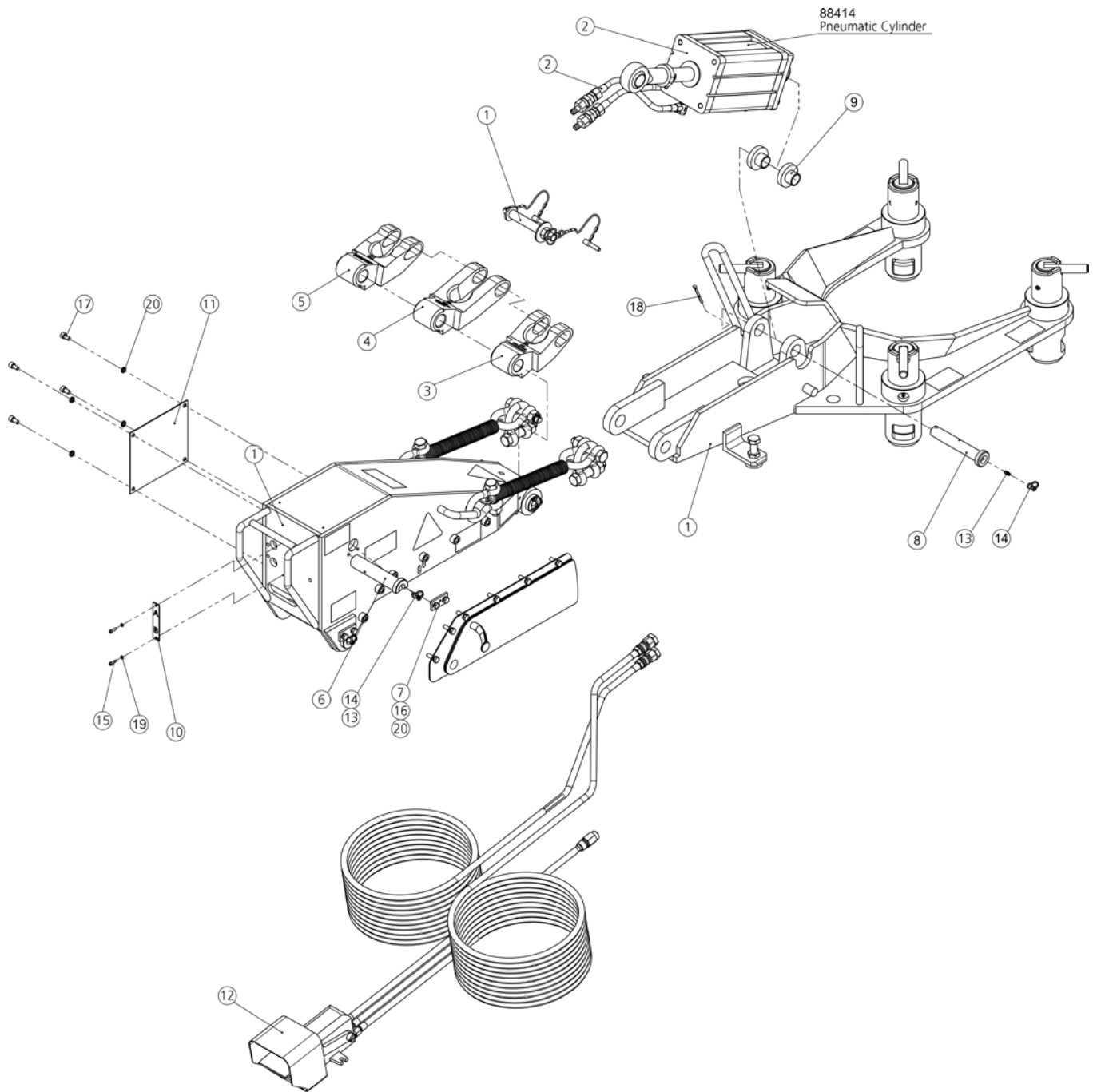


Fig. 53: 88710-A Pneumatic Slip Lifter

Parts List

Pos.	Qty.	P/N	Description
1*	1	88710	Case of PSA / PSH
2**	1	88430-A	Pneumatic Assembly
3	1	88208	Adapter
4	1	88208-5	Adapter
5	1	88208-A	Adapter
6	1	88412-5	Pin Type 5
7	1	88214	Locking Plate
8	1	88463	Bolt
9	2	88471	Adapter Bushing
10	1	88467	Pneumatic Sign
11	1	88482-2	Manufacturer Plate
12	1	88229-1	Control Valve Assembly
13	2	756790	Lubricating nipples
14	2	612518	Protection Cap
15	2	88467-1	Screw
16	2	645028	Screw
17	4	612673	Screw
18	1	70263	Split Pin
19	2	792175	Washer
20	6	792112	Washer

* Refer to Page 68 Chapter 5.3.1.1.

** Refer to Page 88 Chapter 5.3.3.2.

5.3.2.2 88720-A

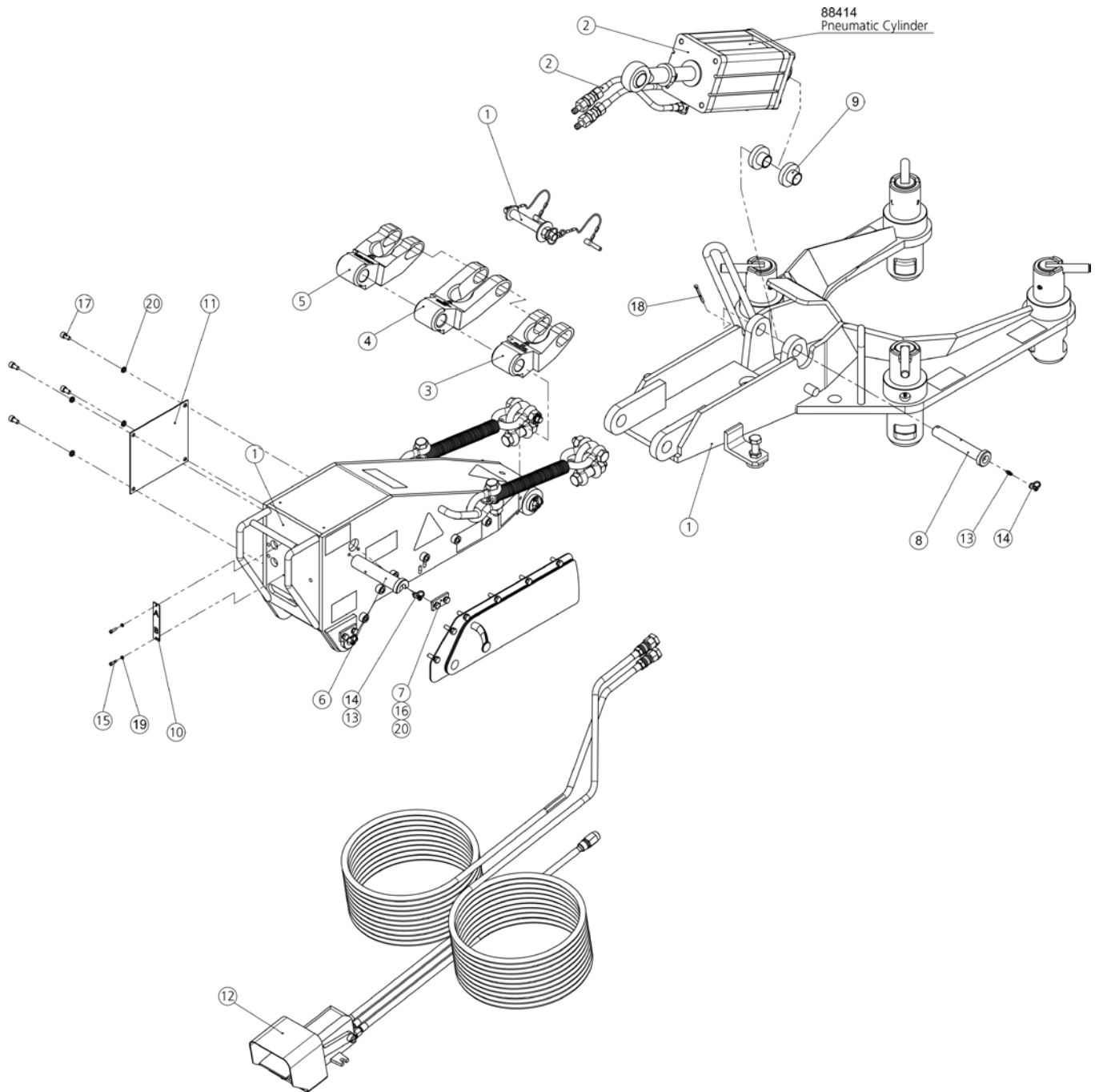


Fig. 54: 88720-A Pneumatic Slip Lifter

Parts List

Pos.	Qty.	P/N	Description
1*	1	88720	Case of PSA / PSH
2**	1	88430-A	Pneumatic Assembly
3	1	88208	Adapter
4	1	88208-5	Adapter
5	1	88208-A	Adapter
6	1	88412-5	Pin Type 5
7	1	88214	Locking Plate
8	1	88463	Bolt
9	2	88471	Adapter Bushing
10	1	88467	Pneumatic Sign
11	1	88482-2	Manufacturer Plate
12	1	88229-1	Control Valve Assembly
13	2	756790	Lubricating nipples
14	2	612518	Protection Cap
15	2	88467-1	Screw
16	2	645028	Screw
17	4	612673	Screw
18	1	70263	Split Pin
19	2	792175	Washer
20	6	792112	Washer

* Refer to Page 74 Chapter 5.3.1.4.

** Refer to Page 88 Chapter 5.3.3.2.

5.3.2.3 88920

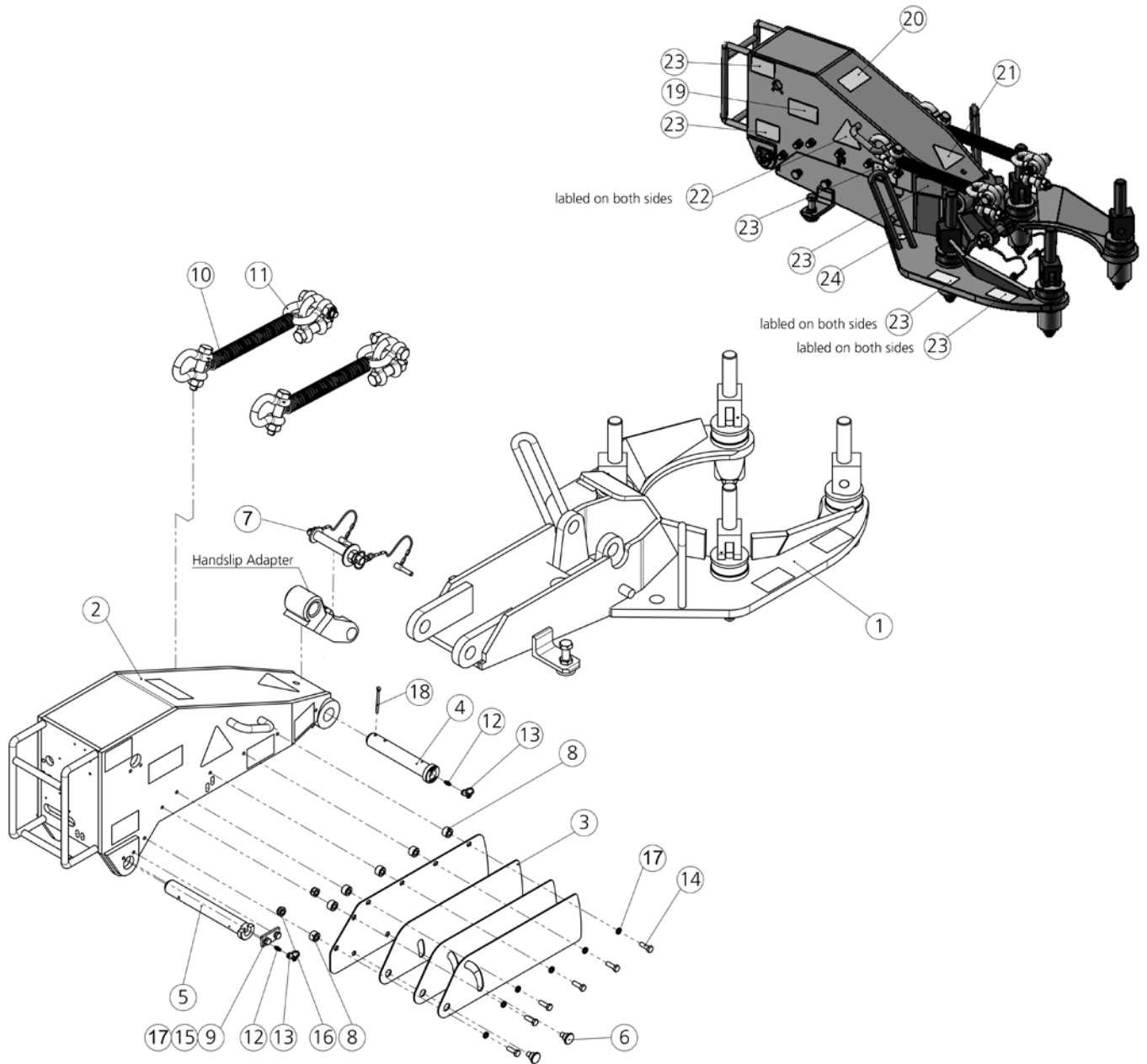


Fig. 55: 88920 Basic Slip Lifter

SERVICE

Parts List

Pos.	Qty.	P/N	Description
1	1	88921	Base Plate Welding Assembly
2	1	88466-F	Jib
3	1	88334	Protection Plate Assembly
4	1	88213	Pin
5	1	88212-1	Pin Type 1
6	4	88224-7	Pin
7	1	88220	Slip Pin Assembly
8	12	88224-6	Bushing
9	1	88214	Locking Plate
10	2	88209	Spring
11	6	88201-2	Shackle
12	2	756790	Lubricating nipples
13	2	612518	Protection Cap
14	12	735852	Screw
15	2	645028	Screw
16	4	89125	Nut
17	14	792112	Washer
18	1	70263	Split Pin
19	1	613129	Sticker Hotline
20	1	671638	Warning sign - Warning
21	1	671641	Warning sign - Squeeze Danger
22	2	671640	Warning sign - Hands
23	8	671642	Warning sign - Grease Daily
24	2	671646-3	Sign - Lifting Point

5.3.2.4 88920-A

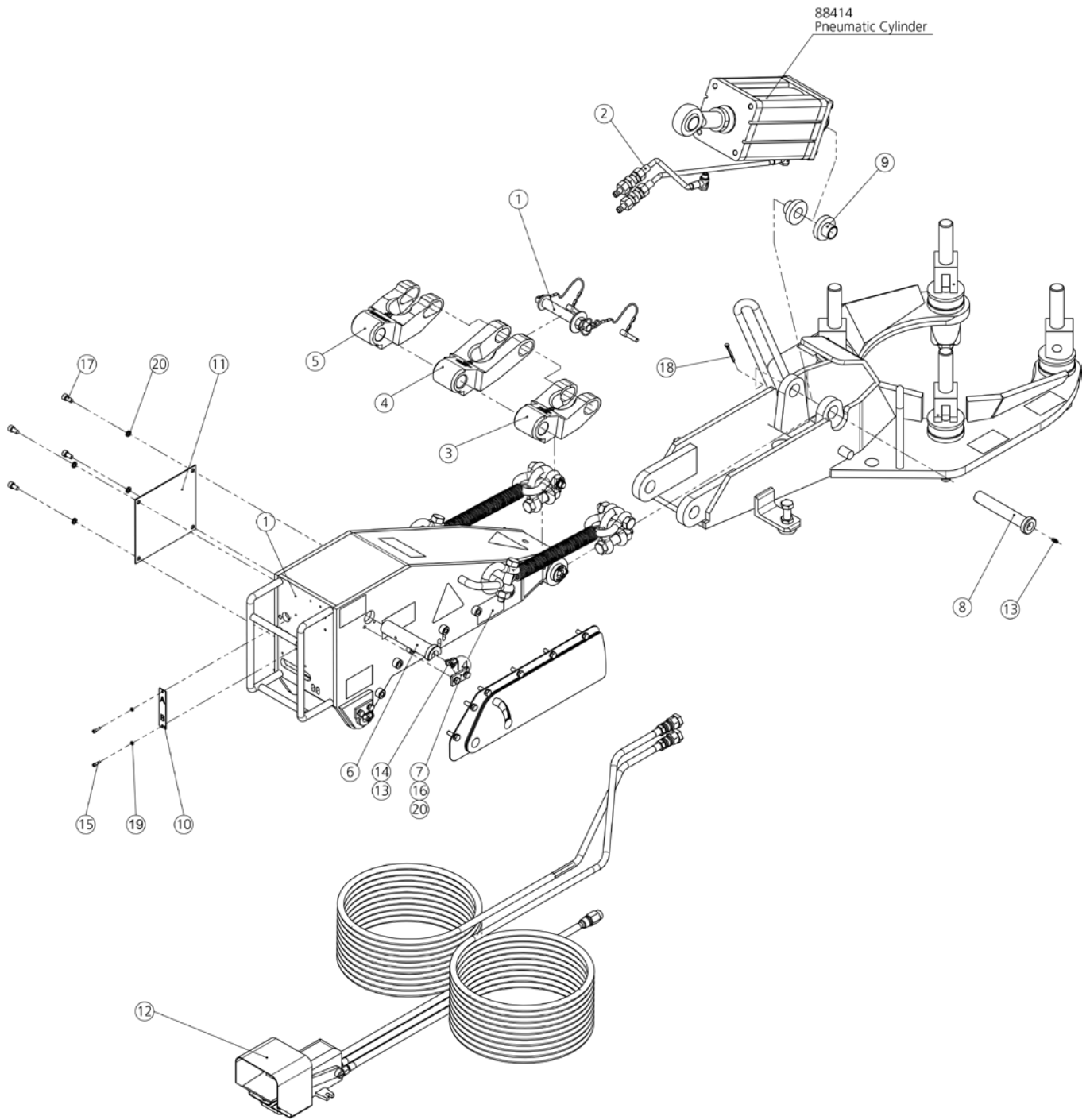


Fig. 56: 88920-A Pneumatic Slip Lifter

SERVICE

Parts List

Pos.	Qty.	P/N	Description
1*	1	88920	Case
2**	1	88430-A	Pneumatic Assembly
3	1	88208	Adapter
4	1	88208-5	Adapter
5	1	88208-A	Adapter
6	1	88412-5	Pin Typ 5
7	1	88214	Locking Plate
8	1	88463	Bolt
9	2	88471	Adapter Bushing
10	1	88467	Pneumatic Sign
11	1	88482-2	Manufacturer Plate
12	1	88229-1	Control Valve Assembly
13	2	756790	Lubricating nipples
14	2	612518	Protection Cap
15	2	88467-1	Screw
16	2	645028	Screw
17	4	612673	Screw
18	1	70263	Split Pin
19	2	792175	Washer
20	6	792112	Washer

* Refer to Page 82 Chapter 5.3.2.3.

** Refer to Page 88 Chapter 5.3.3.2.

5.3.3 Hydraulic and Pneumatic Circuit Drawings and Parts Lists

5.3.3.1 88430-HD Hydraulic Assembly

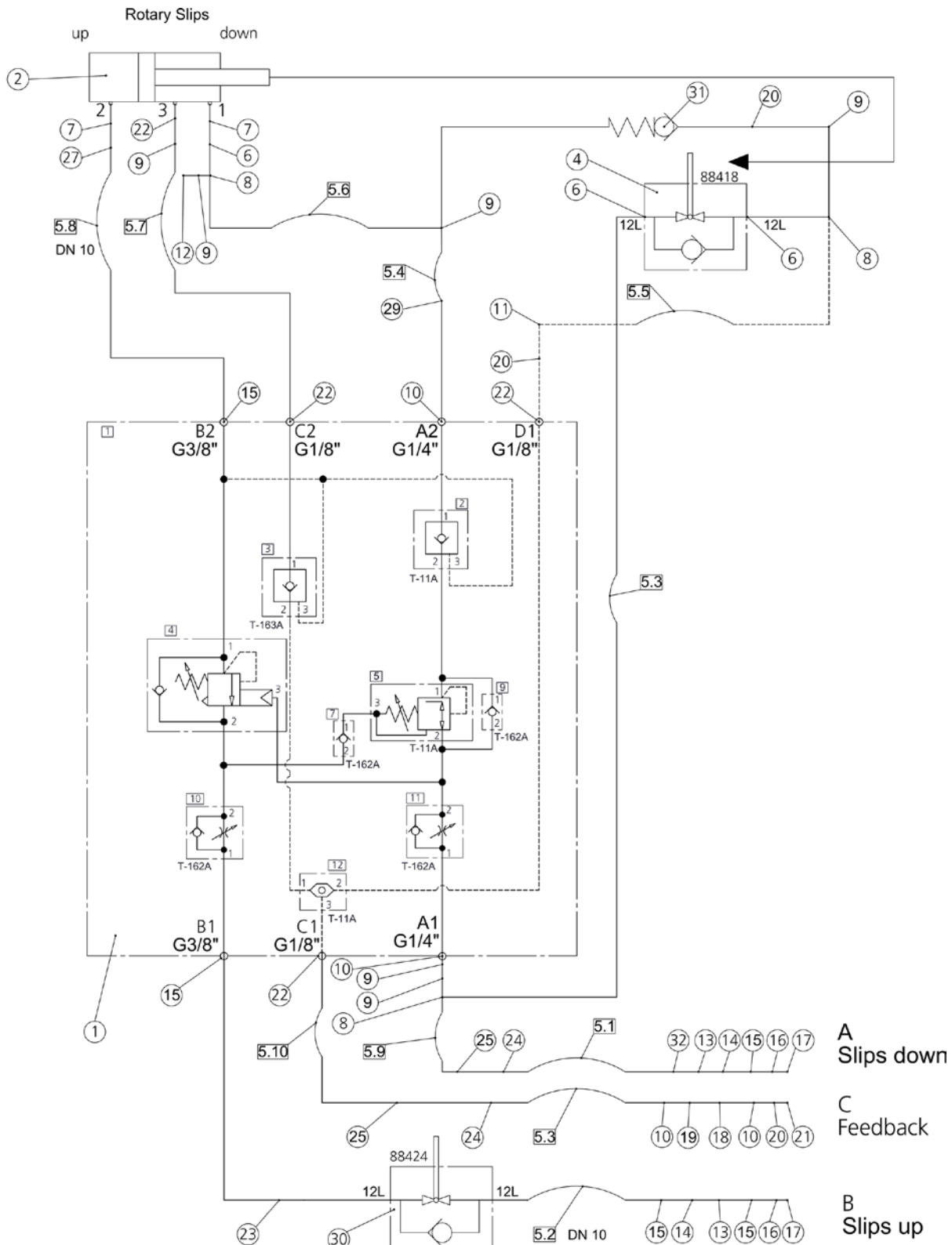


Fig. 57: 88430-HD Hydraulic Assembly

SERVICE

Parts List

Pos.	Qty.	P/N	Description
1	1	88269	Distribution Manifold Assembly
2	1	88415-1	Hydraulic Cylinder
4	1	88418	Stroke Limiter
5	1	88430-30	Hose Assembly
5.1	2	88430-31	Hose A And C
5.2	1	88430-32	Hose B
5.3	1	88430-33	Hose A1
5.4	1	88430-34	Hose A2
5.5	1	88430-35	Hose D1
5.6	1	88430-36	Hose 1
5.7	1	88430-37	Hose 3
5.8	1	88430-38	Hose 2
5.9	1	88430-39	Hose A-A1
5.10	1	88430-29	Hose C1
6	1	755372	Standpipe Reducer
7	2	755365	Banjo Coupling
8	3	645095	Adjustable Stud Barrel Tee
9	6	645096	L-Adapter
10	5	612944	Straight Connection 8L-1/4"
11	1	755738	90 Degree Fitting, 8L
12	1	755361	Pressure Coupling
13	2	612936	Coupling, Flat Face, Male
14	2	612937	Coupling, Flat Face, Female
15	5	755373	Straight Male Stud Coupling
16	2	755364	Swivel Reducer
17	2	645116	Direct Pipe Fitting
18	1	612966	Coupling, Flat Face, Female
19	1	612965	Coupling, Flat Face, Male
20	3	612945	Straight Connection 8L-8L
21	1	645117	Direct Pipe Fitting
22	4	710653	Straight Male Stud Coupling
23	1	88430-2	Pipe Assembly
24	2	645105	Straight Bulkhead Coupling
25	2	774510	Adjustable 45° Connector
27	1	755367	L-Adapter
28	2	645139	Reducing Connector
29	1	755737	Equal Tee
30	1	88424	Valve Assembly
31	1	645110	Check Valve

5.3.3.2 88430-A Pneumatic Assembly

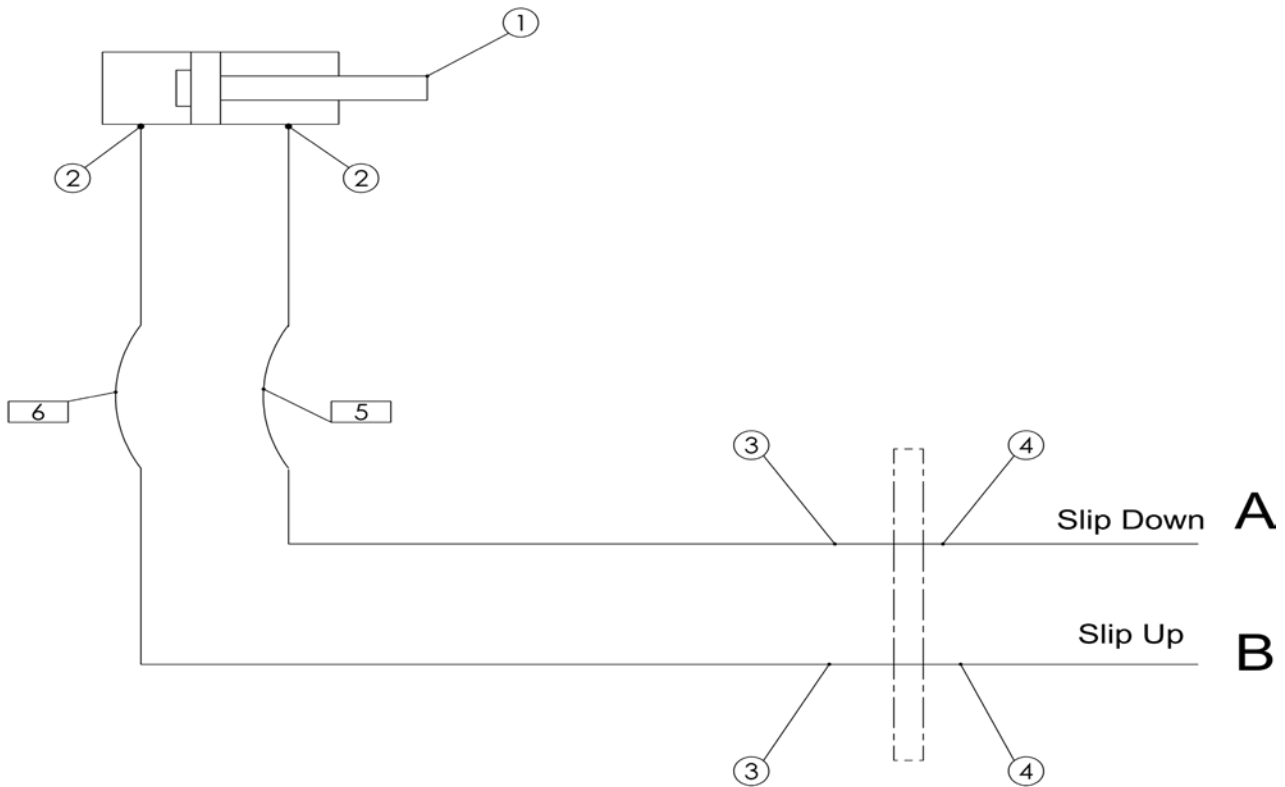


Fig. 58: 88430-A Pneumatic Assembly

Parts List

Pos.	Qty.	P/N	Description
1	1	88414	Pneumatic Cylinder for PSA
2	2	613945	Swivelling Screw Fitting 90°
3	2	88274	Straight Bulkhead Coupling
4	2	88275	Nipple
5	1	88225-3	Pneumatic Hose Assembly
6	1	88225-4	Pneumatic Hose Assembly

SERVICE

5.3.3.3 88229-1 Pneumatic Control valve Assembly

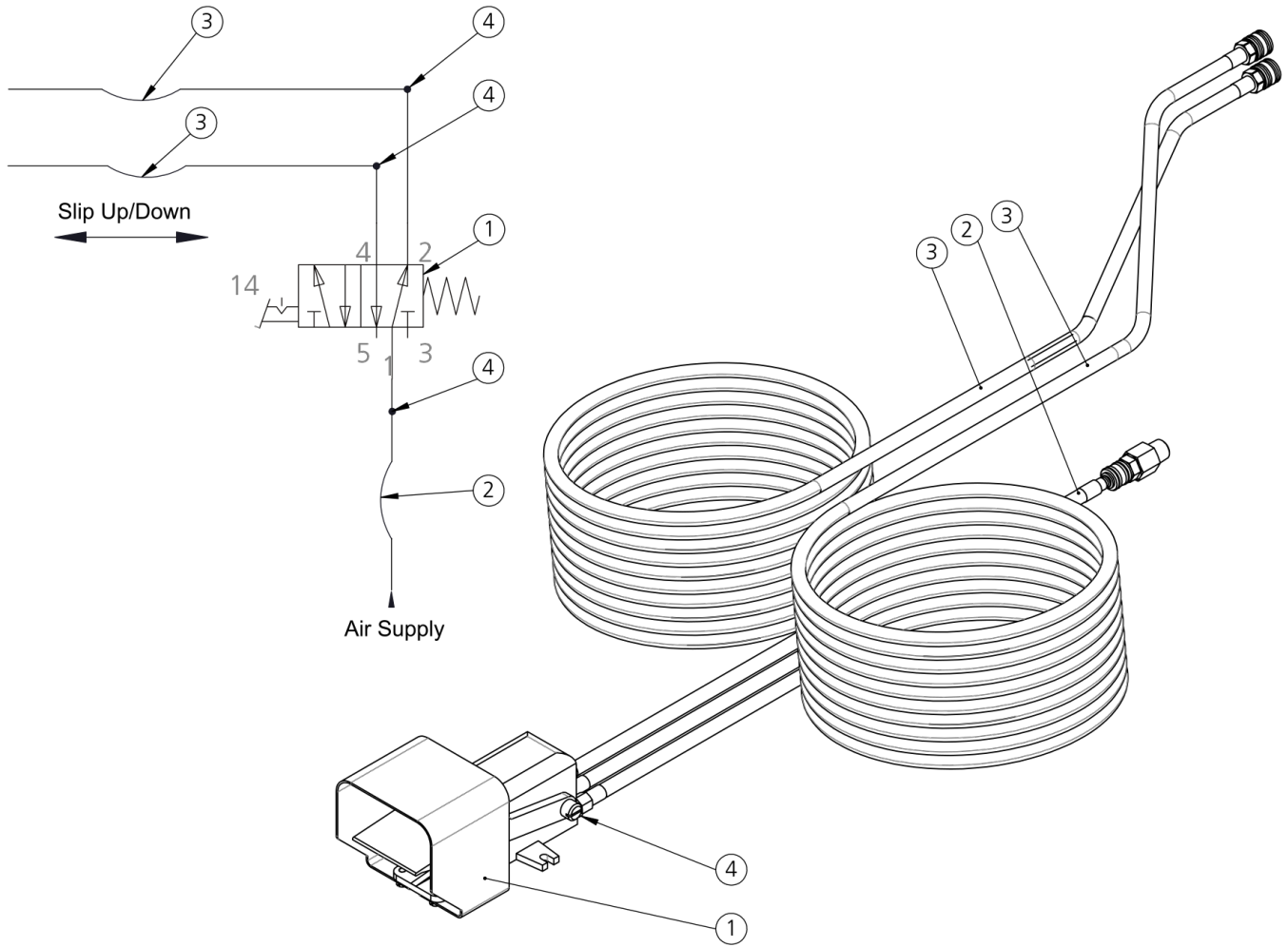


Fig. 59: 88229-1 Pneumatic Control valve Assembly

Parts List

Pos.	Qty.	P/N	Description
1	1	88230-F	Pneumatic Valve with Pedal (ATEX)
2	1	88229-4	Pneumatic Hose Assembly
3	2	88229-3	Pneumatic Hose Assembly
4	3	612944	Straight Connection

5.3.3.4 88269 Hydraulic valve Manifold

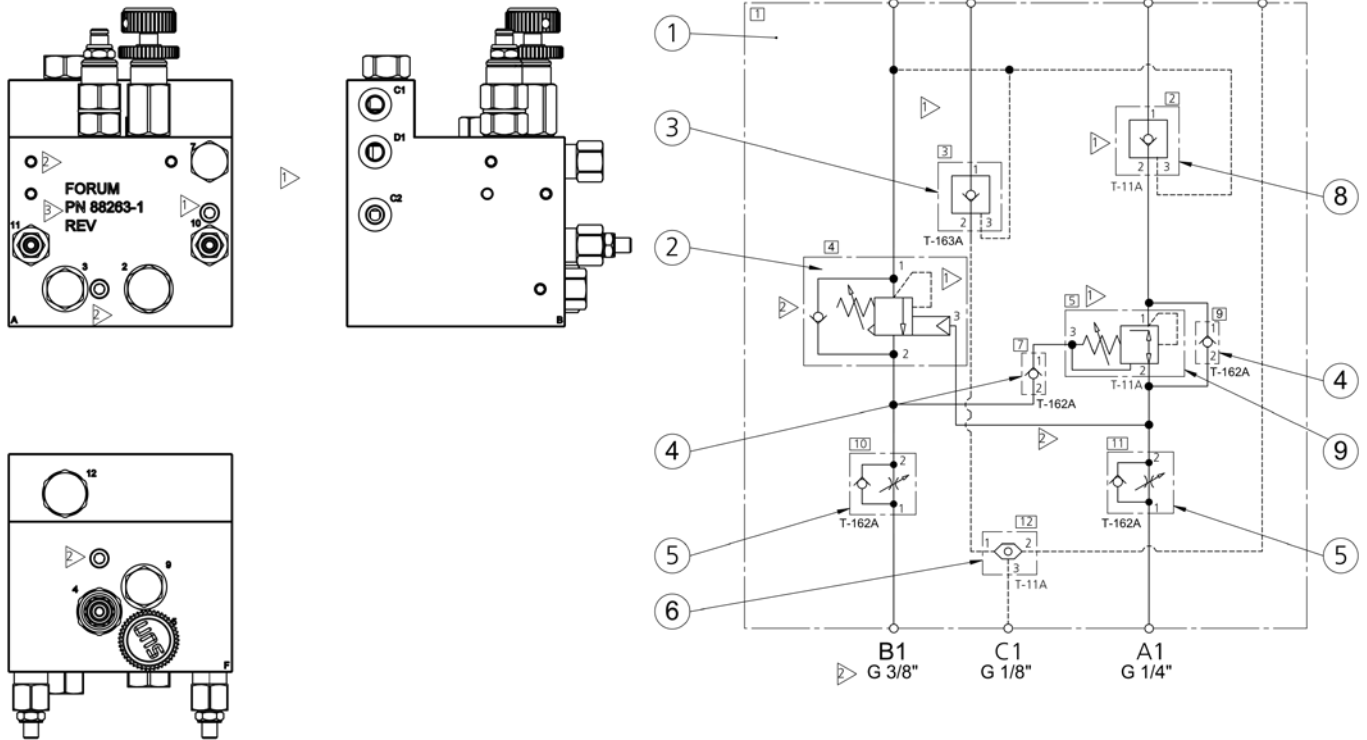


Fig. 60: 88269 Hydraulic valve Manifold

Parts List for 88269

Pos.	Qty.	P/N	Description
1	1	88263-1	Distribution Block
2	1	2010	Load-lowering Valve
3	1	2002	Pilot-to-Open Check 3-Port Valve
4	2	612952-T	Check Valve
5	2	2000	Needle Valve
6	1	2044	Shuttle Valve
7*	13	2012	Locking Screw
8	1	2035	Pilot-to-Open Check Valve
9	1	88417	Reducing Valve
10*	6	553606	Locking screw

*not shown

SERVICE

5.3.4 Assembly Drawings and Parts Lists

5.3.4.1 88240 Quick Lock Assembly

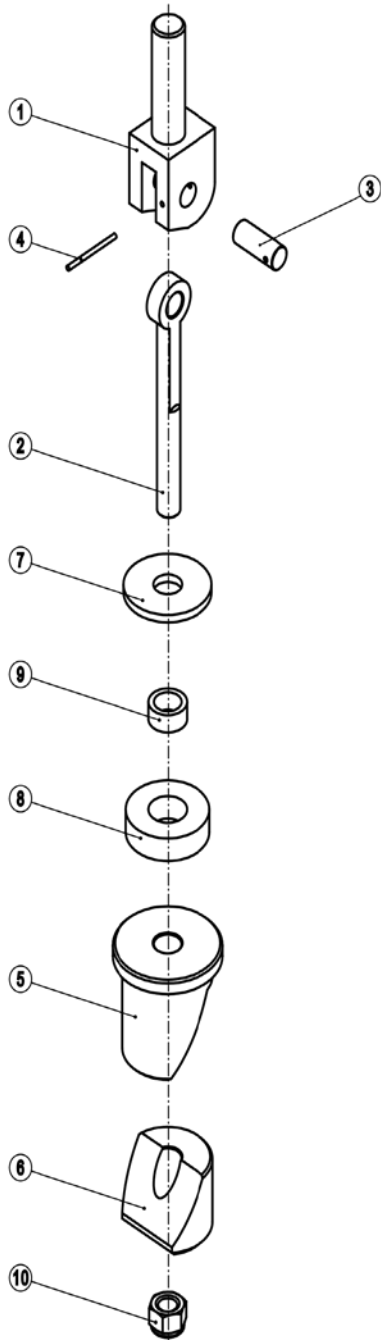


Fig. 61: 88240 Quick Lock Assembly

Parts List

Pos.	Qty.	P/N	Description
1	1	88240-1	Excenter
2	1	88240-2	Screw
3	1	88240-3	Pin
4	1	88240-4	Splint pin
5	1	88240-5	Journal
6	1	88240-6	Clamp
7	1	88240-7	Washer
8	1	88240-8	Rubber washer
9	1	88240-9	Bushing
10	1	88240-10	Nut M22

5.3.4.2 89208 Locking Assembly

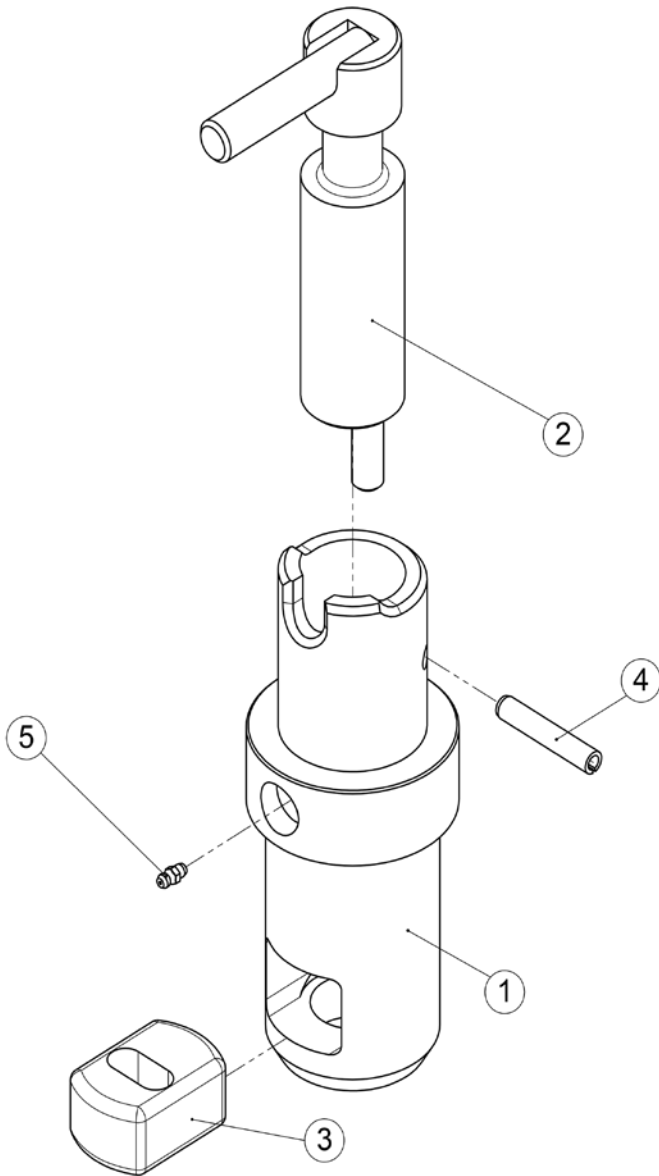


Fig. 62: 89208 Locking Assembly

Parts List for 89208

Pos.	Qty.	P/N	Description
1	1	89208-01	Fixation Bolt
2	1	89208-02	Excenter
3	1	89207-03	Guide
4	1	89207-05	Spring-type straight pin
5	1	756790	Lubricating nipples

SERVICE

5.3.4.3 Protection Plate Assembly

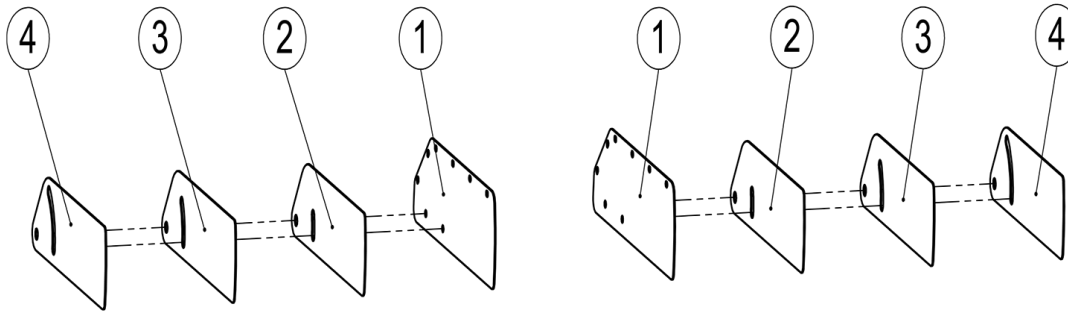


Fig. 63: Protection Plate Assembly

Parts List for 88224

Pos.	Qty.	P/N	Description
1	2	88224-1	Protection plate
2	2	88224-3	Segment 1
3	2	88224-4	Segment 2

Parts List for 88334

Pos.	Qty.	P/N	Description
1	2	88334-1	Cover Plate
2	2	88334-3	Segment 1
3	2	88334-4	Segment 2
4	2	88334-5	Segment 3

5.3.4.4 Base Plate Welding Assembly

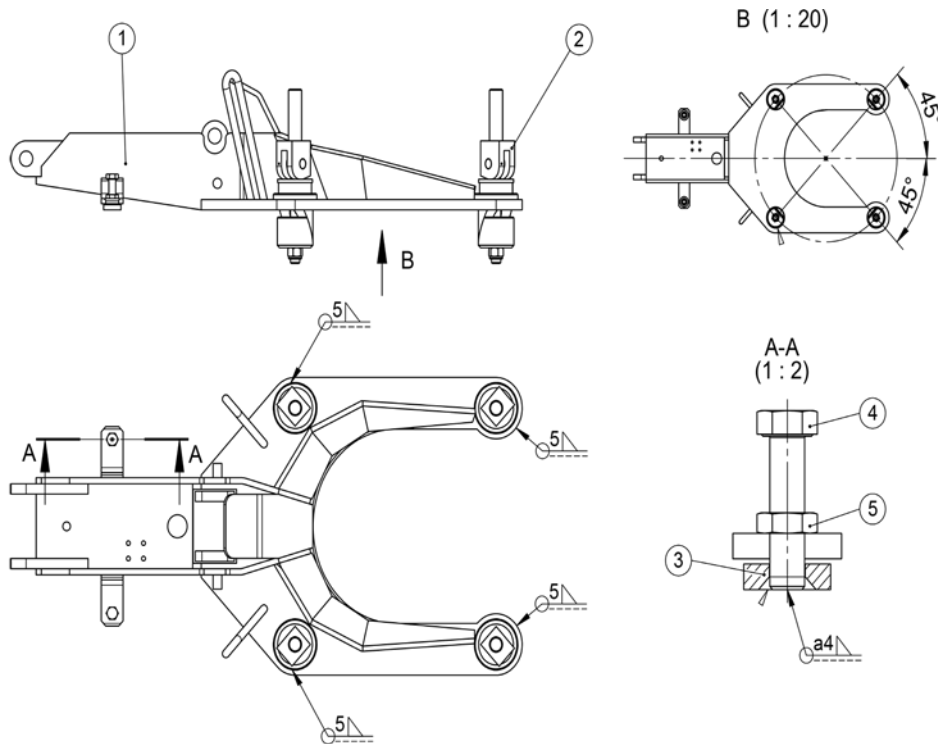


Fig. 64: 88345 Base Plate Welding Assembly

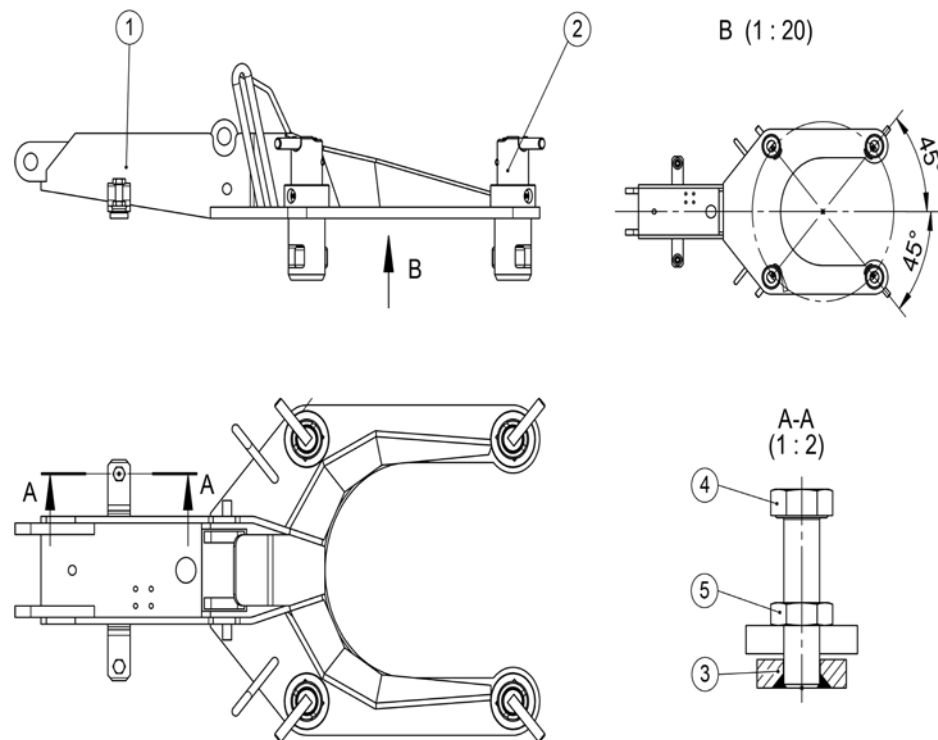


Fig. 65: 88465 Base Plate Welding Assembly

Parts List for 88345

Pos.	Qty.	P/N	Description
1	1	88460-F	Base Plate
2	4	88240	Quick squeeze Lock Pin Assembly for plain
3	2	88406	Plunger
4	2	645673-1	Screw
5	2	710348	Nut

Parts List for 88465

Pos.	Qty.	P/N	Description
1	1	88460-F	Base Plate
2	4	89208	Locking Assembly
3	2	88406	Plunger
4	2	645673-1	Screw
5	2	710348	Nut

SERVICE

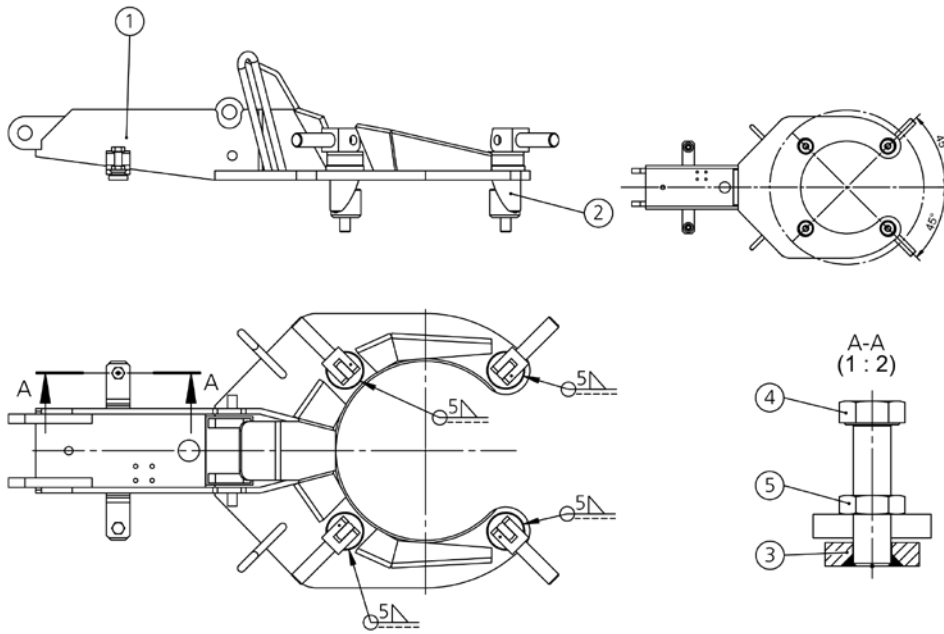


Fig. 66: 88921 Base Plate Welding Assembly

Parts List for 88921

Pos.	Qty.	P/N	Description
1	1	88460-F	Base Plate
2	4	88240	Quick squeeze Lock Pin Assembly for plain
3	2	88406	Plunger
4	2	645673-1	Screw
5	2	710348	Nut

5.3.5 Spare Parts Lists

5.3.5.1 88710-RSP One year spare parts list

Pos.	Qty.	P/N	Description
4	1	88213	Pin
5	1	88212-1	Pin Type 1
6	4	88224-7	Pin
7	1	88220	Slip Pin Assembly
10	2	88209	Spring
11	6	88201-2	Shackle
12	6	756790	Lubricating nipples
13	6	612518	Protection Cap
17	14	792112	Washer
18	5	70263	Split Pin
19	3	08. Sep	Sticker Hotline
20	3	671638	Warning sign Forum
21	3	671641	Warning sign "squeeze danger"
22	6	671640	Warning sign "Hands" - sticker
23	24	671642	Warning sign "GREASE DAILY"
24	6	671646-3	Sign "lifting point"

5.3.5.2 88710-A-RSP One year spare parts list

Pos.	Qty.	P/N	Description
1	1	88710-RSP	RSP for 88710
3	1	88208	Adapter f
5	1	88208-A	Adapter
4	1	88208-5	Adapter f
6	1	88412-5	Pin Typ 5
8	1	88463	Bolt
7*	1	88220	Slip Pin Assembly
9	2	88471	Adapter Bushing
12	1	88229-1	Control Valve Assembly
14	6	612518	Protection Cap
13	6	756790	Lubricating nipples
20	6	792112	Washer
18	1	70263	Split Pin

* Refer to Page 68 Chapter 5.3.1.1.

5.3.5.3 88710-H-RSP One year spare parts list

Pos.	Qty.	P/N	Description
1	1	88710-RSP	RSP for 88710
2	1	88430-HD-RSP	RSP for 88430-HD
3	1	88208	Adapter
4	1	88208-5	Adapter
5	1	88208-A	Adapter
6	1	88412-5	Pin Typ 5
8	1	88462	Bolt
13	2	756790	Lubricating nipples
14	2	612518	Protection Cap
16	2	645028	Screw
17	4	621111	Screw
18	4	613894	Screw
19	2	613633	Nut
20	1	70263	Split Pin
21	6	792111-1	Washer
22	8	792112	Washer
23	4	792103	Washer
24	4	792111	Washer
25	2	613714	Screw
28	2	87805	Screw

5.3.5.4 88710-HD-RSP One year spare parts list

Pos.	Qty.	P/N	Description
1	1	88710-RSP	RSP for 88710
2	1	88430-HD-RSP	RSP for 88430-HD
3	1	88408	Adapter
4	1	88408-5	Adapter
5	1	88412-5	Pin Typ 5
7	1	88462	Bolt
13	2	756790	Lubricating nipples
14	2	612518	Protection Cap
16	2	645028	Screw
17	4	621111	Screw
18	4	613894	Screw
19	2	613633	Nut
20	1	70263	Split Pin
21	6	792111-1	Washer
22	8	792112	Washer
23	4	792103	Washer
24	4	792111	Washer
25	2	87805	Screw
26	2	613714	Screw

5.3.5.5 88720-RSP, 88920-RSP

One year spare parts list

Pos.	Qty.	P/N	Description
4	1	88213	Pin
5	1	88212-1	Pin Type 1
6	1	88224-7	Pin
7	1	88220	Slip Pin Assembly
10	2	88209	Spring
11	6	88201-2	Shackle
12	6	756790	Lubricating nipples
13	6	612518	Protection Cap
17	20	792112	Washer
18	5	70263	Split Pin
19	3	613129	Sticker Hotline
20	3	671638	Warning sign Forum
21	3	671641	Warning sign "squeeze danger"
22	6	671640	Warning sign "Hands" - sticker
23	24	671642	Warning sign "GREASE DAILY"
24	6	671646-3	Sign "lifting point"

5.3.5.6 88720-A-RSP, 88920-A-RSP

One year spare parts list

Pos.	Qty.	P/N	Description
1	1	88710-RSP	RSP for 88710
3	1	88208	Adapter
4	1	88208-5	Adapter
5	1	88208-A	Adapter
6	1	88412-5	Pin Typ 5
8	1	88463	Bolt
9	2	88471	Adapter
13	6	756790	Lubricating nipples
14	6	612518	Protection Cap
20	12	792112	Washer

5.3.5.7 88720-H-RSP for PSH

Pos.	Qty.	P/N	Description
1	1	88710-RSP	RSP for 88710
2	1	88430-HD-RSP	RSP for 88430-HD
3	1	88208	Adapter
4	1	88208-5	Adapter
5	1	88208-A	Adapter
6	1	88412-5	Pin Typ 5
8	1	88462	Bolt
14	2	756790	Lubricating nipples
15	2	612518	Protection Cap
17	2	645028	Screw
18	4	621111	Screw
19	4	613894	Screw
20	2	613633	Nut
21	1	70263	Split Pin
22	6	792111-1	Washer
23	8	792112	Washer
24	4	792103	Washer
25	4	792111	Washer
26	2	87805	Screw
27	2	613714	Screw

5.3.5.8 88430-HD-RSP

One year spare parts list

Pos.	Qty.	P/N	Description
1	1	88269	Distribution Manifold Assembly
2	1	88415-1	Hydraulic Cylinder
4	1	88418	Stroke Limiter
5	1	88430-30	Hose Assembly
12	1	755361	Pressure Coupling
13	2	612936	Coupling
14	2	612937	Coupling
18	1	612966	Coupling
19	1	612965	Coupling
23	1	88430-2	Pipe Assembly 2
30	1	88424	Valve Assembly

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INSPECTION / MAINTENANCE

INSPECTION /
MAINTENANCE

6 Inspection / Maintenance

This chapter contains important information on how to service your Slip Lifter safely, correctly and economically. It helps to avoid dangerous situations and reduce repair costs and downtimes. Furthermore, the reliability and the service life of the Slip Lifter will be increased by following the instructions in this manual.



Ensure that setup and installation work are accomplished only by sufficiently qualified and trained personnel.



Read these instructions carefully before setting up the Slip Lifter and putting it into service.



WEAR EYE PROTECTION!



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!

Instructions for inspection and maintenance

1. In the event of visible damage or excessive wear contact the FORUM Handling Tools Service Department or an authorized repair company.
2. Ensure that welding work on primary load components is performed exclusively by the FORUM Handling Tools Service Department or an authorized repair company observing the FORUM Handling Tools welding instructions.
3. Ensure that all other maintenance work is performed only by personnel trained for this work and familiar with the risks involved in operating the Slip Lifter.
4. Ensure that all repair work not performed by FORUM Handling Tools is, nevertheless, accomplished in compliance with the manufacturer's specifications and instructions.
5. Small cracks and irregularities, which do not affect the safety or proper operation of the Slip Lifter, can be removed by grinding.
6. After repair always check the repaired part in a suitable manner to ensure that the defect has been remedied.

Prerequisites for maintenance work

1. Ensure that the Slip Lifter is set down on a good supporting surface so that it cannot tip.
2. Provide for sufficient lighting at the workplace.
3. The Slip Lifter must be removed from the rotary table and cleared from the area around well center to avoid objects dropped down-hole during maintenance.

6.1 Lubrication

⚠️ WARNING



Hydraulic fluid can pose a health hazard!

- » Hydraulic fluids can lead to skin and eye injury and poisoning symptoms upon contact.
- » Avoid direct contact with hydraulic fluids.



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!

INFO

i Lubricants can be ordered by FORUM Handling Tools. Please contact the FORUM Handling Tools Technical Support or one of the authorized service companies.

Lubrication Intervals

The orange marked areas of the Slip Lifter must be lubricated at least once each day with one of the specified lubricants. The lubrication requirement can be higher depending on the conditions of use. The lubricant can easily be applied with a brush or similar tool.

Lubrication Points

1. Grease the four locking assemblies **1**
2. Grease the Slip hinge **2**
3. Grease the Slip Attachment **3**
4. Grease upper body hinge **4**
5. Grease lower body hinge **5**



Fig. 67: Instructions: Lubricate at Least Once Daily (P/N 671642)

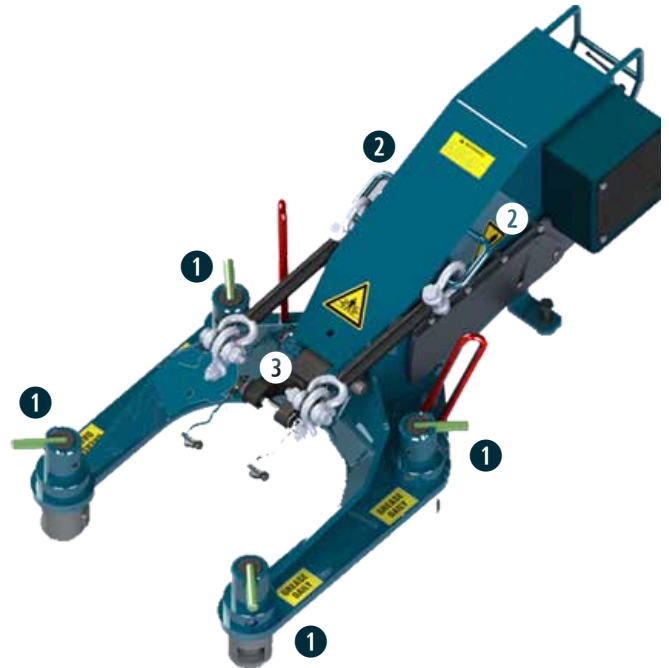


Fig. 68: Lubrication points I

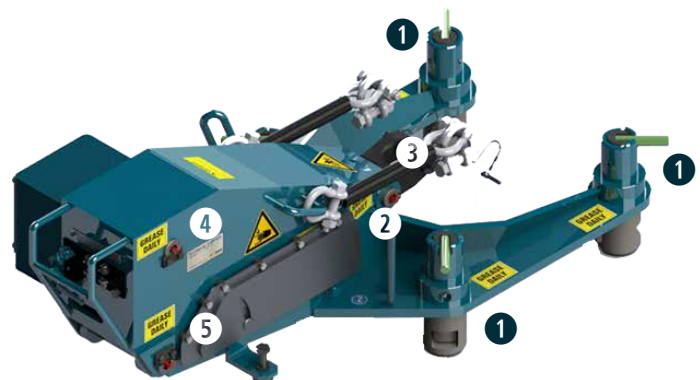


Fig. 69: Lubrication points II

INSPECTION / MAINTENANCE

6.2 Inspections

FORUM Handling Tools recommends to perform inspections at specified intervals and in inspection categories. Otherwise the frequency of required inspections is dependent on the conditions of use of the Slip Lifter. Before inspection remove all foreign material such as dirt, paint, lubricants, oil, abrasion, etc. from the affected parts. Use suitable methods such as stripping off paint, steam cleaning or sand blasting. After an inspection the scope and results of the tests performed should be documented. Periodic inspections and inspections following critical assignments should be accomplished at the operating location by the operators under the supervision of a supervisor. In the event of cracks, excessive wear, etc. contact FORUM Handling Tools or an authorized service company.

INFO

The specified maintenance intervals are recommended for the FORUM Handling Tools Slip Lifters during its service life. The necessity of inspections depends primarily on the following conditions:



- Ambient conditions
- Load cycles
- Regulatory requirements
- Period of use
- Tests
- Repairs
- Overhauls

Inspection Intervals

Category	Interval	Preparatory measures
I	Daily	- Slip Lifter in working environment
II	Weekly	- Slip Lifter on workplace - Slip assembly removed
III	Semi-annually	- Slip Lifter on workplace - Slip assembly removed
IV	Every 1 years	- Slip Lifter on workplace - Slip assembly removed

INFO



The above-mentioned inspection intervals refer to a 100% use of the Slip Lifter on each day of a week (24/7). Personal inspection intervals may vary according to the type and extent of use and may need to be adjusted.

6.2.1 Inspection of automatic operated Equipment

Check the automatic operated equipment daily for leakage in lines. If unacceptably high leakage occurs internally or externally contact FORUM Handling Tools or an authorized service company.

6.2.2 Inspection Following Critical Loads

Perform an inspection **IMMEDIATELY** following any critical or unexpected loads. Critical loads could be:

- Loads resulting from shock when the tubular sets.
- Pulling wedged tubulars.
- Holding heavy tubulars.
- Jarring.
- Operation at very low ambient temperatures (< -20°C / -4°F).

6.2.3 Inspection Following Removal

Generally the Slip Lifter should be inspected immediately before it is taken out of service temporarily or stored. Moreover it should be inspected before putting back into service.

- It is necessary to disassemble the Slip Lifter in an appropriately equipped workshop to check for excessive wear, deformation, cracks and other damage.
- Perform repair work only in compliance with the manufacturer's recommendations. These are available from FORUM Handling Tools.
- Ensure that welding work on critical parts is accomplished only by FORUM Handling Tools or an authorized service company in compliance with the welding specifications issued by FORUM Handling Tools.
- If the field inspection indicates that further inspection work is required, remove the Slip Lifter and have it inspected in an appropriately equipped workshop.
- Check carefully for visible wear and material fatigue.

6.3 Inspection Categories

6.3.1 Inspection Category I

Observe the Slip Lifter during operation. Recognizing inadequate performance and apparent defects is the goal of this category.

Scope/Prerequisites/Procedure:

- Daily visual inspection of the Slip Lifter for damages and defects during operation. Repair them if necessary.
- Functional test.
- A person with appropriate expertise must carry out the test.

6.3.2 Inspection Category II

The inspection of category II includes all inspections of inspection category I and additional tests.

Scope/Prerequisites/Procedure:

- Checking the state of lubrication, the condition of the entire Slip Lifter and the settings of all valves.
- A person with appropriate expertise must carry out the test.

6.3.3 Inspection Category III

The inspection of category III includes all inspections of inspection category II and additional tests.

Scope/Prerequisites/Procedure:

- Check of wear-limits.
- A person with appropriate expertise must carry out the test.

6.3.4 Inspection Category IV

The inspection of category IV includes all inspections of inspection category III and additional tests.

Scope/Prerequisites/Procedure:

- Check/Replacement of all pneumatic and hydraulic components
- A person with appropriate expertise must carry out the test.

6.3.5 Inspection Intervals and inspection tasks

Pos.	Task / Interval	Daily	Weekly	6 Monthly	1 Year
1	Function test and ongoing observation.	✓	✓	✓	✓
2	Functionality of Feedback.	✓	✓	✓	✓
3	Checks for cracks and loose fittings/hoses.	✓	✓	✓	✓
4	Checks for signs of deformations and leakages.	✓	✓	✓	✓
5	Check for signs of wear and corrosion.	✓	✓	✓	✓
6	Check for no loose components and presence of all warning signs.	✗	✓	✓	✓
7	Check for state of lubrication and conservation.	✗	✓	✓	✓
8	Check all possible settings (e.g. valves) on the Slip Lifter.	✗	✓	✓	✓
9	Checking the condition of the overall structure (Rotary Table, hydraulic system) and the interaction of all components and possible attachments with the Slip Lifter.	✗	✓	✓	✓
10	Checking wear limits (component measurement).	✗	✗	✓	✓
11	Exchange of selected hydraulic components.	✗	✗	✗	✓
12	Replacement of wear-intensive components (recommended spare parts).	✗	✗	✗	✓
		✓	Necessary	✗	Not necessary

INSPECTION / MAINTENANCE

6.3.6 Check list for Inspection

INFO

i The following check lists serve as copy templates for inspections to be performed in compliance with API 7L and are required to file performed inspections as defined in the user manual



Ensure that maintenance work is accomplished only by sufficiently qualified and trained personnel.

Slip Lifter model _____

Serial number _____

Inspection Category I

Date / Place of Inspection	Checked		Name of Inspection Operator / Supervisor	Sign.
	OK	NOK		
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Remarks: _____

Inspection Category II

Date / Place of Inspection	Checked		Name of Inspection Operator / Supervisor	Sign.
	OK	NOK		
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Remarks: _____

Inspection Category III

Date / Place of Inspection	Checked		Name of Inspection Operator / Supervisor	Sign.
	OK	NOK		
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Remarks: _____

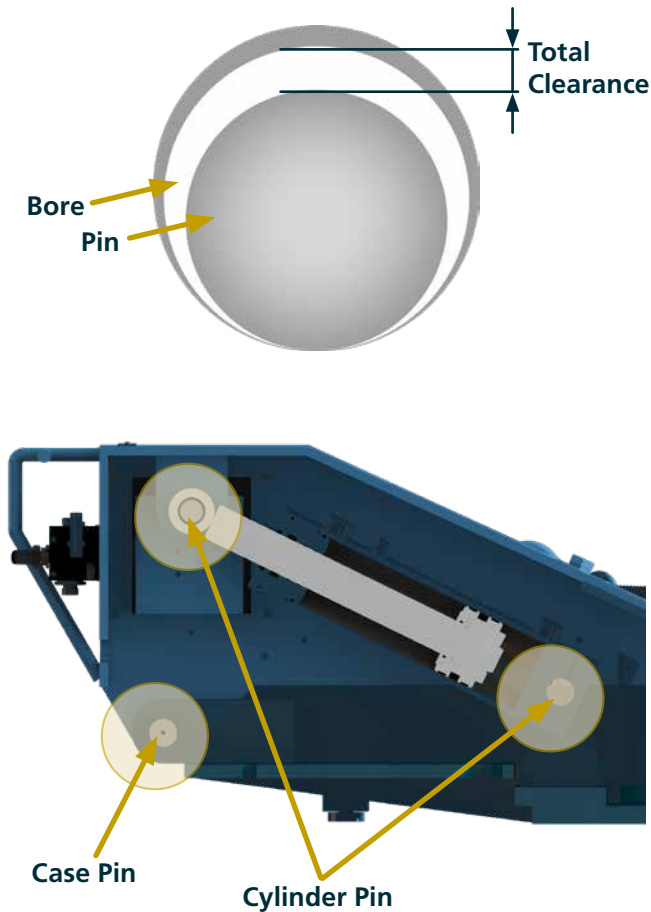
Inspection Category IV

Date / Place of Inspection	Checked		Name of Inspection Operator / Supervisor	Sign.
	OK	NOK		
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Remarks: _____

INSPECTION / MAINTENANCE

6.4 Wear Dimensions



Pin P/N	88462	88412-5
Location	Cylinder Pin Bottom [mm / inch]	Cylinder Pin Top [mm / inch]
Pin Dia. New	30,0 / 1,18	30,0 / 1,18
Pin Dia. worn Max.	28,0 / 1,10	28,0 / 1,10
Nominal Bore Dia.	30,2 / 1,19	30,2 / 1,19
Bore Dia. worn Max.	31,5 / 1,24	31,5 / 1,24
Max. Clearance	02,0 / 0,08	02,0 / 0,08

Pin P/N	88213	88212-1
Location	Adapter Pin [mm / inch]	Case Hinge Pin [mm / inch]
Pin Dia. New	30,0 / 1,18	30,0 / 1,18
Pin Dia. worn Max.	27,0 / 1,06	29,0 / 1,14
Nominal Bore Dia.	30,2 / 1,19	30,2 / 1,19
Bore Dia. worn Max.	31,5 / 1,24	31,0 / 1,22
Max. Clearance	03,0 / 0,12	01,0 / 0,04

6.5 Cleaning

⚠ WARNING

Health hazards from service products!

Splashes of diluted drilling mud and small parts.

» ALWAYS wear your personal protective equipment.



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!

The operating conditions and operating environment result in contamination on the Slip Lifter. Remove this contamination regularly to prevent incrustation and ensure safe operation of the machine. To clean shut off the Slip Lifter, disconnect from hydraulic/pneumatic system and lift out of rotary table and remove slip Assembly.

INSPECTION / MAINTENANCE

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STORAGE / DISPOSAL

STORAGE /
DISPOSAL

7 Storage / Disposal

This chapter deals with procedures and techniques to be taken to the storage after the decommissioning of the Slip Lifter. The aim is to protect the Slip Lifter, the environment and people from damages. Therefore FORUM Handling Tools recommends to read and implement the following procedure accurately.

7.1 Storage

Storage procedure

1. Clean the Slip Lifter. FORUM Handling Tools recommends the use of a high pressure cleaner.
2. Store the Slip Lifter on a pallet located on an even, supporting surface. Observe the weight specifications in the technical data.
3. Ensure that the Slip Lifter is stored so that no one can be injured by moving parts or sharp edges.
4. Secure the Slip Lifter with tensioning cables or in another manner to prevent it from slipping or tipping when moved.
5. Grease the Slip Lifter as described.
6. Conserve all not painted metal surfaces. FORUM Handling Tools recommends the use of a lubricant or Tectyl.
 - » These surfaces should be checked periodically to be sure that no corrosion has occurred.
7. Protect the Slip Lifter against water penetration with a plastic tarp.



Fig. 71: Correct Storage of Spare Parts and components



Fig. 72: Correct Storage of Slip Segments



Fig. 70: Correct Equipment Storage example

Intermediate Storage

- Apply lubricant to all bare surfaces (sliding surfaces at the back of each Slip Lifter segment).
- Protect all other bare surfaces with Tectyl Type 864 or an equivalent agent.
- Place Slip Lifters only on surrounded pallets and secure them with tensioning cables and anti-slip mat.

Ambient Conditions • Store in dry surroundings (maximum humidity 80%).

Longer Storage

- Apply lubricant to all bare surfaces (sliding surfaces at the back of each Slip Lifter segment).
- Protect all other bare surfaces with Tectyl Type 864 or an equivalent agent.
- Place Slip Lifters only on surrounded pallets and secure them with tensioning cables and anti-slip mat.
- Protect the Slip Lifter against water penetration with a plastic tarp.

Ambient Conditions • Store in dry surroundings (maximum humidity 80%).

7.2 Disposal

When used properly the Slip Lifter does not pose any hazard for users or the environment. However, operation of the Slip Lifter requires use of lubricants and cleaning agents, which can pollute the environment. For this reason always ensure that such substances are disposed of properly according to international, national and local regulations. Never dispose greases, oily cleaning rags or oily water together with industrial or domestic wastes. Observe the safety data sheets published by the manufacturers on environmental hazards and disposal of the service and operating products used. Ensure that all service and operating products as well as replacement parts are disposed of safely and ecologically. Please note specifically that is not obligated to take back used equipment.

List of Service Products Used

The Safety Data Sheets on the service products used are included in the appendix to this operating manual.

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APPENDIX

APPENDIX

8 Appendix

A. Third Party Documents

I Safety Data-Sheet

Material Name	Link to file
[Aerosol] Krylon Paint Aerosols	
[Aerosol] Rust O Leum Paint Aerosols	
[Hydraulic Fluid] Aral Vitam GF 32	
[Hydraulic Fluid] Citgo AW 68	
[Hydraulic Fluid] Conoco Megaflow AW 32 68	
[Hydraulic Fluid] Shell Tellus S2 M 32	
[Hydraulic Fluid] Shell Tellus S2 M 68	
[Hydraulic Fluid] Shell Tellus S2 V 15	
[Hydraulic Fluid] Shell Tonna S2 M 68	
[Lubricant] Buster 2007	
[Lubricant] AVIATICON FETT XRF	
[Lubricant] KO5	
[Lubricant] Lubrimatic Multipurpose Lithium	
[Lubricant] MasterPro Hi Temp WB	
[Lubricant] Mobil CM L	
[Lubricant] Mystik JT 6 Multi purpose #2	
[Lubricant] Permatex 767 Anti Seize Lubricant	
[Lubricant] Shell Gadus S2 V220 2	
[Lubricant] Shell Stamina RLS 2	
[Lubricant] Sprayon LU 100 White Lithium	
[Lubricant] Super S Hi Temp Red	

Material Name	Link to file
[Lubricant] Thermaplex Hi Temp Bearings	
[Paint] Paint Gallon	
[Paint] Paint Marker	
[Paint] Paint Marking Ink	
[Paint] Ruthless Paint and Varnish Remover	
[Paint] Startex Paint Thinner	
[Paint] Uni Paint Markers	
[Safety adhesive] Loctite 242 Threadlocker	
[Safety adhesive] Loctite 262 (High Strength)	
[Safety adhesive] Loctite 515 Gasket Eliminator	
[Safety adhesive] Loctite Clover Compound	
[Safety adhesive] Loctite Silver Grade Anti Seize	

II Components

Component Name	Link to file
[Safety Washer] NordLock	
[Lifting] RUD VRS Starpoint	
[Lifting] RUD VLBG Load Ring	

B. EC Certificate of Conformity - Template I



		<h1>FORUM B + V Oil Tools GmbH</h1>		
<h2>EC-DECLARATION OF CONFORMITY</h2>				
We,	FORUM B + V Oil Tools GmbH Hermann-Blohm-Strasse 2 20457 Hamburg / Germany			
declare that the products:	Hydraulic Operated Slip Lifter PSH-150			
which is the subject of this declaration, fulfils all of the relevant requirements of:				
2006/42/EC	Machinery Directive			
2014/34/EC	ATEX Directive of Equipment for use in hazardous areas			
Amongst others following harmonized and technical standards and specifications were used:				
API 7K, 6. Edition	Specification for Drilling and Well Servicing Equipment			
DIN EN ISO 13535	Petroleum and natural gas industries - Drilling and well-servicing equipment			
DIN EN ISO 12100	Safety of machinery, Risk assessment and Risk Reduction			
DIN EN ISO 80079-36	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 / Device Type:	[refer to data book]			
Rated Capacity:	[refer to data book]			
Part Number:	[refer to data book]			
Serial Number:	[refer to data book]			
Delivery date:	[refer to data book]			
Order No.:	[refer to data book]			
Marking:	  II 2G T5			
The Engineering Manager of FORUM B + V Oil Tools GmbH, Hermann-Blohm-Strasse 2, 20457 Hamburg, Germany, is authorized to compile the technical files. Documents in accordance to Directive 2014/34/EU Article 13 (1) b) ii) have been deposit at the notified body IBExU - Institut für Sicherheitstechnik GmbH, Fuchsmühlenweg 7, D-09599 Freiberg, Notified Body No. 0637, reference IB-14-6-001/200, Archive-No. 219/14. FORUM B + V Oil Tools has established a quality assurance system in accordance to ISO 9001 and API 01 approved by API Quality Registrar, Washington D.C./USA, Registration No. 2850 + 01-2769.				
Hamburg, issued on	[refer to data book]			
Authorized Representative	Name Position	 _____ Matthias Theiss Managing Director		
<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> FORUM B + V Oil Tools GmbH Hermann-Blohm-Strasse 2, 20457 Hamburg P.O.Box 11 22 53, 20422 Hamburg, Germany Phone: +49 40 37022-6855, Fax: +49 40 37022-6899 E-Mail: oiltools@f-e-t.com Internet: www.blohmvooss-oiltools.com Registered Office: Hamburg Blohm + Voss is a trademark of Blohm + Voss Shipyards GmbH® </td> <td style="width: 50%; vertical-align: top;"> Managing Directors: Matthias Theiss, Dr. Uwe Wagner, Tylar Kipp Schmitt Commercial Register: District Court of Hamburg, HRB 125 890 Tax-No.: 46/722/02375, VAT-ID. No.: DE 294 745 990 Banking: HSBC Trinkaus & Burkhardt AG BIC / SWIFT: TUBD DE 3303 0000 EUR-Acc.: IBAN: DE73 3003 0880 0012 8350 19 USD-Acc.: 401 / 2835 / 006 / IBAN: DE50 3003 0880 4012 8350 06 14.09.2017 </td> </tr> </table>			FORUM B + V Oil Tools GmbH Hermann-Blohm-Strasse 2, 20457 Hamburg P.O.Box 11 22 53, 20422 Hamburg, Germany Phone: +49 40 37022-6855, Fax: +49 40 37022-6899 E-Mail: oiltools@f-e-t.com Internet: www.blohmvooss-oiltools.com Registered Office: Hamburg Blohm + Voss is a trademark of Blohm + Voss Shipyards GmbH®	Managing Directors: Matthias Theiss, Dr. Uwe Wagner, Tylar Kipp Schmitt Commercial Register: District Court of Hamburg, HRB 125 890 Tax-No.: 46/722/02375, VAT-ID. No.: DE 294 745 990 Banking: HSBC Trinkaus & Burkhardt AG BIC / SWIFT: TUBD DE 3303 0000 EUR-Acc.: IBAN: DE73 3003 0880 0012 8350 19 USD-Acc.: 401 / 2835 / 006 / IBAN: DE50 3003 0880 4012 8350 06 14.09.2017
FORUM B + V Oil Tools GmbH Hermann-Blohm-Strasse 2, 20457 Hamburg P.O.Box 11 22 53, 20422 Hamburg, Germany Phone: +49 40 37022-6855, Fax: +49 40 37022-6899 E-Mail: oiltools@f-e-t.com Internet: www.blohmvooss-oiltools.com Registered Office: Hamburg Blohm + Voss is a trademark of Blohm + Voss Shipyards GmbH®	Managing Directors: Matthias Theiss, Dr. Uwe Wagner, Tylar Kipp Schmitt Commercial Register: District Court of Hamburg, HRB 125 890 Tax-No.: 46/722/02375, VAT-ID. No.: DE 294 745 990 Banking: HSBC Trinkaus & Burkhardt AG BIC / SWIFT: TUBD DE 3303 0000 EUR-Acc.: IBAN: DE73 3003 0880 0012 8350 19 USD-Acc.: 401 / 2835 / 006 / IBAN: DE50 3003 0880 4012 8350 06 14.09.2017			

Fig. 73: EC Certificate of Conformity - Sample

C. EC Certificate of Conformity - Template II



FORUM B + V Oil Tools GmbH

EC-DECLARATION OF CONFORMITY

We, **FORUM B + V Oil Tools GmbH**
Hermann-Blohm-Strasse 2
20457 Hamburg / Germany

declare that the products: **Pneumatic Operated Slip Lifter PSA-150**

which is the subject of this declaration, fulfils all of the relevant requirements of:

- 2006/42/EC Machinery Directive
- 2014/34/EC ATEX Directive of Equipment for use in hazardous areas

Amongst others following harmonized and technical standards and specifications were used:

- API 7K, 6. Edition Specification for Drilling and Well Servicing Equipment
- ISO 14693 Petroleum and natural gas industries - Drilling and well-servicing equipment
- DIN EN ISO 12100 Safety of machinery, Risk assessment and Risk Reduction
- DIN EN ISO 80079-36 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 / Device Type: [refer to data book]
- Rated Capacity: [refer to data book]
- Part Number: [refer to data book]
- Serial Number: [refer to data book]
- Delivery date: [refer to data book]
- Order No.: [refer to data book]
- Marking: **CE Ex II 2G T5**

The Engineering Manager of FORUM B + V Oil Tools GmbH, Hermann-Blohm-Strasse 2, 20457 Hamburg, Germany, is authorized to compile the technical files. Documents in accordance to Directive 2014/34/EU Article 13 (1) b) ii) have been deposit at the notified body IBExU - Institut für Sicherheitstechnik GmbH, Fuchsmühlenweg 7, D-09599 Freiberg, Notified Body No. 0637, reference IB-14-6-001/200, Archive-No. 219/14. FORUM B + V Oil Tools has established a quality assurance system in accordance to ISO 9001 and API 01 approved by API Quality Registrar, Washington D.C./USA, Registration No. 2850 + 01-2769.

Hamburg, issued on [refer to data book]

Authorized Representative

Name
Position



Matthias Theiss
 Managing Director

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Managing Directors: Matthias Theiss, Dr. Uwe Wagner, Tylar Kipp Schmitt
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 EUR-Acc.: IBAN: DE73 3003 0880 0012 8350 19
 USD-Acc.: 401 / 2835 / 006 / IBAN: DE50 3003 0880 4012 8350 06
 14.09.2017

Fig. 74: EC Certificate of Conformity - Sample

Our goal is to become the leading provider of mission critical oilfield products and related services in terms of customer satisfaction, safety and financial performance.

Our experienced management team and employees are dedicated to solving our customers' problems. We invest in long term relationships and cooperate on product development with our clients, we consider them our partners.

OUR CORE VALUES

- Integrity:** In everything we do, in every interaction, both internally and externally, we strive to operate with the upmost integrity and mutual respect.
- Customer focused:** Our products enhance our customer's performance and we listen to their needs and work with them to solve their challenges.
- Good place to work:** We are committed to creating a workplace that fosters innovation, teamwork and pride. Every team member is integral to our success and is treated equally and fairly.
- No one gets hurt:** The safety of our employees and customers is our first priority coupled with a healthy respect for the environment.



FORUM Handling Tools

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