

Power Slip PS-500

Hydraulic operated



Fig. 2: Illustration Example 757000-N

Fig. 1: Illustration Example 757500-E-F

Operating Instructions

Original Operating Instructions

P/N	Type	Load Rating	Pipe Size
755000	PS-500	500	2.3/8" - 14"
756000	PS-500	500	2.3/8" - 14"
757000-RT-VAR	PS-500	500	2.3/8" - 14"
757500-RT-VAR	PS-500	500	2.3/8" - 14"
758000-RT	PS-500	500	2.3/8" - 14"

Rotary Table Adapter: [PN]-N-National [PN]-OW-Oilwell Wirth [PN]-E-Emsco

Possible Variations: [PN-RT]-MC-Multi Coupling Connection [PN-RT]-F-Feedback

Revision history

Version	Date	Author	Changes
00	2008-06	B+V OT,ROK, MH	Initial Release
01	2008-08	B+V OT,ROK, MH	Design Update
02	2008-12	B+V OT,ROK, MH	Product Update
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09	2010-12	B+V OT,ROK, MH	Product Update
10	2011-03	B+V OT,ROK, MH	Product Update
11	2011-11	B+V OT,ROK, MH	Design Update
12	2012-02	B+V OT,ROK, MH	Product Update
13	2012-04	B+V OT,ROK, MH	Product Update
14	2012-07	B+V OT,ROK, MH	Design Update
15	2012-09	B+V OT,ROK, MH	Product Update
16	2015-08	FBV, ROK, MH	Layout, Company Name update - Umbilical Version added Power Slip PS-500
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Document Approval

Version	Author	Eng. Check	Approval Check
17	FORUM Handling Tools St.S 06-2018	FORUM Handling Tools RR 08-2018	FORUM Handling Tools AV 08-2018

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All data in this manual takes place using best knowledge. This manual bases 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 alter 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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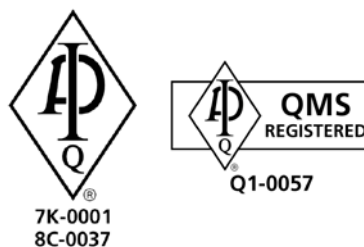


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A. General

I Basic Information

This operation maintenance manual (hereinafter called OMM) refers to the Power Slip PS-500 (hereinafter called PS-500) from FORUM Handling Tools, which is used on oil drilling platforms and rigs. The permissible range of application is specified in the technical data. 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 OMM is intended for the operator of the PS-500. It is intended to ensure safe operation and must be read carefully and kept where it is accessible for PS-500 users at all times. This OMM contains all information on safe and proper operation of the PS-500. Observance of these instructions is the prerequisite for safe operation. In addition, it is necessary to observe all applicable national and local regulations, e.g. accident prevention 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 Handling Tools recommends requesting service from FORUM Handling Tools itself.

II Intended Use

The Power Slip PS-500 is specially designed for drilling operations. The intended use is the vertical gripping and holding of long, heavy pipe strings with a diameter of 2.3/8" to 14" and a total weight of up to 500 sh ton while located in a Rotary Table. The PS-500 is hydraulic operated. In addition to observing all instructions in this OMM, 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 of the PS-500 is allowed for the intended use only. All FORUM Handling Tools PS-500 are designed in accordance with API 8C.

INFO



The abbreviation sh ton and the word sh ton are used to describe short sh ton. 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 PS-500 releases FORUM Handling Tools from any liability for personal injury or property damage resulting therefrom.

The PS-500 is intended exclusively for gripping and holding specified pipes. Always observe the specifications in chapter „Technical Data“ on page 25.

Additionally the intended use covers the compliance and observance of all procedures and safety notes of this OMM, as well as performing all necessary maintenance work in the given intervals.

The following is specifically prohibited:

- Holding pipe with diameter > 14".
- Holding pipe with diameter < 2.3/8".
- Using the PS-500 with pipe diameter for which use is not specified.
- Increasing the load limit of the PS-500.
- Any use of the PS-500, which is not intended.

Moreover, operation of the PS-500 is prohibited under the following conditions:

- When the PS-500 is used for applications other than intended.
- When the hydraulic equipment is not installed properly.
- When the PS-500 or parts thereof are damaged or when additional equipment is not installed properly.
- When protective or safety equipment is damaged, unusable, improperly installed or not present.
- When the PS-500 is not operating properly.
- When humans or foreign objects are located in the hazard area of a PS-500.
- 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 companies not authorized by FORUM Handling Tools have performed repair or service work on the PS-500.

Observe also the chapter „Warranty and Liability“.

IV Potential Misuse

This OMM 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 the PS-500 or service procedures contained within this OMM 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 PS-500 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 PS-500 in methods not intended. The PS-500 have to be used ONLY in the methods described in this OMM.

V Warranty and Liability

V-01 Liability

The technical information, data and instructions for operation contained in this OMM 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 PS-500 treated in this OMM. Claims or entitlements cannot be deduced or derived from information, illustrations and /or descriptions in this OMM.

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 OMM 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 OMM 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 OMM 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 PS-500 with lubricants other than those recommended by FORUM Handling Tools.

Info



Any structural or functional modification to the PS-500 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 PS-500 must be trained by the operating company for the work performed on and with the PS-500. All personnel must have read and understood the OMM.

VI-02 Minimizing Risk of Injury

The following principles apply to minimize the risk of injury:

- Ensure that only qualified personnel perform work on the PS-500.
- The operating company must authorize the personnel for such work.
- The personnel must wear the prescribed protective equipment.
- Procedures, competencies and responsibilities must be clearly defined and established in the area of the PS-500. 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 PS-500 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 OMM at the location where the PS-500 is in operation, where it is easily accessible for everyone and in an easily legible condition.
- Use the PS-500 exclusively for its intended purpose.
- Use the PS-500 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 PS-500 includes knowledge of the general safety precautions. Ensure that the PS-500 is operated only in compliance with the general safety precautions and other instructions in this OMM.

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 PS-500 is familiar with the required procedures and safety precautions.

VI-06 Minimum Qualifications

All work on the PS-500 requires special knowledge and qualifications on the part of the operating personnel. All personnel working on PS-500 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 PS-500.
- Sufficient qualifications for working on the PS-500 under supervision and at the instructions of a trained specialist.

VI-07 User Groups

This OMM is subdivided into the following user groups:

Personnel	Qualifications
Operating personnel	Sufficiently trained in: • Functional procedures on the PS-500. • Operating procedures. Knowledge: • Competency and responsibility about the work to be performed. • Behavior in emergencies.
Service personnel	Basic knowledge of: • Mechanics. • Hydraulic. Authorizations (according to standards of safety engineering): • Starting up PS-500. • Grounding PS-500. • Marking of PS-500. • Basic knowledge of installation and operation of the PS-500.

Special Technical Knowledge

Only specially trained personnel should perform the following work:

Work Performed	Qualifications
Work on hydraulic system	Special knowledge and experience with work on hydraulic 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.

VII Safety Symbols

The safety precautions in this document contain standardized depictions and symbols. Three hazard classes distinguish 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.

VII-01 Preliminary Safety Precautions

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

VII-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. ...

VII-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. ...

VII-04 Linguistic Conventions

This OMM 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. ESequential numbers (1, 2, 3,) in the left margin, indicates enumerations in a certain sequence (e.g. a series of work steps).

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. 3: Illustration Example

VII-05 Personal Protective Equipment (PPE)

The following symbols located at appropriate points in the OMM 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!

INFO



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

VIII Conformity

The PS-500 satisfies all requirements in applicable directives and standards. A sample of the EC Declaration of Conformity is given in the appendix.

INFO



This OMM is a part of the technical documentation for the Power Slip PS-500. The EC Declaration of Conformity is delivered together with the PS-500. Keep these instructions and the associated documents for later use.

IX Contact FORUM Handling Tools Worldwide

In the event of problems that cannot be solved with the aid of this OMM, 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-Locations

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

Canada	Mexico	Scotland
Nr. 106, 3903 - 75 Ave Leduc, Alberta T9E 0K3 Tel: + 1 780.980.0345 Fax: + 1 780.986.3278	Avenida Avante Monterrey N 300 Parque 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	

X Information on the Internet

X-01 Homepage

INFO



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



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- ▶ Safety Clamps
- ▶ Wrench , Pipe Spinner and Floorhands
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EXHIBITIONS

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

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Bushings
Manual Slips
Safety Clamps
Dual Elevator System
Spare Parts

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Fig. 4: Illustration Service–Homepage I

X-02 Extranet

INFO



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 FORUM homepage. To join our Internet Technical Documentation service with the latest updates on new technical documentation in a casual way, you must register to our service with your email-address and name in the customer-login area ① on <https://www.accessoiltools.com/fx/>.



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Fig. 5: Illustration Service–Homepage II

XI Abbreviations

Abbr.	Description	Abbr.	Description
Air	Pneumatic Operated	°C	Degree Celsius
Csg	Casing	F	Degree Fahrenheit
DC	Drill Collars	ft	foot or feet
dia.	diameter	ft.lb	foot pounds (= torque)
DP	Drill Pipe	gpm	(US) gallon per minute
EU	External Upset	in	inch(es)
Hyd	Hydraulic Operated	kW	kilowatt
ID	inside diameter	kPa	kilopascal
IEU	Internal External Upset	kg	kilogram(s)
IU	Internal Upset	lb	pound(s)
OD	outside diameter	m	meter(s)
P/N	part number	mm	millimeter(s)
qty	quantity	Nm	Newton meter (= torque)
max	maximum	oz	ounce(s)
min	minimum	psi	pounds per square inch
no	number	sh T	short ton
Tbg	tubing	t	Metric Ton
w/	with	HCGS	Hydraulic Centring Guide System
w/o	without	EOL	End of Lifetime
w/Zip	with Zip groove	EOS	End of Service Lifetime

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DESCRIPTION

DESCRIPTION

1 Description

The PS-500 is used to grab and hold long, heavy pipe strings vertically with a diameter of 2.3/8" to 14" and a total weight up to 500 sh ton, while located in a Rotary Table. Adapters can be ordered for different brands (National, Emsco etc.) within the size of 37.1/2". Adapter Rings for various Rotary Tables can be ordered also. The use of replaceable Insert Carriers enables the PS-500 for use of various tubular in size and style, such as casings, drill collars and drill pipes. A description of the optional accessories is given in chapter 1.2 on page 22. FORUM Handling Tools PS-500 are designed with strength and safety factors in accordance with API 7K 6th Edition. The PS-500 is ATEX certified.

Features

- Hydraulic operated.
- Maximum load rating of 500 sh tons.
- Suitable for all common pipe sizes and types from 2.3/8" to 14".
- Rapid changing of pipe sizes by means of Insert Carrier and associated Guide Plates.
- Air operated grease system.
- Hydraulic system is completely integrated and covered into the PS-500 body.
- Hydraulic feedback signals when Slip Assembly has been set and raised.
- Hydraulically/Manually operated Centering Guide System.
- Use of standard Bit Breaker plates possible.
- Top Cover-System suitable for top loads up to 500 tons.
- Slips down force 30 ton.

1.1 Overview of PS-500 Variations

1.1.1 Power Slip PS-500 - PN 755000

EOL - 2003 / EOS - 2007

The PS-500 with PN 755000 is the first Power Slip PS-500 of FORUM Handling Tools. This Power Slip is equipped with a manual Top-Cover ⑧, a straight door ⑥, a feedback ⑨ and adapters ⑩ for different types of Rotary Tables. An HCGS is optionally available. This PS-500 PN 755000 has reached end of lifetime at FORUM Handling Tools.

1.1.2 Power Slip PS-500 - PN 756000

EOL - 2006 / EOS - 2010

The PS-500 with PN 756000 is the improved revision PN 755000 version. The HCGS ②, the door ⑥, the feedback ⑨ and adapters ⑩ for different types of Rotary Tables as the Hydraulic Assembly ⑤ have been improved. This PS-500 PN 756000 has reached end of lifetime at FORUM Handling Tools.

1.1.3 Power Slip PS-500 - PN 757000-RT / -RT-MC

EOL - 2016 / EOS - 2020

The PS-500 PN 757000 is the successor of PN 756000. This Power Slip is equipped with the HCGS ② and the straight door ⑥. The feedback ⑨ and the adapters ⑩ for different types of Rotary Tables (abbreviation "-RT") as well as the Hydraulic Assembly ⑤ have been improved. In addition, this Power Slip can be operated with a Multi-Coupling Kit (abbreviation "-MC"). The Guide Plates of the HCGS are manufactured with plug-in connections. An exchange of the door allows the use of the PS-500 with cable penetration (Umbilical option). The HCGS is interchangeable with the Top-Cover ⑦ and ⑧. This PS-500 PN 757000 has reached end of lifetime at FORUM Handling Tools.

1.1.4 Power Slip PS-500 - PN 757500-RT-F / -RT-MC

The PS-500 PN 757500 is the successor of PN 756000 but without HCGS. This Power Slip is equipped with a manual Top-Cover ⑧, an improved curved door (Umbilical option) ⑥, a feedback (abbreviation "-F") ⑨ and adapters ⑩ for different types of Rotary Tables (abbreviation "-RT"). In addition, the Power Slip can be operated with a Multi-Coupling Kit (abbreviation "-MC"). Using suitable FORUM Guide Plates allows the use of the PS-500 with cable penetration (Umbilical option).

1.1.5 Power Slip PS-500 - PN 758000-RT

EOL - 2015 / EOS - 2019

The PS-500 PN 758000 is the successor of PN 756000 with HCGS. The Guide Plates of the HCGS are manufactured with a keyed joint system for optional equipment use on top of the PS-500. An exchange of the door allows the use of the PS-500 with cable penetration (Umbilical option). The HCGS is interchangeable with the Top-Cover ⑧. This PS-500 PN 758000 has reached end of lifetime at FORUM Handling Tools.

1.2 Assemblies and Components

Info

Please note that the following illustration does not reflect the scope of delivery (refer to section 3.1.1 “Scope of Delivery” on page 48). FORUM Handling Tools offers Carrier assemblies and Guide Plates separately to match specific pipe diameters.

For parts catalogue with complete general drawings and parts lists refer to section 5.3 “Drawing, Parts List and Spare Parts” on page 79 of this OMM.

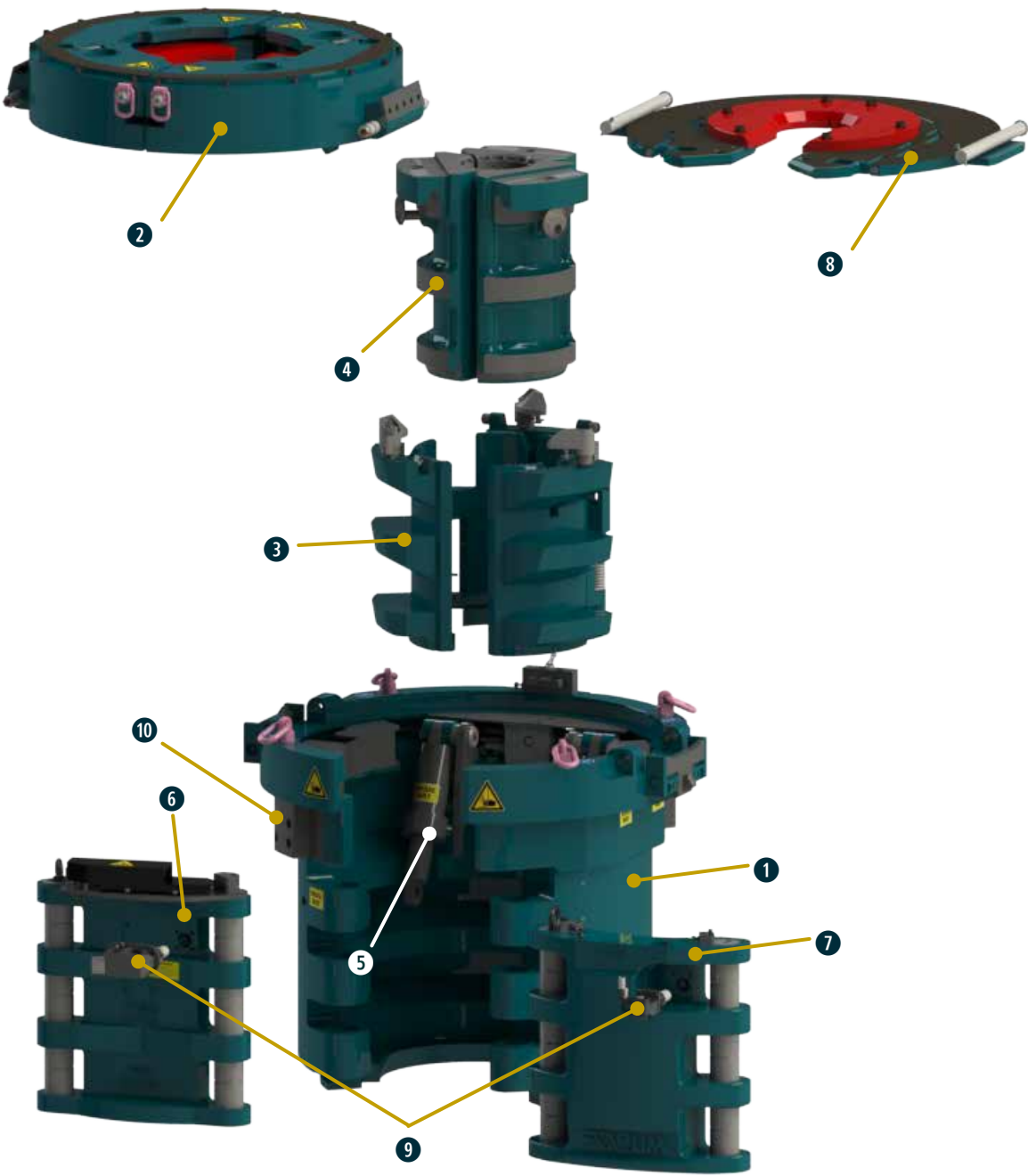


Fig. 6: PS-500 Main Assemblies

Pos. Name		Pos. Name	
1	Body	2	HCGS (incl. Guide Plates)
3	Slip Assembly	4	Insert Carrier Assembly
5	Hydraulic Assembly	6	Straight Door
7	Curved Door (Umbilical Option)	8	Manual Top-Cover (incl. Guide Plates)
9	Slip Assembly	10	RT Adapter

1.2.1 Body and Door

The body ① and the door ② are the basic elements of the PS-500. They are connected with two hinge pins. One hinge pin can be pulled to open the PS-500. The other hinge pin serves only as a hinge to swing the door. When installed to the Rotary Table, the PS-500 is almost flush mounted to the rig floor. Four hoisting eyes are fastened to the body for transportation tasks. The PS-500 can be installed in all common Rotary Tables.

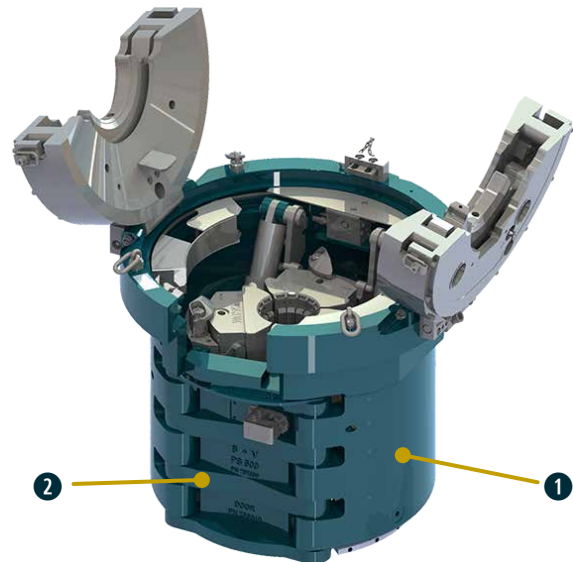


Fig. 7: Body and Door of the PS-500

1.2.2 Hydraulic Centering Guide System [HCGS]

The HCGS centers the pipe and guides the drill string. Both processes take place before setting the Slips and are used to prevent the drill string from hitting against the Inserts. The HCGS consists of two identical modules in which the Guide Plates are guided eccentrically in a dove-tail groove. This prevents the Guide Plates from falling out even when not fastened properly. When the HCGS is opened, each of the modules are locked automatically by a special mechanism, which guarantees high safety. The operator can only release this lock manually. The Guide Plates are opened and closed by hydraulic cylinders. The HCGS can be switched on and off as required using a control valve in the upper section of the body.

⚠ CAUTION Always ensure that the right size Guide Plates are installed for the respective pipe diameter.

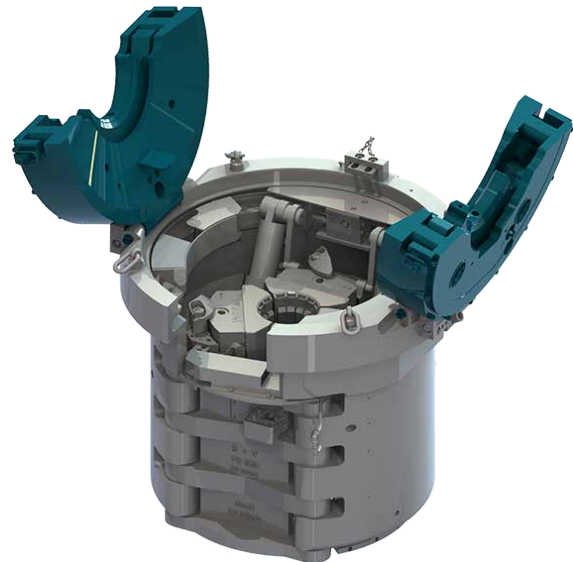


Fig. 8: HCGS of the PS-500

1.2.3 Slip and Insert Carrier Assembly

Insert Carriers ① are inserted to the Slip Assembly and provide direct contact to the drill string by the Inserts. Each Slip has one Insert Carrier, whose position is dictated by the geometry. The Slip Assembly ② serves as a frame for the Insert Carriers. The Slip Assembly consists of three Slip segments. All segments are connected with hinge pins. The middle segment is attached to the lifting cylinders of the PS-500. An adaptation of the PS-500 to another tube size only requires an exchange of the existing Insert Carriers. These can easily be lifted from the top of the PS-500. The Slip Assembly remains in the PS-500.

⚠ CAUTION Always ensure that the right sized Insert Carrier are installed for the respective pipe diameter.

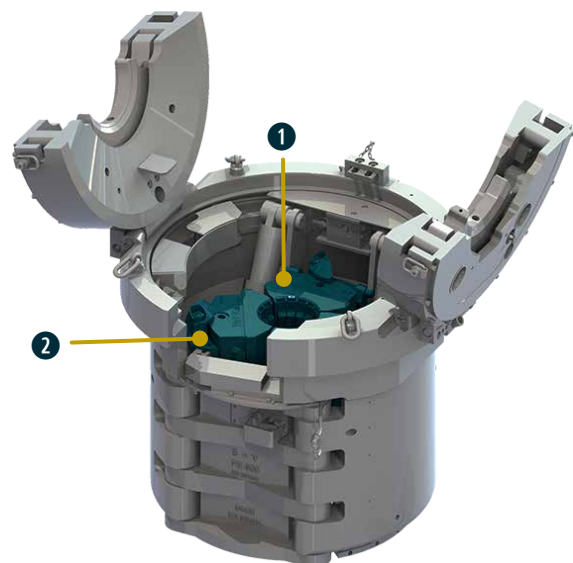


Fig. 9: Slip and Insert Carrier Assembly of the PS-500

1.2.4 Hydraulic Assembly

Hydraulic Components

The hydraulic system is completely added and integrated to the PS-500 body and the HCGS. The hydraulic system essentially consists of four hydraulic cylinders (two ❶ are located in the PS-500 interior and one ❷ is located in each HCGS module). They are actuated by a complex hydraulic control, which consists of valve blocks, hoses and fittings.

Feedback

The Feedback Assembly ❸ consists of a mechanically actuated hydraulic valve positioned in the body. The feedback signal is given through the line C as soon as the Slips are properly set and properly raised. The signal can be split outside (Control Unit) of the PS-500 and evaluated separately.

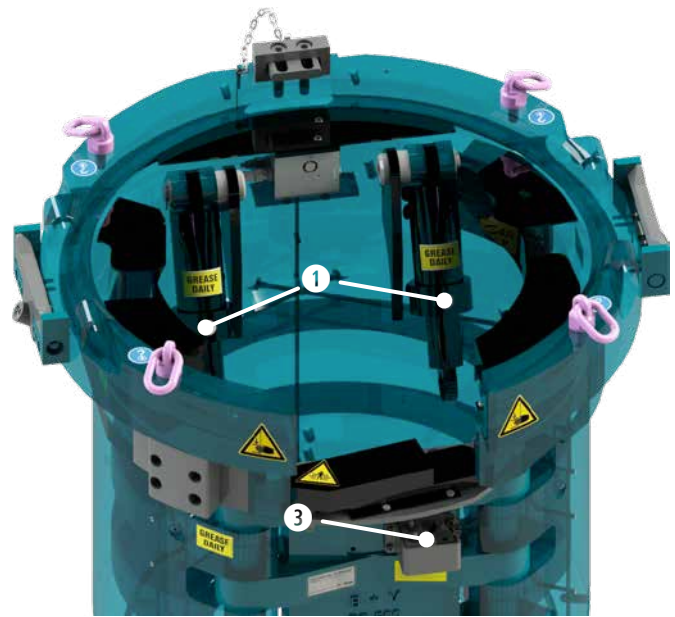


Fig. 10: Hydraulic Assembly of the PS-500, part I

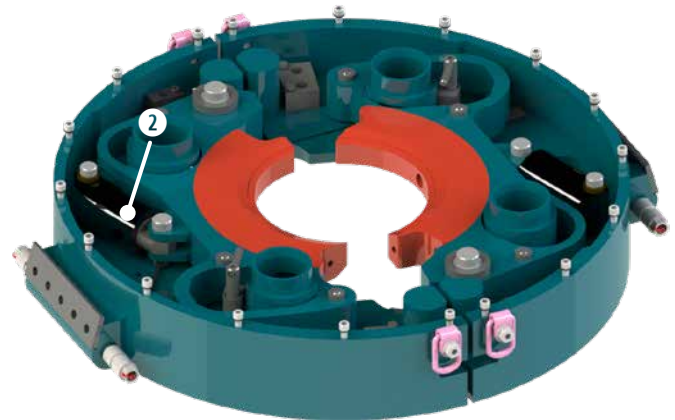


Fig. 11: Hydraulic Assembly of the PS-500, part II

1.2.5 Hoses and Couplings

All supply connections are equipped with quick connection couplings of the size 3/8" or 1/4". FORUM Handling Tools uses quick connection couplings which fulfil the ISO 16028 standards and which are ideal for interchangeability with other manufacturers. This feature includes the ability to connect with virtually no air inclusion or disconnect with little or no spillage. External hoses are provided with a fire-resistant casing. To operate the PS-500, all hydraulic couplings have to be connected to all hydraulic supply lines.

- A** Used for moving Slip Assembly DOWNWARDS (Drill string fixed).
- B** Used for moving Slip Assembly UPWARDS (Drill string released).
- C** Used as Feedback line (Slips are DOWN and drill string is fixed / Slips are UP and drill string is free).
- G** Grease Line.

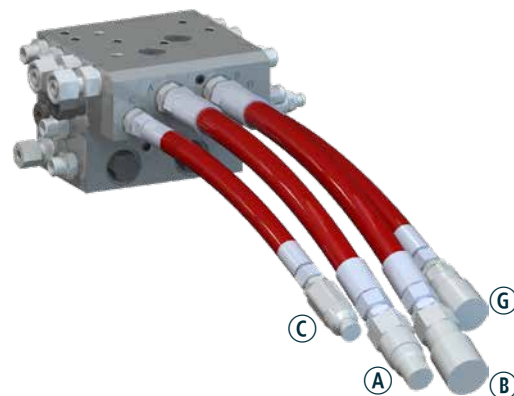


Fig. 12: PS-500 Hydraulic Connections

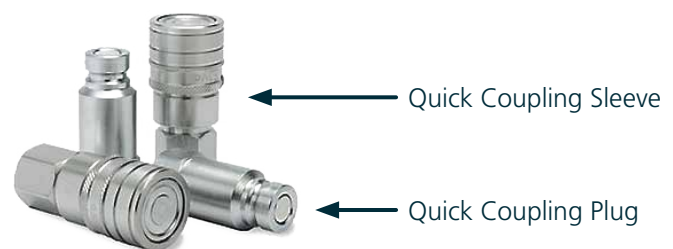


Fig. 13: Illustration Quick Couplings

1.3 Optional Equipment and Accessory Tools

Following Optional Equipment is available for the PS-500:

Top-Cover	P/N 757520
Guide Plates (Umbilical)	P/N 7575XX

The Top-Cover serves as a guide and increases protection during operation of the PS-500.

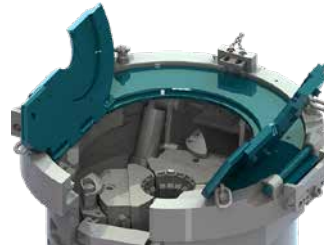


Fig. 14: Top Cover for PS-500

Pipe Wiper	P/N 756750
-------------------	-------------------

This feature allows the PS-500 to be operated with a pipe cleaner, which is threaded around the pipe. During drill pipe removal the drill pipe will be cleaned automatically. The Pipe Wiper is located at the bottom of the PS-500.



Fig. 15: Pipe Wiper for PS-500

Top Wear Guide	P/N 776750
Wear Guide 6.5/8"	P/N 776751
Wear Guide 5.7/8"	P/N 776752

The Top Wear Guide reduces the wear on the HCGS during drilling operations. It is mounted to the pin drive locations on top of the PS-500. The wear guide material is designed to minimize any wear to the drill string.



Fig. 16: Top Wear Guide for PS-500

Multi-Coupling Kit (standard)	P/N 756850
Multi-Coupling Kit (modified)	P/N 756860

This option enables possibilities in terms of connections, diameter, flow rates and types of locking. A number of different energy can be connected simultaneously, without risk of error or impact on performance with regard to flow rate and tightness.



Fig. 17: Multi-Coupler Kit for PS-500

Hand Slip	
Insert Bowl No. 3	2.3/8" - 8.5/8" P/N 755820-X

Insert Bowls allow you to handle smaller pipe diameters without major conversion work on the PS-500. Insert Bowls are Always used with a Hand Slip and provide the necessary wedge surface for the Hand Slip. Therewith, a uniform radial load distribution on the Master Bushing is guaranteed.

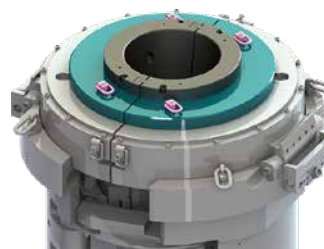


Fig. 18: Insert Bowl No.3 for PS-500

Hand Slip Top Bowl	200 tons	P/N 553600-X
(Hinged Casing Spider)		
Reducing Bushing	9.5/8" - 10.3/4"	P/N 553610-X
Reducing Bushing	2.3/8" - 8.5/8"	P/N 553611-X

The HCS is used for installation on top of the PS-500 in situations where it is preferred not to place heavy casing string loads directly on Rotary Table bearings. The HCS is load rated for 200 sh tons and for pipe diameters 11.3/4" to 13.3/8".



Fig. 19: Top Bowl for PS-500

Solid Adapter 37.1/2" - 49.1/2" P/N 553200

Hinged Adapter 37.1/2" - 49.1/2" P/N 553210

A large variety of Adapter for different Rotary Tables are available. If you require a customized solution, please feel free to contact FORUM Handling Tools.



Fig. 20: Rotary Table Adapter (Solid Adapter) for PS-500

Stand Alone Control Unit P/N 757160

Stand Alone Control Units are designed to send control signals (signal for setting/raising the Slip Assembly) remotely to FORUM Handling Tools Equipment. Stand Alone Control Units can be set up flexibly and as needed, are operated hydraulically and pneumatically and are able to evaluate Feedback signals.



Fig. 21: Stand Alone Control Unit for PS-500

Grease Counter (230 V AC Zone 1) P/N 755105-11

Grease Counter (24 V CC Zone 1) P/N 755105-12

Grease Counter allow automatic lubrication of the PS-500 at fixed time intervals and intensity. The programming is very simple and can be done directly on the device. Depending on the type of power supply, FORUM Handling Tools offers two variants.



Fig. 22: Grease Counter for PS-500

Compact hydraulic Power Unit P/N 757150

Compact hydraulic power units are flexible, self-contained and mobile hydraulic systems. They are characterized by their own hydraulic supply and are designed to send control signals (signal for setting/raising the Slip Assembly) remotely to FORUM Handling Tools Equipment.

Control Unit P/N 757109

Control Units are designed to send control signals (signal for setting/raising the Slip Assembly) remotely to FORUM Handling Tools Equipment. They are permanently installed, electrically controlled and are able to evaluate Feedback signals.

Manual Grease Pump P/N 755667-3

Air operated Grease Pump with electrical grease level indicator P/N 776811

Air operated Grease Pump without electrical grease level indicator P/N 775811

Info



Only use NLGI 0 greases for the Air operated grease pump.
P/N 775811 for Grease.

Hook Up Kit

P/N 757000-HUK

The Hook Up Kit for the PS-500 contains all equipment required by the customer for transport, setup and startup. The Hook Up Kit consists of following Items:

Pos.	Qty.	P/N	Description
1	1	755670	Cover Plate
2	1	776810	Grease Pump
3	1	775002-2	Lift Beam Assembly
4	1	755661	Lifting Sling
5	1	755662	Sling Gear for Slip Assembly
6	1	757070	Carrier Lifting Tool

Pos.	Qty.	P/N	Description
7	1	553455	Bit Breaker Adapter Plate 13.9/16"
8	1	775820	Toolkit for PS
9	1	757008-FBSB	Hose Assembly for Power Slip
10	1	776008	Service-Box for Hook Up Kit
11	1	675162	Toolset Power Slip
12	1	675163	Wire Rotator Tong

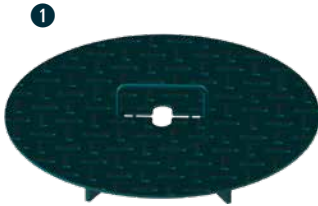


Fig. 23: Cover Plate



Fig. 24: Grease Pump

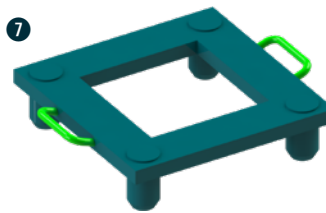


Fig. 25: Bit Breaker



Fig. 29: Lift Beam Assembly

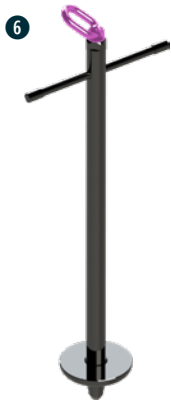


Fig. 26: Carrier Lifting Tool

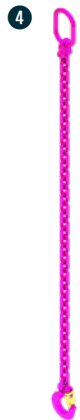


Fig. 27: Lifting Sling



Fig. 28: Sling Gear



Fig. 30: Wire Rotator Tong



Fig. 31: Toolset



Fig. 32: Toolkit



Fig. 33: Hose Assembly



Fig. 34: Service Box

1.4 Technical Data

General

Maximum permissible operating load	500 sh ton
Material and Production Standard	API 7k 6.Edition
Pipe diameter	2.3/8" to 14"
Rotary Table diameter	37.1/2"
Rotary Table	All Rotary Table with respective Adapter

Weights

Weight Power Slip w/o Insert Carriers and Slip Assembly (incl. hydraulic centering system)	4300 lb / 1950 kg
Weight Power Slip w/o Insert Carriers and Slip Assembly (incl. Top-Cover Assembly)	3170 lb / 1438 kg
Weight Insert Carrier Assembly	refer to section 1.10 "Component Sizes" on page 33
Weight Slip Assembly	635 lb / 288 kg
Weight Guide Plate	refer to section 1.10 "Component Sizes" on page 33

Environmental conditions

Hydraulic Working Pressure	Min 160 bar (2321 psi), Max 210 bar (3046 psi)
Temperature Working Range Ambient	- 20° C to + 55° C - 4° F to 131° F
Hydraulic Flow Rate	Min 18.9 l/min (5 gpm), Max 37.9 l/min (10 gpm)
Maximum Temperature Hydraulic Fluid	+ 60° C to + 140° C
Minimum required clearness of Hydraulic Fluid	NAS 9

1.5 Main Dimensions

1.5.1 PS-500 with HCGS

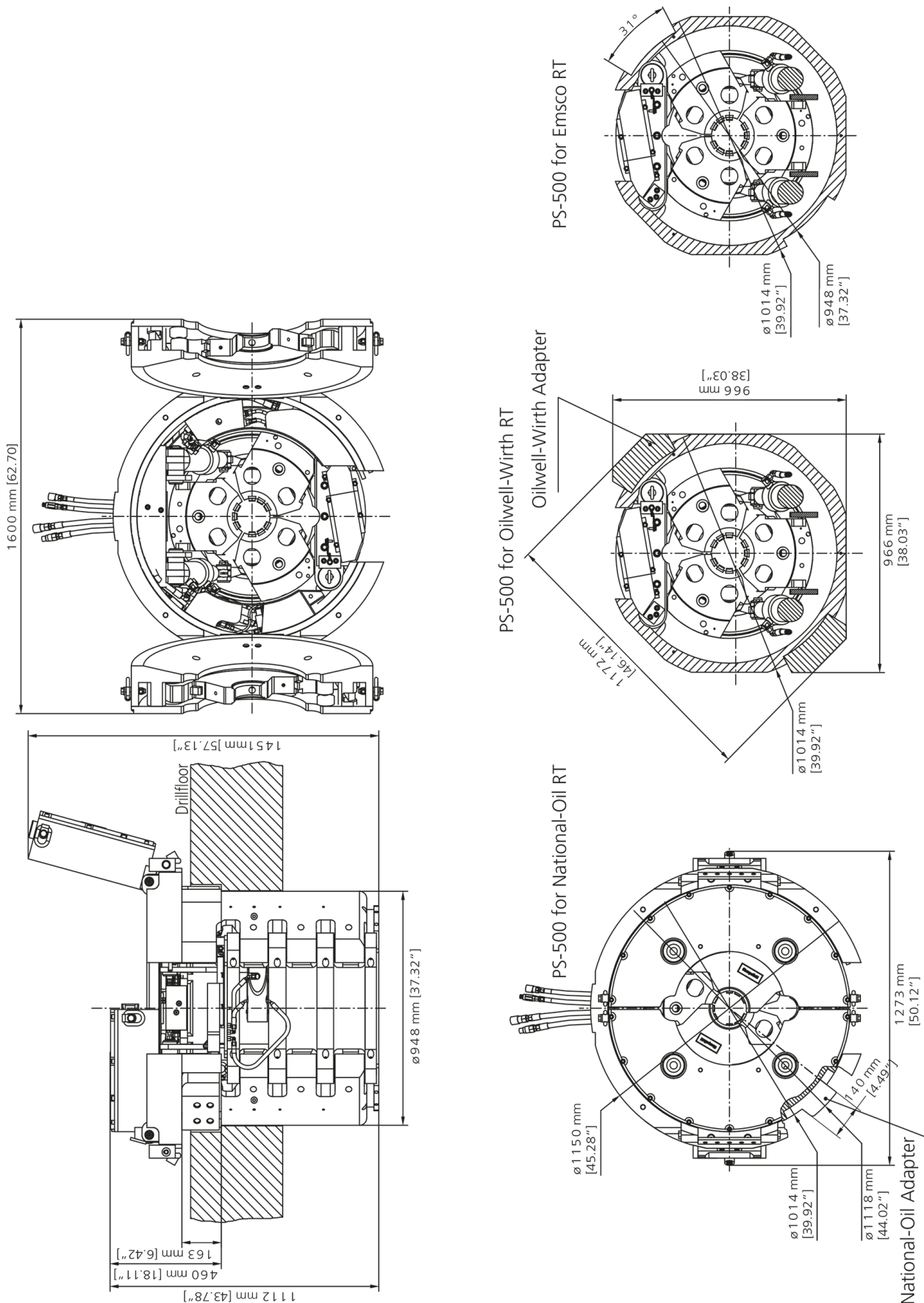
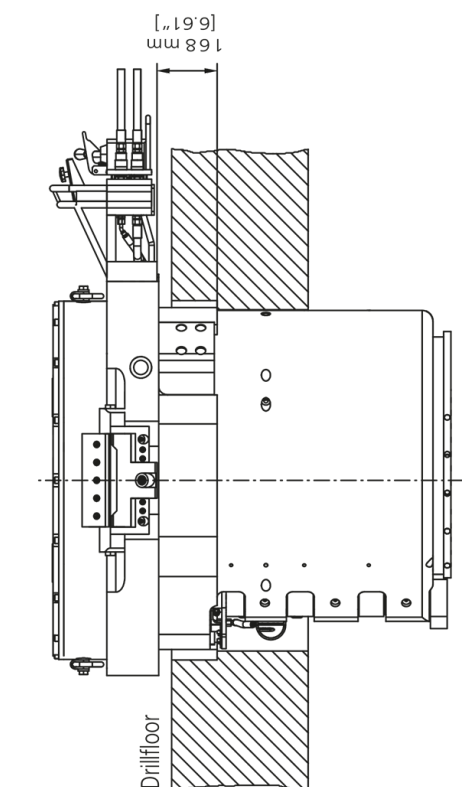


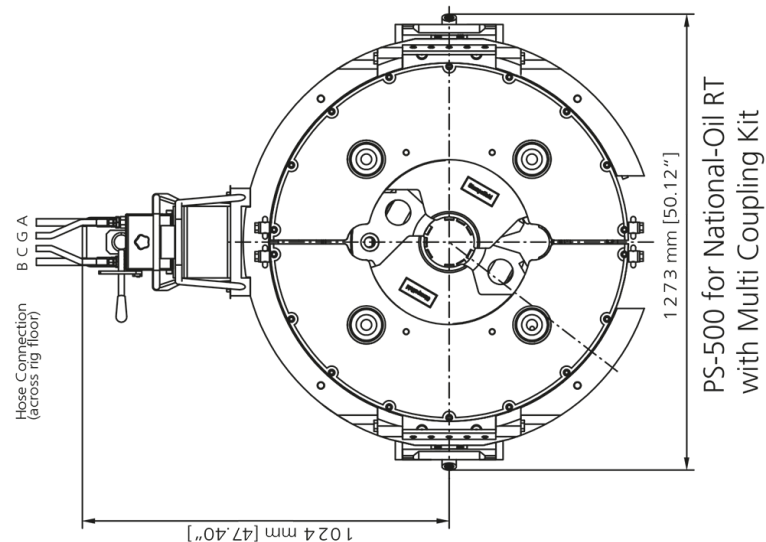
Fig. 35: Main Dimension of PS-500 with HCGS

1.5.2 PS-500 with Multi Coupling Kit

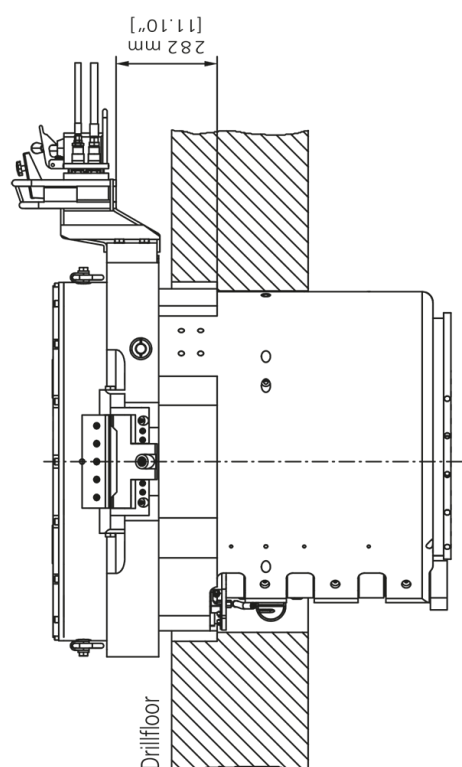


Standard Multi Coupling Kit

P/N 756850



DESCRIPTION



Modified Multi Coupling Kit

P/N 756860

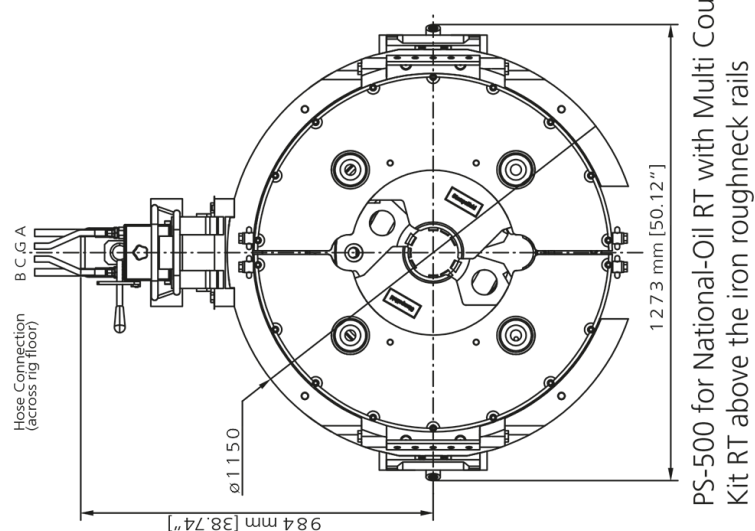


Fig. 36: Main Dimension of PS-500 with Multi-Coupling Kit

1.5.3 PS-500 with Top-Cover

DESCRIPTION

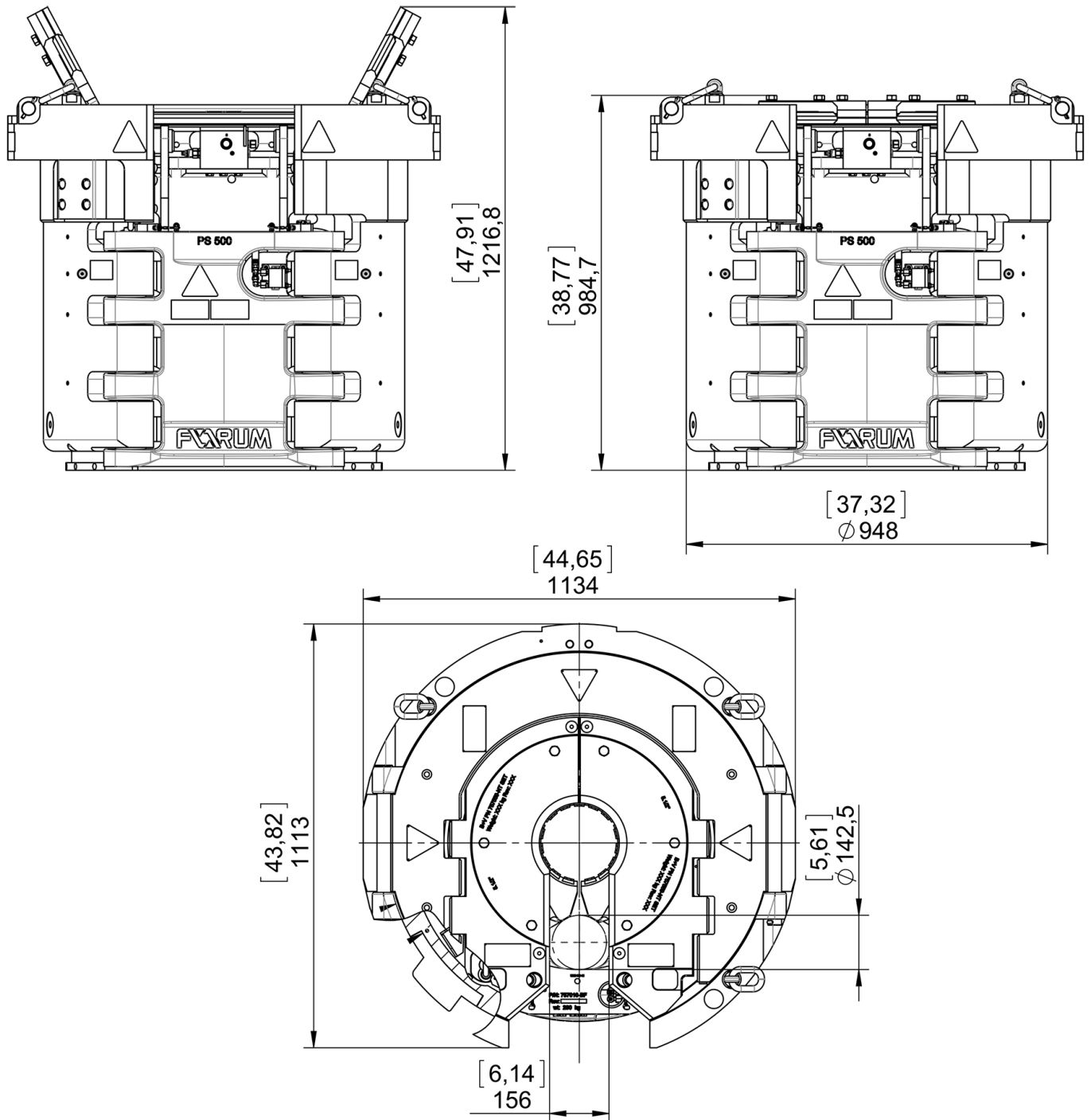


Fig. 37: Main Dimension of PS-500 with Top-Cover

1.5.4 Opening diameter

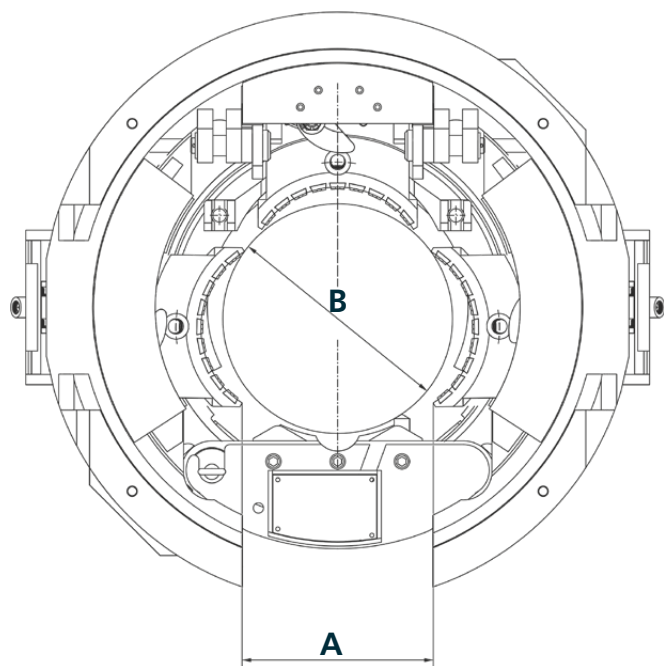


Fig. 38: Opening diameter PS-500

	Pipe Size	Opening dimension A mm [inch]	Maximum diameter B mm [inch]
Casing	7"	288.0 [11.3]	322.0 [12.7]
	7.5/8"	297.0 [11.7]	333.0 [13.1]
	8.5/8"	314.0 [12.4]	357.0 [14.0]
	9.5/8"	323.5 [12.7]	357.0 [14.0]
	13.3/8"	372.0 [14.6]	423.0 [16.6]
Drill pipe	3.1/2"	242.0 [9.5]	245.5 [9.60]
	4.1/2"	257.0 [10.1]	264.5 [10.4]
	5"	262.0 [10.3]	277.0 [10.9]
	5.1/2"	270.0 [10.6]	282.5 [11.1]
	5.7/8"	281.0 [11.1]	297.5 [11.7]
Drill collar	6.5/8"	288.0 [11.3]	314.0 [12.4]
	6.3/4"	283.5 [11.2]	301.0 [11.8]
	8"	296.0 [11.6]	318.5 [12.5]
	9.1/2"	323.5 [12.7]	357.0 [14.0]

1.5.5 Dimensions for Control Lines

PS-500 with HCGS

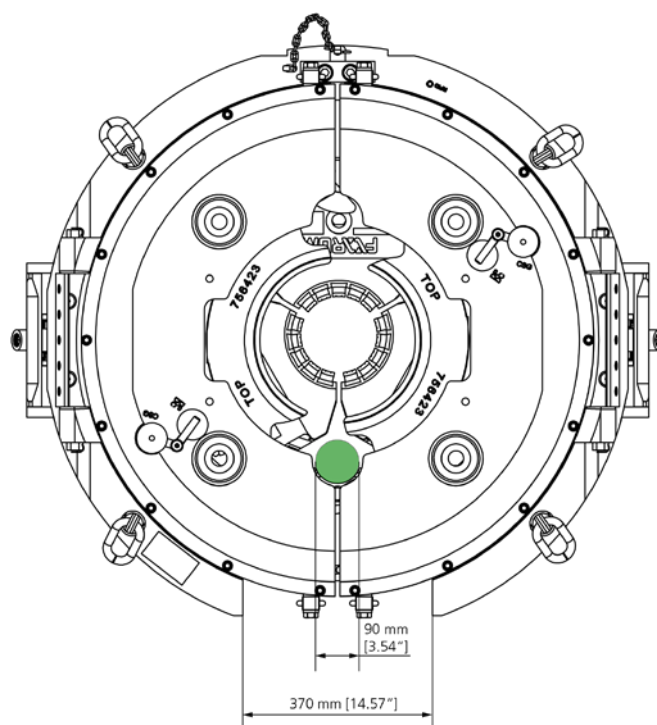


Fig. 39: PS-500 with HCGS

PS-500 with Top-Cover

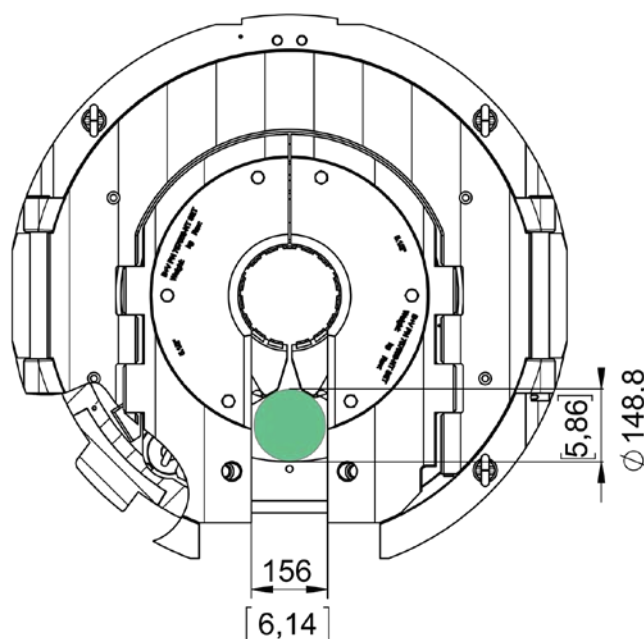


Fig. 40: Umbilical Version PS-500

1.5.6 Gripping Length

Carrier for Drill Pipe and Casing

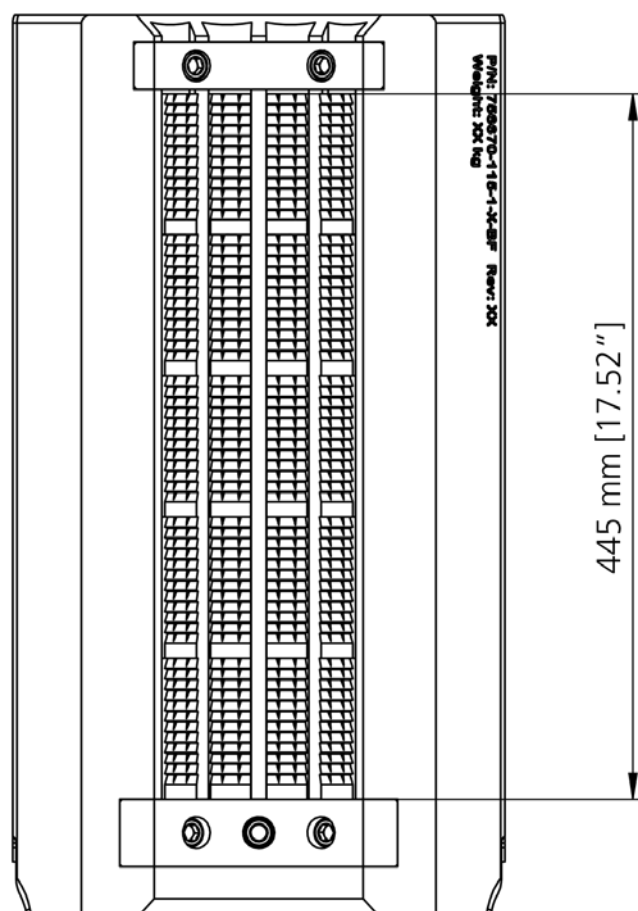


Fig. 41: Gripping Length I

Drill Collar

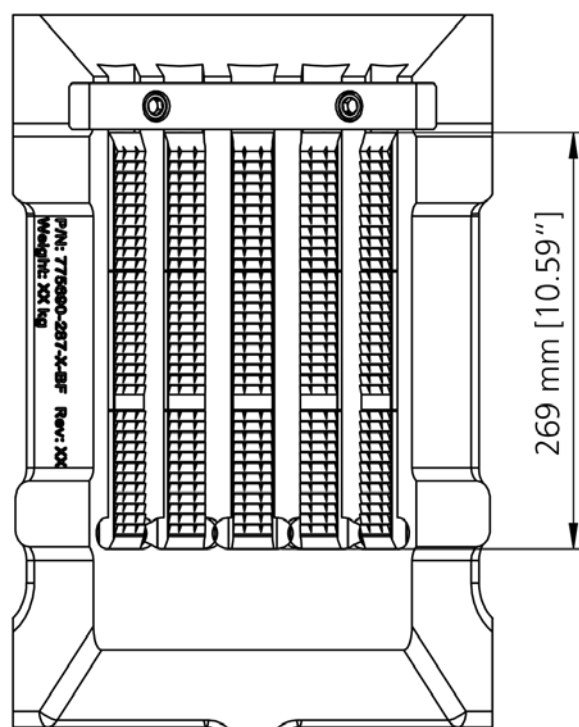


Fig. 42: Gripping Length II

1.6 Recommended Consumables

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 and 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 using the following lubricants for effective lubrication under various ambient conditions:

Brand	Name	Temperature range*	Remarks
Finke	Aviaticon XRF Low-Viscosity Grease	- 20 to + 29°C (- 4 to + 84.2 °F)	NLGI 0
Fuchs	NESSOS SF0 EP grease for non-oil tight gear trains	- 20 to + 29°C (- 4 to + 84.2°F)	NLGI 0 DIN 51826 GPOF-25 DIN 51502 GPOF-25
Castrol	MP grease	- 20 to + 29°C (- 4 to + 84.2°F)	-
Chevron	Avi-Motive W	- 20 to + 29°C (- 4 to + 84.2°F)	-
Exxon	Lidok EP2	- 20 to + 29°C (- 4 to + 84.2°F)	-
Gulf	Gulfcrown EP2	- 20 to + 29°C (- 4 to + 84.2°F)	-
Mobil	Mobilux EP2	- 20 to + 29°C (- 4 to + 84.2°F)	-
Shell	Alvania EP2	- 20 to + 29°C (- 4 to + 84.2°F)	-
Texaco	Multifak EP2	- 20 to + 29°C (- 4 to + 84.2°F)	-
Union	Unoba EP2	- 20 to + 29°C (- 4 to + 84.2°F)	-

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

1.7 Functional Description

The PS-500 locates and holds drill strings with a total weight of up to 500 short ton. It operates hydraulically and with the HCGS option, the pipe can hydraulically be centered. The hydraulic signal "Slips set" appears, after the Slips have been set. After lifting the Slips and reaching the end position, the hydraulic signal "Slips lifted" appears.

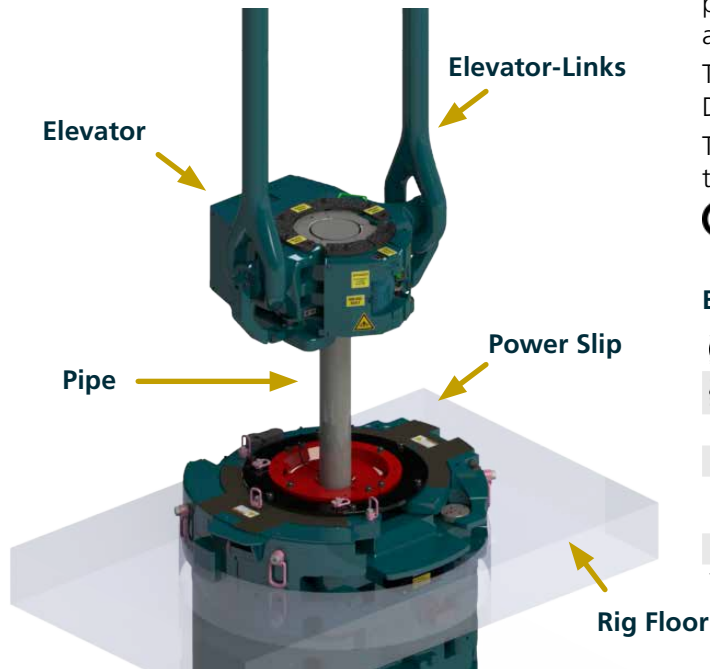


Fig. 43: General Structure

Functional hydraulic system description

- Set slips** Pressure at port "A" initiates the Slip Assembly move downwards (hydraulic cylinders engage) so that the pipe string is held by the PS-500.
- Raise slips** Pressure at port "B" initiates the Slip Assembly move upwards (hydraulic cylinders engage) so that the pipe string is no longer held by the PS-500, but completely by the Elevator. A load retention valve prevents the Slip Assembly of sagging.
- Feedback** Pressure at port B and C represent the Feedback signal, which indicates "Slip Assembly is raised /Slips open" while pressure at port A and C represent the Feedback signal "Slip Assembly is Lowered /Slips set".

1.8 Operational Environment

The PS-500 is designed and constructed for use in the drilling industry on ships and platforms. The Equipment complies with the Machinery Directive 2006 / 42 / EC. The equipment is approved for operation in explosion hazard areas. For equipment 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 in accordance with CE (with reference to the ATEX guideline) is as followed:

CE **Ex** II 2G IIB T5 for hydraulic equipment

Explanation

CE	CE- marking (with reference to the ATEX guideline)
Ex	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
T5	Temperature class

1.9 Equipment Markings

Markings enable traceability and provide general information about the component/ device. All markings are in compliance to the latest API 7K 6th Edition and at least include the following information:

General Markings according to API 7K 6th Edition

- API Stamp (API monogram, spec, license).
- 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).
- Load Rating.
- Own weight.
- Maximum weight in kg, if the weight increases by attachments.
- CE-ATEX marking.
- Country of manufacture.

Supplementary Requirements - SR

Supplementary Requirements, abbreviated by "SR", are labeled beside the general markings, if additionally ordered. Supplementary Requirements in accordance to API 7K 6th Edition are:

- SR 1 - Proof Load Testing.
- SR 2 - Low-temperature Testing.
- SR 3 - Data Book.
- SR 4 - Additional Volumetric Examination of Castings.
- SR 5 - Volumetric Examination of Wrought Material.



Fig. 44: Markings on PS-500 I

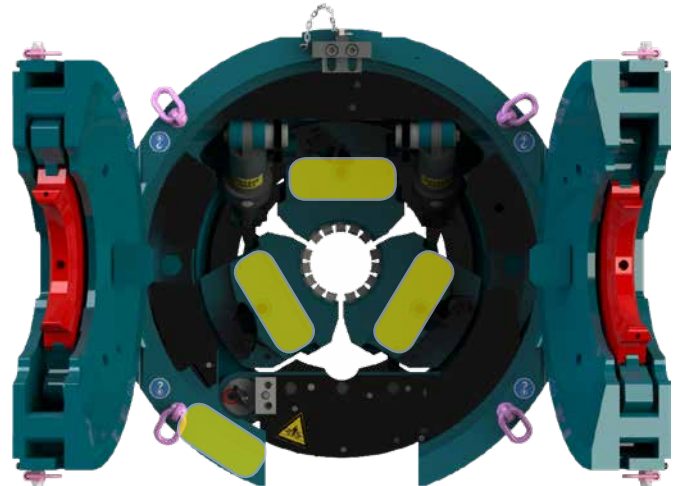


Fig. 45: Markings on PS-500 II

1.10 Component Sizes

The pipe diameters and matching components for the PS-500 are listed with part numbers. To order components please contact the FORUM Handling Tools Service Department at the address given under Contact.

CAUTION Always ensure that the correct size Guide Plates, Insert Carriers and Inserts are installed for a defined pipe diameter.

1.10.1 Inserts

PS-500 - Drill Collar

Body size	Pipe size	Quantity	P/N
3.1/2"	3.1/8"	18	350 403 Reducer
3.1/2"	3.3/8"	18	350 203 Reducer
5.1/2"	4.3/4"	27	350 706 Reducer
6.3/4"	6.1/4"	36	350 510 Reducer
6.3/4"	6.1/2"	36	350 310 Reducer
6.3/4"	6.3/4"	36	350 110 Basic
8.1/2"	8"	45	350 511 Reducer
8.1/2"	8.1/4"	45	350 311 Reducer
8.1/2"	8.1/2"	45	350 111 Reducer
9.1/2"	9"	45	350 511 Reducer
9.1/2"	9.1/2"	45	350 111 Basic

Plain PS-500 - Casing

Body size	Pipe size	Quantity	P/N
7"	7"	75	350 110 Basic
7.5/8"	6.5/8"	75	350 909 Reducer
7.5/8"	7"	75	350 610 Reducer
7.5/8"	7.5/8"	75	350 111 Basic
7.5/8"	7.3/4"	75	350 010 Oversized
9.5/8"	8.5/8"	105	350 911 Reducer
9.5/8"	9.5/8"	105	350 111 Basic
10.3/4"	9.5/8"	105	351 011 Reducer
10.3/4"	9.7/8"	105	350 811 Reducer
10.3/4"	10"	105	350 712 Reducer
10.3/4"	10.3/4"	105	350 112 Basic
12.3/4"	11.3/4"	135	350 912 Reducer
12.3/4"	11.7/8"	135	350 812 Reducer
12.3/4"	12.3/4"	135	350 112 Basic
14"	12.3/4"	135	351 112 Reducer
14"	13.3/8"	135	350 612 Reducer
14"	13.1/2"	135	350 513 Reducer
14"	13.5/8"	135	350 413 Reducer
14"	14"	135	350 113 Basic

1.10.2 Guide Plates for Top-Cover Operation

Guide Plates (Umbilical)

P/N	Size	Weight lbs [kg]
757564-NT	3.1/2"	19.79 [8.98]
757563-NT	4"	17.17 [7.79]
757562-NT	4.1/2" - 5"	17.22 [7.81]
757559-NT	5.1/2"	18.89 [8.57]
757558-NT	6.5/8" - 7.5/8"	17.22 [7.81]

Guide Plates (Standard)

P/N	Size	Weight lbs [kg]
1035421	4"	70.02 [31.76]
1035425	4.1/2"	56.56 [25.66]
1035426	5"	55.59 [25.22]
1035427	5.1/2"	54.69 [24.81]
1035428	6.5/8" - 7"	51.23 [23.24]
1035429	7.5/8" - 7.3/4"	48.00 [21.77]
1035430	8.5/8" - 8.3/4"	45.65 [20.71]
1035431	9.5/8"	42.96 [19.49]
1035432	9.3/4" - 9.7/8"	45.28 [20.54]
1035433	10.3/4" - 10.7/8"	38.75 [17.58]
1035434	11.3/4" - 11.7/8"	35.07 [15.91]
1035435	12.3/4"	31.62 [14.34]
1035435-2	12.3/4"	63.23 [28.68]
1035436	13.3/8"	29.85 [13.54]
1035437	13.1/2" - 13.5/8"	28.77 [13.05]
1035438	14"	27.78 [12.59]

1.10.3 Insert Carrier for Drill Pipe

API Pipe Size	Carrier Body Size	Carrier Assembly c/w Inserts		Guide Plate with plug-in connection		Guide Plate with keyed joint system		Guide Plate for Cable Penetration		Load Rating
		P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	
2.3/8"	3.1/2"	756670-101-X	496 [1092]	756473	61 [135]	upon request	upon request	757565	64 [141]	250 ton
2.7/8"	3.1/2"	756670-103-X	492 [1089]	756473	61 [135]	upon request	upon request	757565	64 [141]	250 ton
3.1/2"	3.1/2"	756670-105-X	488 [1076]	756474	55 [122]	757474	57 [126]	757564	61 [135]	250 ton
3.1/2"	4.1/2"	756670-105-1-X	481 [1061]	756474	55 [122]	757474	57 [126]	757564	61 [135]	350 ton
4"	4.1/2"	756670-106-X	476 [1050]	756475	56 [124]	757475	56 [124]	757563	61 [135]	350 ton
4.1/2"	4.1/2"	756670-107-X	471 [1039]	756476	54 [119]	757476	53 [117]	757562	59 [130]	350 ton
3.1/2"	5.1/2"	756670-107-1-X	463 [1021]	756476	54 [119]	757476	53 [117]	757562	59 [130]	500 ton
5"	5.1/2"	756670-109-X	456 [1006]	756476	54 [119]	757476	53 [117]	757562	59 [130]	500 ton
5.1/2"	5.1/2"	756670-111-X	449 [990]	756470	58 [128]	upon request	upon request	757559	58 [128]	500 ton
5.7/8"	7"	756670-115-X	427 [942]	756421	57 [126]	757421	57 [126]	upon request	upon request	500 ton
6.5/8"	7"	756670-114-X	414 [913]	756424	54 [119]	757424	55 [122]	757560	56 [124]	500 ton
6.906"	7"	756670-112-X	410 [904]	756422	52 [115]	757422	51 [113]	757558	53 [117]	500 ton
6.906"	7.5/8"	756670-112-1-X	400 [882]	756422	52 [115]	757422	51 [113]	757558	53 [117]	500 ton

* Weight from CAD models.

1.10.4 Insert Carrier for Casing

API Pipe Size	Carrier Body Size	Carrier Assembly c/w Inserts		Guide Plate with plug-in connection		Guide Plate with keyed joint system		Guide Plate for Cable Penetration		Load Rating
		P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	
6.5/8"	7.5/8"	756670-228-X	404 [891]	756422	52 [115]	757422	51 [113]	757558	53 [117]	500 ton
7"	7"	756670-229-1-X	408 [900]	756422	52 [115]	757422	51 [113]	757558	53 [117]	500 ton
7"	7.5/8"	756670-229-X	398 [878]	756422	52 [115]	757422	51 [113]	757558	53 [117]	500 ton
7.5/8"	7.5/8"	756670-231-X	387 [854]	756422	52 [115]	757422	51 [113]	757558	53 [117]	500 ton
7.3/4"	7.5/8"	756670-269-X	385 [849]	upon request	upon request	upon request	upon request	upon request	upon request	500 ton
8"	8.1/2"	756670-232-X	366 [807]	756422	52 [115]	upon request	upon request	upon request	upon request	500 ton
8.5/8"	9.5/8"	756670-234-X	415 [945]	756425	49 [108]	upon request	upon request	757557	51 [113]	500 ton
9.5/8"	9.5/8"	756670-236-X	392 [865]	756423	45 [100]	757423	44 [97]	757556	48 [106]	500 ton
9.5/8"	10.3/4"	756670-236-1-X	367 [810]	756423	45 [100]	757423	44 [97]	757556	48 [106]	500 ton
9.7/8"	10.3/4"	756670-265-X	361 [796]	756477	44 [97]	757477	43 [95]	upon request	upon request	500 ton
10"	10.3/4"	756670-237-X	358 [790]	756477	44 [97]	757477	43 [95]	upon request	upon request	500 ton
10.3/4"	10.3/4"	756670-238-X	341 [752]	756426	38 [84]	757426	40 [89]	757554	43 [95]	500 ton
11.3/4"	12.3/4"	756670-239-X	266 [587]	756427	32 [71]	757427	30 [67]	upon request	upon request	500 ton
11.7/8"	12.3/4"	756670-262-X	262 [578]	756427	32 [71]	757427	30 [67]	upon request	upon request	500 ton
12.3/4"	12.3/4"	756670-241-X	235 [518]	756471	26 [58]	upon request	upon request	upon request	upon request	500 ton
12.3/4"	14"	756670-241-1-X	199 [439]	756471	26 [58]	upon request	upon request	upon request	upon request	500 ton
13.3/8"	14"	756670-243-X	180 [397]	756472	22 [49]	757472	20 [44]	757551	31 [69]	500 ton
13.1/2"	14"	756670-270-X	176 [388]	756428	19 [42]	upon request	upon request	upon request	upon request	500 ton
13.5/8"	14"	756670-259-X	172 [380]	756428	19 [42]	757428	18 [40]	upon request	upon request	500 ton
14"	14"	756670-255-X	161 [355]	756428	19 [42]	757428	18 [40]	upon request	upon request	500 ton

* Weight from CAD models.

1.10.5 Carrier for Drill Collar with ZIP Groove

API Pipe Size	Carrier Body Size	Carrier Assembly c/w Inserts		Guide Plate with plug-in connection		Guide Plate with keyed joint system		Guide Plate for Cable Penetration		Load Rating
		P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	
4.3/4"	4.1/2"	756690-182-X	464 [1023]	756420	51 [113]	upon request	upon request	757561	59 [130]	150 ton
5.1/4"	5.1/2"	756690-183-X	442 [975]	756421	57 [126]	757421	57 [126]	upon request	upon request	150 ton
6.1/4"	6.3/4"	756690-187-X	341 [752]	756421	57 [126]	757421	57 [126]	upon request	upon request	150 ton
6.1/2"	6.3/4"	756690-188-X	339 [748]	756424	54 [119]	757424	55 [122]	757560	56 [124]	150 ton
6.3/4"	6.3/4"	756690-189-X	337 [743]	756424	54 [119]	757424	55 [122]	757560	56 [124]	150 ton
7"	6.3/4"	756690-190-X	335 [739]	756422	52 [115]	757422	51 [113]	upon request	upon request	150 ton
8"	8.1/2"	756690-194-X	305 [673]	756422	52 [115]	757422	51 [113]	upon request	upon request	150 ton
8.1/4"	8.1/2"	756690-195-X	302 [666]	756425	49 [108]	upon request	upon request	757557	51 [113]	150 ton
8.1/2"	8.1/2"	756690-196-X	300 [662]	756425	49 [108]	upon request	upon request	757557	51 [113]	150 ton
8.3/4"	8.1/2"	756690-197-X	297 [655]	756423	45 [100]	757423	44 [97]	757556	48 [106]	150 ton
9"	9.1/2"	756690-198-X	276 [609]	756423	45 [100]	757423	44 [97]	757556	48 [106]	150 ton
9.1/2"	9.1/2"	756690-199-X	271 [598]	756423	45 [100]	757423	44 [97]	757556	48 [106]	150 ton
9.3/4"	9.1/2"	756690-203-X	268 [591]	upon request	upon request	upon request	upon request	upon request	upon request	150 ton
10"	9.1/2"	756690-202-X	266 [587]	upon request	upon request	upon request	upon request	upon request	upon request	150 ton

* Weight from CAD models.

1.10.6 Carrier for Drill Collar without ZIP Groove

API Pipe Size	Carrier Body Size	Carrier Assembly c/w Inserts		Guide Plate with plug-in connection		Guide Plate with keyed joint system		Guide Plate for Cable Penetration		Load Rating
		P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]	
3.1/8"	3.1/2"	756690-308-X	483 [1065]	756476	55 [122]	757476	53 [117]	upon request	upon request	150 ton
3.3/8"	3.1/2"	756690-309-X	482 [1063]	upon request	upon request	upon request	upon request	upon request	upon request	150 ton
4.3/4"	5.1/2"	756690-276-X	445 [981]	756420	51 [113]	upon request	upon request	757561	59 [130]	150 ton
6.1/4"	6.3/4"	756690-284-X	337 [743]	756421	57 [126]	757421	57 [126]	upon request	upon request	150 ton
6.1/2"	6.3/4"	756690-286-X	335 [739]	756424	54 [119]	757424	55 [122]	757560	56 [124]	150 ton
6.3/4"	6.3/4"	756690-287-X	333 [735]	756424	54 [119]	757424	55 [122]	757560	56 [124]	150 ton
8"	8.1/2"	756690-293-X	300 [662]	756422	52 [115]	757422	51 [113]	upon request	upon request	150 ton
8.1/4"	8.1/2"	756690-295-X	297 [655]	756425	49 [108]	upon request	upon request	upon request	upon request	150 ton
8.1/2"	8.1/2"	756690-296-X	295 [651]	756425	49 [108]	upon request	upon request	upon request	upon request	150 ton
9"	9.1/2"	756690-297-X	271 [598]	756423	45 [100]	757423	44 [97]	757556	48 [106]	150 ton
9.1/2"	9.1/2"	756690-298-X	266 [587]	756423	45 [100]	757423	44 [97]	757556	48 [106]	150 ton

* Weight from CAD models.

1.11 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 („Extranet“ on page 14).

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 PS-500 is designed and produced with consideration of all required safety precautions. Failure to observe the safety precautions and operating instructions specified in this OMM can lead to hazardous situations when operating the PS-500. While it is not possible to eliminate all hazardous situations with awareness and instruction from this OMM, good judgement should be used at all times surrounding the use of the PS-500. The PS-500 should only be used for its intended purpose. Rectify all faults immediately, which could have a negative effect on the PS-500 safety.

2.1 General Safety Precautions

Ensure that work on the PS-500, 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 8). For safe and proper operation of the PS-500, it is essential that all personnel working on the PS-500 take the prescribed safety measures and observe the safety precautions specified in this OMM. Before switching on and before working on the PS-500 Always ensure that no one is put in a hazardous situation. All safety features must be installed completely before switching on the PS-500. Safety features may be released only when:

1. The entire PS-500 is switched off.
2. Switching back on unintentionally is not possible.

The PS-500 contains components subject to wear. After longer periods of operation, the safety can be reduced due to wear. Service the PS-500 regularly in compliance with the maintenance chart (refer to section 6.2.5 "Inspection intervals und Inspection tasks -" on page 137) 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 PS-500 and secure it against being switched back on unintentionally. Advise the responsible service organization. Rectify every fault, which affects the safety, immediately.

INFO



The operating company is responsible for ensuring safe and correct use of the PS-500 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 OMM.

2.2 Safety Equipment

The Power Slip PS-500 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 with safety quick-release couplings.
- Hazard points on the PS-500 are marked with signs, indicating the type and consequences of a hazard as well as measures to prevent it.
- 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.
- External hoses are provided with a chafe guard.
- The PS-500 is equipped with two feedbacks, which indicate "Slip Assembly is set" or "Slip Assembly is not set".
- Guide Plates, which are part of the HCGS and the Top-Cover, prevent the pipe from hitting the Inserts and guarantee effective centering of the pipe before the Slip Assembly has been set.
- Treads on the HCGS and the Top-Cover are covered with an anti-slip coating.
- » 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.

⚠ 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.

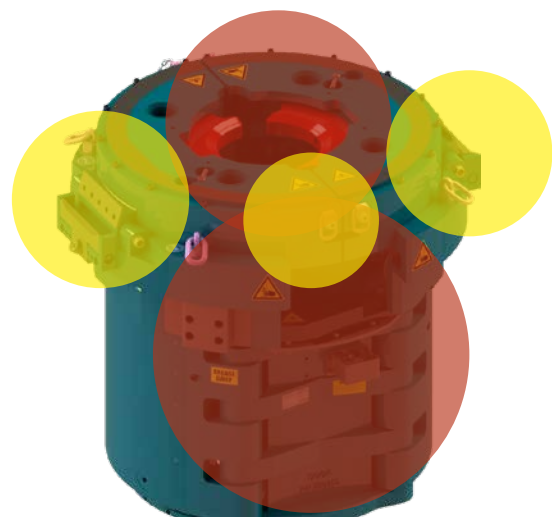


Fig. 46: Hazardous areas on the PS-500

2.3 Safety Precautions

The safety precautions in this OMM are indicated using standardized depictions and symbols. Examples of the symbols and terms used in this OMM are explained below. These are used in the form shown wherever possible hazards are present.

2.3.1 Warning Signs

The safety precautions in this OMM are indicated using standardized depictions and symbols. Examples of the symbols and terms used in this OMM 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 stumbling/tripping!

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



⚠ Caution

Risk of stumbling/tripping!

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



⚠ WARNING

Health hazards from service products!

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



⚠ WARNING

Separated hydraulic lines pose an injury hazard!

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



⚠ WARNING

Defective hydraulic lines pose an injury hazard!

This symbol marks areas where injuries are possible from defective hydraulic lines.

2.3.2 Warning and Safety Signs on PS-500

Special stickers on the PS-500 indicate hazard points. Ensure that these are Always kept in an easily legible state and replaced as required.

SAFETY

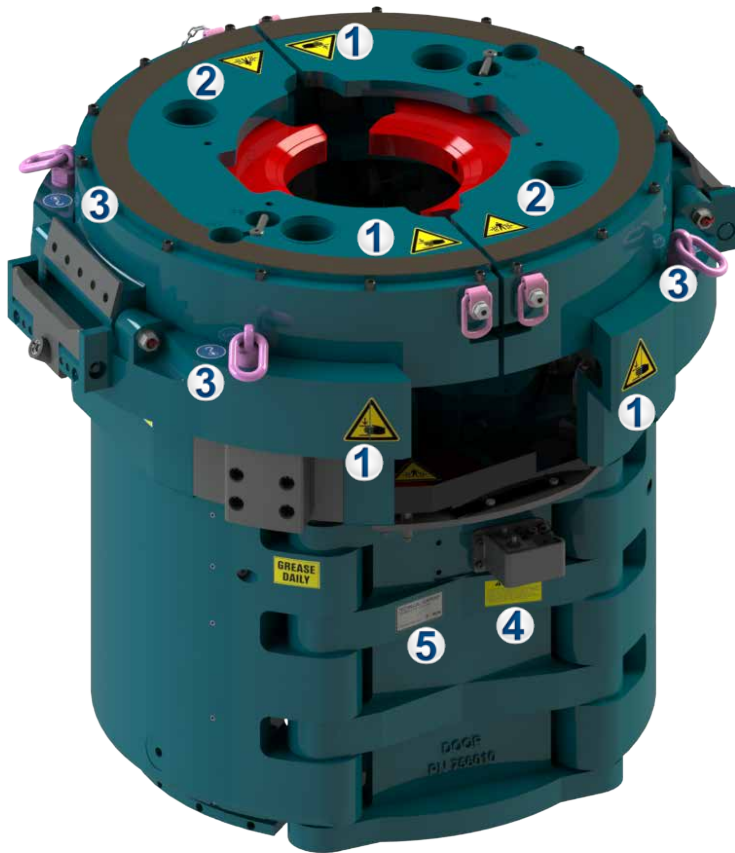


Fig. 47: Safety precautions on PS-500, part I

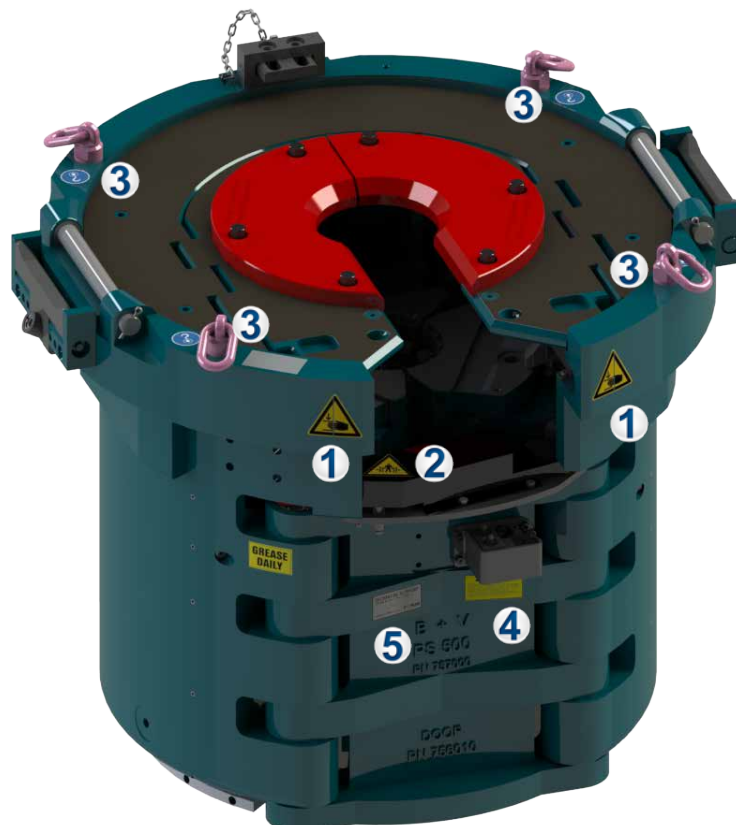


Fig. 48: Safety precautions on PS-500, part II

1


 Fig. 49: WARNING sign "Hazard – Hand Injury"
 ANSI Z535.4 - P/N 671640-1

2


 Fig. 50: WARNING sign "Body crushing"
 ANSI Z535.4 - P/N 671641

3

NOTE



Lifting point locations are marked on the device, where slings can be securely fastened. Thus, the safe transport of FORUM Handling Tools equipment is ensured.

 Fig. 51: WARNING sign "Closing"
 ANSI Z535.4 P/N 671639

4

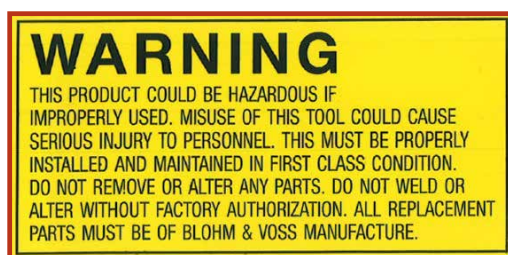


Fig. 52: General WARNING - PN 671638

5



Fig. 53: Support sticker PN 613129

2.4 Safety Precautions against Remaining Hazards

The PS-500 was designed and produced in consideration of the safety precautions specified in EC Directive 2006 / 42 / EC on Machinery.

The PS-500 may be used only for:

- Its intended purpose (refer to section II "Intended Use" on page 6).
- When it is in a technically safe state.

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

⚠ WARNING

Mechanically generated sparks

During some operation tasks, like such as clamping components, the use of metal equipment, like hammers, can generate sparks.

- The use of metallic equipment in hazardous areas must be prohibited by the operating company.
- » Only use non-metallic equipment for loosening of clamping components..



2.4.1 Incorrect Handling of Hydraulic 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.
- » Lay hydraulic lines so that they are not kinked or pinched.



⚠ WARNING

Separated hydraulic lines pose an injury hazard!

- » Hydraulic 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 fluid can pose a health hazard!

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



Weak hydraulic lines due to incorrect routing or damages can burst under load. The hydraulic fluid then escapes under pressure resulting in a powerful jet, which can lead to skin or eye injury. Always wear your personal protective equipment.

⚠ CAUTION

Danger of stumbling and Equipment defects!

Before turning the drilling table ensure that the supply lines for the Power Slip PS-500 are disconnected, to prevent the hoses from tearing.



Hydraulic 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 fluid 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 on 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. Repair or replace leaks and damaged pressure lines immediately.

2.4.2 Risk of Stumbling/Tripping



⚠ CAUTION

Risk of stumbling/tripping!

When Power Slip PS-500s are installed.

» Do not run. Watch your step.

2.4.3 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 under 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. 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.

2.4.4 Organizational Measures

The operating company is responsible for ensuring that all legally and officially prescribed approvals for operation of the PS-500 are present and in compliance with national laws and regulations. The required personal protective equipment (refer to section IX "Personal Protective Equipment (PPE)" on page 11) must be provided by the company operating the PS-500. All safety features present must be checked regularly in compliance with national and local requirements. Warning signs and safety notices on the PS-500 and its components must be legible at all times and replaced as required. The operating instructions must be kept so that they are available to those operating the PS-500 at all times.

Personal Protective Equipment

The required Personal Protective Equipment (PPE) must be used when operating the Power Slip PS-500. This has 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.

2.4.5 Human Error

Ignorance of hazards, inattentiveness and limited reactions can lead to hazard situations while working with the Power Slip PS-500.

Safe Work

1. All personnel working on the PS-500 are responsible for paying attention to their colleagues.
2. Consumption of alcohol and drugs is prohibited.
3. Work on and with the PS-500 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 PS-500, to allow communication by hand signals.
5. Always keep your personal protective equipment in perfect condition.
6. All personnel working on and with the PS-500, must be familiar with and observe the safety precautions in this OMM and on the PS-500.
7. The instructions for handling and maintenance intervals specified in this OMM must be observed.
8. Keep a copy of this OMM near the PS-500, where it is accessible at all times.
9. All personnel working on and with the PS-500 have to know the PS-500 limitations.
10. Do not permit people near the unit controls during inspections or repair, unless they are supervised or part of the inspection/repair team.
11. Recognize all pinch points on moving components and maintain a safe distance from them.
12. Ample loose clothing, watches or bracelets, which can be dangerous in some circumstances. Therefore, they are not recommended to be worn on the job.
13. Do not store materials, tools or other equipment on or next to the PS-500.
14. Always listen for abnormal noises during operation.
 - » In the event of an abnormal occurrence (noise, irregular motion, etc.), immediately stop operation and secure the area for inspection.
 - » Notify the site supervisor immediately.

SAFETY INSTRUCTIONS

for **PS-500**



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** Power Slips were designed and produced in consideration of all required safety precautions. For safe and proper use it is essential that all personell working on the machine take the prescribed safety measures and observe the safety precautions specified when operating the machine.

► Inspection Guide

- ⚠ **Use the PS-500** only for the intended purpose in 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 PS-500 contains components **subject to wear**.
- ⚠ **Check the specified wear limits regularly**.
- ⚠ Replace **worn or defective parts** immediately with new parts.

► ATTENTION !

Do not step on cover plate during operation!



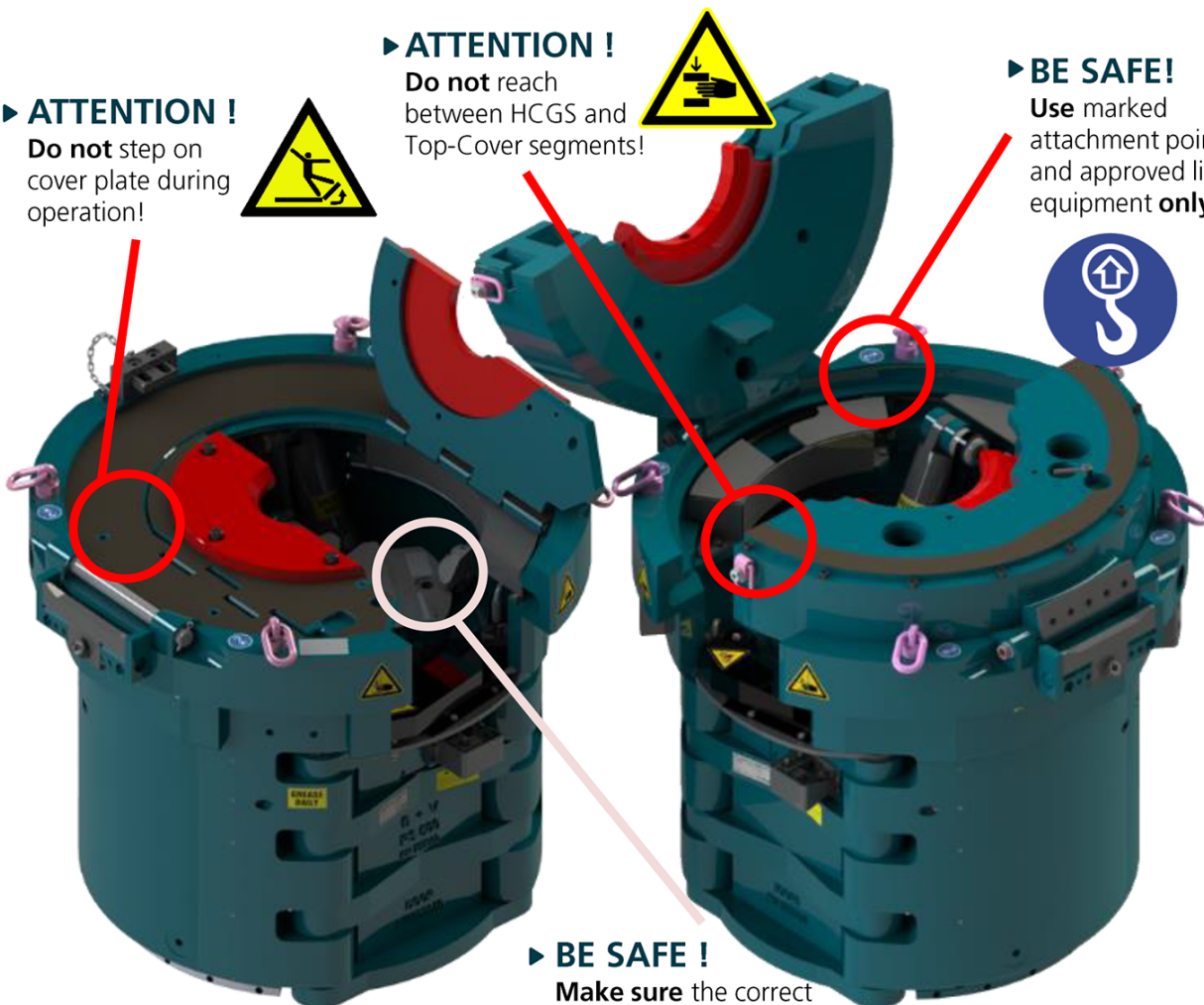
► ATTENTION !

Do not reach between HCGS and Top-Cover segments!



► BE SAFE!

Use marked attachment points and approved lifting equipment **only**!



► BE SAFE !

Make sure the correct size Guide Plates, Insert Carrier and Slip Assembly has been chosen.

FORUM™ Pipe Handling Tools

DO NOT DISCARD - GIVE TO OPERATOR

SAFETY INSTRUCTIONS

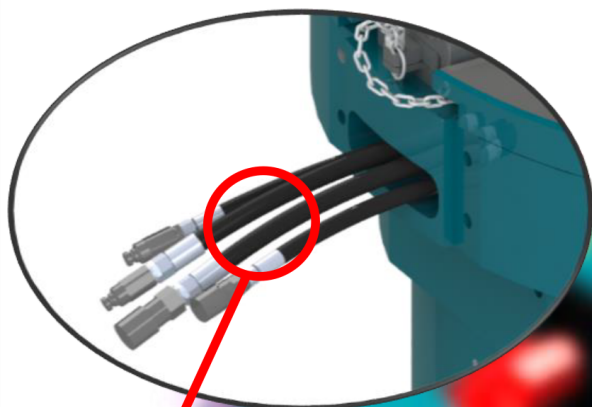
for **PS-500**



WARNING

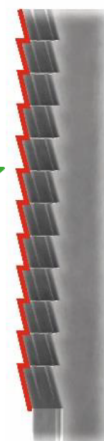
To reduce the risk of injury, everyone using, installing, performing maintenance, changing accessories on, or working with this tool must read and understand these instructions before operation.

*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.*



► BE SAFE !

Make sure that inserts are undamaged and mounted correctly.



► ATTENTION !

Use undamaged hydraulic lines **only** !

► ATTENTION !

Always release pressure in hydraulic equipment when working on equipment!



► ATTENTION !

Always avoid contact with hydraulic fluids!



► MAKE SURE !

No loose fittings!

► MAKE SURE !

Always lubricate all lubrication points as recommended!

**GREASE
DAILY**

► MAKE SURE !

Always connect line C for Feedback!

FXRUM™ Pipe Handling Tools

DO NOT DISCARD - GIVE TO OPERATOR

TRANSPORT/ INSTALLATION

TRANSPORT/
INSTALLATION

3 Transport / Setup



Ensure that only sufficiently qualified and trained personnel accomplish transport and setup work.



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

3.1 Delivery

The PS-500 and all accessory parts are shipped on transport pallets or crates. All items on the pallets are secured against tipping and slipping with transport straps.

- » Instructions for safe transport are attached to the transport crate.
- » Transport the packed equipment as specified in these instructions.

3.1.1 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 - refer to section XI "Contact Worldwide" on page 12 immediately.

The scope of supply includes all components required for the intended operation of the PS-500:

- PS-500 including HCGS or Top-Cover.
- Slip Assembly.
- Insert Carrier Assembly for pipe diameter (as ordered).
- Guide plates for pipe diameter (as ordered).
- Hook UP Kit.
- Optional accessories (as ordered).

3.1.2 Unpacking and Disposal of Packing Material

Remove the transport packaging and transport aids before hoisting the PS-500.



NOTE Do not remove transport retainers!

The transport retainers should be removed only at the installation site just before startup.

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.

If the PS-500 has been damaged during transport or the shipment is incomplete, please notify the manufacturer immediately (refer to section XI "Contact Worldwide" on page 12).

Dispose of the packaging material ecologically in compliance with all applicable regulations.

3.1.3 Intermediate Storage

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

- Leave the PS-500 in its transport packaging. This provides sufficient protection against external influences.
- Secure the PS-500 to prevent it from slipping or falling due to motion.

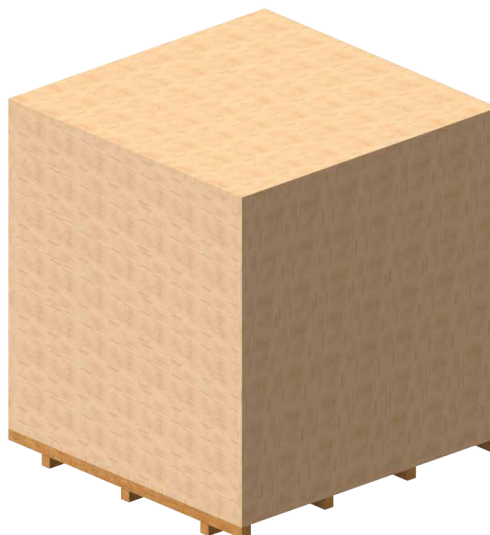


Fig. 54: Typical transport and conservation packing for a PS-500
Following space requirements are needed during operation and maintenance.

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



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!

INFO

Safe Lifting Points!



- Lifting point locations are marked on the PS-500.
- Make Sure all load hooks are fully installed in the lifting point.
- It is advised to use pallets for longer component transports.
- » Thus, the safe transport of FORUM Handling Tools equipment is ensured.

Principles for transport

1. Ensure that transport routes are sufficiently dimensioned and marked.
 - » Ensure that persons are aware that transport is taking 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 only sufficiently qualified personnel perform such work.
 5. Always shut off PS-500 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 PS-500 against Slipping/sliding.
 - » Observe PS-500 weight.
 - » Observe center of gravity.
 11. Never stand under suspended loads.
 12. Transport the PS-500 carefully.
 - » Do not fasten, lift or pull the PS-500 on not suitable parts.
 - » 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.
-
- For detailed weight specifications refer to section 1.3 "Technical Data" on page 25, and refer to section 1.10 "Component Sizes" on page 33 also.
 - FORUM Handling Tools recommends the use of the Hook Up Kit (P/N 757000-HUK).
-

3.3 Attachment Points and Lifting Arrangements



⚠ DANGER

Safe Lifting!

Always make sure that load hooks are fully installed to lifting points before lifting.

3.3.1 HCGS

Use the attachment points marked with ❶, which are located on the side of each HCGS module to open the HCGS when the PS-500 is mounted to the Rotary Table. Use the attachment points marked with ❷ to transport the HCGS when installing them to the PS-500.



⚠ DANGER

Never use the HCGS lifting points marked with ❶ to lift the PS-500.

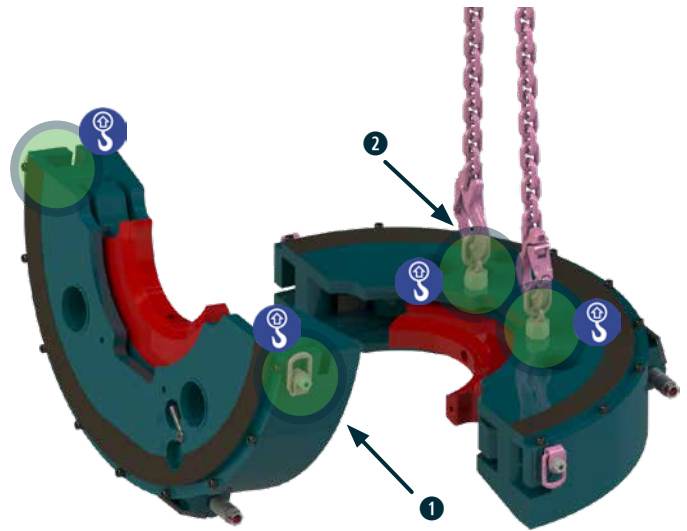


Fig. 55: Attachment points on HCGS



Fig. 56: Attachment points on Insert Carrier and Slip Assembly

3.3.2 Insert Carrier and Slip Assembly

Insert Carriers can be removed only by using the Carrier Lifting Tool (P/N 757070) from the Hook Up Kit ❶. When screwing in, the tool pushes the Insert Carrier lock aside and fixes it in this position. The Insert Carriers can now be removed individually.

The Slip Assembly has to be attached at three points ❷. All attachment points are located on top of each Slip Assembly segment. FORUM Handling Tools recommends using the Slip Gear (P/N 755662) from the Hook Up Kit.

3.3.3 Hinge Pins and Door

To remove the Hinge Pin, screw a lifting eye into the Hinge Pin first. Carefully pull out the Hinge Pin with a crane. Always focus on the need not to wedge the Hinge Pin.

When attaching the Door, you have to remove the Door Hydraulic Cover (shown transparently) and both Door Pins. Therefore, loosen all three screws and washers. Screw a lifting eye into the bore, which is located on top of the Door. Attach the Lifting Sling (Hook Up Kit - P/N 755661) to the lifting eye and remove the Door by lifting the door gently and sliding it out of the door hinges.

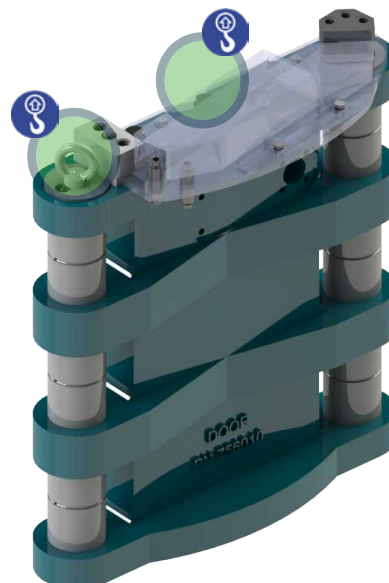


Fig. 57: Attachment points on Hinge Pin and Door

3.3.4 Lifting the PS-500 with Lift Beam Assembly

The body is provided with four hoisting eyes for transportation of the PS-500. It is only allowed to lift the PS-500 when all lifting eyes are in use. For this FORUM Handling Tools recommends to use the Lift Beam Assembly of the Hook Up Kit.



⚠ DANGER

Never use the HCGS lifting points to lift the PS-500.

Always pay special attention to swinging loads.

1. Fasten the upper lifting ropes of the Lift Beam Assembly to a crane.
2. Lift the crane slightly and attach the upper lifting ropes to the Lift Beam.
3. Lift the crane slightly again and attach the lower lifting ropes to the Lift Beam.
4. Lift the crane slightly and attach the lifting ropes to all four lifting eyes of the PS-500.
5. Check that all load hooks are completely mounted to the lifting eyes. Always make sure that all hydraulic lines to the PS-500 have been disconnected. The opening of the Lift Beam Assembly has to point towards the door of the PS-500.
6. Lift the PS-500 slightly to tension the lifting ropes.
7. Lift the PS-500.
8. Move the PS-500 to the installation location.
9. Set the PS-500 down carefully on a suitable surface.



Fig. 58: PS-500 attached to Lift Beam Assembly

3.3.5 Insert Bowl No.3 and Top Bowl

Attachment points are located on top of the Insert Bowl No.3 and Top Bowl. Always use all lifting eyes.



Fig. 59: Attachment points on Insert Bowl No.3 and Top Bowl

3.3.6 Top Wear Guide

When transporting the Bowl of the Top Wear Guide, use the bores on top of the Bowl ❶ to attach lifting eyes. When transporting the complete Top Wear Guide, use the holes ❷ on the side of the Top Wear Guide, to attach load hooks.

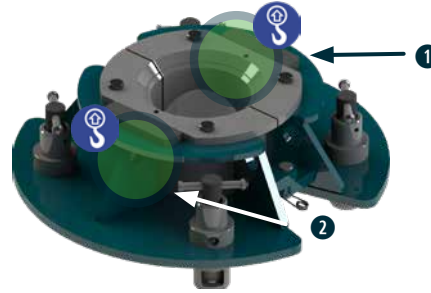


Fig. 60: Attachment points on Top Wear Guide

3.3.7 Pipe Wiper

The Wiper Plate has to be wrapped with a sling. When transporting the Pipe Wiper, Always use all lifting eyes, which are located on each pipe wiper side.

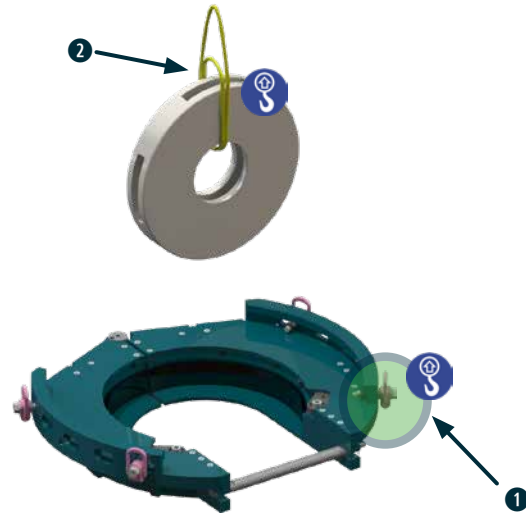


Fig. 61: Attachment points for Pipe Wiper

3.3.8 Top Cover

The attachment points of the Top Cover are located on top of the Top Cover. Always use all four lifting eyes.

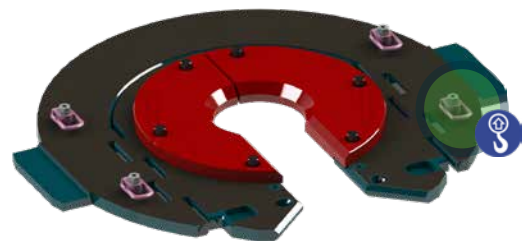


Fig. 62: Attachment points on Top Cover

3.3.9 Guide Plates

Depending on the type of Guide Plates, attachment points are located on the side of each Guide Plate ❶ or on top of each Guide Plate ❷.

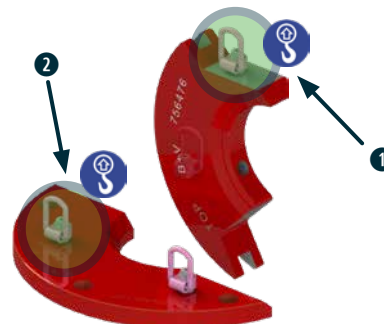


Fig. 63: Attachment points on Guide Plates

3.4 Installation and Arrangement

3.4.1 Installation and Arrangement of necessary Equipment

Except pipe size specific components, the PS-500 is completely pre-assembled before shipment, so that it can be installed immediately after unpacking it at the installation site. These include Guide Plates, Slip Assembly, Insert Carrier and other optional equipment and accessory tools. FORUM Handling Tools recommends using the Hook Up Kit and respective tools for installation and Setup tasks.



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!



⚠ DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

- » Never stand beneath or in the swing area of lifted loads.



⚠ WARNING

Danger of pinching/crushing hands!

Severe pinching/crushing up to loss of limbs.

- » Never reach between body and bottom guide assembly when setting down.



⚠ WARNING

Pinching/crushing hazard from lowering body!

Severe pinching/crushing up to loss of limbs.

- » Never step beneath the PS-500 with feet.

3.4.1.1 Installation of the Insert Carriers

Preparations/Requirements

- The correct size Insert Carriers were chosen.
- The Slip Assembly is mounted to the PS-500.
- The contact surfaces of the Slip segments and the Insert Carrier have been cleaned and lubricated as recommended by FORUM Handling Tools.
- The HCGS or Top Cover is raised and secured.
- All hydraulic connections of the PS-500 are disconnected.
- Carrier Lifting Tool (Hook Up Kit - P/N 757070).
- Lifting Sling (Hook Up Kit - P/N 755661).

Removal Procedure

1. Screw the Carrier Lifting Tool into the respective bore ❶.
2. The Insert Carrier safety lock will be pushed away when screwing in ❷. Only when the Carrier Lifting Tool has been completely screwed in, the Insert Carrier can be safely and easily removed.
3. Attach the Lifting Sling to the lifting eye of the Carrier Lifting Tool ❸.
4. Slightly lift the Insert Carrier to tension the Lifting Sling.
5. Remove the Insert Carrier, by lifting it out of the Slip Assembly.
6. Place the Insert Carrier on a pallet, facing with the Inserts to the pallet.
7. Repeat steps 1 to 6 for the other Insert Carriers.

Installation Procedure

1. Perform removal procedure in reverse order.

⚠ CAUTION Always make sure, that all Insert Carrier segments are marked with the serial number. Otherwise, safe operation is not guaranteed.

⚠ CAUTION Always make sure, that all Insert Carrier segments are secured and locked with the safety lock. Incorrect locked or unlocked Insert Carriers might lead to a loss of the pipe string and damages to the PS-500.

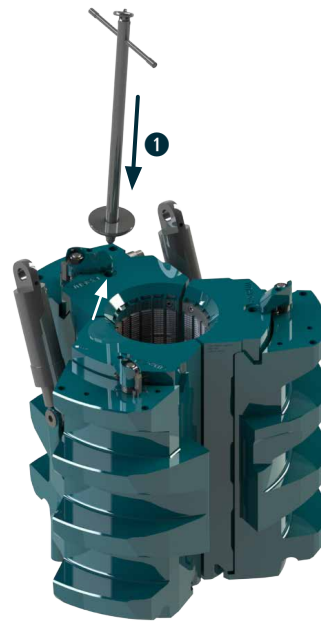


Fig. 64: Installation Step I

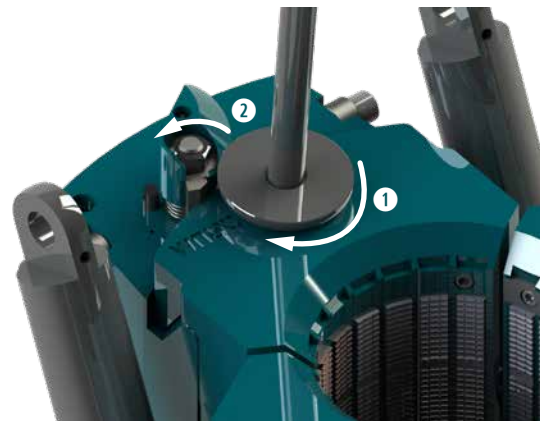


Fig. 65: Installation Step II

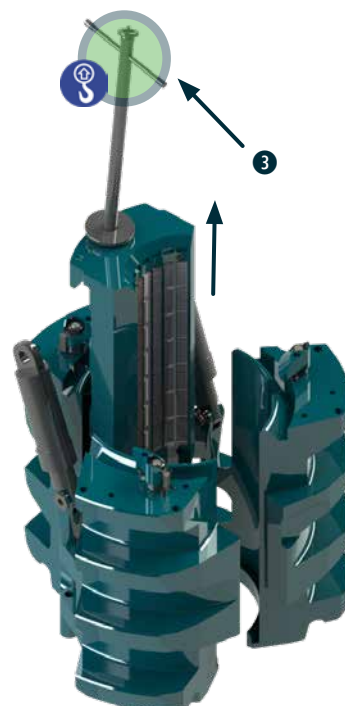


Fig. 66: Installation Step III

3.4.1.2 Installation of the Guide Plates I

Preparations/Requirements

- The correct size Guide Plates were chosen.
- The contact surfaces of the Guide Plates and the HCGS have been cleaned and lubricated as recommended by FORUM Handling Tools.
- The HCGS is raised and secured.
- All hydraulic connections of the PS-500 are disconnected.
- Lifting Sling (Hook Up Kit P/N 755661).

Installation Procedure

1. Attach the Lifting Sling to the lifting eye ❶.
2. Lower ❷ and place the Guide Plate with a sliding rotating movement ❸.
3. Secure the Guide Plate with a washer and a screw and remove the Lifting Sling and lifting eye ❹.

Removal Procedure

1. Perform installation procedure in reverse order.

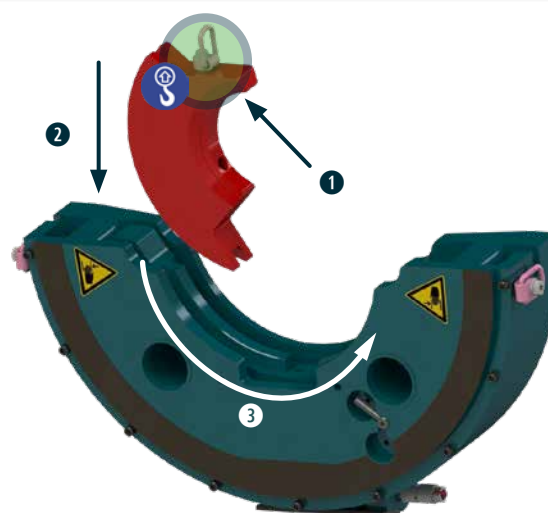


Fig. 67: Installation Step I

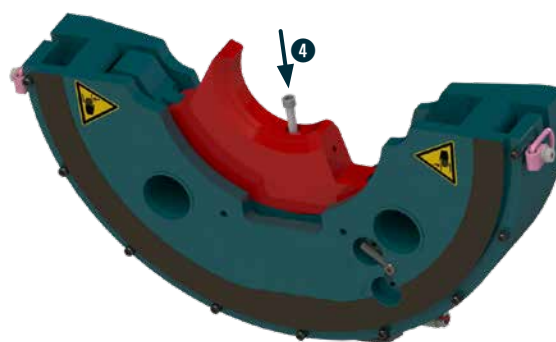


Fig. 68: Installation Step II

3.4.1.3 Installation of the Guide Plates II

Preparations/Requirements

- The correct size Guide Plates were chosen.
- The contact surfaces of the Guide Plates and the HCGS were lubricated as recommended by FORUM Handling Tools.
- The HCGS is raised and secured.
- All hydraulic connections of the PS-500 are disconnected.
- Opening Tool (Hook Up Kit P/N 755661).

Installation Procedure

1. Attach the Lifting Slings to the lifting eyes ❶.
2. Lower ❷ and place the Guide Plate on top of the Top-Cover.
3. Secure the Guide Plate with three washers and screws and remove the Lifting Slings and lifting eyes ❸.
4. Repeat steps 1 to 3 for the other Guide Plate.

Removal Procedure

1. Perform installation procedure in reverse order.

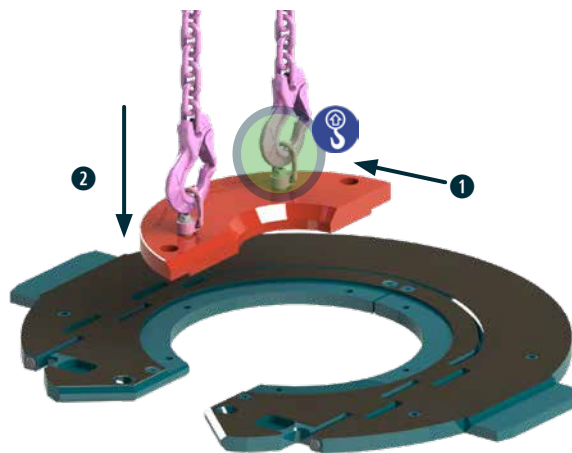


Fig. 69: Installation Step I

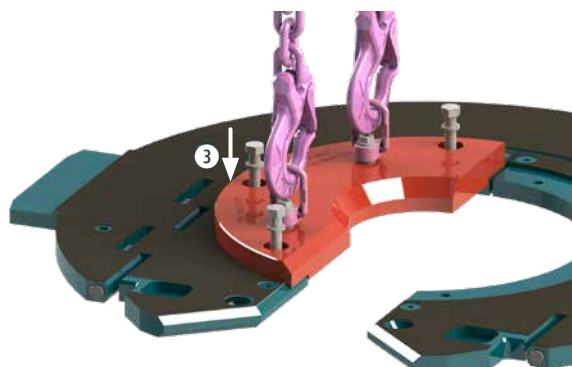


Fig. 70: Installation Step II

3.4.1.4 Installation of the PS-500 to the Rotary Table

Preparations/Requirements

- The correct size Insert Carriers are mounted to the Slip Assembly.
- The Slip Assembly is in the upper position and the hydraulic cylinders are retracted.
- The correct size Guide Plates are mounted to the Slip Assembly.
- The HCGS or Top Cover is raised and secured.
- All hydraulic connections of the PS-500 are disconnected.
- Lift Beam Assembly (Hook Up Kit P/N 775002-2).

Installation Procedure

1. Remove Hinge Pin. Loosen and Remove the Hinge Pin securing first. Pull out the Hinge Pin and avoid movements and techniques that could cause the Hinge Pin to become wedged ❶.
2. Open the Door (90°) ❷.
3. Attach Lift Beam Assembly to the PS-500 ❸. Follow instructions in chapter 3.3.4.
4. Lift the PS-500 slightly to tension the lifting ropes.

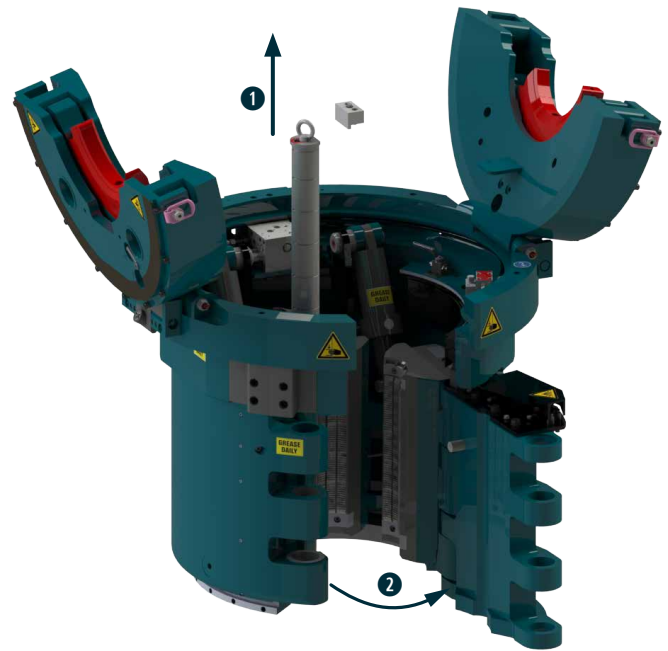


Fig. 71: Installation Step I

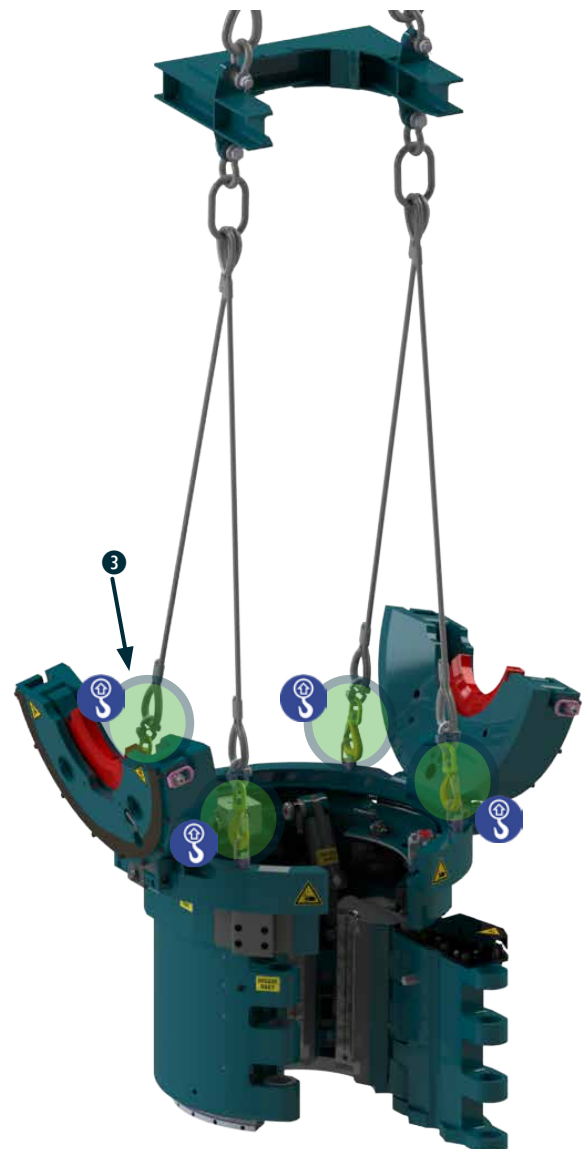


Fig. 72: Installation Step II

5. Transport the PS-500 to the installation site.
6. Guide the PS-500 carefully to the borehole.
7. Position the PS-500 coaxial to the Drill Pipe ④.
8. Close the door, so that you can lower the PS-500 ⑤.

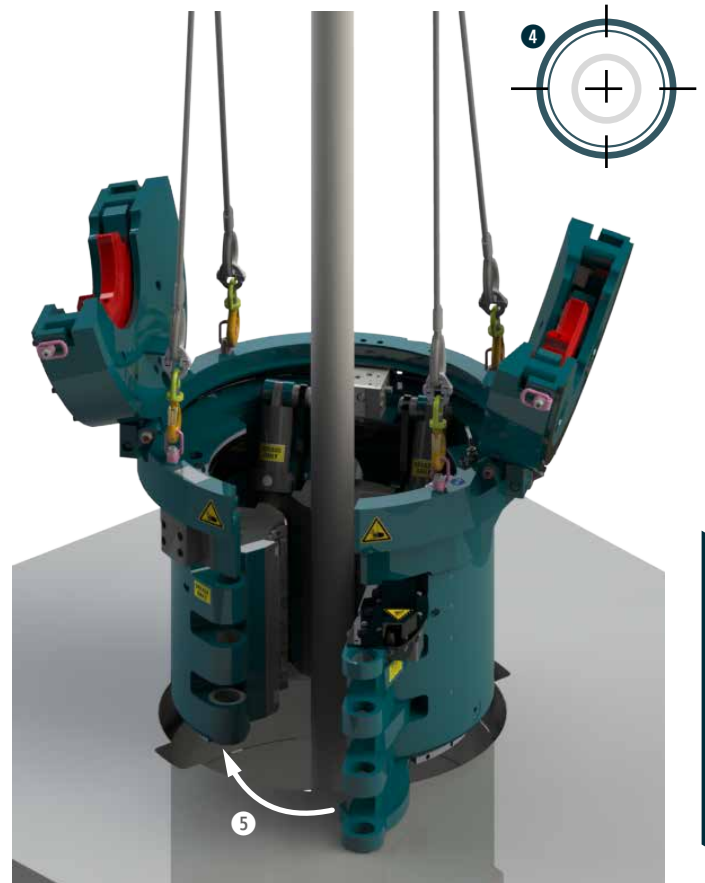


Fig. 73: Installation Step III

9. Lower the PS-500 and pay special attention to the correct position of the Rotary Table Adapters and the direction of the PS-500 hydraulic connections.
10. Remove the Lift Beam Assembly.
11. Place and secure the Hinge Pin.
12. Lower the HCGS, by following the instructions in chapter 3.3.1 ⑥.
13. Connect all hydraulic connections of the PS-500 with the hydraulic supply.

Removal Procedure

1. Perform Installation procedure in reverse order.

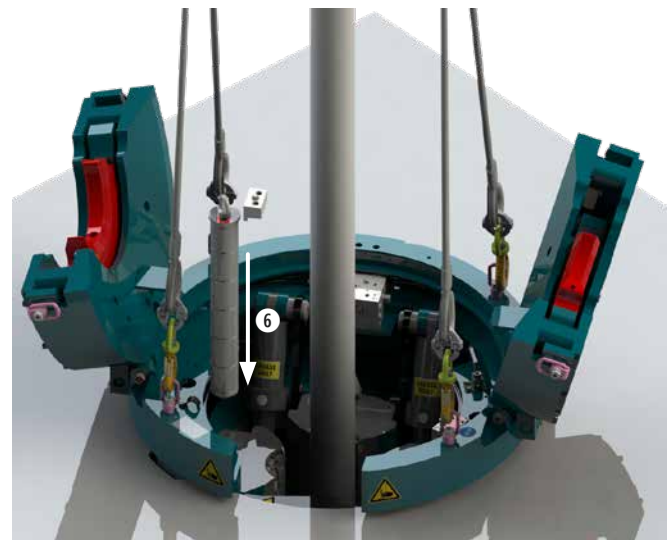


Fig. 74: Installation Step IV

3.4.2 Installation and Arrangement of additional Equipment

3.4.2.1 Installation of the Top Wear Guide

Preparations/Requirements

- The correct size Top Bowl has been chosen.
- Guide Plates are retracted.
- Insert Carriers have been removed.
- The PS-500 is mounted to the Rotary Table or standing on a plane supporting surface.
- PS-500 is equipped with a HCGS.
- HCGS has been switched off.
- Lifting Sling (Hook Up Kit - P/N 755661).

Installation Procedure

1. Attach the Top Wear Guide to the Lifting Slings ❶. Only use the attachment points shown in 3.3.6.
2. Lift and position the Top Wear Guide coaxial to the PS-500 ❷.
3. Slowly lower the Top Wear Guide.
4. Guide the Top Wear Guide brackets into the HCGS holes ❸.
5. Secure the Top Wear Guide by turning the bracket handles ❹.
6. Remove the lifting eyes and the Lifting Slings.

Removal Procedure

1. Perform removal procedure in reverse order.

⚠ CAUTION Always make sure all handles of the Top Wear Guide brackets point towards the center of the PS-500 to lock the Top Wear Guide to the HCGS.

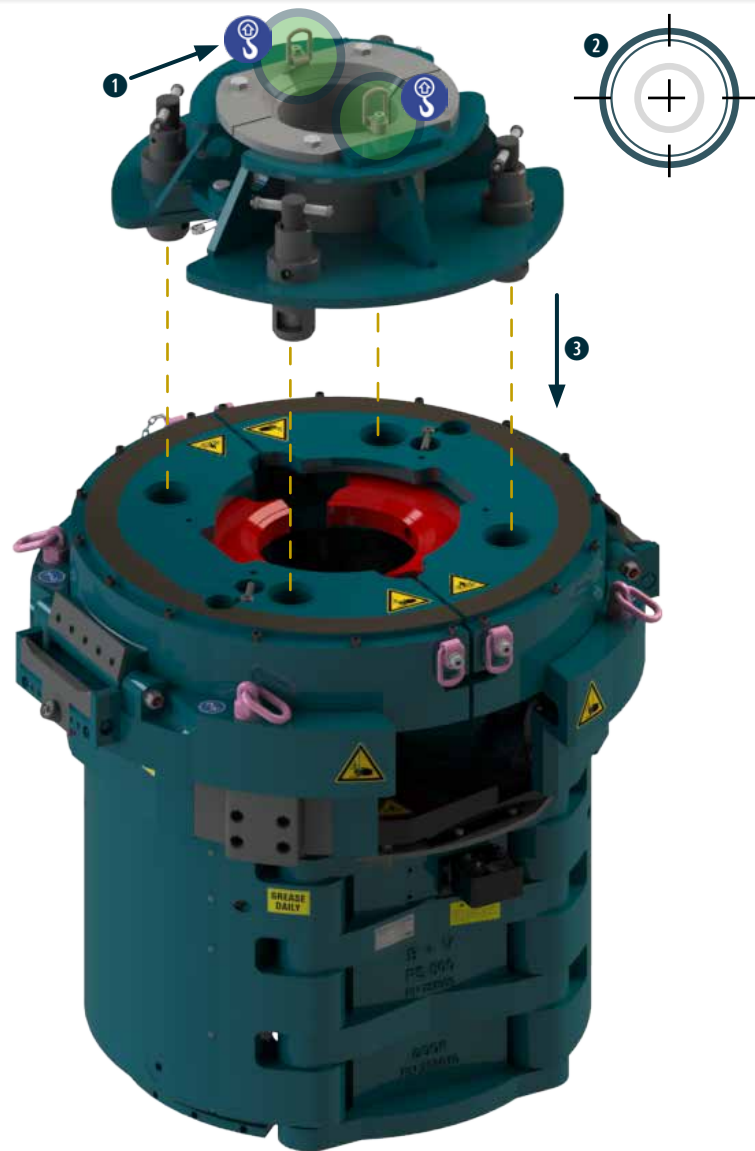


Fig. 75: Installation Step I

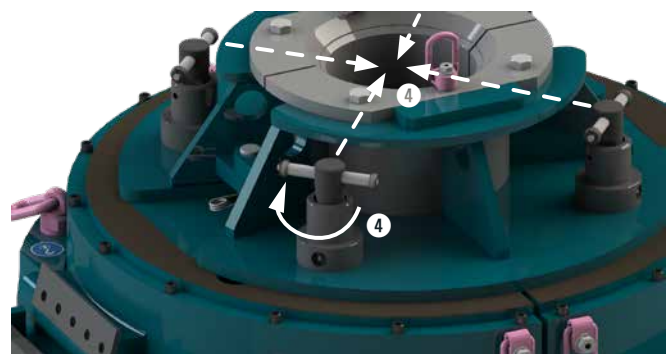


Fig. 76: Installation Step II

3.4.2.2 Installation of the Pipe Wiper

Preparations/Requirements

- The Pipe Wiper is lying on plane surface.
- The correct size Wiper has been chosen.
- PS-500 is not mounted to the Rotary Table.
- All hydraulic connections of the PS-500 are disconnected.
- Lift Beam Assembly (Hook Up Kit P/N 775002-2).
- The Pipe Wiper is open.
- The Wiper fixation is retracted.

Installation Procedure

1. Place the Pipe Wiper on a plane surface.
2. Open the Pipe Wiper by loosening the securing bolt.
3. Attach Lift Beam Assembly to the PS-500 ❶. Follow instructions in chapter 3.3.4.
4. Lift the PS-500 slightly to tension the lifting ropes.
5. Lift the PS-500 and position the PS-500 coaxial to the Pipe Wiper ❷.
6. Slowly lower the PS-500 ❸ on top of the Pipe Wiper.
7. Close and secure the Pipe Wiper.
8. Bolt the Piper Wiper together with the PS-500 ❹.

Removal Procedure

1. Perform installation procedure in reverse order.

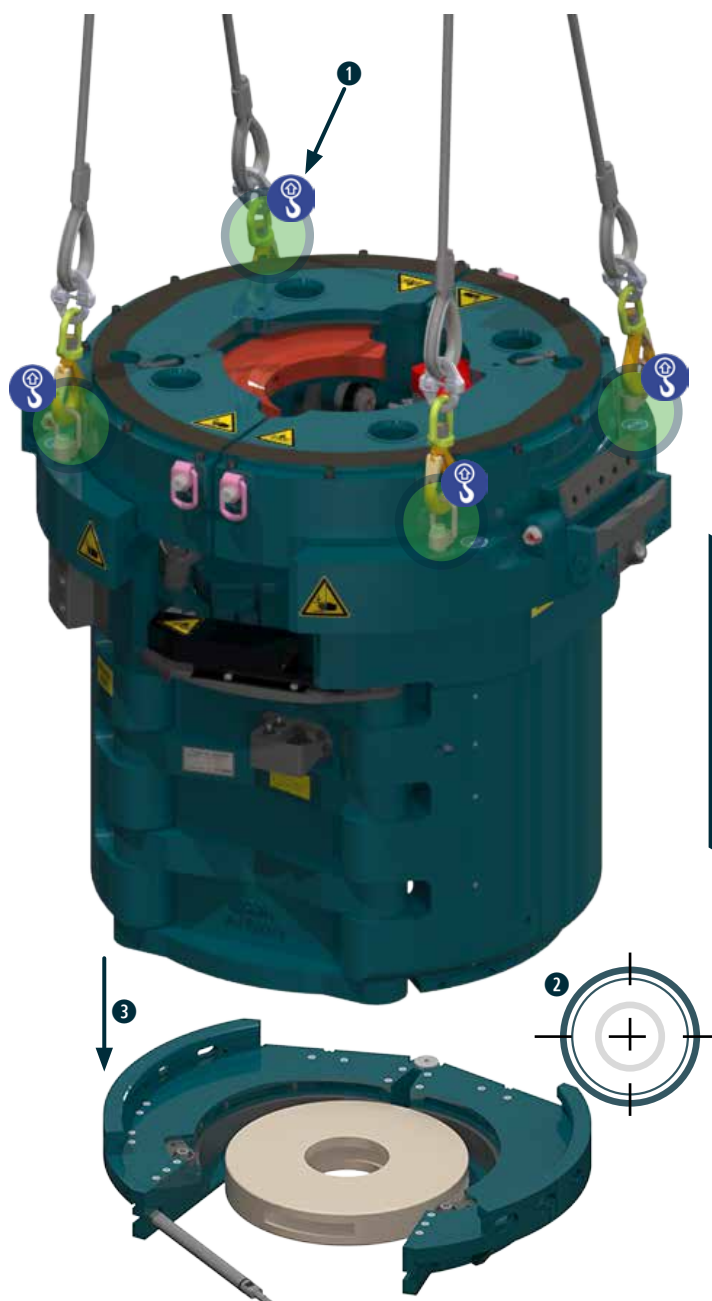


Fig. 77: Installation Step I



Fig. 78: Installation Step II

3.4.2.3 Installation of the Insert Bowl No.3

Preparations/Requirements

- The correct size Insert Bowl has been chosen.
- Guide Plates have been removed.
- Insert Carriers have been removed.
- Slip Assembly is in upper position.
- The PS-500 is mounted to the Rotary Table or standing on a plane supporting surface.
- PS-500 is equipped with a HCGS.
- HCGS has been switched off.
- Lifting Sling (Hook Up Kit - P/N 755661).

Installation Procedure

1. Attach the Insert Bowl to the Lifting Slings ①. Only use the attachment points shown in 3.3.5.
2. Lift and position the Insert Bowl coaxial to the PS-500 ②.
3. Slowly lower the Insert Bowl ③.
4. Guide the Insert Bowl into the HCGS center ④.
5. Remove the lifting eyes and the Lifting Slings.

Removal Procedure

1. Perform installation procedure in reverse order.

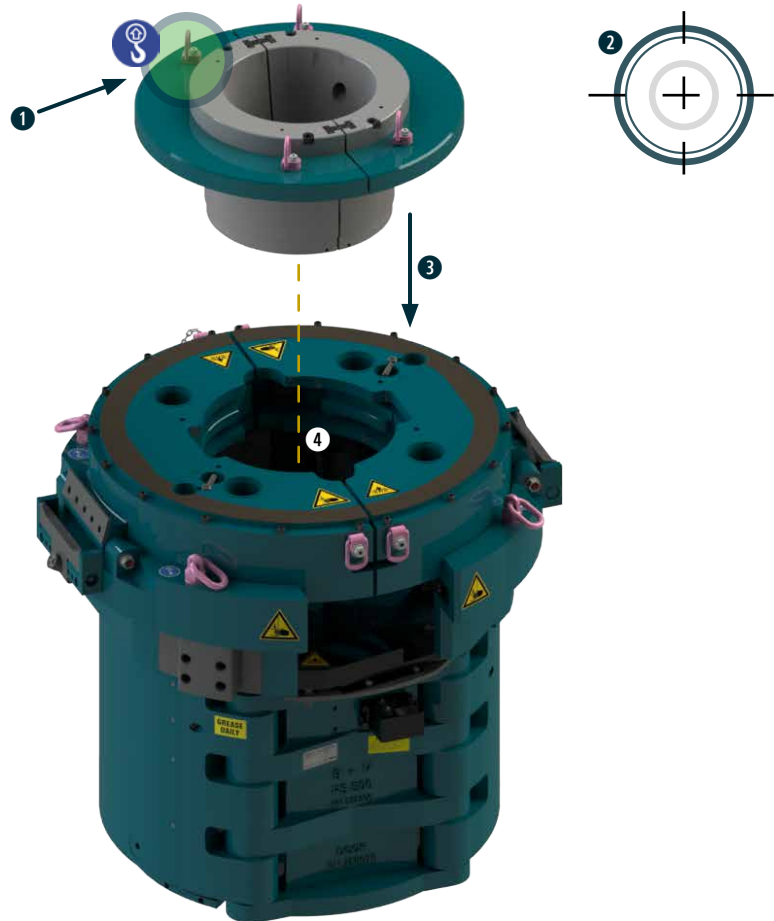


Fig. 79: Installation Step I

3.4.2.4 Installation of the Top Bowl - HCS

Preparations/Requirements

- The correct size HCS has been chosen.
- Guide Plates have been removed.
- Insert Carriers have been removed.
- PS-500 is equipped with a HCGS.
- HCGS has been switched off.
- Slip Assembly is in upper position.
- The PS-500 is mounted to the Rotary Table or standing on a plane supporting surface.
- Lifting Sling (Hook Up Kit - P/N 755661).

Installation Procedure

1. Attach the HCS to the Lifting Slings ①. Only use the attachment points shown in 3.3.5.
2. Lift and position the HCS coaxial to the PS-500 ②.
3. Slowly lower the HCS ③.
4. Place the HCS on top of the HCGS ④.
5. Remove the lifting eyes and the Lifting Slings.

Removal Procedure

1. Perform installation procedure in reverse order.

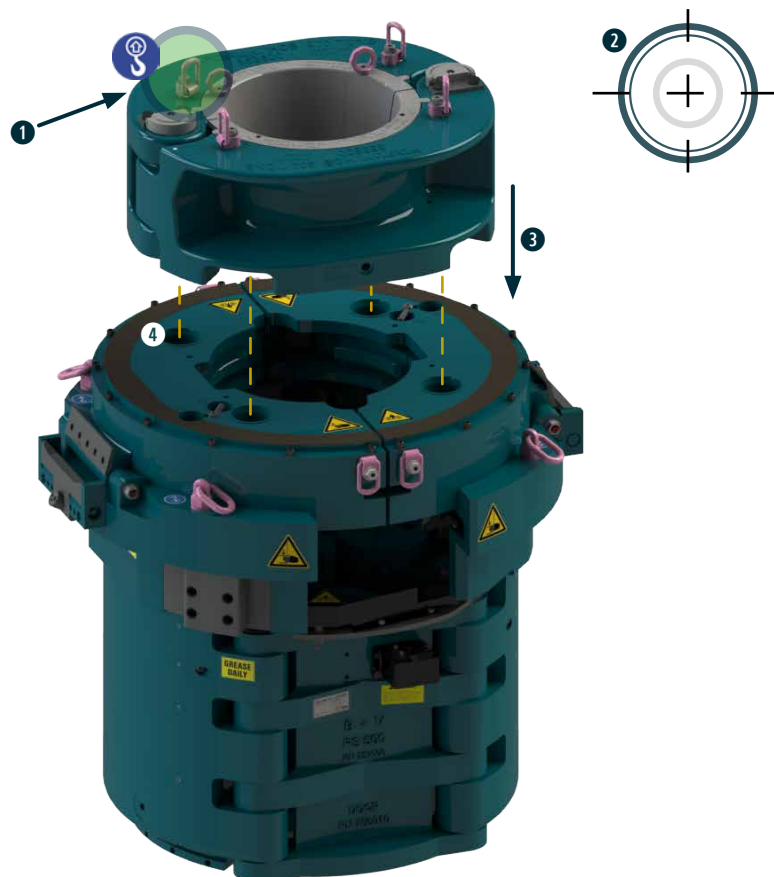


Fig. 80: Installation Step II

3.5 Installation Checklist

The PS-500 has to be installed as shown in the OMM.

Recommended Checks for general equipment

- OK ☐ There are no foreign objects in the working area of the PS-500.
- OK ☐ Lifting equipment has been removed.
- OK ☐ All assemblies, parts, areas and surfaces, which have to be lubricated, are lubricated.
- OK ☐ All PS-500 hydraulic lines are aligned correctly.
- OK ☐ The right size Insert Carriers are in use.
- OK ☐ The right size Guide Plates are in use.
- OK ☐ There are no loose fittings, hoses, valves and screws.
- OK ☐ All warning signs are present and readable.
- OK ☐ PS-500 door has been closed. The Hinge Pin has been secured.
- OK ☐ All Insert Carriers have been installed properly. Check for the correct seat.
- OK ☐ No visual damages recognizable.
- OK ☐ The correct Rotary Table Adapters are in use.
- OK ☐ The PS-500 is mounted properly to the Rotary Table.
- OK ☐ All transport tools have been removed.

Recommended Checks for additional equipment

- OK ☐ Lifting equipment has been removed.
- OK ☐ No visual damages recognizable.
- OK ☐ There are no loose screws, washers, parts or components.
- OK ☐ All assemblies, parts, areas and surfaces, which have to be lubricated, are lubricated.
- OK ☐ All transport tools have been removed.
- OK ☐ The Top Wear Guide is installed correctly [if applicable].
- OK ☐ All Top Wear Guide brackets are in use and pointing to the center of the PS-500 [if applicable].
- OK ☐ The right size Top Bowl is in use [if applicable].
- OK ☐ Both Top Bowl segments have the identical serial number [if applicable].
- OK ☐ The right size Wiper is in use [if applicable].
- OK ☐ The Pipe Wiper is installed correctly [if applicable].
- OK ☐ The Pipe Wiper lock is closed and secured [if applicable].
- OK ☐ The right size Insert Bowl or HCS is in use [if applicable].
- OK ☐ The Insert Bowl or HCS is installed correctly [if applicable].

Info



This Installation Checklist contains only essential points of an installation process to be checked. Check at least the mentioned points on your PS-500. For further questions or complete Installation Checklists (templates), please contact the Technical Support from FORUM Handling Tools.

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COMMISSIONING/ OPERATION

COMMISSIONING/
OPERATION

4 Commissioning and Operation



Ensure that the PS-500 is commissioned only by personnel trained for this work and familiar with the risks involved in commissioning the PS-500.



Read these instructions carefully before setting up the PS-500 and putting it into service.

INFO



FORUM Handling Tools recommends having the PS-500 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 Equipment parts.



⚠ WARNING

Separated hydraulic lines pose an injury hazard!

- » Do not fix any disconnected hydraulic lines without depressurizing the complete hydraulic system and all hydraulic lines and couplings.



⚠ WARNING

Defective hydraulic lines pose an injury hazard!

- » Protect yourself from leaks.



⚠ 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 and in the swing area of suspended loads.



⚠ WARNING

Danger of pinching/crushing body!

- » Do not step between the body and the door.
- » Do not stand within the opening range of the door while it is being opened or closed!



WEAR EYE PROTECTION!



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!

4.1.1 Safety Considerations

Safety considerations and checks before initial operation

1. PS-500 and additional equipment have been installed following the instructions in Chapter 3 - Installation Checklist has been completed.
2. All covers attached and completely screwed down.
3. All screw connections tightened properly.
4. All screw retainers present.
5. Insert Carriers and Guide Plates correspond to type/size of pipe used.
6. All hydraulic connections are connected correctly and laid securely.
7. No hydraulic line is damaged.
8. All lubrication points are lubricated properly (refer to section 6.1 "Lubrication" on page 135).

4.1.2 Connecting the Hydraulic System

Installation Schematics

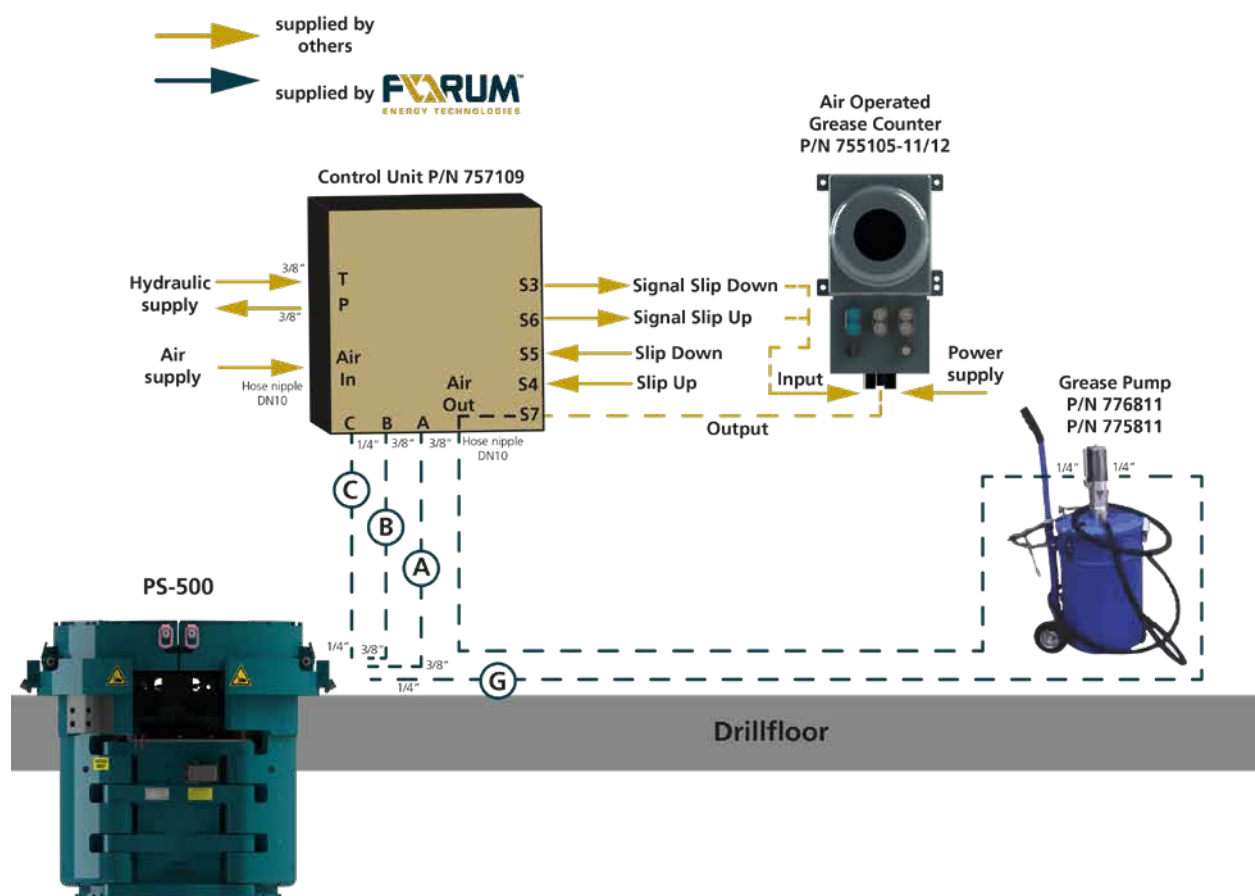


Fig. 81: Hydraulic Connections for PS-500

Info

i This illustration shows a typical arrangement of the PS-500. The particular arrangement may vary according to individual requirements.

Hydraulic Characteristics

160 - 210 bar
(2030 - 3046 psi) Operating pressure

40 - 210 bar
(2031 - 3046 psi) Pilot/Feedback pressure

85 bar
(1233 psi) Slip Down

170 bar
(2466 psi) Slip UP

18.9 - 37.85 l/min
(5 - 10 GPM) Volumetric Flow

NAS 7 Minimum required hydraulic oil cleanliness

Electric Connections

S3 Feedback Signal for "Slip Down".
Signal can be used as input signal for Grease Counter.

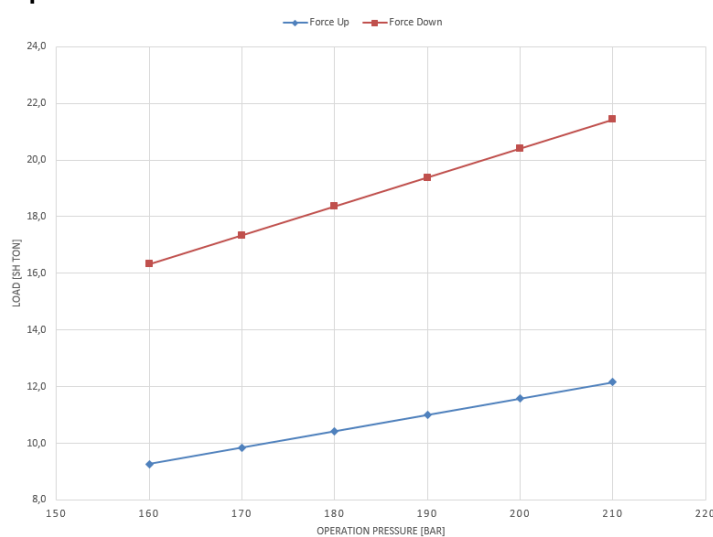
S4 Signal for Operation "Slip Up".

S5 Signal for Operation "Slip Down".

S6 Feedback Signal for "Slip Up".
Signal can be used as input signal for Grease Counter.

S7 Connection for Output signal.
Signal will switch a pneumatic valve.

Slip Load for PS-500



NOTE During installation, when setting up and taking down as well as during operation of the PS-500, ensure that the hydraulic lines Do not chafe. If necessary, provide hydraulic lines with chafe guard.

Info

Bleeding

The hydraulic system in the PS-500 is bled at the factory. Ensure that the rig's own supply connections are bled before connecting the PS-500.

Info

Pre-Adjustment

The hydraulic system of the PS-500 is adjusted at the factory. The pressures can be converted into electrical signals on site by the operator.

NOTE The air in the hydraulic system of a new PS-500 is shop-purged. Be aware that the hydraulic connection hoses (Slips up, Slips down and Feedback signal) should be purged before connecting it to the PS-500.

NOTE All hydraulic connections have a coupling bushing and a plug coupling with quick connection couplings, 3/8" and 1/4". The used coupling by FORUM Handling Tools meet the ISO 16028 standard and are ideal for interchangeability with other manufacturers.

4.1.3 Arrangement of Hydraulic Lines/Connections

Ensure that the hydraulic connections are arranged so that damages cannot be caused by external effects. The following illustration shows the PS-500 between the Iron Roughneck rails. Hydraulic hoses must therefore not be laid over rails.

Iron Roughneck rail

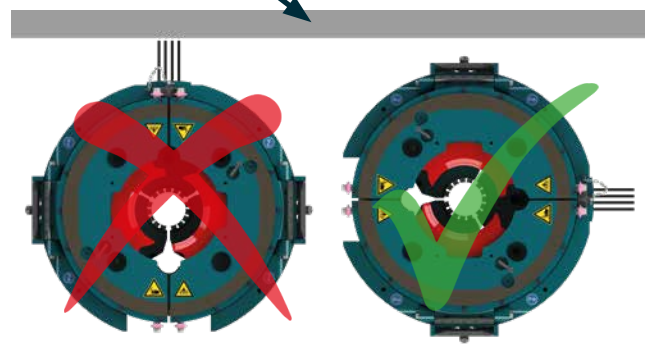


Fig. 82: Correct Installation on Drill Floor.

4.1.4 Adjusting Centering Stroke Limitation

The centering system can be adjusted for the following:

1. Drill Pipe / Drill Collar
2. Casing

Procedure:

1. Pull the stroke limitation up on the handle ①.
2. Turn the handle until the desired position is reached. Arrest the handle properly in the groove ②.

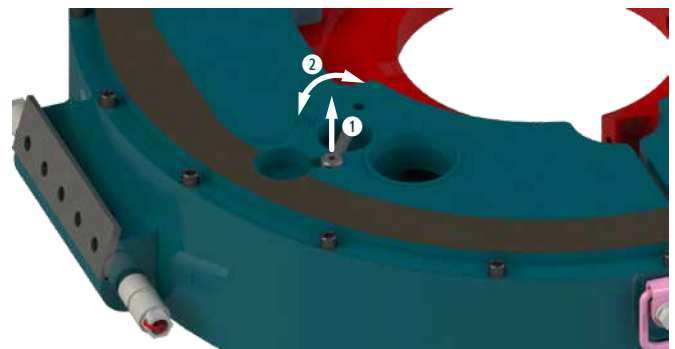


Fig. 83: Drill Pipe / Drill Collar

4.1.5 Commissioning Checklist

FORUM Handling Tools strongly recommends to accomplish the commissioning with the FORUM Handling Tools Commissioning Service.

Prior to use of the FORUM Handling Tools following checks must be carried out :

- OK ☐ Operating personnel is aware of all dangers regarding handling the FORUM Handling Tools PS-500 and its additional equipment.
- OK ☐ The entire operating personnel went through the OMM.

Check Installation and Lubrication

- OK ☐ PS-500 and all additional components are installed as shown in chapter 3.
- OK ☐ The Installation Checklist has been filled out completely. No fields are left blank and no fields have the status NOK.
- OK ☐ All parts, components (lifting equipment, etc.) not required for the actual operation have been removed.
- OK ☐ There are no people in the working area.
- OK ☐ All assemblies, parts, areas and surfaces, which have to be lubricated, are lubricated.

Hydraulic Characteristics

- OK ☐ Operating pressure. 160 bar (2320 PSI) - 210 bar (3046 PSI)
- OK ☐ Volumetric flow. 18.9 l/min (5 GPM) - 37.85 l/min (10GPM)
- OK ☐ Min. required hydraulic Oil clearness. NAS 7
- OK ☐ Correct Hydraulic connection/line arrangement.
- OK ☐ Automatic lubrication system has been connected to the PS-500.

Function Test

- OK ☐ HCGS centers the pipe prior setting the Slip Assembly [if applicable].
- OK ☐ Slip Assembly is set after supplying pressure to connection "A". Feedback signal appears.
- OK ☐ HCGS opens automatically after setting the Slip Assembly [if applicable].
- OK ☐ Slip Assembly is raised after supplying pressure to connection "B". Feedback signal appears.
- OK ☐ Slip Assembly remains in raised position by a pressure drop to connection "B".
- OK ☐ One greasing cycle has been manually activated and finished.
- OK ☐ Grease is coming out of bores.
- OK ☐ Automatic grease function adjusted (5 sec. of greasing after 10 cycles).

Info



This commissioning Checklist contains only essential points and main contents of an internal commissioning. Check at least the mentioned points on your PS-500. For further questions or complete Commissioning Checklists (templates), please contact the Technical Support from FORUM Handling Tools.

4.2 Operation



Ensure that the PS-500 is operated only by personnel trained for this work and familiar with the risks involved in operating the PS-500.



Read these instructions carefully before operating the PS-500.

⚠ WARNING

Danger of pinching/crushing body!

- » Do not step between the body and the door.
- » Do not stand within the opening range of the door while it is being opened or closed!



⚠ WARNING

Danger of pinching/crushing feet!

Transporting and setting down heavy components.

- » Never step below moving PS-500 parts.



⚠ WARNING

Separated hydraulic lines pose an injury hazard!

- » Do not fix any disconnected hydraulic lines without depressurizing the complete hydraulic system and all hydraulic lines and couplings.



⚠ WARNING

Defective hydraulic lines pose an injury hazard!

- » Protect yourself from leaks.



⚠ 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 PROTECTIVE GLOVES!



WEAR EYE PROTECTION!



WEAR SAFETY SHOES!



WEAR PROTECTIVE HELMET!

Operational Safety

1. The Checklists to verify correct installation and commissioning have been fully processed and completed. There are no points on the lists that would have to be answered with NOK.
2. Operate the PS-500 smoothly and carefully.
3. Do not touch the PS-500 while in operation.
4. All hoses have to be laid so that they cannot interfere with your work or that you can stumble upon them.
5. It is recommended to have the PS-500 operated by the driller.
6. Insert Carriers are set on the correct section of the pipe.
7. Both feedbacks appear when they have to appear.
8. No foreign objects obstruct the view between the operating personnel at the borehole and the operator in the drilling cabin.
9. Do not operate the PS-500 without the HCGS or the Top-Cover.

4.2.1 Handling the Drill String

Operation MU (make up)

1. The floor man attaches the next joint of a pipe in the V-door when the Elevator has been lowered.
2. The Elevator is raised slowly until the new pipe hangs vertically in the Elevator.
3. The newly picked up pipe is taken to the borehole and screwed there with the pipe, which protrudes from the PS-500.
4. When the pipes are connected properly to each other the Elevator is lifted to pick up the load of the pipe string.
5. The PS-500 gets the signal to raise the Slip Assembly.
6. The driller lowers the pipe string into the borehole, until the tool joint is above the PS-500.
7. The driller centers the pipe string and sets the Slip Assembly of the PS-500.
8. A feedback signal is given to the driller when the Slip Assembly has been set.
9. The Elevator is lowered until the load is not hold by the Elevator any more. Now the PS-500 is holding the complete load.
10. The driller opens and removes the Elevator.
11. A new section of pipe can be picked up.

Operation BO (break out)

1. Perform Operation MU in reversed order.

⚠ Caution



- Never raise the Slip Assembly when the PS-500 is under load. Always make sure the Elevator holds the pipe string properly before raising the Slip Assembly.
- Never raise or lower the Slip Assembly while pulling or lowering the pipe string.

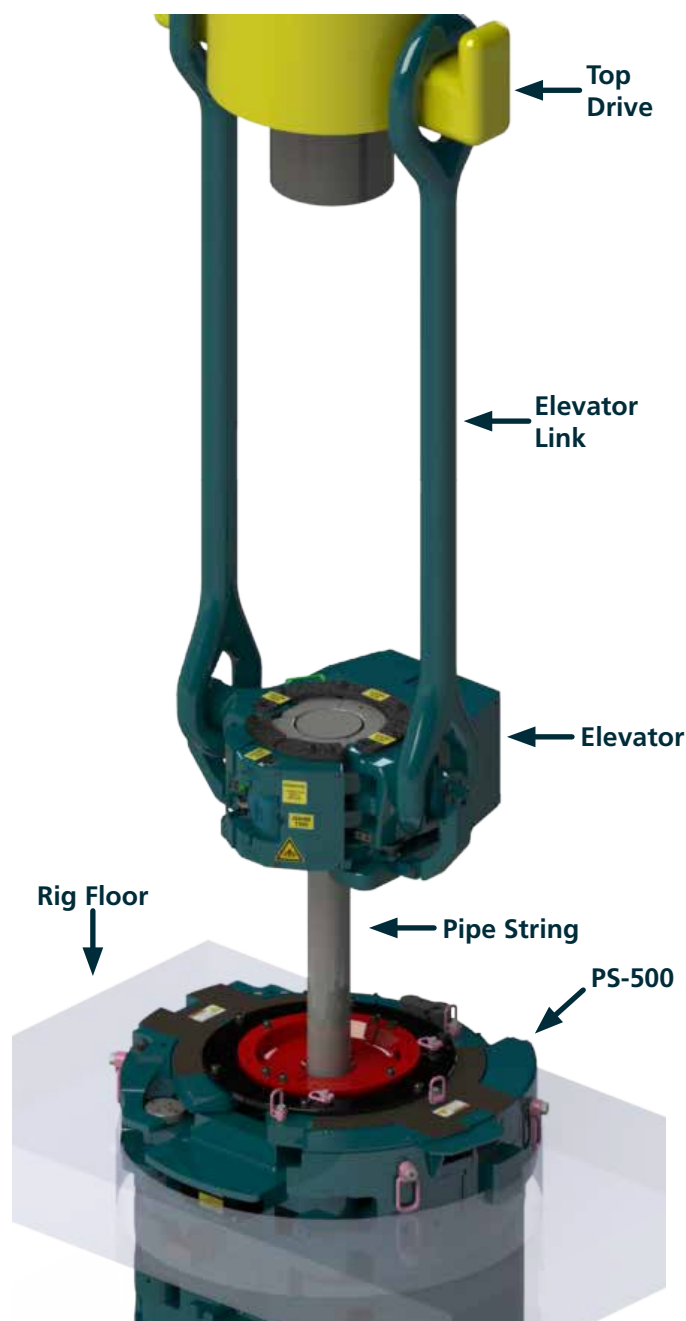


Fig. 84: General arrangement

4.2.2 Changing the Inserts

Proceed as follows to replace Inserts:

1. Remove Insert Carriers from Slip Assembly (refer to section 3.4.1.1 "Installation of the Insert Carriers" on page 54).
2. Loosen and remove all screws ❶ from Insert Retainer.
3. Remove Insert Retainer ❷.
4. Remove Inserts from dovetail guide and place to side separate from new parts.
5. Clean the dovetail guide and insert new Inserts into dovetail guide ❸.
6. Reinstall Insert Retainer by mounting screws to Insert Carrier.

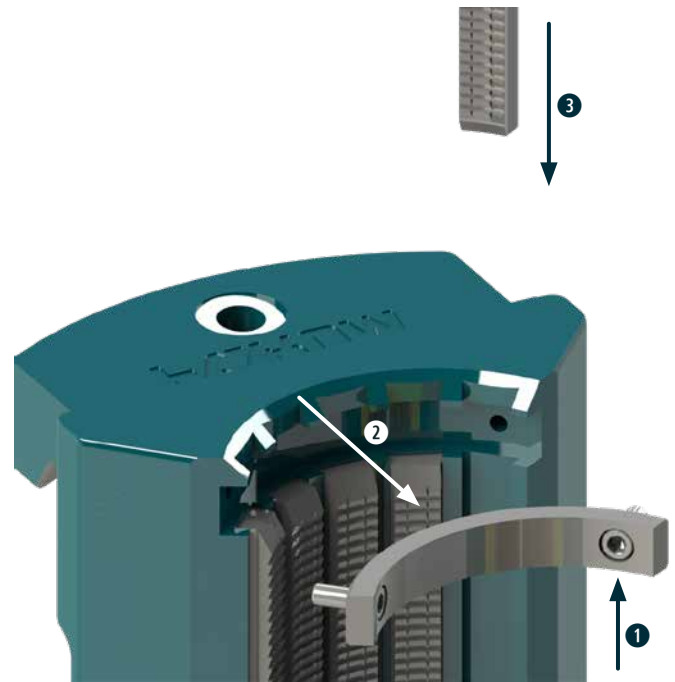


Fig. 85: Preparation

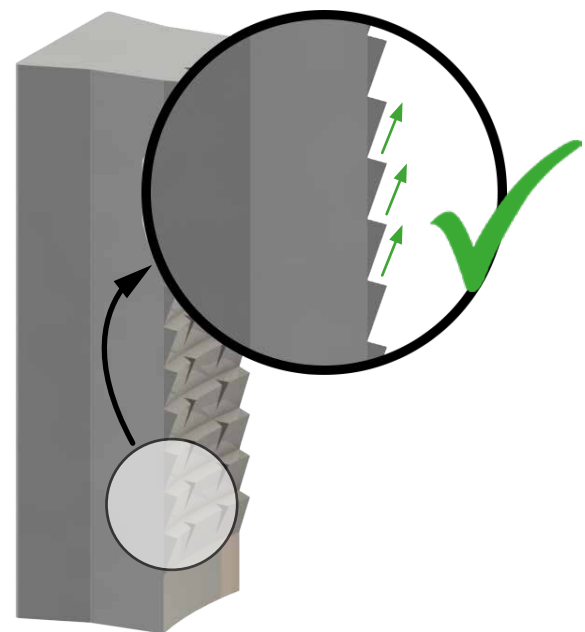


Fig. 86: Correct Insert direction

⚠ NOTE Observe installation direction of Inserts. Ensure that sharp edges of Inserts point upwards. Otherwise, the holding function of the PS-500 is NOT guaranteed.

⚠ NOTE Observe installation order of Inserts. Bottom Beveled Dies belong to the lower end. Top Beveled Dies belong to the upper end.

4.2.3 Opening/Closing the Top-Cover

Opening Procedure

1. Take the Lever (P/N 757526) from the Hook-Up-Kit (P/N 757100-TK-OES) ❶.
2. Guide the Lever into the bore, which is located at the front end of the Top-Cover ❷.
3. Tilt the Top-Cover half with the aid of the Lever and remove the lever afterwards ❸.
4. Perform step 2 and 3 on the other half of the Top-Cover.



⚠ WARNING

Danger of falling down!

- » Do not step on Top-Cover during operation.



⚠ WARNING

Danger of falling down!

- » Be careful when the Top-Cover is completely open.

Closing Procedure

1. Perform opening tasks in reversed order.



Fig. 87: Opening Step I

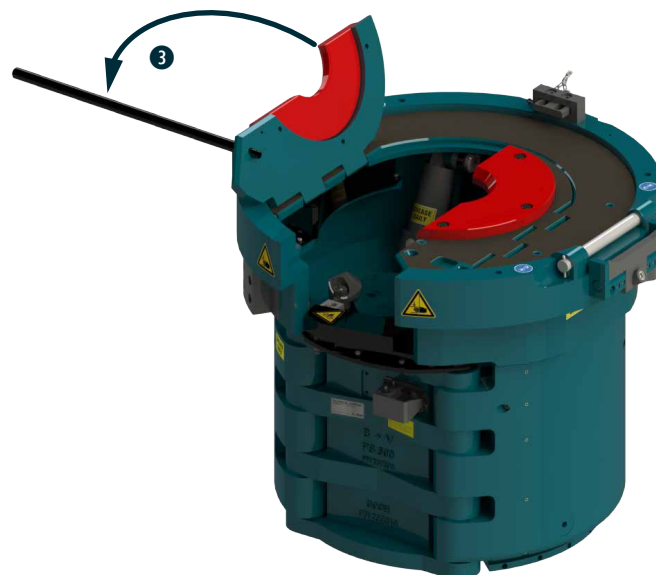


Fig. 88: Opening Step II

4.2.4 Changing the Wiper

Preparation

- Lifted and secured HCGS/Top-Cover.
- All Insert Carriers have been removed from the PS-500.

Installation Procedure

1. Take the adjustment tool (P/N 756757) for the Pipe Wiper Assembly and place it on the dedicated attachment ❶. Unlock the lock by pushing the tool downwards.
2. Turn the tool to the left to open the Wiper Tongue ❷.

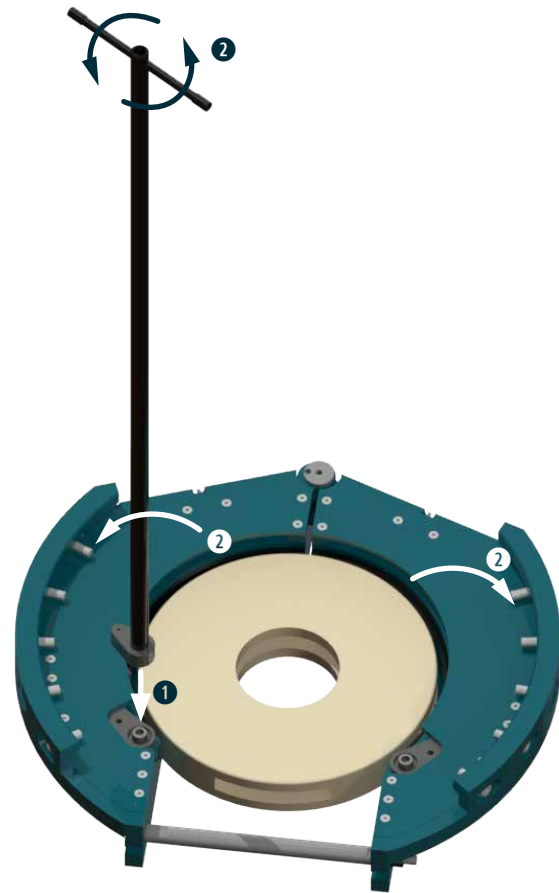


Fig. 89: Step I

3. Remove the worn Wiper and replace it with a new one.
4. Turn the tool the right to secure the Wiper ❸.
5. Make sure that the Pipe Wiper Tongue is completely extended.
6. Remove the adjustment tool.

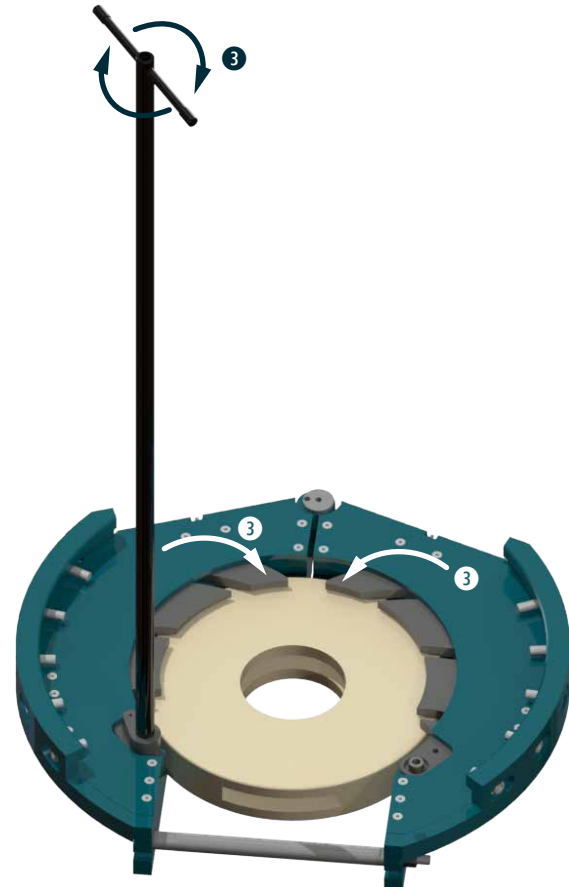


Fig. 90: Step II

⚠ NOTE Always make sure, that the Wiper is placed correctly and lies completely on its supporting surface.

4.2.5 Locking/Unlocking the HCGS

Unlocking Procedure

1. Pull out the retaining pin ❶.
2. Pull out the locking bar ❷.
3. Insert the retaining pin in the rest bore ❸.

Locking Procedure

1. Perform unlocking procedure in reversed order.



Fig. 91: Open lock, step I

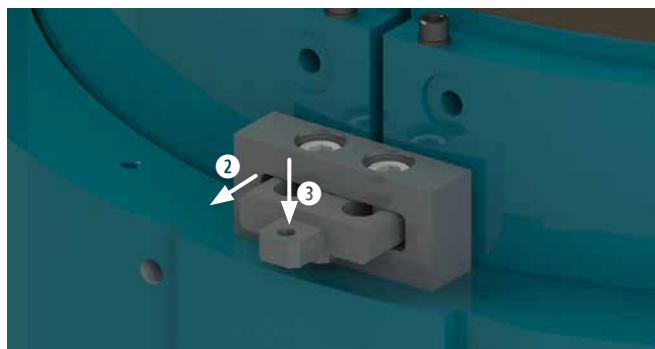


Fig. 92: Open lock, step II

4.2.6 HCGS release after fixation

⚠ NOTE The HCGS will lock automatically, when opened completely. Always unlock first. Close in a next step.

⚠ WARNING Never open or close the Cover Assembly with hands or feet, Always use a crane.

1. Attach HCGS segment to crane. Use both attachment points ❶.
2. Remove the retaining ring and the screw ❷.
3. Press the lock with the tool inwards first ❸ and then downwards ❹. The lock is now unlatched.
4. Close the HCGS segment by use of a crane ❺.

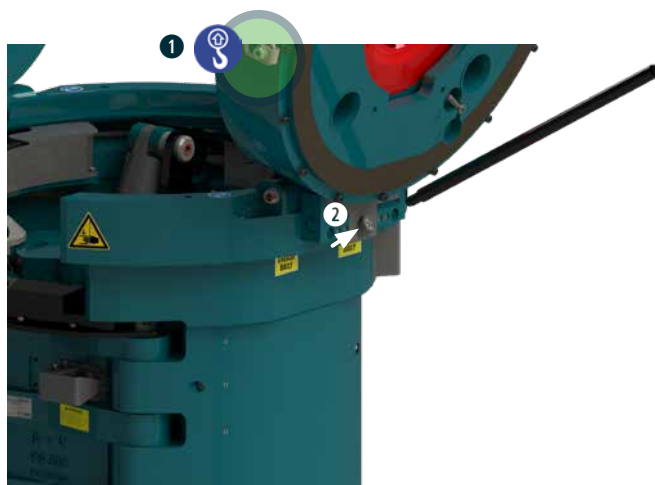


Fig. 93: Open Cover Assembly, step I

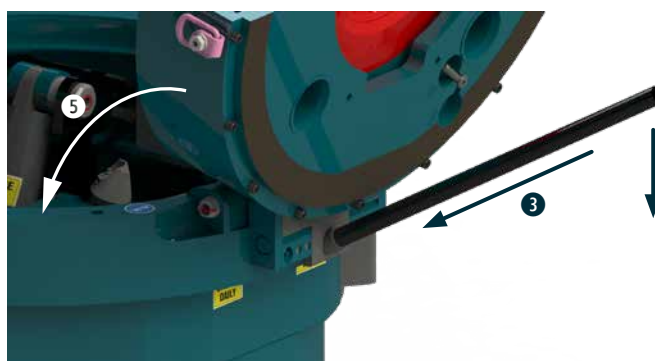


Fig. 94: Open Cover Assembly, step II

4.2.7 Hydraulic Adjustments

Valve ① - Sequence Valve

Adjusts sequence of PS-500 and HCGS (Guide Plate Extension).

- ☞ Enhance pressure - Guide Plates extend later.
- ☞ Reduce pressure - Guide Plates extend earlier.

Valve ② - Load-Holding Valve

Prevents setting of the Slip Assembly when pressure drops.

- ☞ Enhance pressure (load to be hold).
- ☞ Reduce pressure (load to be hold).

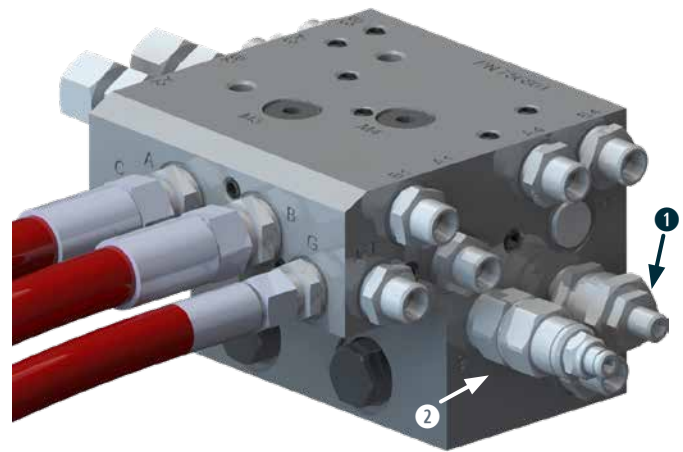


Fig. 95: PS-500 Valve Block

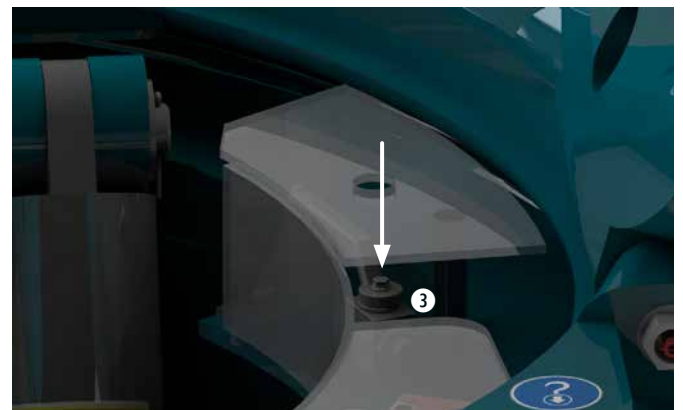


Fig. 96: PS-500 Ball Valve I

Valve ③ - Ball Valve

Turns off and on the HCGS. Use the Socket Wrench (P/N 77812) which is part of the Toolkit (P/N 775820). To adjust the Ball Valve, raise the HCGS and guide the Socket Wrench through the bore, which is located on top of the Cover.

- ☞ Blocked volumetric flow.
- ☞ Released volumetric flow.

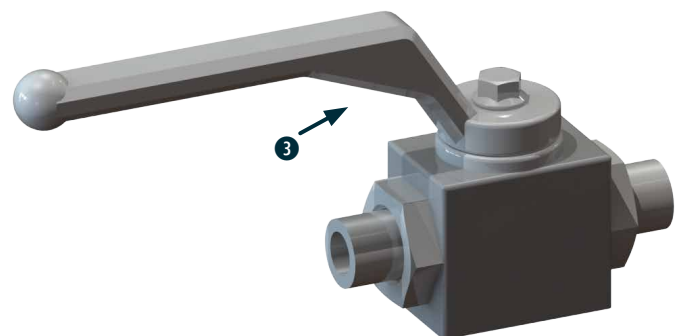


Fig. 97: PS-500 Ball Valve II

Valve ④ - Throttle - Sequence

Adjusts sequence of PS-500 and HCGS (Guide Plate Retraction).

- ☞ Enhance pressure - Guide Plates retract later.
- ☞ Reduce pressure - Guide Plates retract earlier.

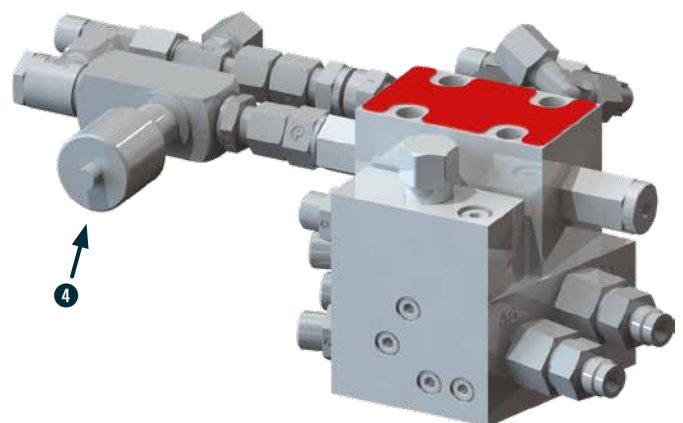


Fig. 98: PS-500 Distribution Block

4.3 Troubleshooting

Common Symptoms	Useful steps for troubleshooting. Check for...															
	... correct Rotary Table Adapters.	... no loose or damaged parts of the latch mechanism.	... correct seat of the Insert Carriers. Check also for no damages to the Securing Assembly.	... correct working pressure of min. 160 bar / 2321 psi.	... correct size Insert Carriers.	... correct size Inserts.	Check Inserts for status of wear.	... deactivation / activation of the HCGS.	... correct adjustment of the sequence valve and throttle (4.2.8).	... correct adjustment of the ball valve (4.2.8).	... correct adjustment of the load-holding valve (4.2.8).	... correct function and adjustment of the feedback.	... correct function and adjustment of the feedback.	... no blocked grease nipples (PS-500 body).	... proper grease line connection and fill level of the grease barrel.	... correct working pressure of the grease system.
PS-500 does not fit into the respective Rotary Table.	✓															
HCGS lock does not engage when opening.		✓														
Insert Carrier securing does not latch the Insert Carrier.			✓													
Slip Assembly is neither lowered nor raised.				✓					✓		✓	✓				
Insert Carrier Do not hold the pipe.					✓	✓	✓									
HCGS does not center the pipe.								✓	✓							
Guide Plates Do not extend.								✓	✓							
Slip Assembly and Guide Plates operate simultaneously.									✓							
Guide Plates Do not retract, after Slip Assembly has been set.										✓		✓				
Slip Assembly does not stay in raised position.											✓					
No Feedback signal for "Slip Assembly has been set".												✓				
No Feedback signal for "Slip Assembly has been raised".													✓			
Automatic lubrication of the PS-500 interior is not possible.														✓	✓	✓
Automatic lubrication of the Feedback actuator is not possible.															✓	✓

NOTE Due to the complexity of the PS-500, 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, 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.

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SERVICE

SERVICE

5 Service

INFO



Operational safety and readiness of the PS-500 Do not only depend on your skill, but also on maintenance and servicing the PS-500. Insist on using original spare parts when carrying out maintenance and repair work. This ensures operational safety and readiness of your PS-500, and maintains its value.

5.1 Malfunction

If a malfunction occurs or the PS-500 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 PS-500.
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 OMM, please contact the FORUM Handling Tools Technical Support or one of the authorized service companies („Contact Worldwide“ on page 12).

5.2 Repair

5.2.1 Repair by Customer

It is only permissible for the customer/company operating the PS-500 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 only FORUM Handling Tools or an authorized service company performs any repair work required on the PS-500.

INFO



Please contact the FORUM Handling Tools Technical Support or one of the authorized service companies („Contact Worldwide“ on page 12) to perform repair or maintenance work.

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.

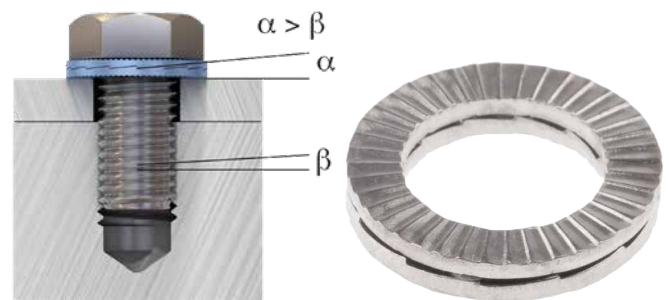


Fig. 99: Wedge-Locking Washer principle illustration

Wedge-Locking Washer specified torques

Several Wedge-Locking style bolt securing systems are used on the PS-500 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 B "Third Party Documents" on page 152) 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 metric grade and make of the bolt can be seen on top of the bolt/nut.



Fig. 100: Bolt head marking

On FORUM Handling Tools Pipe Handling Equipment the metric grades 8.8, 10.9 and 12.9 are used and the tightening torques can be found in refer to section B "Third Party Documents" on page 152.

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

INFO



Resulting 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 („Contact Worldwide" on page 12) to order replacement parts or in the event of any questions.

5.3.1 PS-500

Main Assembly P/N 755000

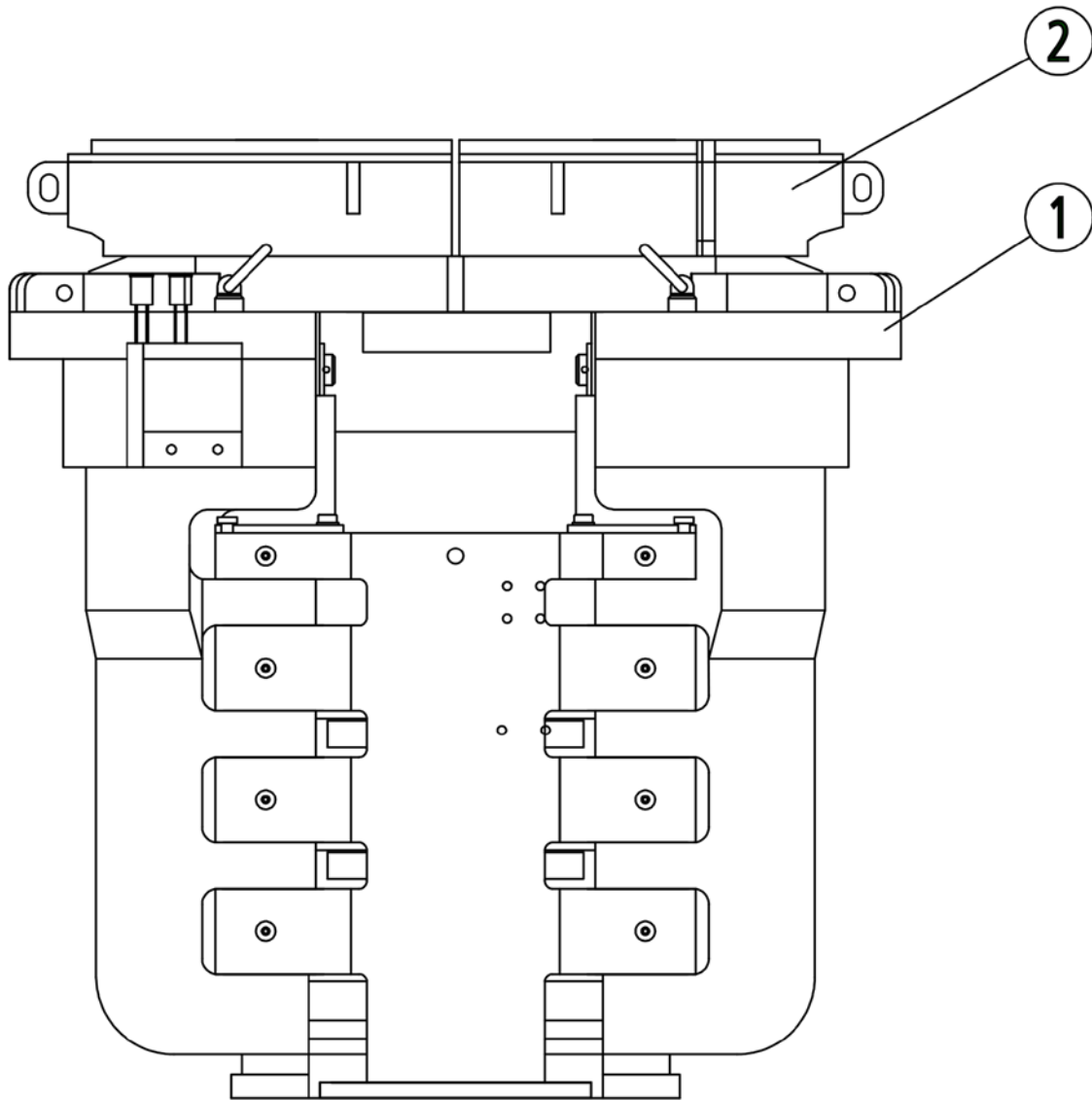


Fig. 101: General Illustration

Parts list 755000

Pos.	Qty.	P/N	Description
1	1	755100	Body Assembly
2	1	755700	HCGS

5.3.1.1 PS-500 Body Assembly

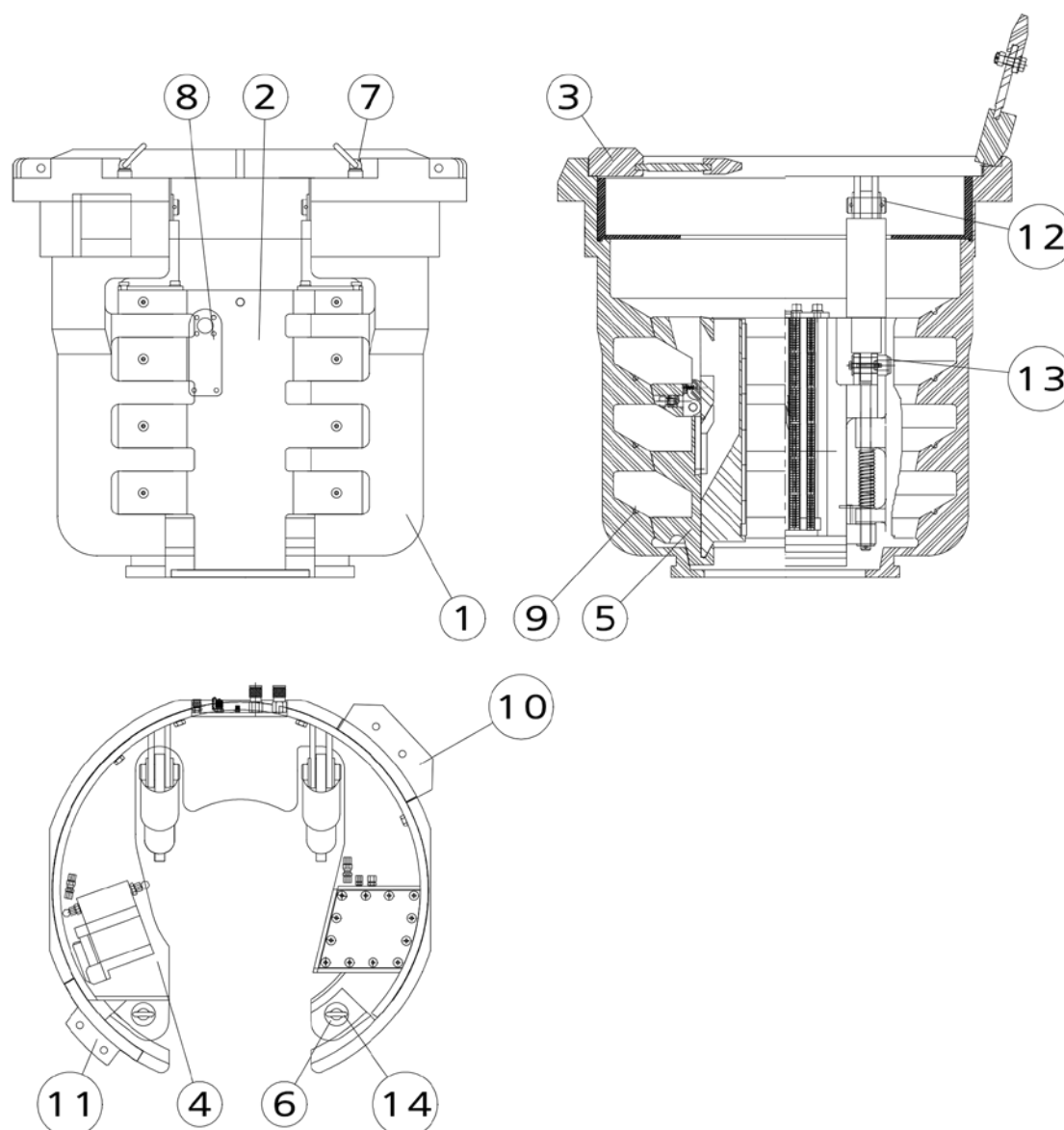


Fig. 102: Illustration Body Assembly

Parts list 755100

Pos.	Qty.	P/N	Description
1	1	755100	Body
2	1	755120	Door Assembly
3	1	755130	Cover Assembly
4	1	755300	Hydraulic Assembly
5	1	755200	Slip Assembly
6	2	755111	Hinge Pin
7	4	755116	Lifting Eye
8	1	755260	Feedback Assembly
9	1	755500	Grease System
10	1	755163	Adapter for Oilwell-Wirth Rotary Table
11	1	755161	Adapter for National Rotary Table
12	2	755332	Upper Bolt
13	2	755331	Lower Bolt
14	2	755402	Lifting Eye Bolt

5.3.1.2 Door Assembly

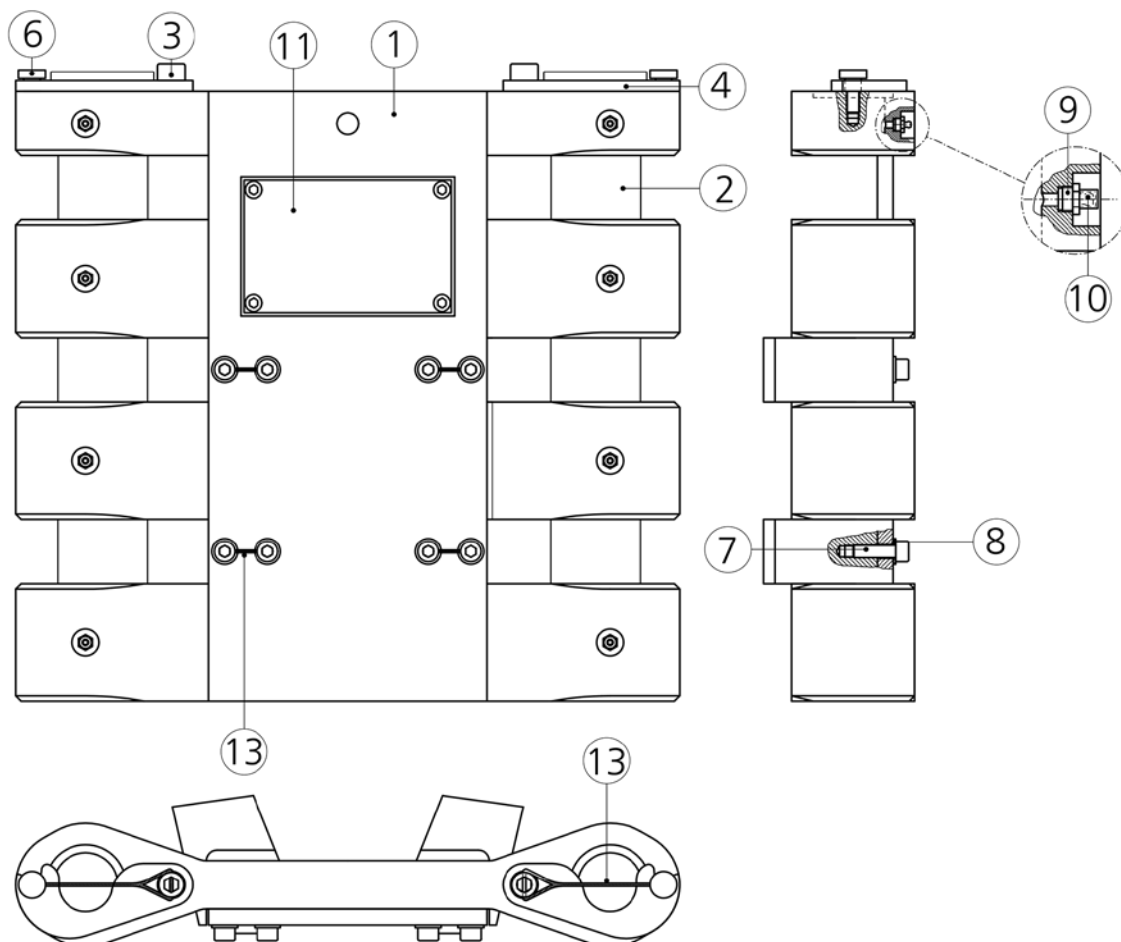


Fig. 103: Illustration Door Assembly

Parts list 755120

Pos.	Qty.	P/N	Description
1	1	755121	Door
2	2	755111	Hinge Pin
3	2	735324	Screw
4	2	755122	Securing Plate
5*	2	755402	Lifting eye bolt
6	2	755123	Bolt for Securing Plate
7	8	612559	Screw
8	8	621431	Washer
9	8	612515	Grease nipple
10	8	612518	Protection Cap
11	1	755103	Label for PS-500
12	4	612949	Screw
13	1	671052	Safety Wire

* not shown on illustration.

5.3.1.3 HCGS

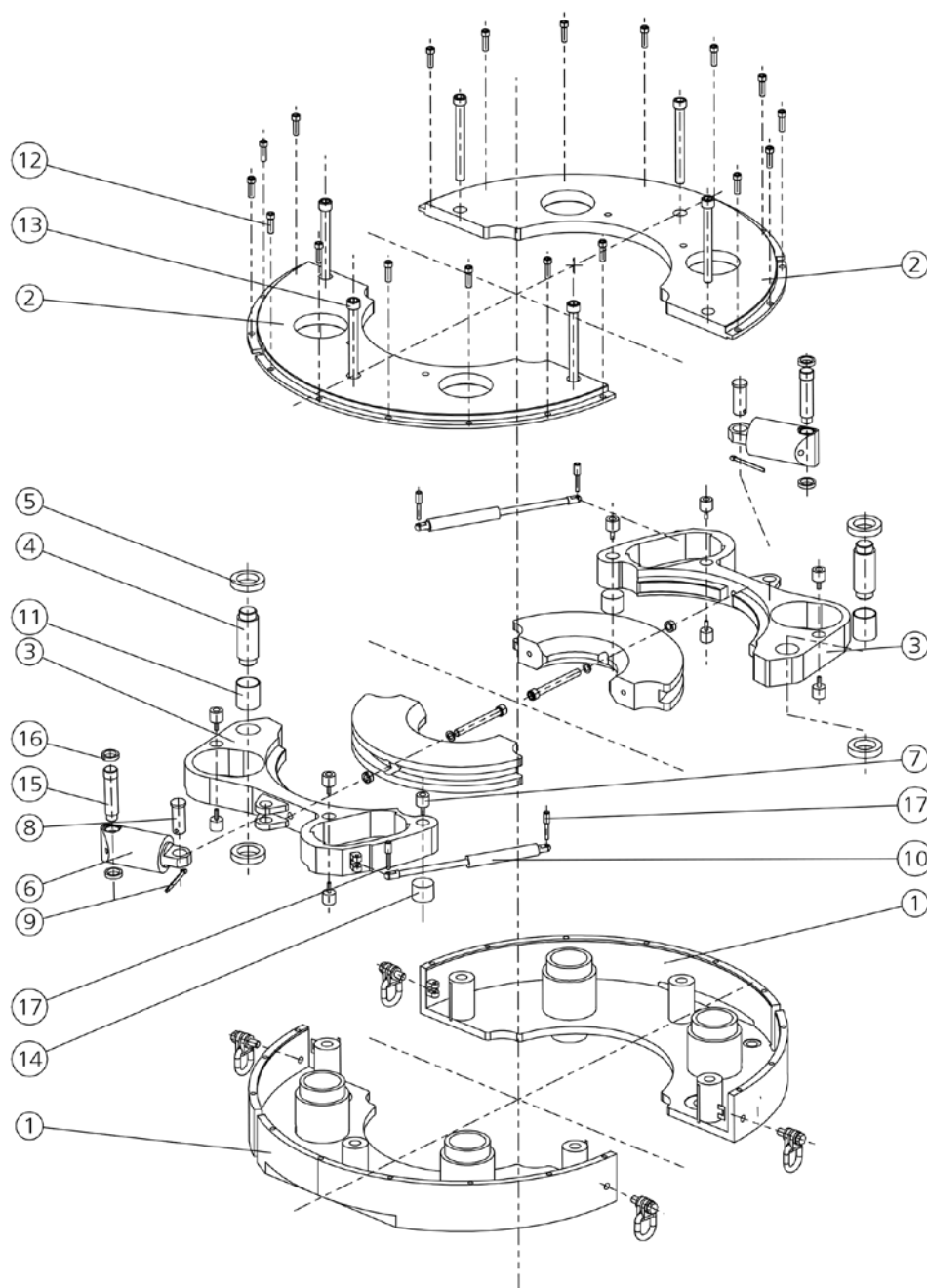


Fig. 104: Illustration HCGS

Parts list 755700

Pos.	Qty.	P/N	Description
1	1	755701	Frame
2	1	755702	Cover
3	2	755703	Lever
4	2	755704	Hinge Bolt
5	4	755705	Washer
6	2	755706	Cylinder
7	10	755703-1	Roller, small
8	2	755708	Bolt
9	2	70864	Cotter Pin

Pos.	Qty.	P/N	Description
10	2	755709	Spring
11	2	755710	Bushing
12	18	612559	Screw
13	6	755711	Screw
14	4	755703-2	Roller
15	2	755713	Bolt for Cylinder
16	4	755712	Washer
17	2	755714	Set of Bolts

5.3.1.4 Slip Assembly

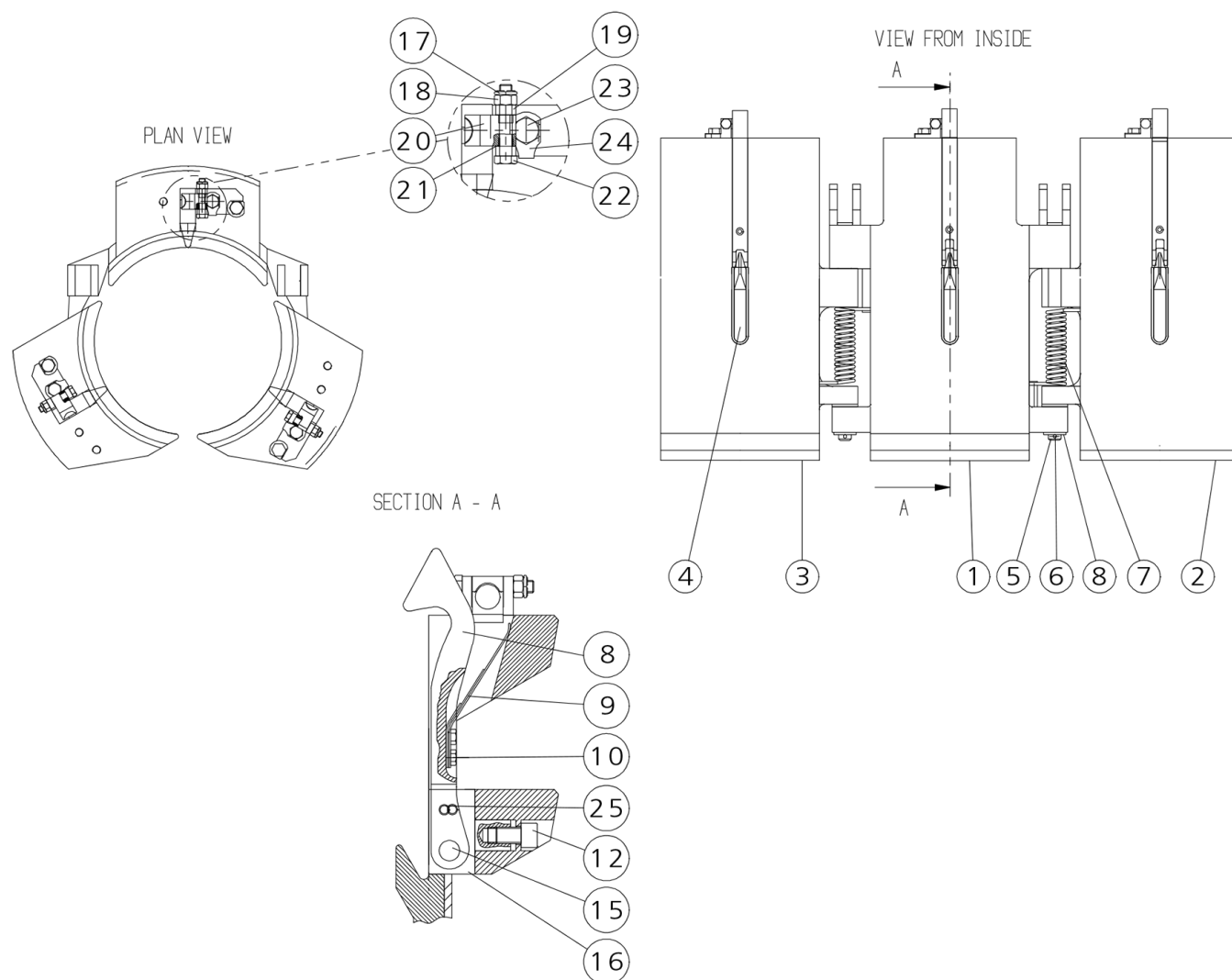


Fig. 105: Illustration Slip Assembly

Parts list 755200

Pos.	Qty.	P/N	Description
1	1	755210R	Slip Center Part
2	1	755220R	Slip Right Part
3	1	755230R	Slip Left Part
4	3	755246	Guiding Hook
5	2	755250	Hinge Pin for Slips
6	2	70363	Split Pin
7	2	755253	Spring
8	2	621435	Washer
9	3	755241	Looking Hook
10	3	755243	Spring for Hook
11	6	755249	Screw
12	3	755251	Nut
13	3	755247	Screw

Pos.	Qty.	P/N	Description
14	3	755244	Screw
15	3	755248	Washer
16	3	755245	Bolt for Hook
17	3	755242	Hinge
18	3	80340-1	Split Pin
19	3	613728	Castle Nut
20	3	755202	Plate
21	3	755203	Lever
22	6	612609	Bushing
23	3	752311	Screw
24	6	617519	Screw
25	6	792106	Washer

5.3.1.5 Feedback Assembly

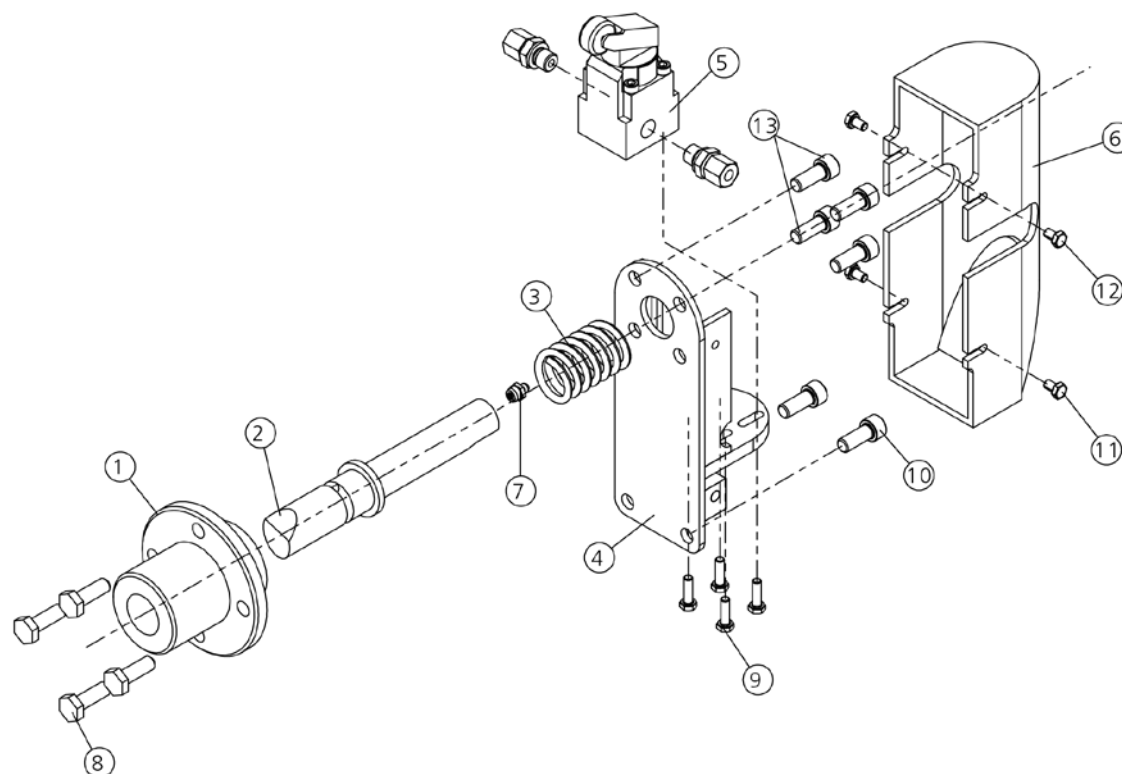


Fig. 106: Illustration Feedback Assembly

Parts list 755260

Pos.	Qty.	P/N	Description
1	1	755262	Socket
2	1	755261	Actuating Pin
3	1	775090	Spring
4	1	775092	Connection Plate for Poppet Valve
5	1	755088	Directional Poppet Valve
6	1	755263	Cover for Poppet Valve
7	1	612515	Grease Nipple
8	4	645195	Screw
9	4	775091-1	Screw
10	4	612666	Screw
11	2	735852	Screw
12	2	645128	Screw
13	2	612676	Screw

5.3.1.6 Grease System

Parts list 755500

Pos.	Qty.	P/N	Description
1	4	645093	Hydraulic Pipe
2	2	755512-1.1	Nozzle
3	1	755512-1.5	Nozzle
4	1	755512.2.0	Nozzle

5.3.1.7 Hydraulic Assembly

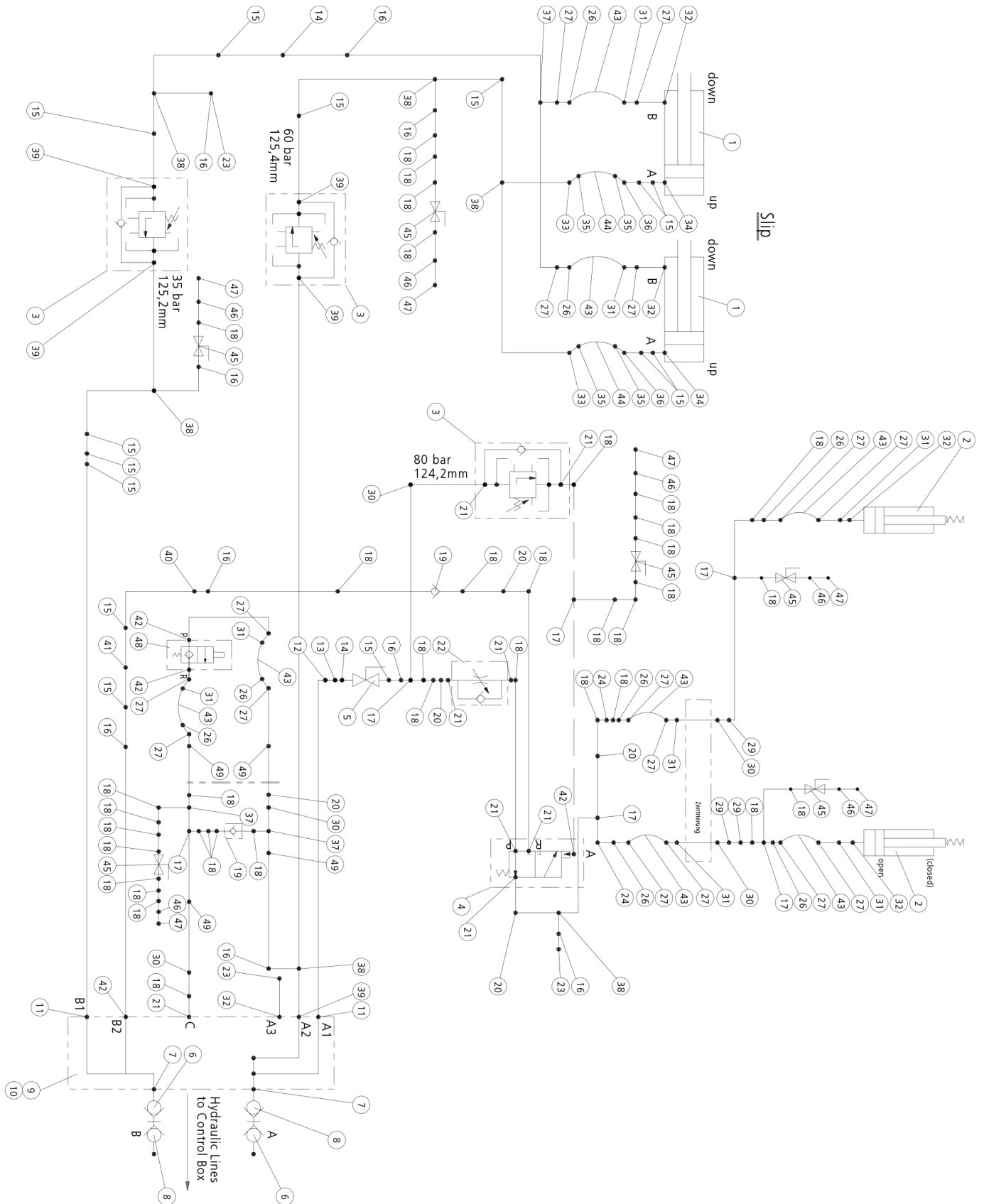


Fig. 107: Illustration Hydraulic Assembly

Parts list 755300

Pos.	Qty.	P/N	Description
0	1	755330-L	Hydraulic Cylinder, left
1	1	755330-R	Hydraulic Cylinder, right
2	2	755706	Hydraulic Cylinder for CGS, PS-500
3	2	755375	Valve
4	1	755346	Directional Poppet Valve
5	1	755360	Valve
6	2	612937	Cuppling, Flat Face
7	2	613949	Adapter
8	2	612936	cuppling, Flat Face
9	1	755323	Manifold Plate
10	1	755322	Connecting Plate
11	2	755365	Banjo Coupling
12	1	755366	Equal Elbow
13	1	755364	Swivel Reducer
14	2	755369	Elbow Bulkhead Coupling
15	8	755367	Adjustable Stud Elbow
16	5	755372	Standpipe Reducer
17	3	645095	L-Adapter
18	12	645096	L-Adapter
19	2	645110	Check Valve
20	3	612945	Straight Connection 8L-8L
21	7	613943	Fitting
22	1	612934	Throttle
23	3	755361	Pressure Coupling
24	2	645105	Connection
25	1	645096	L-Adapter
26	6	612951	Hose Connection, straight 8L
27	11	612955	Hose Fitting
28	2	612953	Hose Connection 45 degree
29	4	613941	Straight Connection
30	5	755738	90 degree Fitting, 8L-8L
31	3	612954	Hose Connection, 90 degree 8L
32	5	613945	90 degree Fitting
33	2	617552	Tapered nipple
34	2	755374	Straight Male Stud Coupling
35	4	617551	Swaged Fitting
36	2	755325	Tapered Nipple 45 degree
37	1	645104	T-Connection
38	2	755368	Equal Tee
39	5	755373	Staight Male Stud Coupling
40	1	617553	Bulkhead elbow
41	2	755370	Straight Bulkhead coupling
42	1	612944	Straight Connection
43	2	612956	Hydraulic Hose
44	1	617550	Hydraulic Hose
45	1	755375-2	Valve
46	6	612968	Pressure Gauge Connecting Part
47	6	612967	Air Bleeder
48	1	755088	Valve
49	4	645106	Bulkhead Elbow

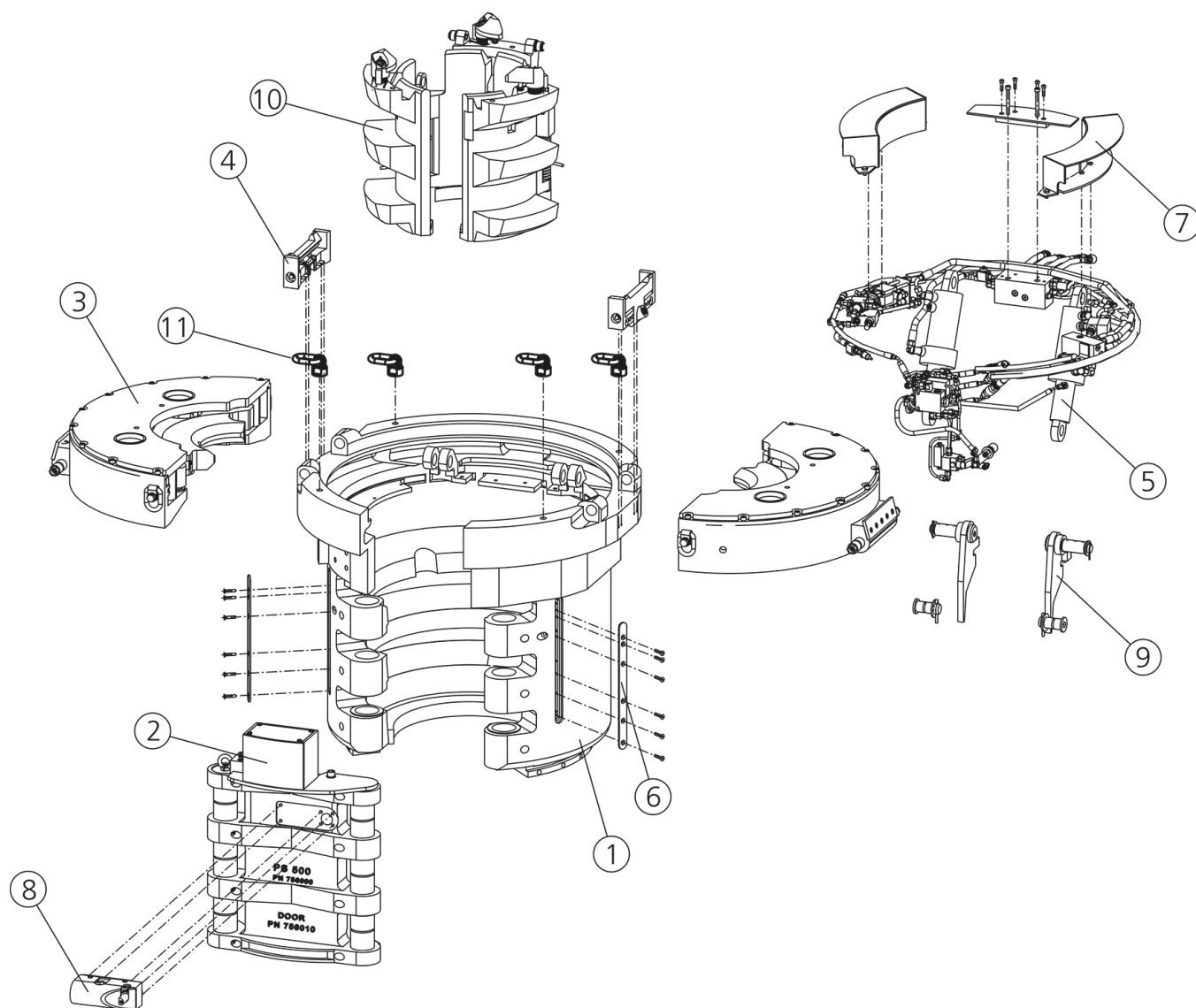
5.3.2 PS-500
Main Assembly P/N 756000


Fig. 108: General Illustration

Parts list 756000

Pos.	Qty.	P/N	Description
1	1	756000-BF-2	Body
2	1	756009	Door Assembly
3	1	756700	Hydraulic Centering Guide System
4	2	756720	Locking Device for Cover
5	1	756300	Hydraulic Assembly
6	1	756060	Greasing System
7	1	756083	Hydraulic Cover, One Set
8	1	756094	Feedback Assembly
9	1	756006	Bolt Assembly
10	1	756020	Slip Assembly
11	4	755116	Lifting eye

5.3.2.1 Door Assembly

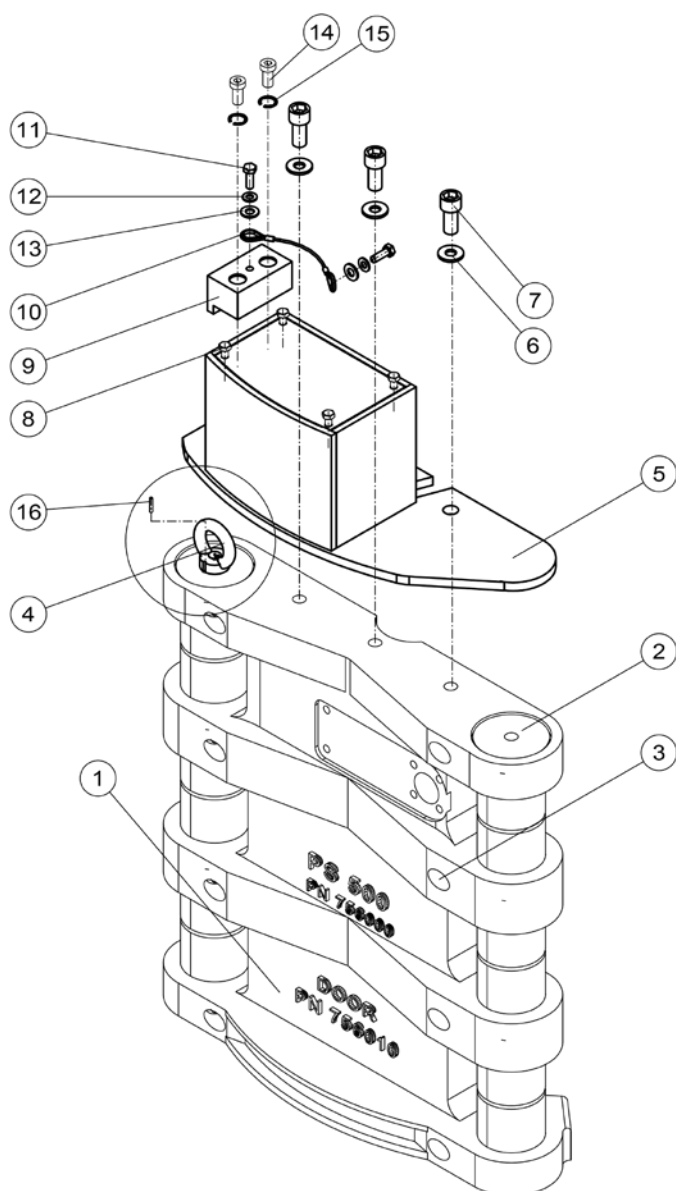


Fig. 109: Illustration Door Assembly

Parts list 756009

Pos.	Qty.	P/N	Description
1	1	756009-BF	Door
2	2	756011	Hinge Pin
3	8	70064	Grease Nipple
4	1	755402	Lifting Eye Bolt
5	1	757014	Door Plate Assembly
6	3	615879	Washer
7	3	710542	Screw
8	4	645058	Screw
9	1	756015	Securing Block
10	1	645037	Rope
11	2	735852	Screw
12	2	645683	Washer
13	2	725443	Washer
14	2	613548	Screw
15	2	645026	Retaining Ring
16	1	641599	Spring-type Straight Pin

5.3.2.2 HCGS

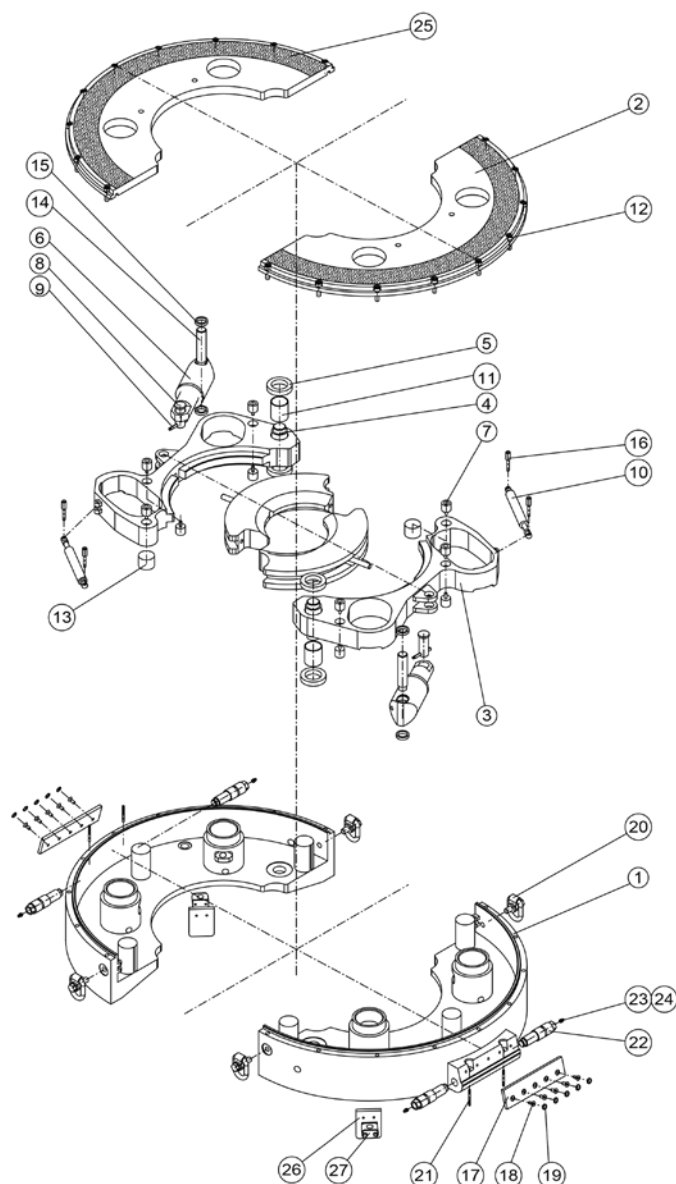


Fig. 110: Illustration Hydraulic Centering Guide System

Parts list 756700

Pos.	Qty.	P/N	Description
1	1	756701	Cover
2	1	756702	Cover Plate, left and right
3	2	756703	Lever for Centering Device
4	2	755704	Hinge Bolt
5	4	755705	Washer
6	0	755706	Hydraulic Cylinder
7	10	755703-1	Roller
8	2	755708	Bolt
9	4	70864	Split Pin
10	2	755709	Cylinder for Guide Plates
11	2	755710	Bushing
12	18	612559	Screw
13	2	755703-2	Roller
14	2	755713	Bolt

Pos.	Qty.	P/N	Description
15	4	755712	Washer
16	4	755714	Bolt
17	2	756710	Sheet Metal
18	10	645054	Screw
19	10	756734	Retaining ring
20	4	553468	Lifting eye
21	4	756730	Grooved pin
22	4	756067	Hinge Pin
23	4	70064	Grease Nipple
24	4	612518	Protection Cap
25	2	800100	Slipping Protection
26	2	756704	Protection Plate
27	2	613929	Tube Holder

5.3.2.3 Cover Locking Device

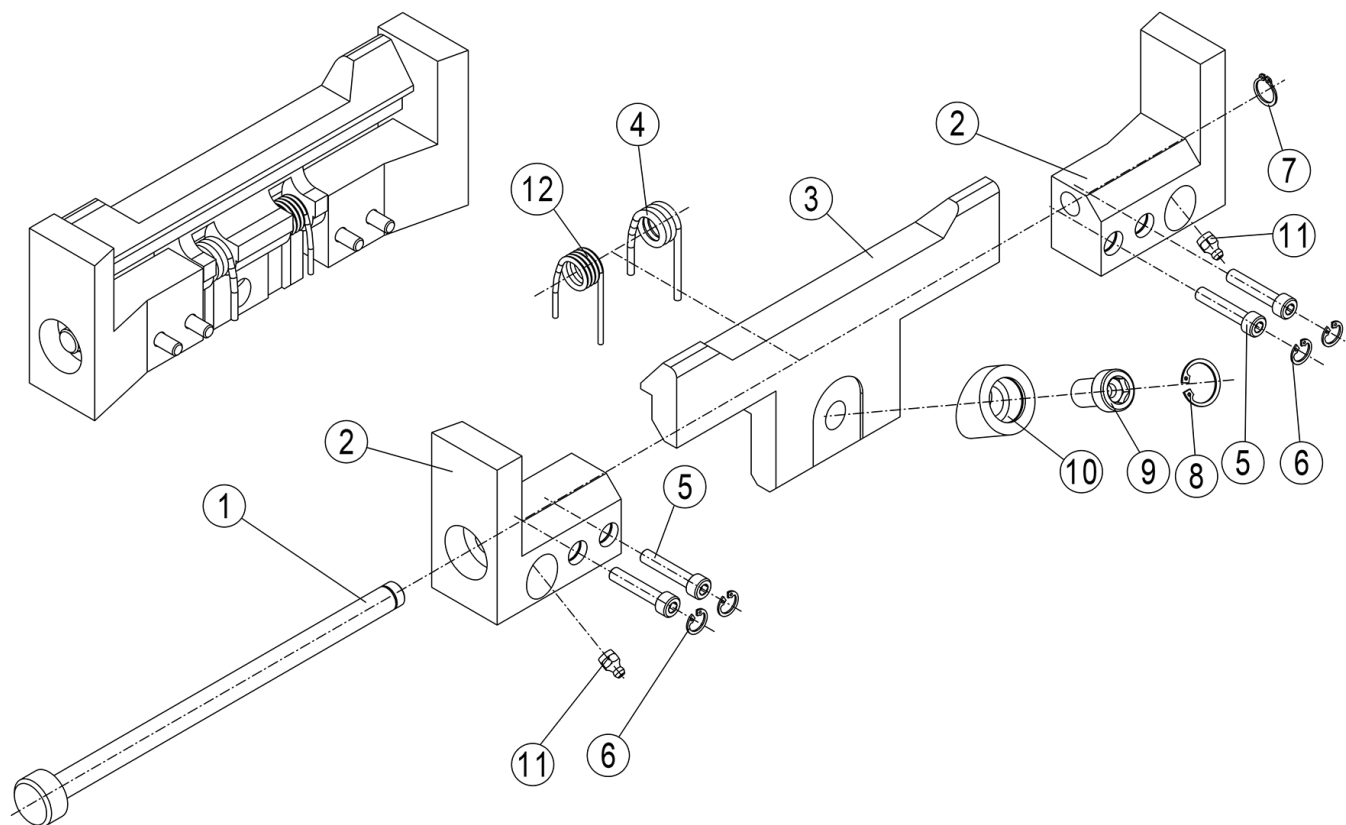


Fig. 111: Illustration Locking Device

Parts list 756720

Pos.	Qty.	P/N	Description
1	1	756721	Pin For Snap
2	1	756722	Clamp
3	1	756723	Snap
4	1	756724	Spring
5	4	756725	Screw
6	4	756726	Retaining Ring
7	1	613721	Retaining Ring
8	1	756786	Retaining Ring
9	1	756728	Screw
10	1	756727	Bolt
11	2	70064	Grease Nipple
12	1	756729	Spring

5.3.2.4 Bolt Assembly

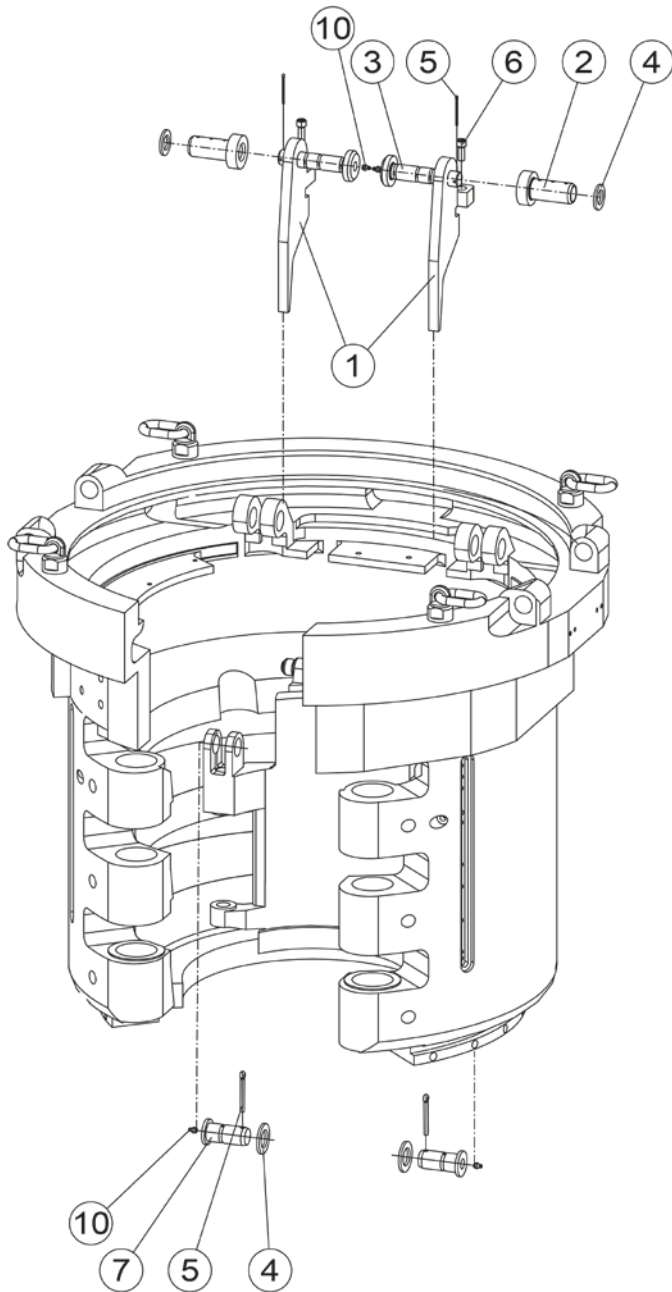


Fig. 112: Illustration Bolt Assembly

Parts list 756006

Pos.	Qty.	P/N	Description
1	1	756097	Set Guide Plates For Center Slip
2	2	756095	Upper Bolt, Part 1
3	2	756096	Upper Bolt, Part 2
4	2	756096-1	Washer
5	2	755334	Split Pin
6	2	725348	Screw
7	2	756025	Lower Bolt; (PS-500)
8	2	775096-3	Washer For Clevis Pin
9	2	70864	Split Pin
10	4	70064	Grease Nipple

5.3.2.5 Slip Assembly

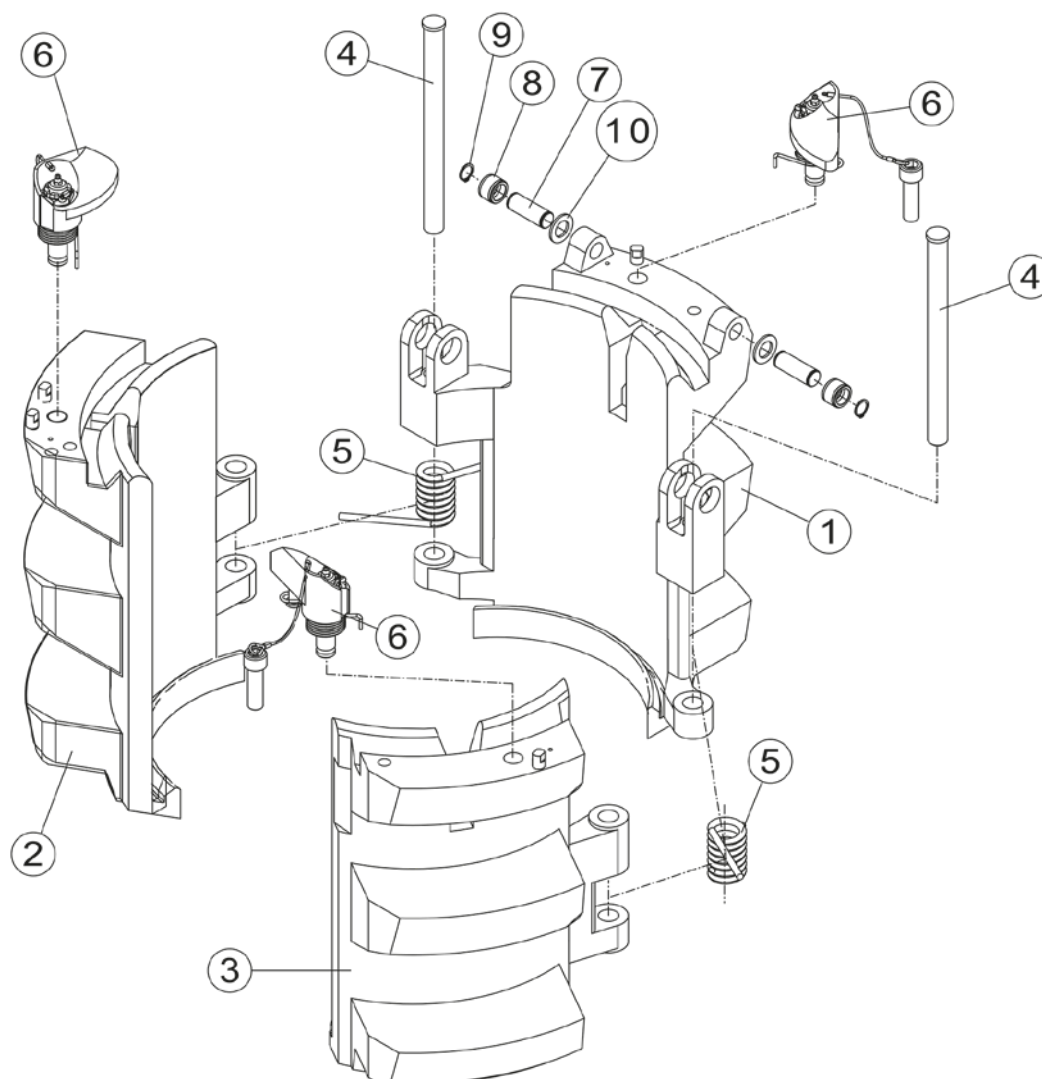


Fig. 113: Illustration Slip Assembly

Parts list 756020

Pos.	Qty.	P/N	Description
1	1	756021-BF	Slip Segment Midle
2	1	756022-BF	Slip Segment Left
3	1	756023-BF	Slip Segment Right
4	2	756014	Hinge Pin
5	2	756014-1	Hinge Pin Spring
6	3	756018	Carrier Securing Assembly
7	2	756096-4	Bolt For Roller
8	2	752210	Roller
9	4	613720	Retaining Ring
10	2	70116	Washer

5.3.2.6 Insert Carrier Securing Assembly

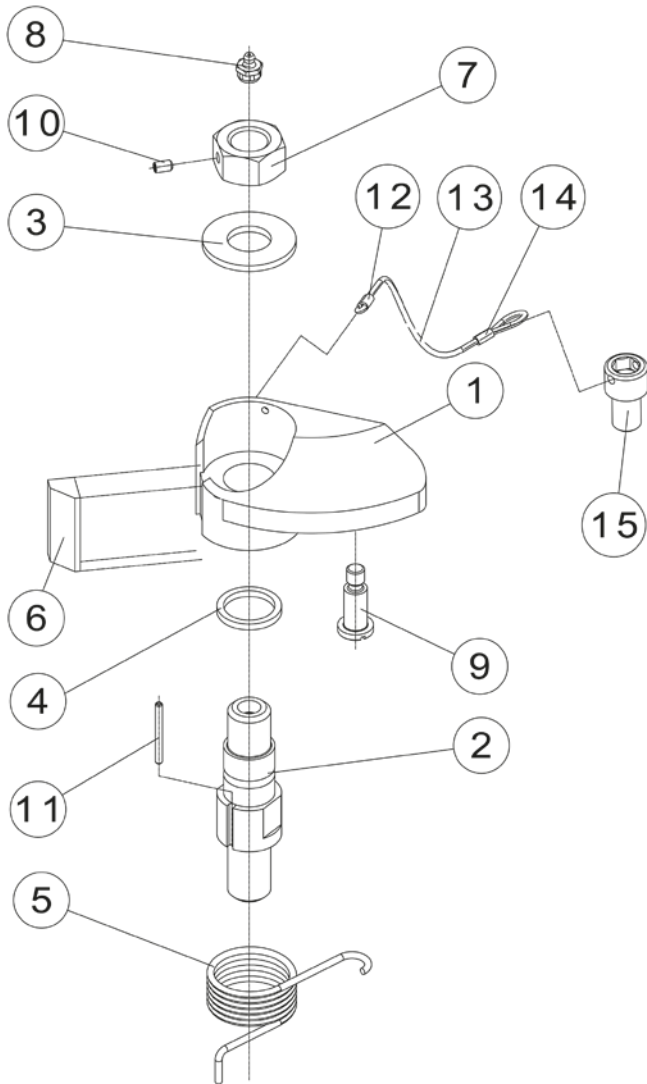


Fig. 114: Illustration Securing Assembly

Parts list 756018

Pos.	Qty.	P/N	Description
1	1	756024	Securing Latch for Insert Carrier
2	1	756017	Pin for Securing Latch
3	1	775026	Washer
4	1	775027	Washer
5	1	775028	Spring
6	1	775029	Stopper
7	1	775015-1	Nut
8	1	612515	Grease Nipple
9	1	775019	Screw
10	1	775015-3	Set screw
11	1	88240-4	Spring-type Straight Pin
12	1	643801-1	Rope Clamp
13	1	643801	Wire line
14	1	643801-11	wire line clamp 3mm
15	1	643663	Screw

5.3.2.7 Greasing System

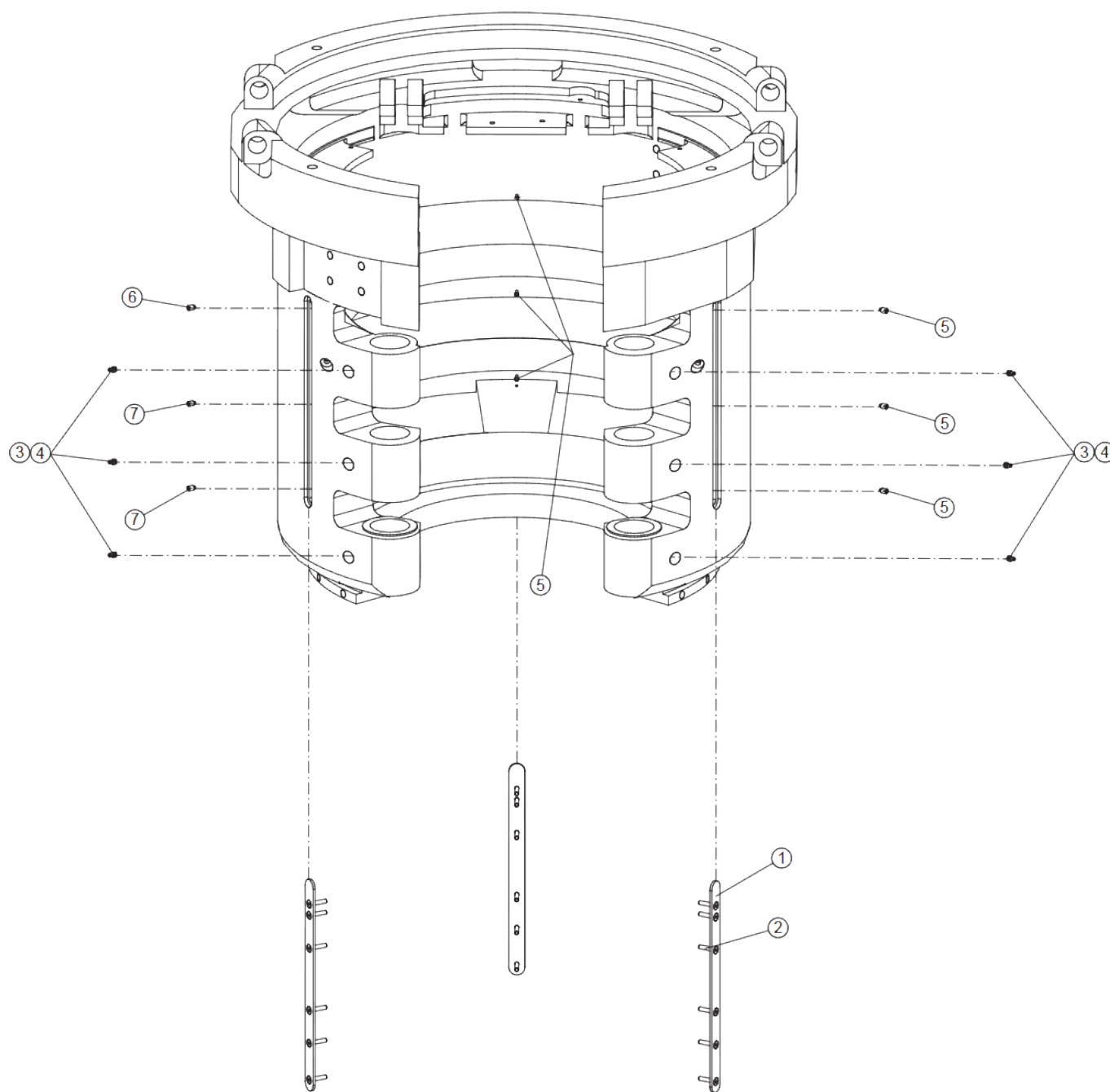


Fig. 115: Illustration Greasing System

Parts list 756060

Pos.	Qty.	P/N	Description
1	3	756061	Cover
2	18	775073	Screw
3	6	70064	Grease Nipple
4	6	612518	Protection Cap
5	1	775048-1.1	Grease Nozzle - Ø 1,1mm
6	2	775048-1.5	Grease Nozzle - Ø 1,5mm
7	6	775048-2.0	Grease Nozzle - Ø 2,0mm

5.3.2.8 Feedback Assembly

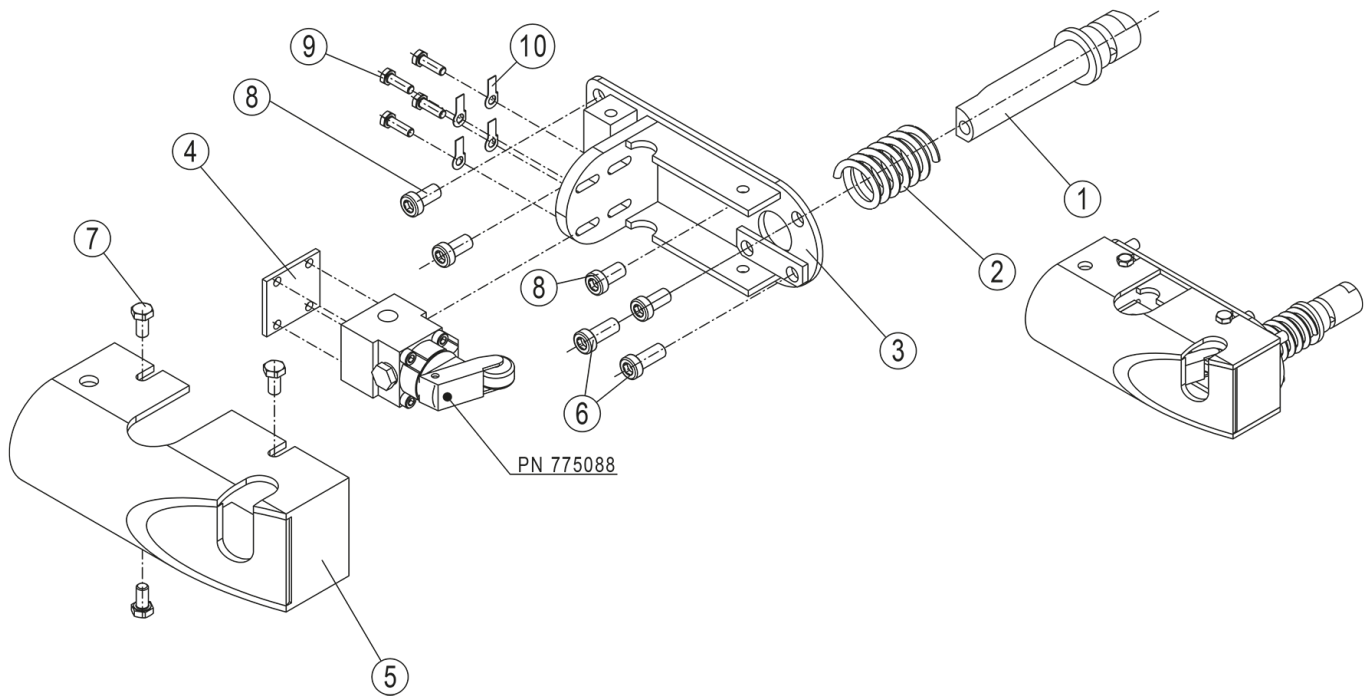


Fig. 116: Illustration Feedback Assembly

Parts list 756094

Pos.	Qty.	P/N	Description
1	1	756091-2	Plunger
2	1	775090	Spring
3	1	756192	Connection Plate for Poppet Valve
4	1	756092	Plate
5	1	756093	Cover
6	2	612577	Screw
7	3	645028	Screw
8	4	612576	Screw
9	4	775092-1	Screw
10	4	792111	Washer

5.3.2.9 Hydraulic Assembly

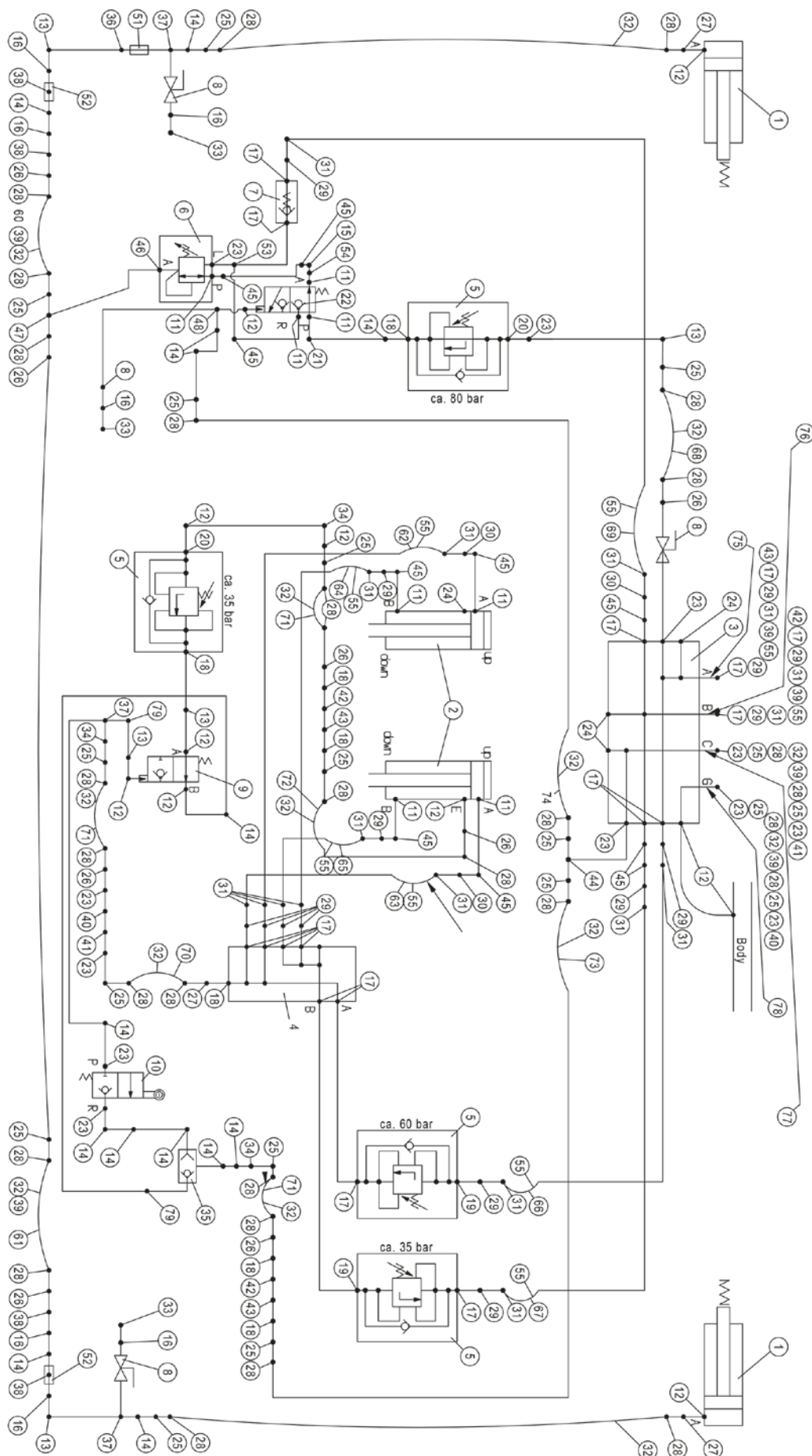


Fig. 117: Illustration Hydraulic Assembly

Parts list 756300

Pos.	Qty.	P/N	Description
1	2	755706	Hydraulic Cylinder
2	2	756099	Hydraulic Cylinder
3	1	756081	Hydraulic Block 1
4	1	756085	Hydraulic Block 2
5	4	755375	Valve
6	1	645156	Valve
7	1	615861-4	Check Valve
8	4	645099	Valve BKH-8L
9	1	775797	3/2 Way Valve
10	1	775088	Valve
11	8	755365	Banjo Coupling
12	10	613945	90 degree Fitting
13	4	755738	90 degree Fitting, 8L-8L
14	13	645096	L-Adapter 12 L
15	2	755369	Elbow Bulkhead Coupling
16	7	612968	Pressure Gauge Connecting Part
17	17	755373	Straight Male Stud Coupling
18	7	613943	Fitting
19	2	755374	Straight Male Stud Coupling
20	1	613944	Reducing Nipple
21	2	755372	Standpipe Reducer
22	1	755346	Directional Poppet Valve
23	12	612944	Straight Connection 8L-1/4"
24	16	612929	Blind Screw (8x screwed to Frame)
25	2	612951	Hose Connection Straight 8L
27	2	612954	Hose Connection 90° 8L
28	4	612955	Hose Fitting
32	0,8 m	612956	Hydraulic Hose
33	3	612967	Air Bleeder
34	3	645106	Elbow Bulkhead Coupling
35	1	756320	Coupling
36	1	613941	Straight Connection
37	3	645095	L-Connection
38	4	756315	Swivel Male Stud Coupling
44	1	755737	Equal Tee
45	10	755367	Adjustable Stud Elbow
46	1	615932	Adapter G3/8" – G1/4"
47	1	615933	T-Connection
48	1	645104	T-Connection
49	1	613946	Straight Connection
51	1	755740	Tube Holder I, complete
52	2	613929	Tube Holder
53	1	756318	Adjustable Stud Barrel Tee with O-ring
54	2	755364	Swivel Reducer
56	2 m	645093	Hydraulic Pipe
60	1	756300-1	Hydraulic Hose
61	1	756300-2	Hydraulic Hose
62	1	756300-3	Hydraulic Hose
49	1	613946	Straight Connection
50	1	755325	Tapered Nipple - 45°
51	1	755740	Tube Holder I
52	2	613929	Tube Holder II
53	1	756318	Adjustable Direction Fitting, L Shaped
54	2	755364	Swivel Reducer
55	4	617550	Hydraulic Hose
57	1	756300-1	Hydraulic Hose
58	1	756300-2	Hydraulic Hose
59	1	756300-3	Hydraulic Hose
60	1	756300-4	Hydraulic Hose
61	1	756300-5	Hydraulic Hose
62	1	756300-6	Hydraulic Hose

Pos.	Qty.	P/N	Description
63	1	756300-4	Hydraulic Hose
64	1	756300-5	Hydraulic Hose
65	1	756300-6	Hydraulic Hose
66	1	756300-7	Hydraulic Hose
67	1	756300-8	Hydraulic Hose
68	1	756300-9	Hydraulic Hose
69	1	756300-10	Hydraulic Hose
70	1	756300-11	Hydraulic Hose
71	1	756300-12	Hydraulic Hose
72	1	756300-13	Hydraulic Hose
73	1	756300-14	Hydraulic Hose
74	1	756300-15	Hydraulic Hose
75	1	756300-16	Hydraulic Hose
76	1	756300-17	Hydraulic Hose
77	1	756300-18	Hydraulic Hose
78	1	756300-19	Hydraulic Hose
79	2	612945	Straight Connection 8L-8L

5.3.3 PS-500

Main Assembly P/N 757000-RT

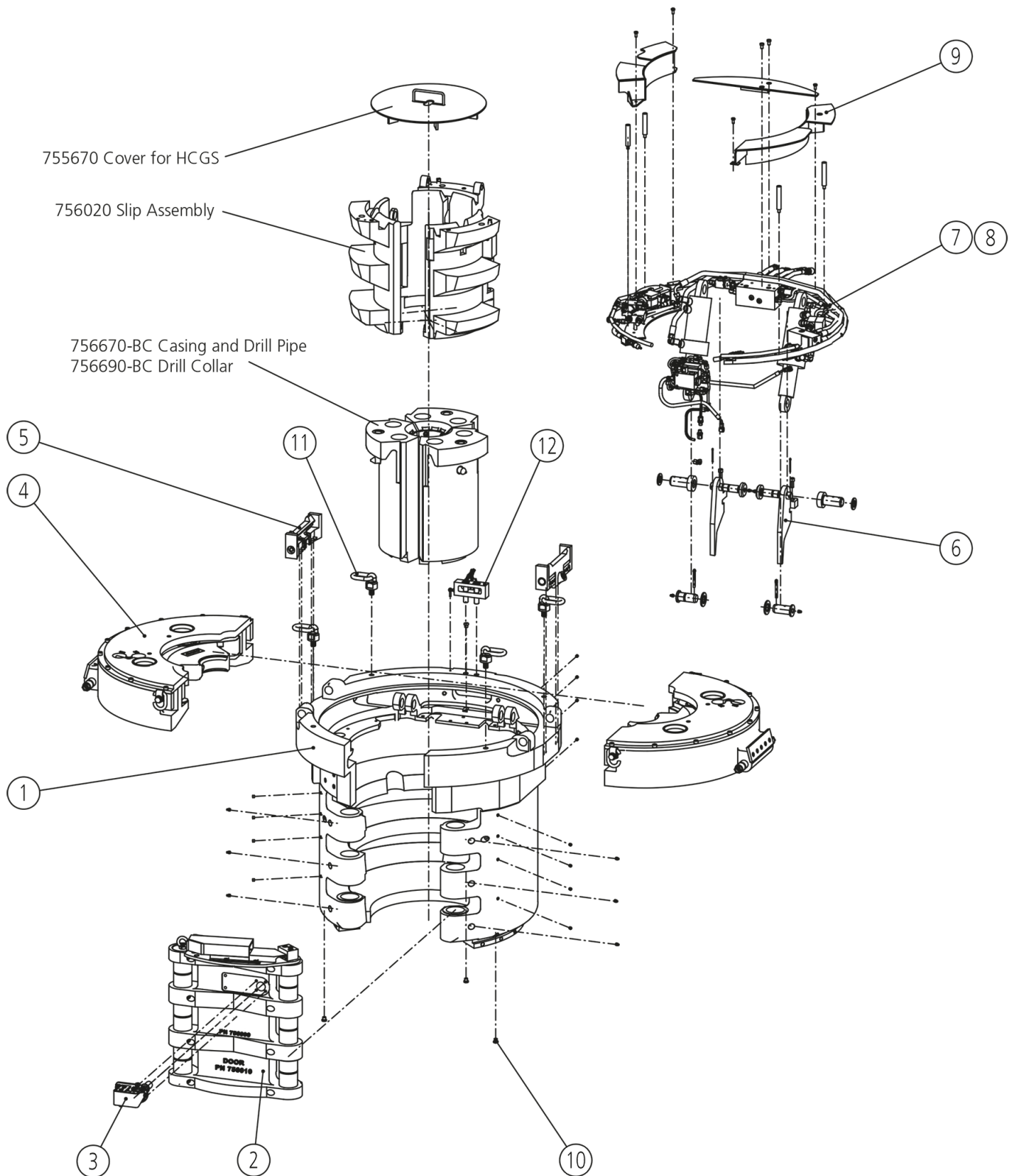


Fig. 118: General Illustration

Parts list 757000-E

Pos.	Qty.	P/N	Description
1	1	756000-BF-2	Body
2	1	756009	Door Assembly
3	1	757680	Feedback Assembly
4	1	756330	Hydraulic Centering Guide System
5	2	756720	Locking Device for Cover (Refer to chapter 5.3.2.3 for the respective drawing and parts list.)
6	1	757006	Bolt Assembly (Refer to chapter 5.3.2.4 for the respective drawing and parts list.)
7	1	756800	Hydraulic Assembly
8	1	756800-1	Hydraulic Connection
9	1	757030	Hydraulic Cover
10	1	757060	Greasing System (Refer to chapter 5.3.2.7 for the respective drawing and parts list.)
11	4	755116	Lifting eye
12	1	757080	Locking Device
-	4	612530-5	Marking Point for Grease Nipple
-	2	611524	Warning Sign "Don't Touch"
-	1	613129	Sticker Hotline
-	1	671638	Warning Sign Forum
-	5	671640	Warning Sign "Hands"
-	6	671642	Warning Sign "Grease Daily"
-	4	671646-2	Sign "Lifting Point"
-	3	737103	Warning Sign "Body"

Parts list 757000-N

Pos.	Qty.	P/N	Description
1	1	757000-E	PS-500
2	2	756161	Adapter Assembly for National-Oil

Parts list 757000-OW

Pos.	Qty.	P/N	Description
1	1	757000-E	PS-500
2	2	756163	Adapter Assembly for National-Oil

5.3.3.1 Adapter Assembly for National-Oil RT

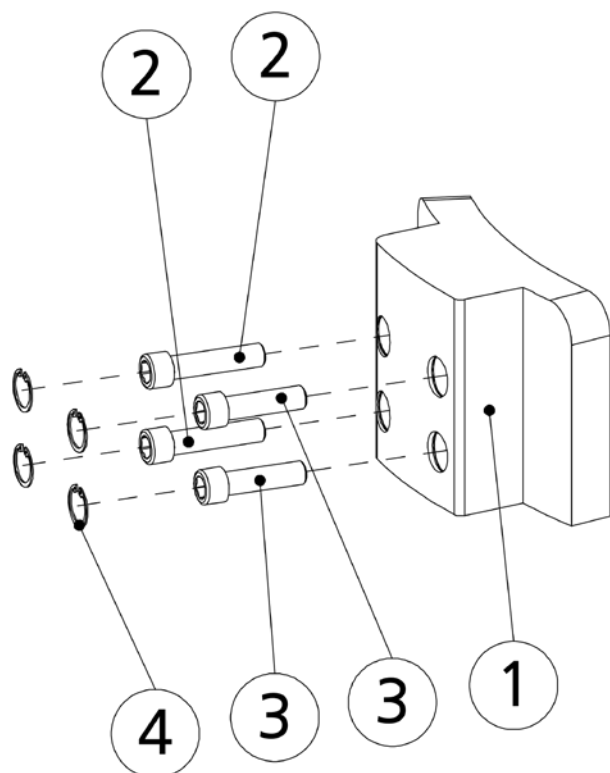


Fig. 119: Illustration Oilwell-Wirth RT

Parts list 756161

Pos.	Qty.	P/N	Description
1	2	756162	Adapter for National-Oilwell RT
2	4	755167	Screw
3	4	725467	Screw
4	8	755168	Retaining Ring

5.3.3.2 Adapter Assembly for Oilwell-Wirth RT

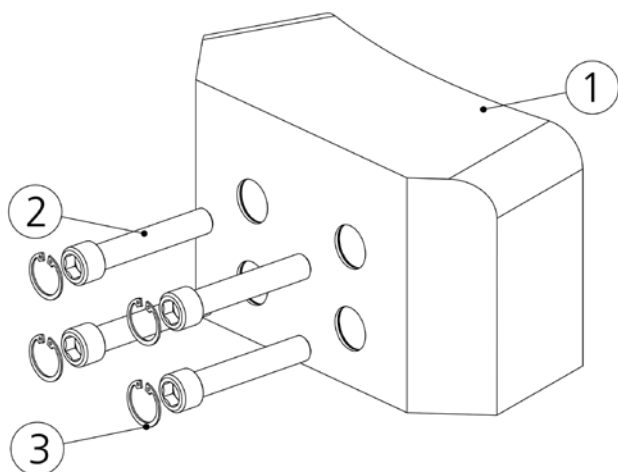


Fig. 120: Illustration Oilwell-Wirth RT

Parts list

Pos.	Qty.	P/N	Description
1	2	756164	Adapter for Oilwell-Wirth RT
2	8	725465	Screw
3	8	755168	Retaining Ring

5.3.3.3 Feedback Assembly

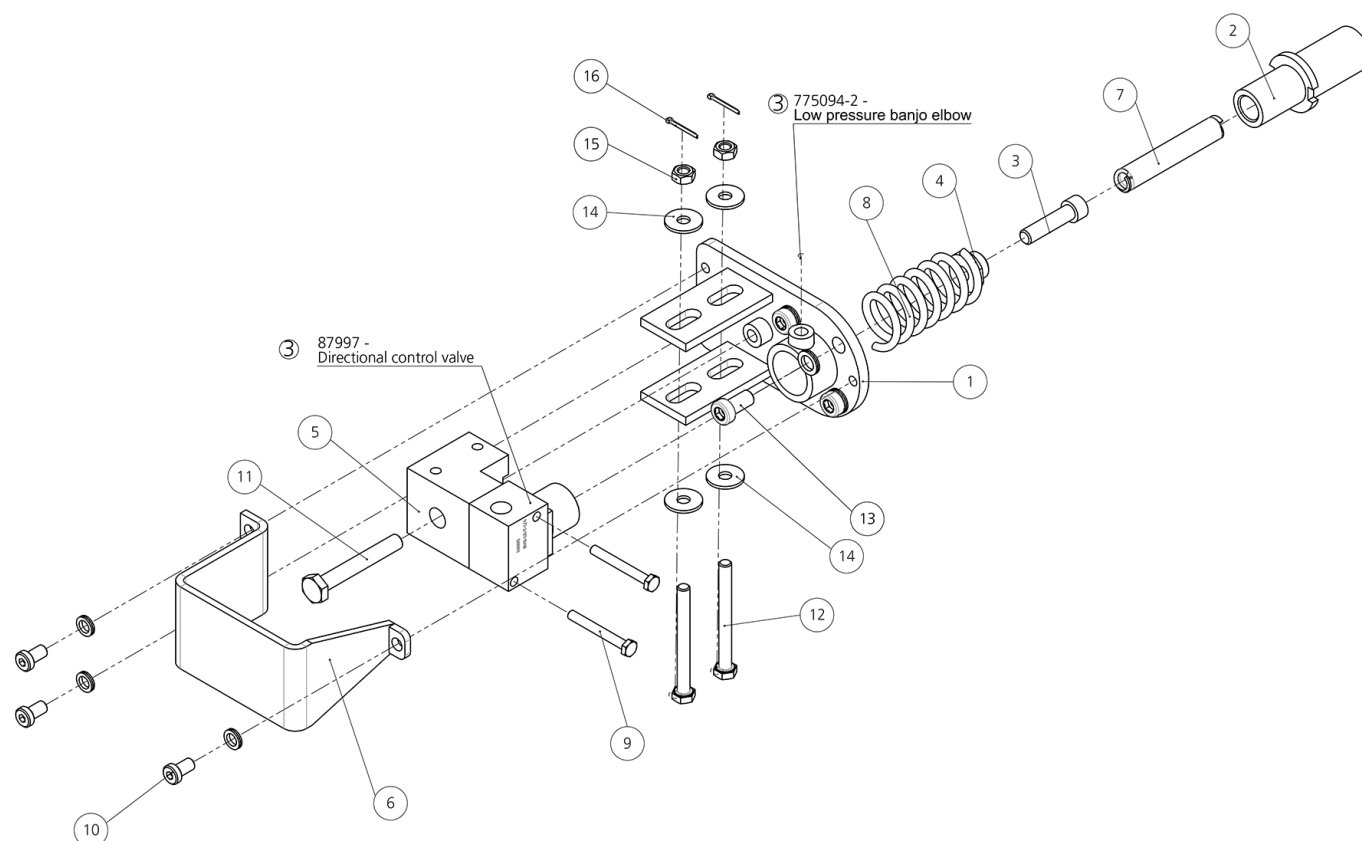


Fig. 121: Illustration Feedback Assembly

Parts list 757680

Pos.	Qty.	P/N	Description
1	1	757680-1	Connection Plate
2	1	757680-2	Plunger
3	1	757680-3	Bolt
4	1	757680-4	Channel
5	1	757680-5	Block
6	1	757680-6	Cover plate
7	1	757680-8	Pressure spring
8	1	775090	Spring
9	2	726009	Screw
10	3	757680-12	Screw
11	1	757680-10	Screw
12	2	757685	Screw
13	4	612576	Screw
14	2	613633	Nut
15	4	753051	Washer
16	5	792112	Washer
-	4	792103	Washer
-	2	620609	Split Pin

5.3.3.4 Door Assembly

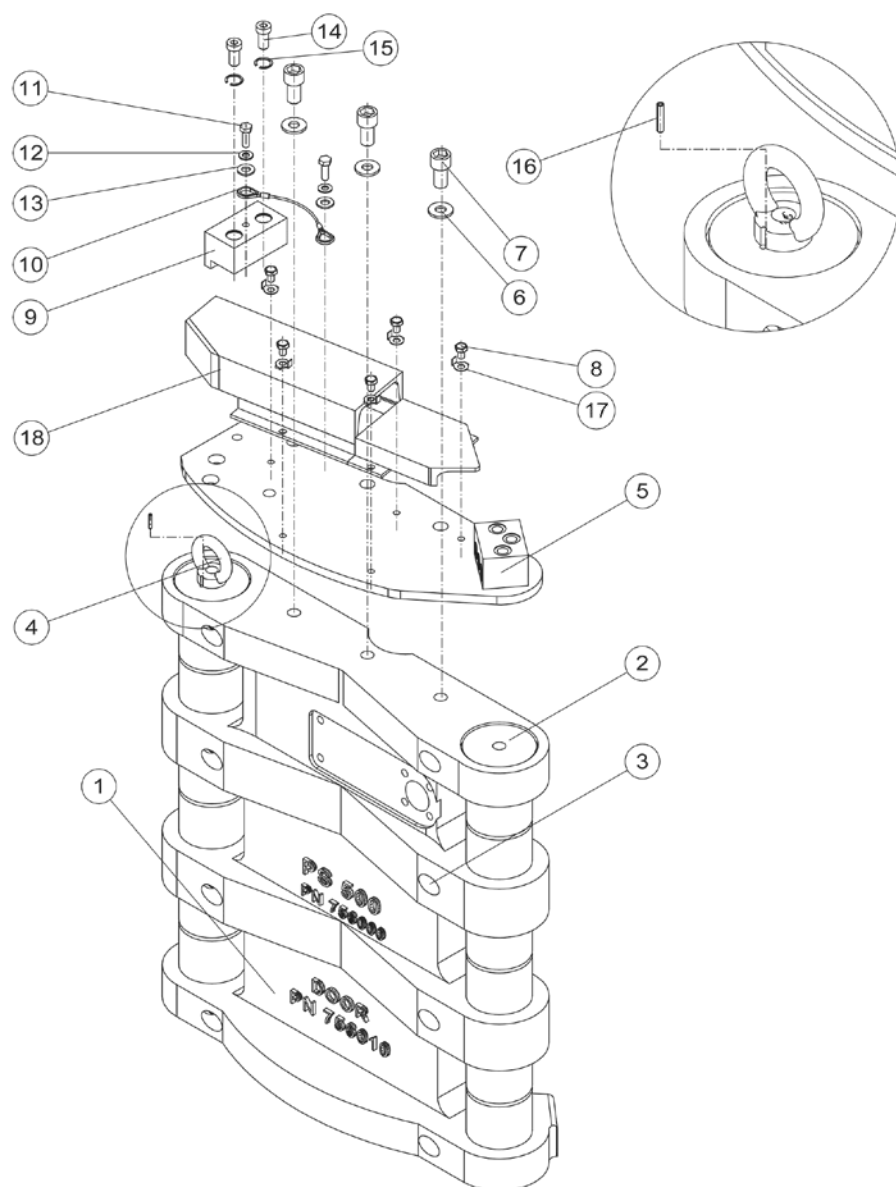


Fig. 122: Illustration Door Assembly

Parts list 756009

Pos.	Qty.	P/N	Description
1	1	756009-BF	Door
2	2	756011	Hinge Pin
3	8	70064	Grease Nipple
4	1	755402	Lifting Eye Bolt
5	1	757014	Door Plate Assembly
6	3	615879	Washer
7	3	710542	Screw
8	5	645058	Screw
9	1	756015	Securing Block
10	1	645037	Rope
11	2	735852	Screw
12	2	645683	Washer
13	2	725443	Washer
14	2	613548	Screw
15	2	645026	Retaining Ring
16	1	641599	Spring-type Straight Pin
17	5	792112	Washer
18	1	757016	Hydraulic Cover

5.3.3.5 HCGS (Guide Plates with Plug-in Connection)

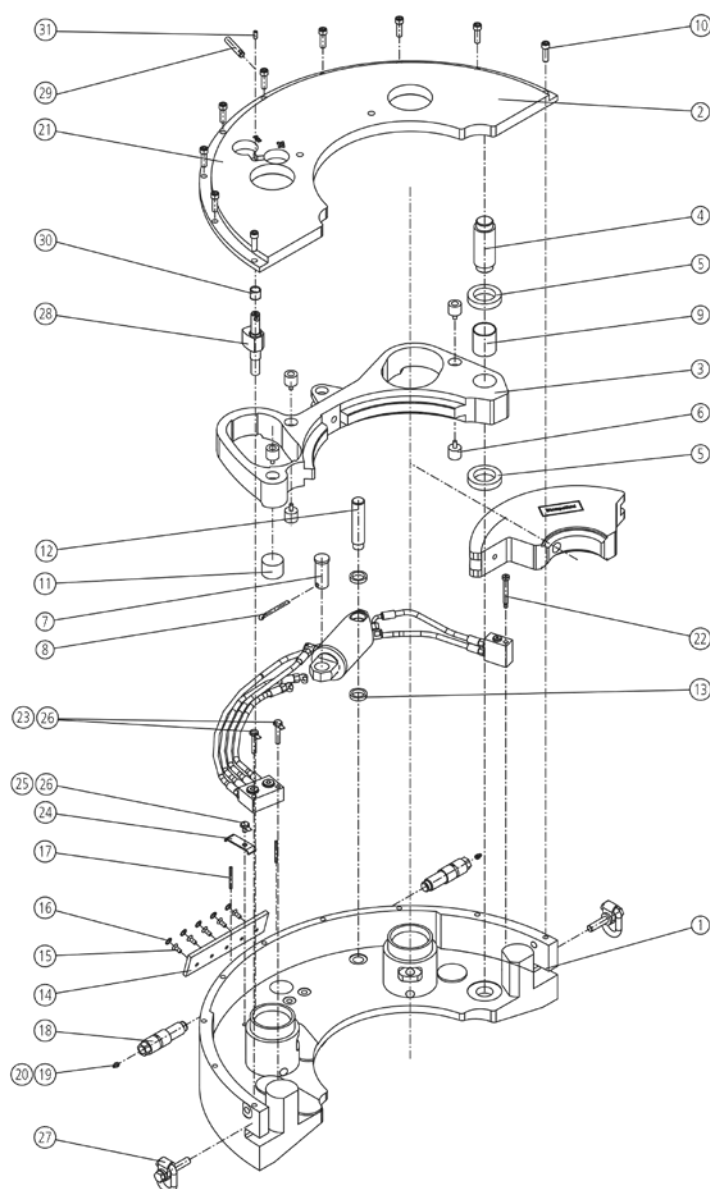


Fig. 123: Illustration Hydraulic Centering Guide System

Parts list 756330

Pos.	Qty.	P/N	Description
1	1	756331	Cover
2	2	756333	Cover Plate
3	2	756335	Lever
4	2	755704	Hinge Pin
5	4	755705	Washer
6	10	755703-1	Roller, small
7	2	755708	Bolt
8	2	70864	Cotter Pin
9	2	755710	Bushing
10	18	612559	Screw
11	2	755703-2	Roller
12	2	755713	Bolt for Cylinder
13	4	755712	Washer
14	2	756710	Sheet Metal
15	10	645054	Screw
16	10	756734	Securing Ring

Pos.	Qty.	P/N	Description
17	4	756730	Pin
18	4	756067	Hinge Pin for Cover
19	4	70064	Grease Fitting
20	4	612518	Protection Cap
21	2	710353	Screw
22	4	645073	Screw
23	2	756347	Plate
24	2	613894	Screw
25	6	792103	Washer
26	4	553468	Lifting Eye
27	2	756806	Stopper
28	2	756807	Rod
29	2	756805	Spring
30	2	651527-12	Screw
31	2	756331-1	Plate
-	18	792103	Washer

5.3.3.6 Locking Device

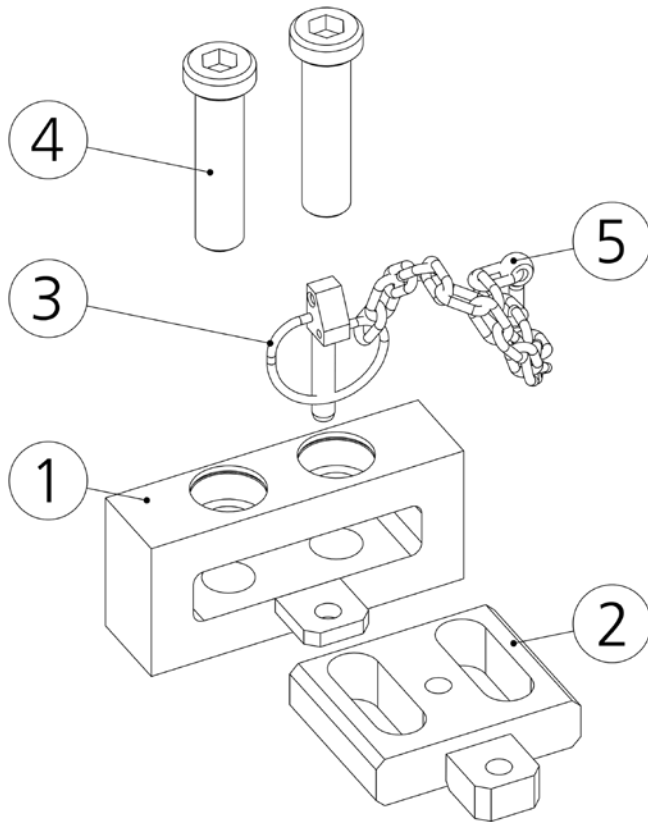


Fig. 124: Illustration Locking Device

Parts list 757080

Pos.	Qty.	P/N	Description
1	1	757081	Locating Bracket
2	1	757082	Locking
3	1	645085-1	Linch Pin
4	2	757084	Screw
5	1	660414-1	Eye Screw

5.3.3.7 Hydraulic Assembly

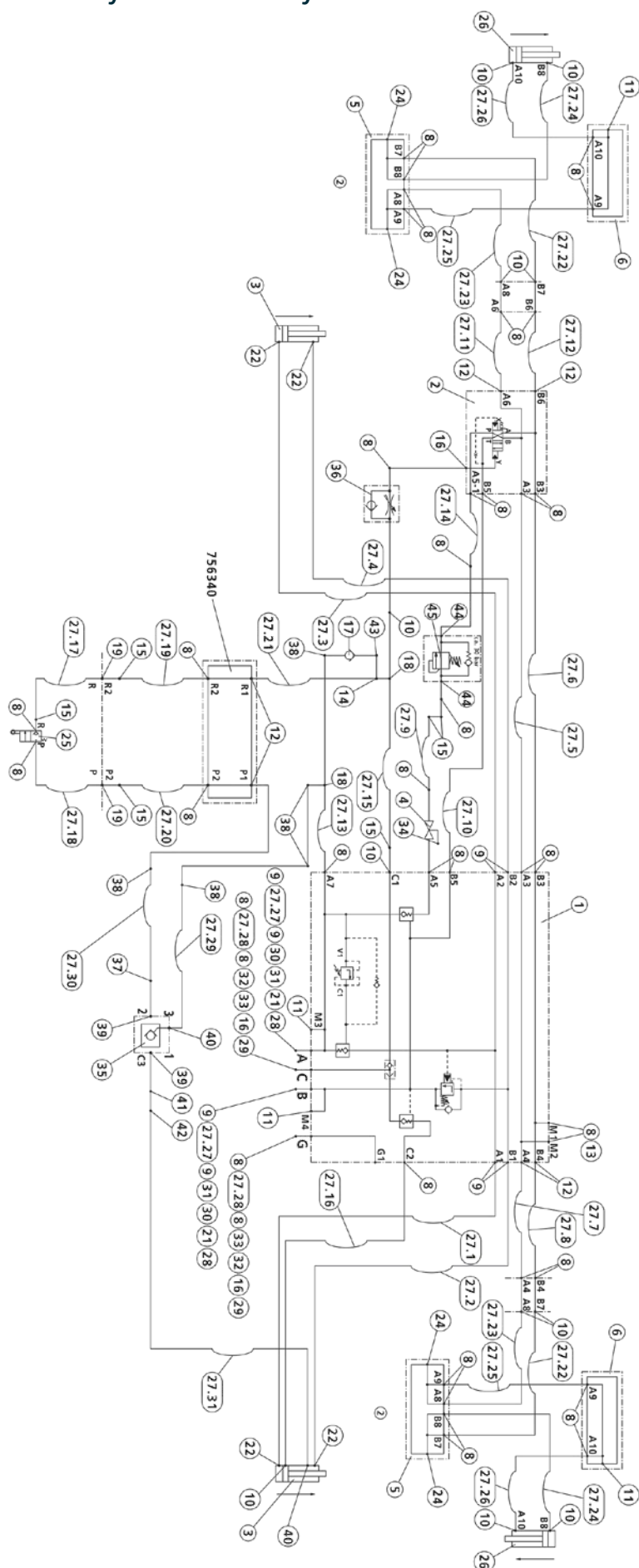


Fig. 125: Illustration Hydraulic Assembly

Parts list 756800

Pos.	Qty.	P/N	Description
1	1	756801	Valve Block for Power Slips
2	1	756802	Distribution Plate for Power Slips
3	1	756099	Hydraulic Cylinder, One Set
4	1	645099	Stop Cock Valve
5	2	756338	Distributor block 1
6	2	756339	Distributor block 2
7	-	-	-
8	43	612944	Straight Connection 8L - 1/4"
9	10	755373	Straight Male Stud Coupling
10	11	613945	
11	12	612929	Blind screw
12	7	756315	Swivel Male Stud Coupling
13	2	755361	Pressure Coupling
14	2	645095	Adjustable Stud Barrel Tee
15	10	645096	L-Adapter
16	4	613946	straight connection
17	1	645110	Check Valve
18	3	645104	T-Connection
19	2	88226	Weldable Bulkhead Couplings
20	1	645106	Connection
21	2	645109	Adjustable Adapter
22	4	755365	Banjo Coupling
23	-	-	-
24	4	2101	Coupling
25	1	775088	Directional Poppet Valve
26	2	756334	Cylinder for HCGS
27	1	756800-40	Set of Hydraulic Hose Assembly for PS-500
27.1	1	756800-2	Hydraulic Hose Assembly for Connection A
27.2	1	756800-3	Hydraulic Hose Assembly for Connection B
27.3	1	756800-4	Hydraulic Hose Assembly for Connection A
27.4	1	756800-5	Hydraulic Hose Assembly for Connection B
27.5	1	756800-6	Hydraulic Hose Assembly for Connection A
27.6	1	756800-7	Hydraulic Hose Assembly for Connection B
27.7	1	756800-8	Hydraulic Hose Assembly for Connection A
27.8	1	756800-9	Hydraulic Hose Assembly for Connection B
27.9	1	756800-10	Hydraulic Hose Assembly for Connection A
27.10	1	756800-11	Hydraulic Hose Assembly for Connection B
27.11	1	756800-12	Hydraulic Hose Assembly for Connection A
27.12	1	756800-13	Hydraulic Hose Assembly for Connection B
27.13	1	756800-14	Hydraulic Hose Assembly for Connection A
27.14	1	756800-15	Hydraulic Hose Assembly for Connection A
27.15	1	756800-16	Hydraulic Hose Assembly for Connection C
27.16	1	756800-17	Hydraulic Hose Assembly for Connection C
27.17	1	756800-18	Hydraulic Hose Assembly for Connection R
27.18	1	756800-19	Hydraulic Hose Assembly for Connection P
27.18	1	756800-19	Hydraulic Hose Assembly for Connection P
27.19	1	756800-20	Hydraulic Hose Assembly for Connection R
27.20	1	756800-21	Hydraulic Hose Assembly for Connection P
27.21	1	756800-22	Hydraulic Hose Assembly for Connection R
27.22	2	756800-24	Hydraulic Hose Assembly for Connection B
27.23	2	756800-25	Hydraulic Hose Assembly for Connection A
27.24	2	756800-26	Hydraulic Hose Assembly for Connection B
27.25	2	756800-27	Hydraulic Hose Assembly for Connection A
27.26	2	756800-28	Hydraulic Hose Assembly for Connection A
27.27	2	756800-29	Hydraulic Hose Assembly for Connection A
27.28	2	756800-30	Hydraulic Hose Assembly for Connection C
27.29	1	756800-35	Hydraulic Hose Assembly for Connection A
27.30	1	756800-36	Hydraulic Hose Assembly for Connection P
27.31	1	756800-37	Hydraulic Hose Assembly for Connection C
28	2	645116	Direct Pipe Fitting
29	2	645117	Direct Pipe Fitting

Pos.	Qty.	P/N	Description
30	2	612936	Coupling, Flat Face, male
31	2	612937	Coupling, Flat Face, female
32	2	612965	Coupling, Flat Face, male
33	2	612966	Coupling, Flat Face, female
34	1	611523	Retaining Ring
35	1	726303	Pilot operated check valve
36	1	612934	Throttle
37	1	671551-2	Straight fitting
38	2	671551-3	Fitting
39	2	671551-4	Reducing adapter
40	2	671551-6	Banjo coupling 90°
41	1	775094-2	Fitting 90°
42	1	775094-3	Adjustable Stud Elbow
43	3	612945	Straight Connection 8L-8L
44	2	613944	Reducing Nipple
45	1	612948	Sequenze Valve

5.3.3.8 Hydraulic Connection

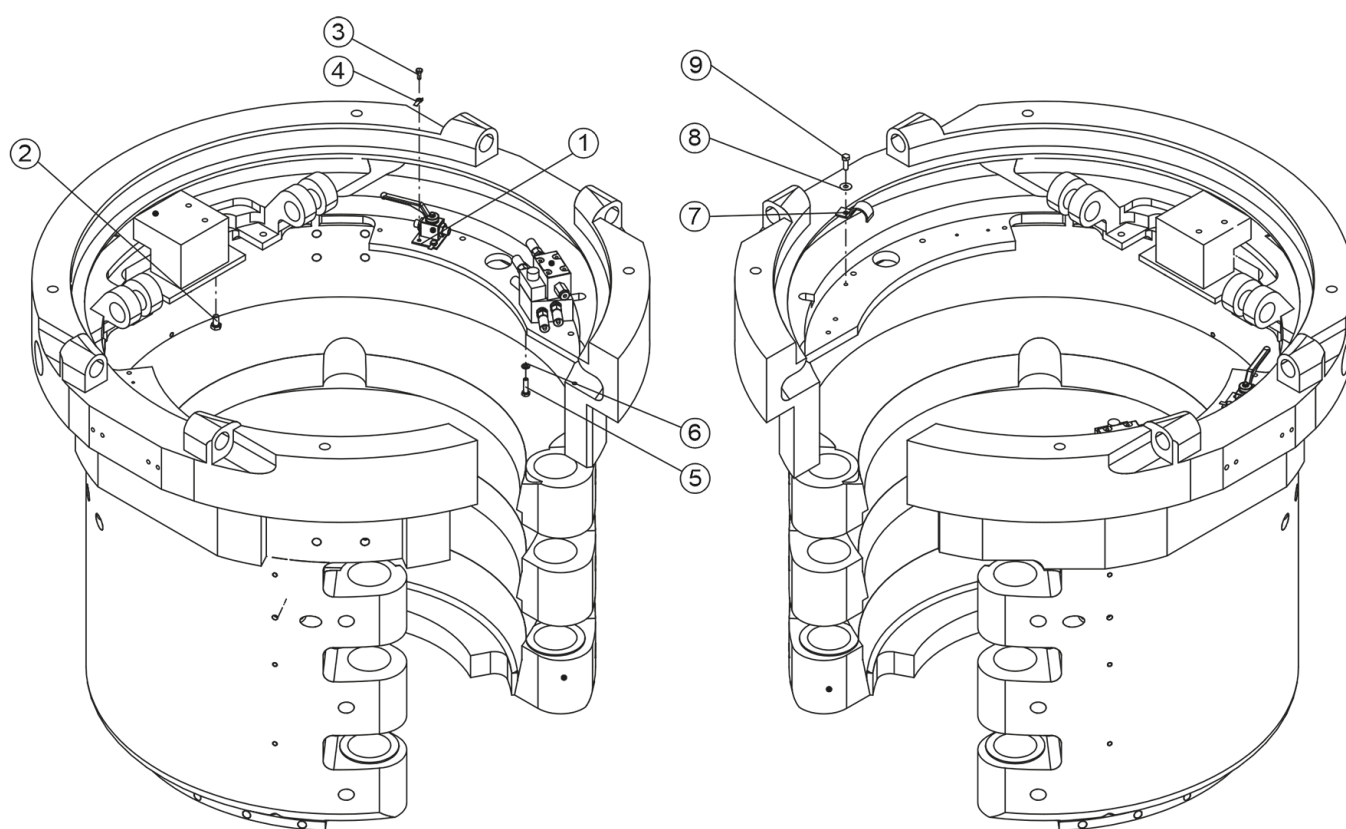


Fig. 126: Illustration Hydraulic Connection

Parts list 756800-1

Pos.	Qty.	P/N	Description
1	1	756803	Plate
2	3	613899	Screw
3	2	725461	Screw
4	2	792111	Washer
5	2	645671	Screw
6	2	645685	Spring Washer
7	1	756012	Casing Clamp
8	1	792112	Washer
9	1	645671	Screw

5.3.4 PS-500

Main Assembly P/N 758000-RT

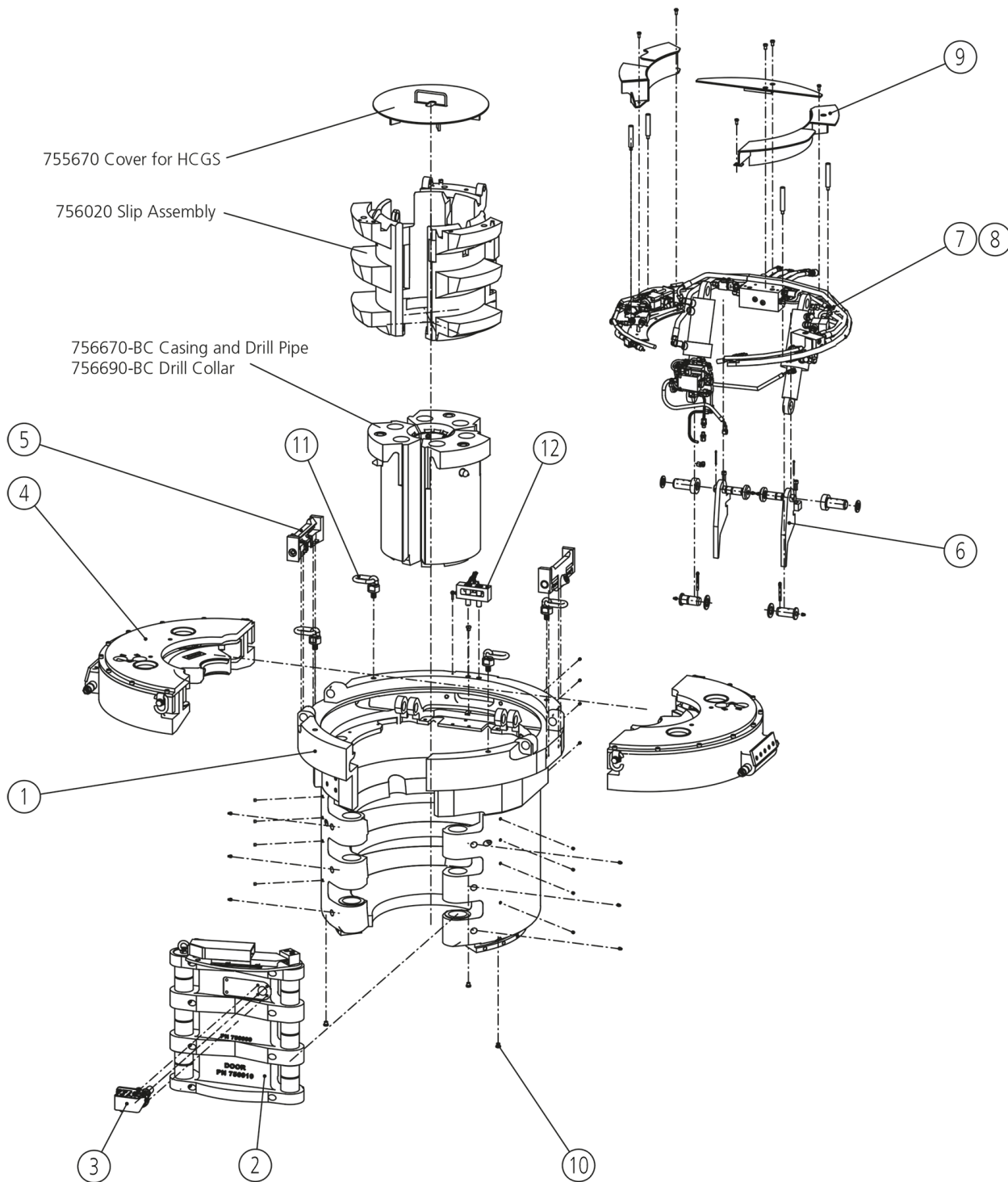


Fig. 127: General Illustration

Parts list P/N 758000-E

Pos.	Qty.	P/N	Description
1	1	756000-BF-2	Body
2	1	756009	Door Assembly (Refer to chapter 5.3.2.1 for the respective drawing and parts list.)
3	1	757680	Feedback Assembly (Refer to chapter 5.3.2.7 for the respective drawing and parts list.)
4	1	758330	Hydraulic Centering Guide System
5	2	756720	Locking Device for Cover (Refer to chapter 5.3.2.3 for the respective drawing and parts list.)
6	1	757006	Bolt Assembly (Refer to chapter 5.3.2.4 for the respective drawing and parts list.)
7	1	756800	Hydraulic Assembly (Refer to chapter 5.3.3.7 for the respective drawing and parts list.)
8	1	756800-1	Hydraulic Connection (Refer to chapter 5.3.3.8 for the respective drawing and parts list.)
9	1	757030	Hydraulic Cover
10	1	757060	Greasing System (Refer to chapter 5.3.2.7 for the respective drawing and parts list.)
11	4	755116	Lifting eye
12	1	757080	Locking Device (Refer to chapter 5.3.3.6 for the respective drawing and parts list.)
-	4	612530-5	Marking Point for Grease Nipple
-	2	611524	Warning Sign "Don't Touch"
-	1	613129	Sticker Hotline
-	1	671638	Warning Sign Forum
-	5	671640	Warning Sign "Hands"
-	6	671642	Warning Sign "Grease Daily"
-	4	671646-2	Sign "Lifting Point"
-	3	737103	Warning Sign "Body"

Parts list 758000-N

Pos.	Qty.	P/N	Description
1	1	758000-E	PS-500
2	2	756161	Adapter Assembly for National-Oil (Refer to chapter 5.3.3.1 for the respective drawing and parts list.)

5.3.4.1 HCGS (Guide Plates with keyed joint system)

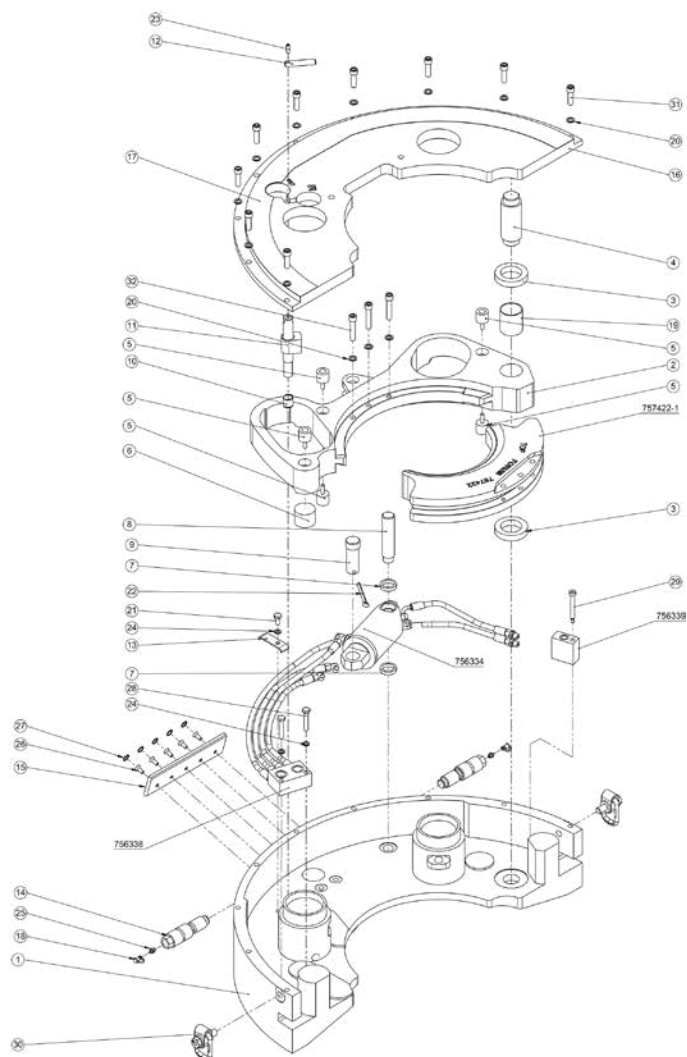


Fig. 128: Illustration Hydraulic Centering Guide System

Parts list 758330

Pos.	Qty.	P/N	Description
1	1	756331	Cover
2	2	756350	Lever
3	4	755705	Washer
4	2	755704	Hinge Bolt
5	10	755703-1	Roller, small
6	2	755703-2	Roller
7	4	755712	Washer
8	2	755713	Bolt
9	2	755708	Bolt
10	2	756805	Spring
11	2	756806	Stopper
12	2	756807	Rod
13	2	756347	Plate
14	4	756067	Hinge Pin for Cover
15	2	756710	Sheet Metal
16	2	756333	Cover Plate

Pos.	Qty.	P/N	Description
17	0	756333-1	Step Protection
18	4	612518	Protection Cap
19	2	755710	Bushing
20	24	792104	Washer
21	2	645198	Screw
22	2	70864	Split Pin
23	2	651527-12	Set screw
24	6	792103	Washer
25	4	70064	Grease Nipple
26	10	645054	Screw
27	10	756734	Retaining ring
28	4	645073	Screw
29	2	710353	Shoulder Screw
30	4	553468	Lifting eye
31	18	612559	Screw
32	6	775967	Screw

5.3.5 PS-500

P/N 757500-RT-F

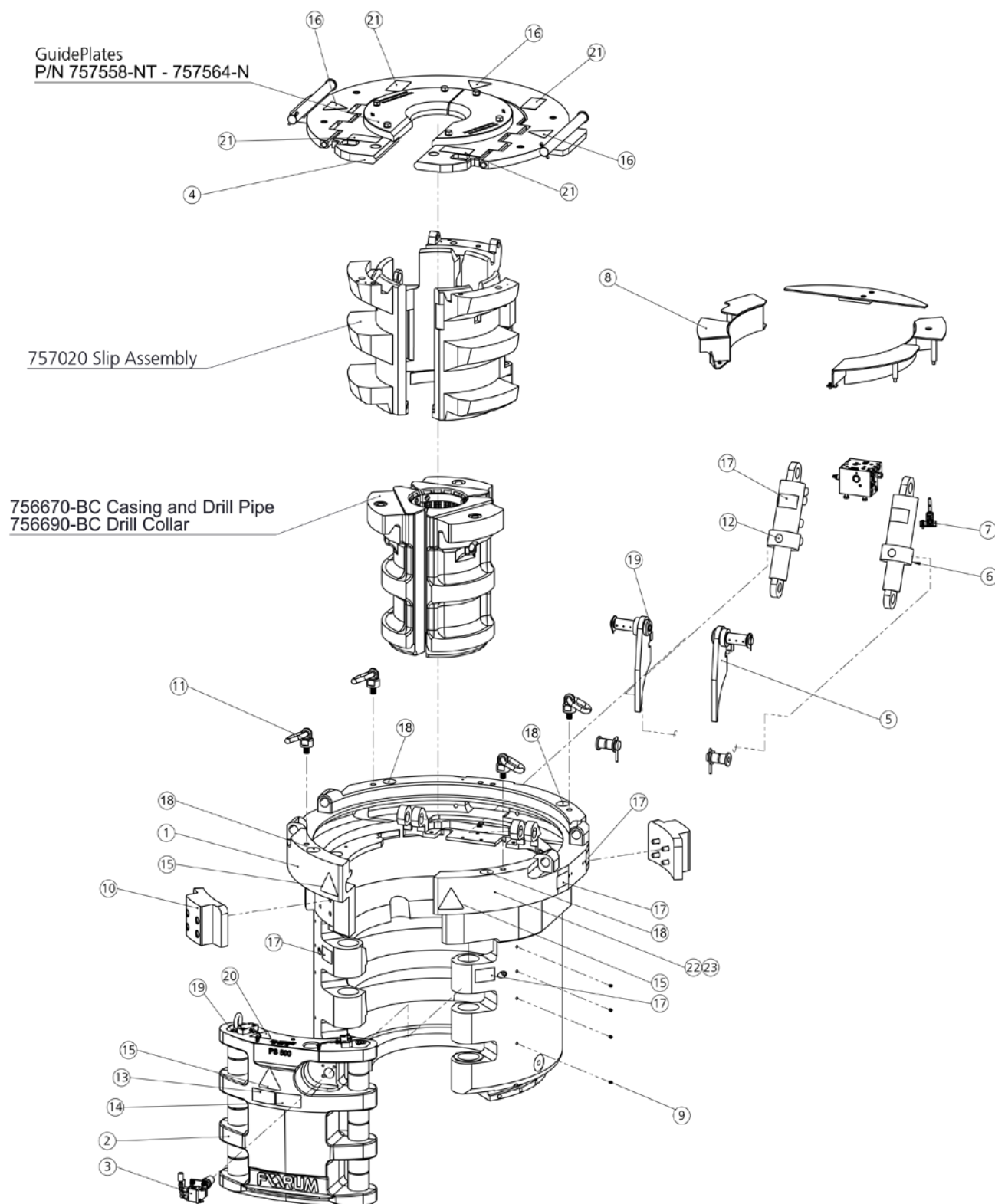


Fig. 129: General Illustration

Parts list 757500-E-F

Pos.	Qty.	P/N	Description
1	1	756005-BF	Body
2	1	757010	Door Assembly
3	1	757595	Feedback Assembly
4	1	757520	Top Cover Assembly
5	1	757006	Bolt Assembly (Refer to chapter 5.3.2.4 for the respective drawing and parts list.)
6	1	757585	Hydraulic Assembly
7	1	757585-10	Hydraulic Connection Assembly
8	1	757030	Hydraulic Cover one Set
9	1	757060	Greasing Assembly (Refer to chapter 5.3.2.7 for the respective drawing and parts list.)
10	1	756161	Adapter Assembly for National
11	4	755116	Lifting Eye
12	2	611524	Warning sign "don't touch"
13	1	613129	Technical Support
14	1	671638	Warning sign
15	3	671640	Warning sign "Hands"
16	3	671640-1	Warning sign "Hands"
17	8	671642	Warning sign Grease Daily
18	4	671646	sign "lifting point" - sticker
19	4	612530-3	Marking Point
20	1	737103	Warning sign "Body"
21	4	754108	Warnschild
22	2	613929	Tube Holder
23	4	645136	Screw

Parts list 757500-N-F

Pos.	Qty.	P/N	Description
1	1	757500-E-F	PS-500
2	2	756161	Adapter Assembly for National-Oil (Refer to chapter 5.3.3.1 for the respective drawing and parts list.)

Parts list 757500-OW-F

Pos.	Qty.	P/N	Description
1	1	757500-E-F	PS-500
2	2	756163	Adapter Assembly for National-Oil (Refer to chapter 5.3.3.2 for the respective drawing and parts list.)

5.3.5.1 Top-Cover Assembly

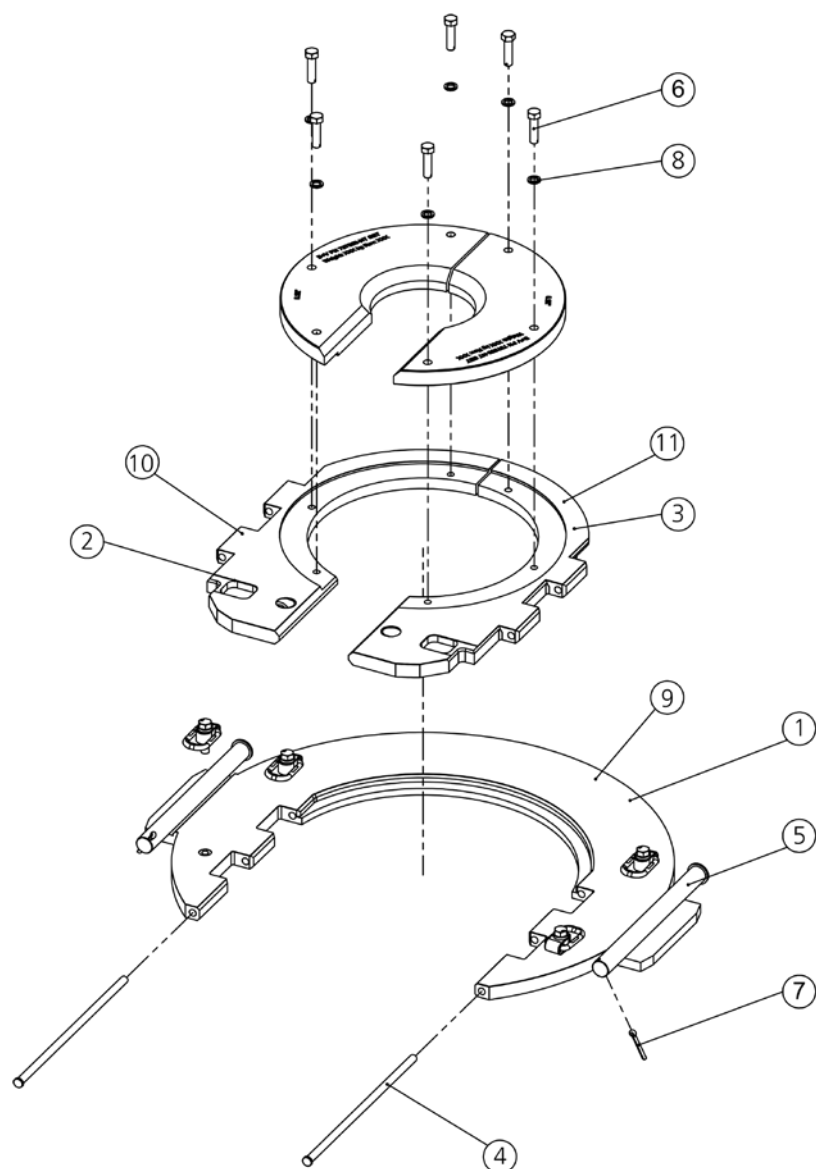


Fig. 130: Illustration Feedback Assembly

Parts list 757520

Pos.	Qty.	P/N	Description
1	1	757521	Cover Base Plate
2	1	757522	Flap left
3	1	757523	Flap right
4	2	757524	Flap pin
5	2	757525	Cover pin
6	6	611926	Screw
7	2	613556-35	Cotter Pin
8	6	792106	Washer
9	4	553471	Load ring
10	1	757521-1	Safety Walk
11	1	757522-1	Safety Walk (left)
12	1	757523-1	Safety Walk (right)

5.3.5.2 Door Assembly

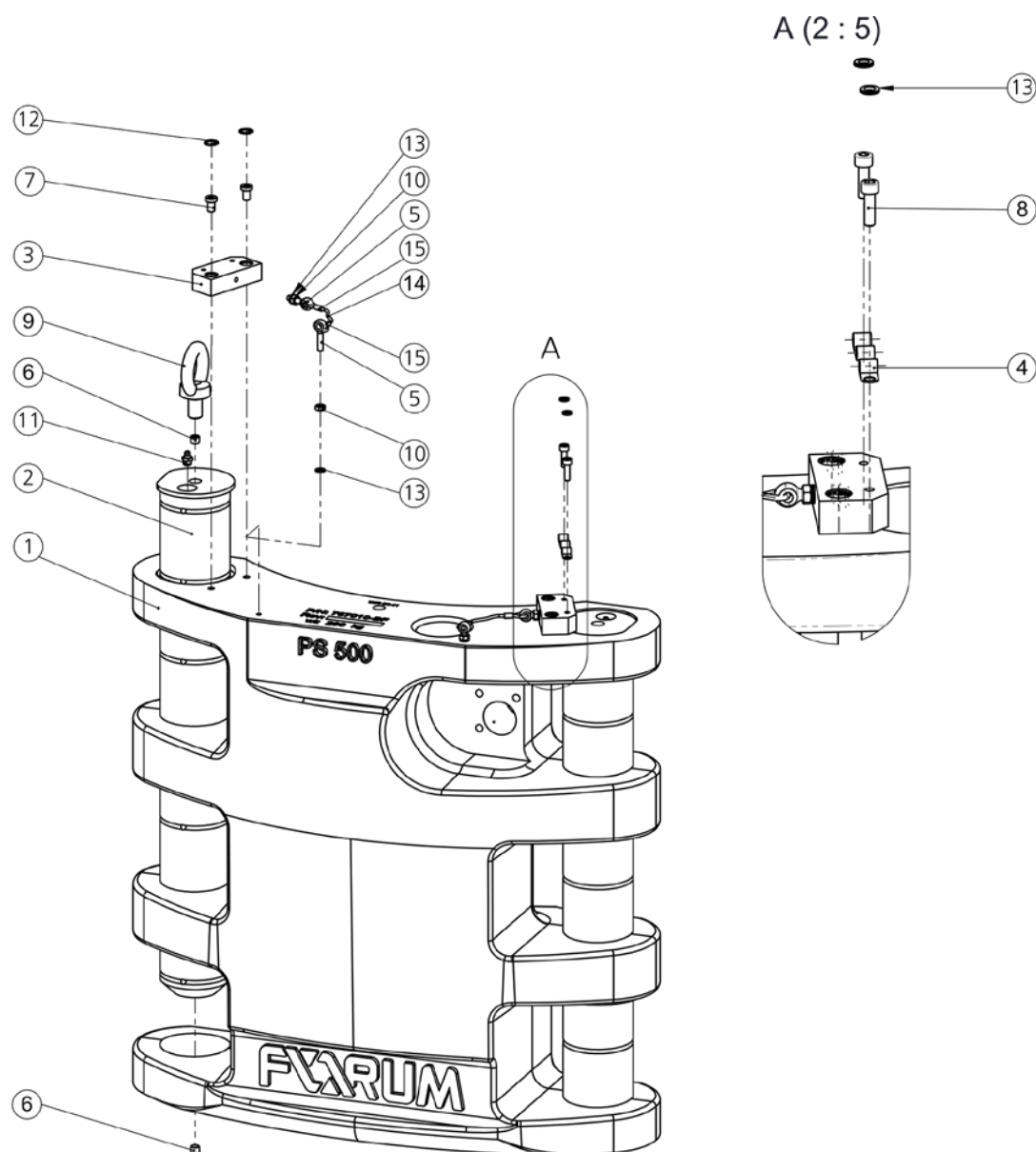


Fig. 131: Illustration Door Assembly

Parts list 757010

Pos.	Qty.	P/N	Description
1	1	757010-BF	Door
2	2	756011	Hinge Pin
3	2	757535	Pin Securing
4	3	774561	Mounting Clamps
5	4	660414-1	Eye Screw
6	2	771108	Locking screw
7	4	757536	Screw
8	2	612597	Screw
9	2	755402	Lifting Eye Bolt
10	4	755251	Nut
11	2	70064	Grease Nipple
12	4	756726	Retaining Ring
13	6	792111	Washer
14	2	643801	Wire line
15	1	641599	Spring-type Straight Pin
16	8	643801-1	Rope Clamp

5.3.5.3 Feedback Assembly

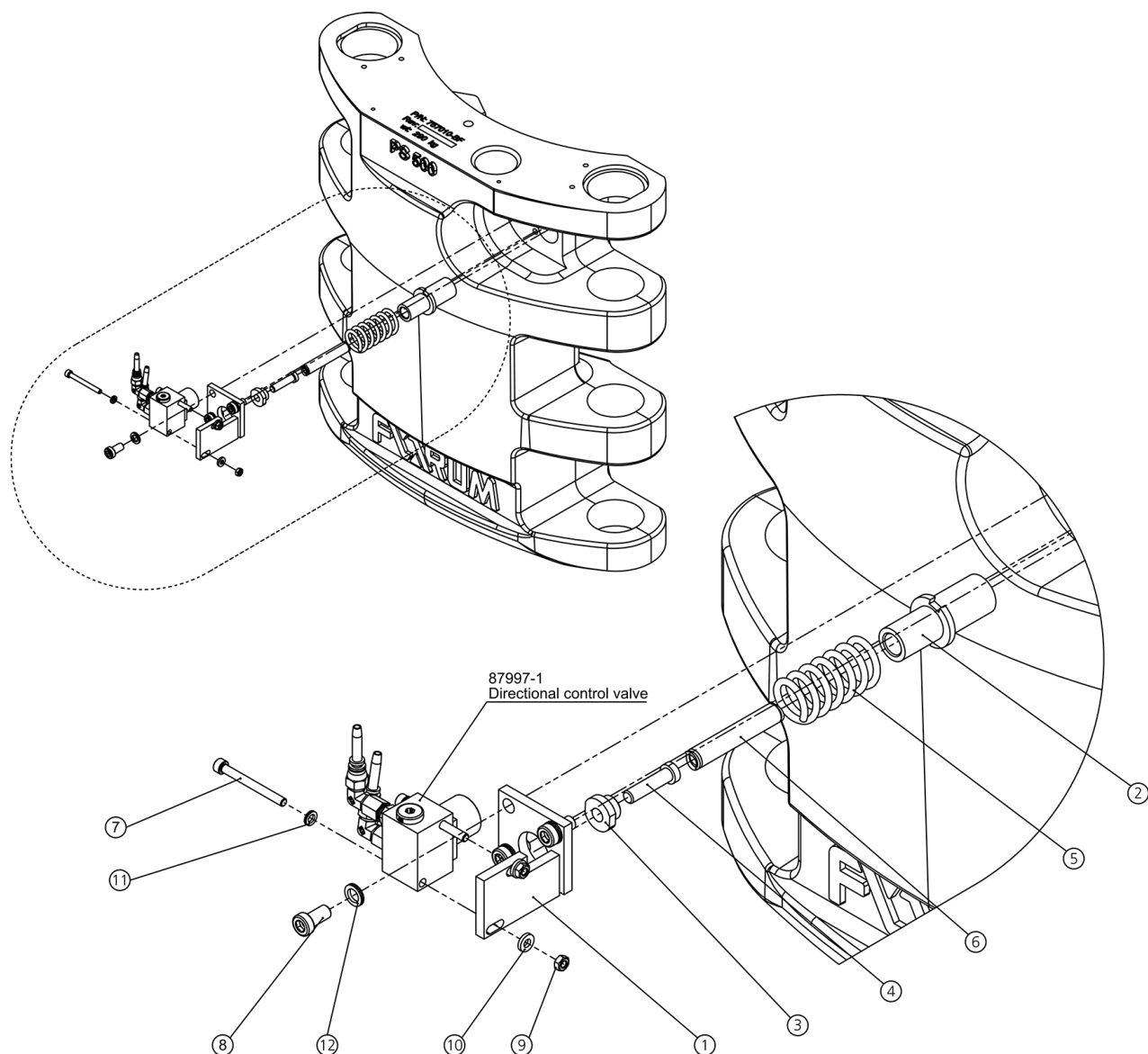


Fig. 132: Illustration Feedback Assembly

Parts list 757595

Pos.	Qty.	P/N	Description
1	1	757595-3	Connection Plate
2	1	757574-4	Plunger
3	1	757680-4	Channel
4	1	757595-5	Bolt
5	1	775090	Spring
6	1	757680-8	Pressure Spring
7	2	757595-4	Screw
8	3	612576	Screw
9	2	755251	Nut
10	2	792111-1	Washer
11	2	792111	Washer
12	3	792103	Washer

5.3.5.4 Hydraulic Assembly

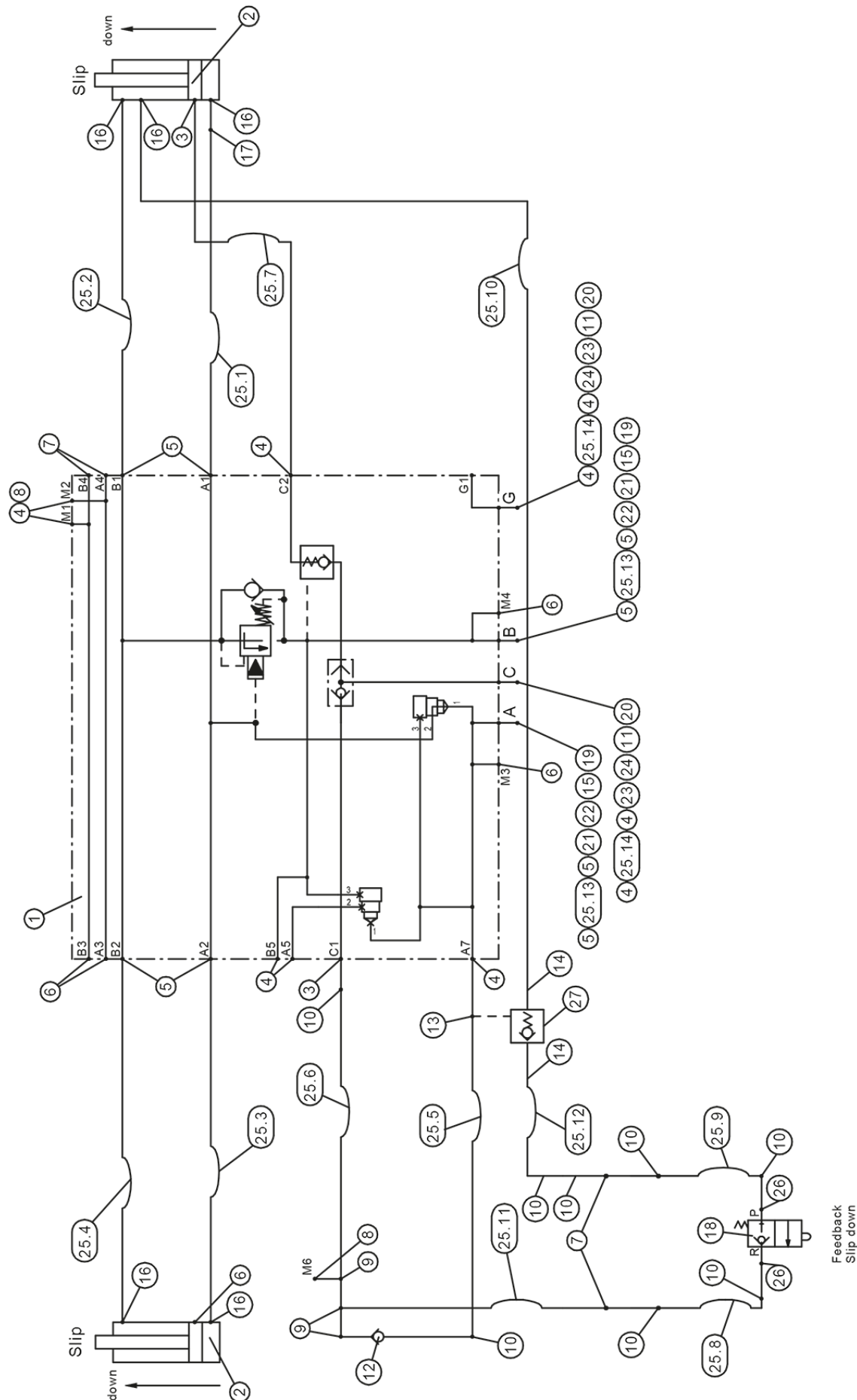


Fig. 133: Illustration Hydraulic Connection

Parts list 757585

Pos.	Qty.	P/N	Description
1	1	756801	Valve Block
2	1	756099	Hydraulic Cylinder
3	2	612945	Straight Connection 8L-8L
4	8	612944	Straight Connection 8L-1/4"
5	8	755373	Straight Male Stud Coupling
6	9	612929	Locking screw
7	2	645105	Straight Bulkhead Coupling
8	3	755361	Pressure Coupling
9	3	645095	Adjustable Stud Barrel Tee
10	8	645096	L-Adapter
11	2	613946	Straight Connection
12	1	645110	Check Valve
13	1	645104	T-Connection
14	2	613943	Straight Male Stud Coupling
15	2	645109	Adjustable Adapter
16	5	755365	Banjo Coupling
17	1	755367	L-Adapter
18	1	87997-1	Directional Control Valve
19	2	645116	Direct Pipe Fitting
20	2	645117	Direct Pipe Fitting
21	2	612936	Coupling, Flat Face, male
22	2	612937	Coupling, Flat Face, female
23	2	612965	Coupling, Flat Face, male
24	2	612966	Coupling, Flat Face, female
25	1	757585-40	Set of Hydraulic Hose Assembly
26	2	671551-2	Straight Fitting
27	1	726303	Pilot Operated Check Valve

5.3.6 PS-500 Type Series Insert Carrier

5.3.6.1 Insert Carrier Drill Pipe and Casing I

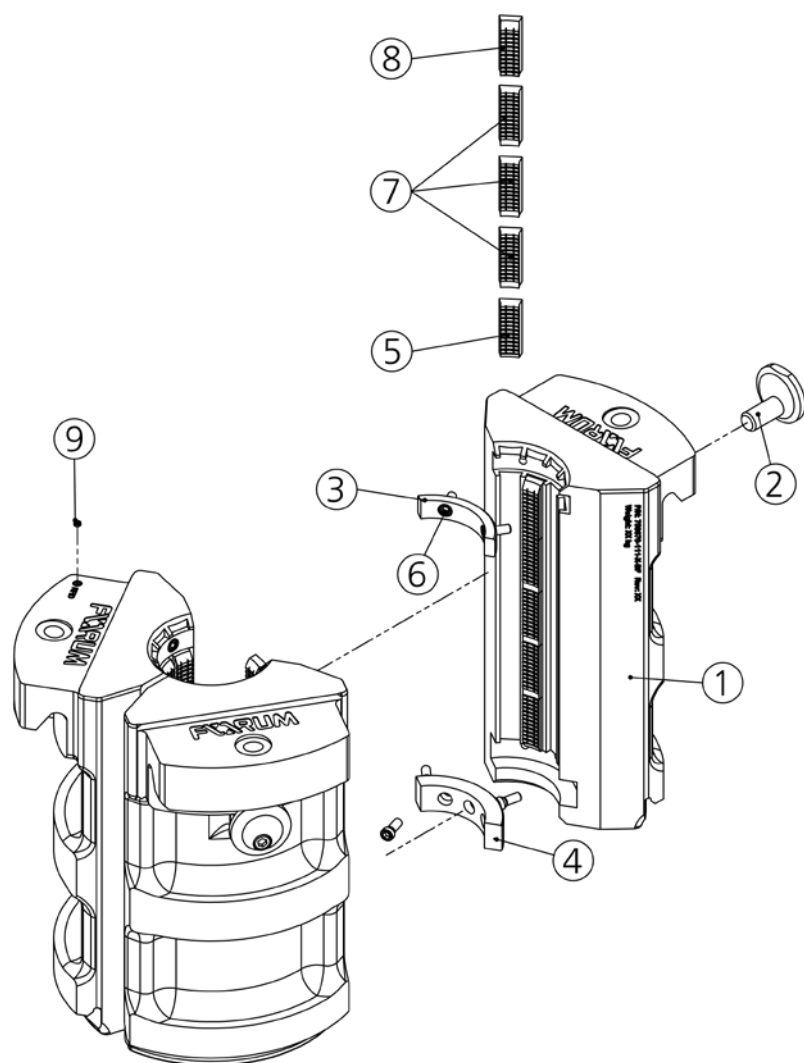


Fig. 134: Illustration Insert Carrier

Parts lists

Pos.	Description	756670-101-X 3.1/2" x 2.3/8"		756670-103-X 3.1/2" x 2.7/8"		756670-105-1-X 3.1/2" x 3.1/2"		756670-106-X 4.1/2" x 4"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756670-105-X-BF	1	756670-105-X-BF	1	756670-107-X-BF	1	756670-107-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775651-1	3	775651-1	3	775632-1	3	775632-1
4	Load Carrying Ring	3	775671-2	3	775671-2	3	775672-2	3	775672-2
5	Screw	15	775056	15	775056	15	775056	15	775056
6	Reducing Insert	18	351001	18	350602	27	350903	27	350504
7	Reducing Insert	6	351001B	6	350602B	9	350903B	9	350504B
8	Reducing Insert	6	351001T	6	350602T	9	350903T	9	350504T
9	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

Pos.	Description	756670-107-1-X 5.1/2" x 4.1/2"		756670-109-X 5.1/2" x 5"		756670-115-X 7" x 5.7/8"		756670-114-X 7" x 6.5/8"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756670-111-X-BF	1	756670-111-X-BF	1	756670-229-1XBF	1	756670-229-1XBF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775633-1	3	775633-1	3	775634-1	3	775634-1
4	Load Carrying Ring	3	775673-2	3	775673-2	3	775674-2	3	775674-2
5	Screw	15	775056	15	775056	15	775056	15	775056
6	Reducing Insert	36	350905	36	350506	45	351008	45	350409
7	Reducing Insert	12	350905B	12	350506B	15	351008B	15	350409B
8	Reducing Insert	12	350905T	12	350506T	15	351008T	15	350409T
9	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

Pos.	Description	756670-112-X 7" x 6.906"		756670-112-1-X 7.5/8" x 6.906"		756670-228-X 7.5/8" x 6.5/8"		756670-229-X 7.5/8" x 7"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756670-229-1XBF	1	756670-231-X-BF	1	756670-105-X-BF	1	756670-231-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775634-1	3	775635-1	3	775635-1	3	775635-1
4	Load Carrying Ring	3	775674-2	3	775675-2	3	775675-2	3	775675-2
5	Screw	15	775056	15	775056	15	775056	15	775056
6	Reducing Insert	45	350210	45	350710	45	350909	45	350610
7	Reducing Insert	15	350210B	15	350710B	15	350909B	15	350610B
8	Reducing Insert	15	350210T	15	350710T	15	350909T	15	350610T
9	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

Pos.	Description	756670-232-X 8.1/2" x 8"		756670-234-X 9.5/8" x 8.5/8"		756670-236-1-X 10.3/4" x 9.5/8"		756670-265-X 7" x 5.7/8"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756670-232-X-BF	1	756670-236-X-BF	1	756670-238-X-BF	1	756670-238-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775655-1	3	775636-1	3	775637-1	3	775637-1
4	Load Carrying Ring	3	775681-2	3	775676-2	3	775677-2	3	775677-2
5	Screw	15	775056	15	775056	15	775056	15	775056
6	Reducing Insert	54	350511	63	350911	63	351011	63	350811
7	Reducing Insert	18	350511B	21	350911B	21	351011B	21	350811B
8	Reducing Insert	18	350511T	21	350911T	21	351011T	21	350811T
9	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

Pos.	Description	756670-237-X 10.3/4" x 10"	
		Qty.	P/N
1	Carrier	1	756670-238-X-BF
2	Carrier Guide Assembly	3	757057
3	Insert Retainer	3	775637-1
4	Load Carrying Ring	3	775677-2
5	Screw	15	775056
6	Reducing Insert	63	350712
7	Reducing Insert	21	350712B
8	Reducing Insert	21	350712T
9	RFID Plug	1	1150376

5.3.6.2 Insert Carrier Drill Pipe and Casing II

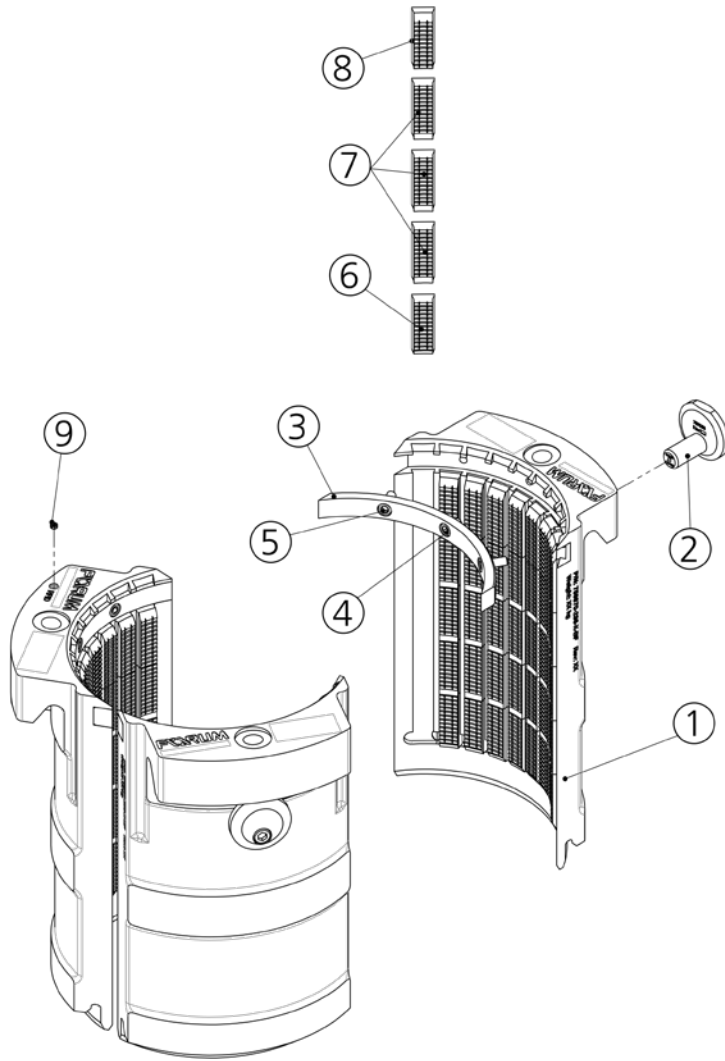


Fig. 135: Illustration Insert Carrier

Pos.	Description	756670-241-1-X 14" x 12.3/4"		756670-243-X 14" x 13.3/8"		756670-270-X 14" x 13.1/2"		756670-259-X 14" x 13.1/2"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756670-255-X-BF	1	756670-255-X-BF	1	756670-255-X-BF	1	756670-255-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775639-1	3	775639-1	3	775639-1	3	775639-1
4	Screw	3	775056-1	3	775056-1	3	775056-1	3	775056-1
5	Screw	6	775056	6	775056	6	775056	6	775056
6	Reducing Insert	27	351112B	27	350612B	27	350513B	27	350413B
7	Reducing Insert	81	351112	81	350612	81	350513	81	350413
8	Reducing Insert	27	351112T	27	350612T	27	350513T	27	350413T
9	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

5.3.6.3 Insert Carrier Drill Pipe and Casing III

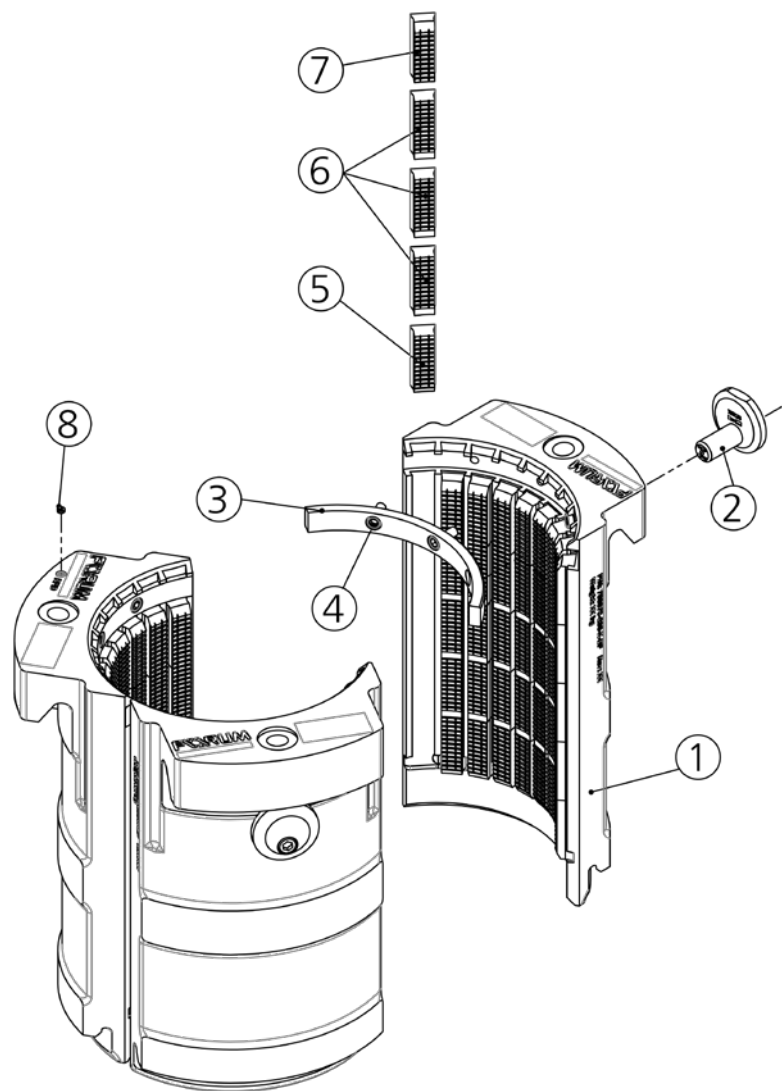


Fig. 136: Illustration Insert Carrier

Parts lists

Pos.	Description	756670-239-X 12.3/4" x 11.3/4"		756670-262-X 12.3/4" x 11.7/8"	
		Qty.	P/N	Qty.	P/N
1	Carrier	1	756670-241-X-BF	1	756670-241-X-BF
2	Carrier Guide Assembly	3	757057	3	757057
3	Insert Retainer	3	775638-1	3	775638-1
4	Load Carrying Ring	9	775056	9	775056
5	Screw	81	350912	81	350812
6	Reducing Insert	27	350912B	27	350812B
7	Reducing Insert	27	350912T	27	350812T
8	RFID Plug	1	1150376	1	1150376

5.3.6.4 Insert Carrier Drill Pipe and Casing IV

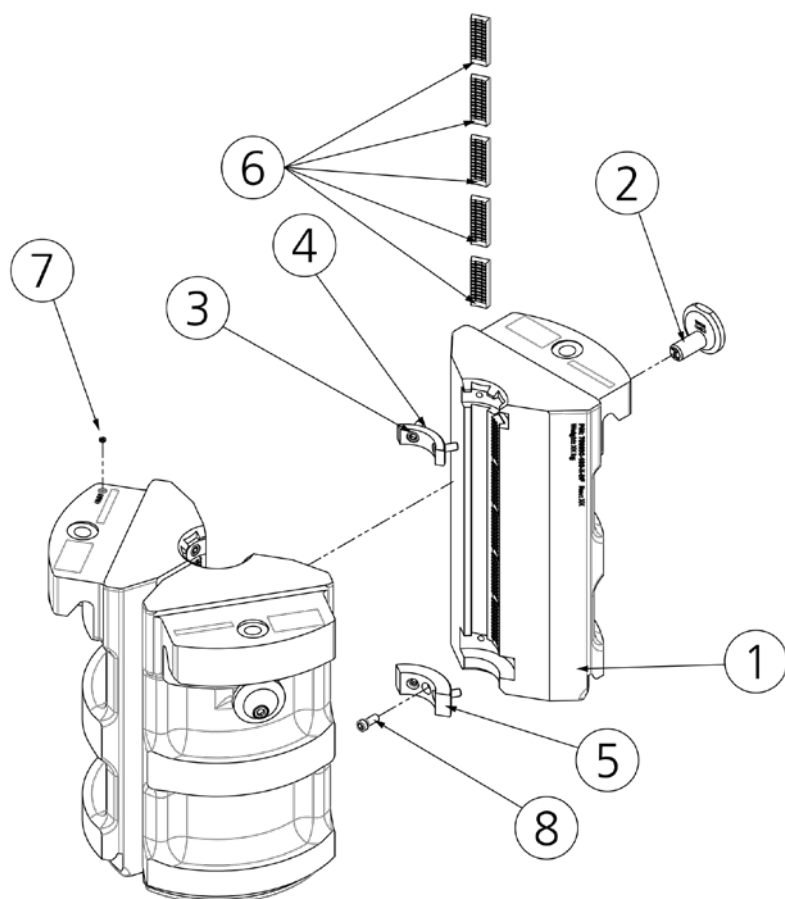


Fig. 137: Illustration Insert Carrier

Parts lists

Pos.	Description	756670-105-X 3.1/2" x 3.1/2"		756670-107-X 4.1/2" x 4.1/2"		756670-111-X 5.1/2" x 5.1/2"		756670-229-1-X 7" x 7"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756670-105-X-BF	1	756670-107-X-BF	1	756670-111-X-BF	1	756670-229-1-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Screw	15	775065	15	775065	15	775065	15	775065
4	Insert Retainer	3	775651-1	3	775632-1	3	775633-1	3	775634-1
5	Load Carrying Ring	3	775671-2	3	775672-2	3	775673-2	3	775674-2
6	Basic Insert	30	350103	45	350103	60	350107	75	350110
6	Undersizing Insert	-	-	-	-	-	-	-	-
7	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376
8	Screw	-	-	-	-	-	-	-	-

Pos.	Description	756670-231-X 7.5/8" x 7.5/8"		756670-269-X 7.5/8" x 7.3/4"		756670-236-X 9.5/8" x 9.5/8"		756670-238-X 10.3/4" x 10.3/4"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756670-231-X-BF	1	756670-269-X-BF	1	756670-236-X-BF	1	756670-238-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Screw	15	775065	15	775065	15	775065	15	775065
4	Insert Retainer	3	775635-1	3	775635-1	3	775636-1	3	775637-1
5	Load Carrying Ring	3	775675-2	3	775675-2	3	775676-2	3	775677-2
6	Basic Insert	75	350111	-	-	105	350111	105	350112
6	Undersizing Insert	-	-	75	350011	-	-	-	-
7	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376
8	Screw	-	-	-	-	-	-	-	-

Pos.	Description	756670-241-X 12.3/4" x 12.3/4"		756670-255-X 14" x 14"	
		Qty.	P/N	Qty.	P/N
1	Carrier	1	756670-241-X-BF	1	756670-255-X-BF
2	Carrier Guide Assembly	3	757057	3	757057
3	Screw	6	775056	6	775056
4	Insert Retainer	3	775638-1	3	775639-1
5	Load Carrying Ring	-	-	-	-
6	Basic Insert	135	350112	135	350113
6	Undersizing Insert	-	-	-	-
7	RFID Plug	1	1150376	1	1150376
8	Screw	3	775056-1	3	775056-1

5.3.7 Drill Collar Insert Carrier I

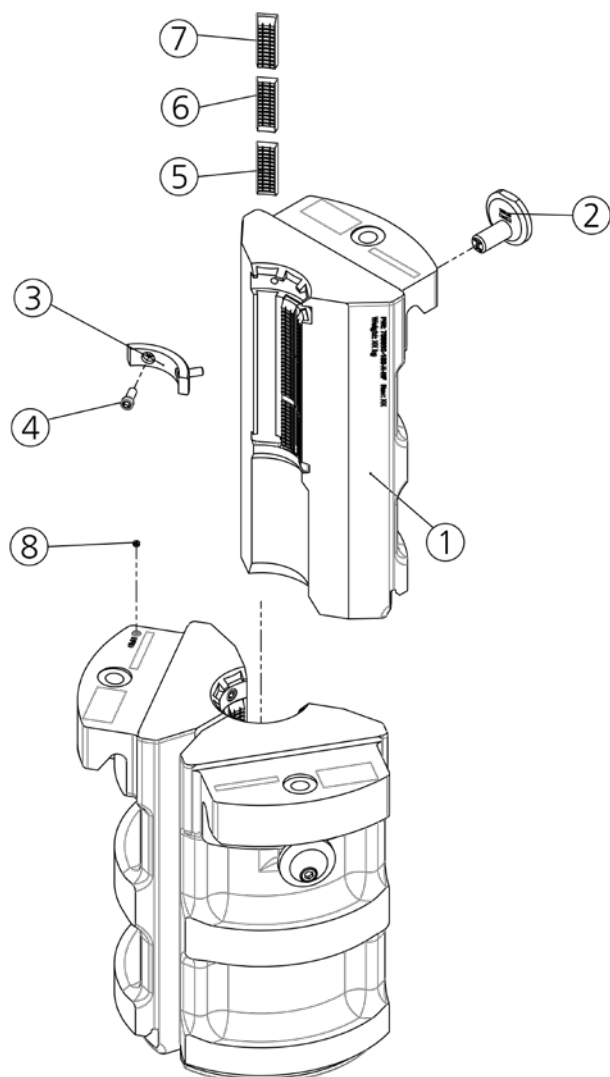


Fig. 138: Illustration Insert Carrier

Parts list

Pos.	Description	756690-182-X 4.1/2" x 4.3/8"		756690-183-X 5.1/2" x 5.1/8"		756690-187-X 6.3/4" x 5.3/4"		756690-188-X 6.3/4" x 6"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756690-182-X-BF	1	756690-183-X-BF	1	756690-287-X-BF	1	756690-287-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775632-1	3	775633-1	3	775654-1	3	775654-1
4	Screw	6	775056	6	775056	6	775056	6	775056
5	Reducing Insert	9	350205	12	350406	12	350910	12	350710
6	Reducing Insert	9	350205B	12	350406B	12	350910B	12	350710B
7	Reducing Insert	9	350205T	12	350406T	12	350910T	12	350710T
8	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

Pos.	Description	756690-189-X 6.3/4" x 6.1/4"		756690-190-X 6.3/4" x 6.1/2"		756690-194-X 8.1/2" x 7.1/2"		756690-195-X 8.1/2" x 7.3/4"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756690-287-X-BF	1	756690-287-X-BF	1	756690-296-X-BF	1	756690-296-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775654-1	3	775654-1	3	775655-1	3	775655-1
4	Screw	6	775056	6	775056	6	775056	6	775056
5	Reducing Insert	12	350510	12	350310	15	350911	15	350711
6	Reducing Insert	12	350510B	12	350310B	15	350911B	15	350711B
7	Reducing Insert	12	350510T	12	350310T	15	350911T	15	350711T
8	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

Pos.	Description	756690-196-X 8.1/2" x 8"		756690-197-X 8.1/2" x 8.1/4"		756690-198-X 9.1/2" x 8.1/2"		756690-199-X 9.1/2" x 9"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756690-296-X-BF	1	756690-296-X-BF	1	756690-298-X-BF	1	756690-298-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775655-1	3	775655-1	3	775656-1	3	775656-1
4	Screw	6	775056	6	775056	6	775056	6	775056
5	Reducing Insert	15	350511	15	350311	15	350911	15	350511
6	Reducing Insert	15	350511B	15	350311B	15	350911B	15	350511B
7	Reducing Insert	15	350511T	15	350311T	15	350911T	15	350511T
8	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

Pos.	Description	756690-203-X 9.1/2" x 9.1/4"		756690-308-X 3.1/2" x 3.1/8"		756690-309-X 3.1/2" x 3.3/8"		756690-274-X 4.1/2" x 4.1/8"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756690-298-X-BF	1	756690-308-X-BF	1	756690-308-X-BF	1	756690-182-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775656-1	3	775651-1	3	775651-1	3	775632-1
4	Screw	6	775056	6	775056	6	775056	6	775056
5	Reducing Insert	15	350311	9	350403	6	350203	9	350404
6	Reducing Insert	15	350311B	9	350403B	6	350203B	9	350404B
7	Reducing Insert	15	350311T	9	350403T	6	350203T	9	350404T
8	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

Pos.	Description	756690-276-X 5.1/2" x 4.3/4"		756690-284-X 6.3/4" x 6.1/4"		756690-286-X 6.3/4" x 6.1/2"		756690-288-X 7.5/8" x 7"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756690-183-X-BF	1	756690-287-X-BF	1	756690-287-X-BF	1	756690-296-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775633-1	3	775654-1	3	775654-1	3	775655-1
4	Screw	6	775056	6	775056	6	775056	6	775056
5	Reducing Insert	12	350706	12	350510	12	350310	15	350511
6	Reducing Insert	12	350706B	12	350510B	12	350310B	15	350511B
7	Reducing Insert	12	350706T	12	350510T	12	350310T	15	350511T
8	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

Pos.	Description	756690-293-X 8.1/2" x 8"		756690-295-X 8.1/2" x 8.1/4"		756690-297-X 9.1/2" x 9"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756690-296-X-BF	1	756690-296-X-BF	1	756690-298-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057
3	Insert Retainer	3	775655-1	3	775655-1	3	775656-1
4	Screw	6	775056	6	775056	6	775056
5	Reducing Insert	15	350511	15	350311	15	350511
6	Reducing Insert	15	350511B	15	350311B	15	350511B
7	Reducing Insert	15	350511T	15	350311T	15	350511T
8	RFID Plug	1	1150376	1	1150376	1	1150376

5.3.8 Drill Collar Insert Carrier II

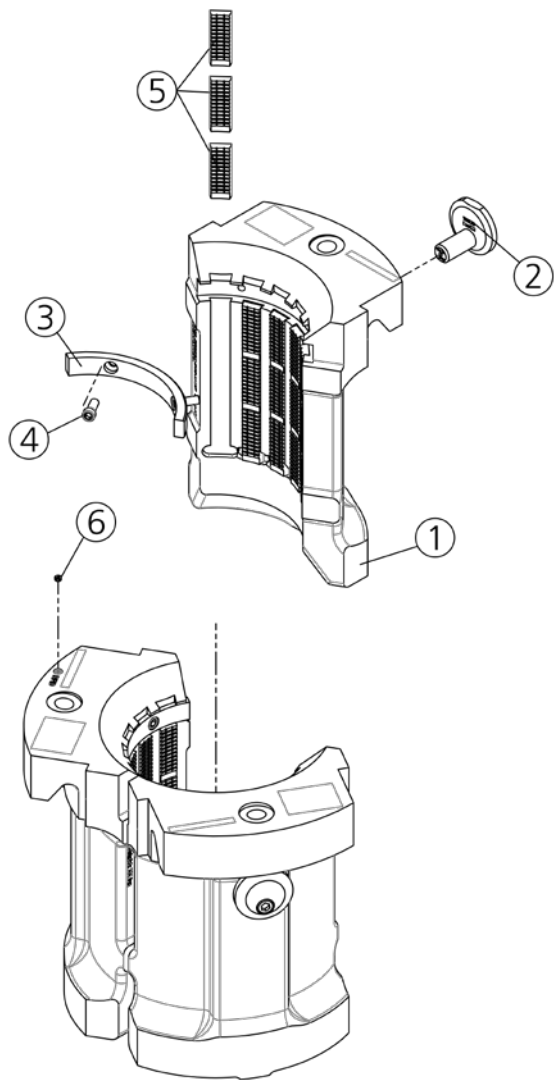


Fig. 139: Illustration Insert Carrier

Parts list

Pos.	Description	756690-202-X 9.1/2" x 9.1/2"		756690-287-X 6.3/4" x 6.3/4"		756690-296-X 8.1/2" x 8.1/2"		756690-298-X 9.1/2" x 9.1/2"	
		Qty.	P/N	Qty.	P/N	Qty.	P/N	Qty.	P/N
1	Carrier	1	756690-298-X-BF	1	756690-287-X-BF	1	756690-296-X-BF	1	756690-298-X-BF
2	Carrier Guide Assembly	3	757057	3	757057	3	757057	3	757057
3	Insert Retainer	3	775656-1	3	775654-1	3	775655-1	3	775656-1
4	Screw	6	775056	6	775056	6	775056	6	775056
5	Basic Insert	45	350111	36	350110	45	350111	45	350111
6	RFID Plug	1	1150376	1	1150376	1	1150376	1	1150376

5.3.9 Optional Equipment and Accessory Tools

5.3.9.1 Multi-Coupling Kit

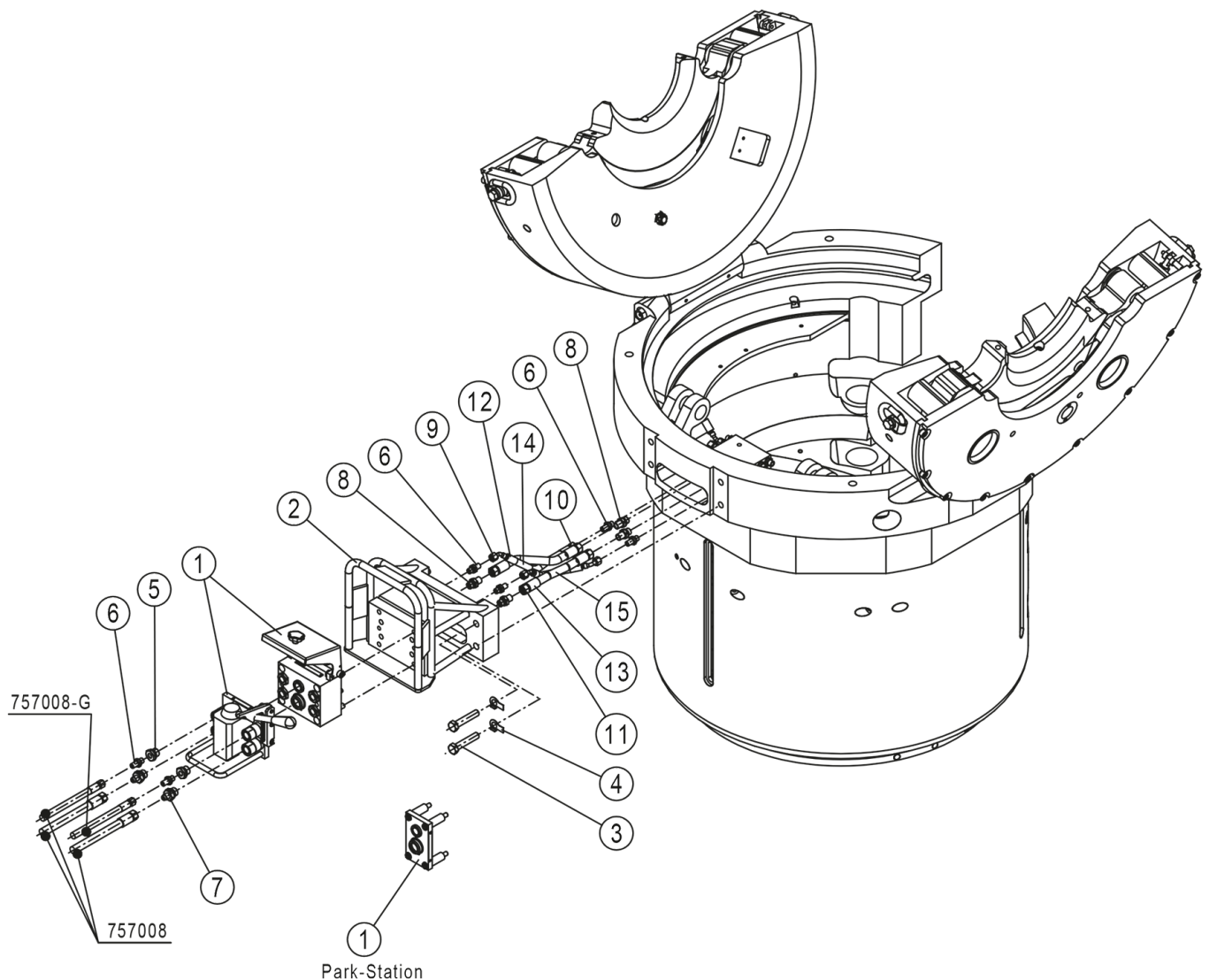


Fig. 140: Illustration Multi-Coupling Kit

Parts list 756850

Pos.	Qty.	P/N	Description
1	1	775325	Multi-Coupling Assembly
2	1	756851	Adapter for Multi-Coupling
3	4	645672	Screw
4	4	792106	Washer
5	2	613944	Reducing Nipple
6	6	612944	Straight Connection 8L-1/4"
7	2	755374	Straight Male Stud Coupling
8	4	755373	Straight Male Stud Coupling
9	3	612953	Hose Connection 45°
10	1	612951	Hose Connection, straight 8L
11	4	617552	Tapered nipple
12	4	612955	Swaged Fitting
13	4	617551	Swaged fitting
14	1	612956	Hydraulic Hose
15	1	617550	Hydraulic Hose
-	1	756852	Emergency Hose Assembly

5.3.9.2 Top Wear Guide

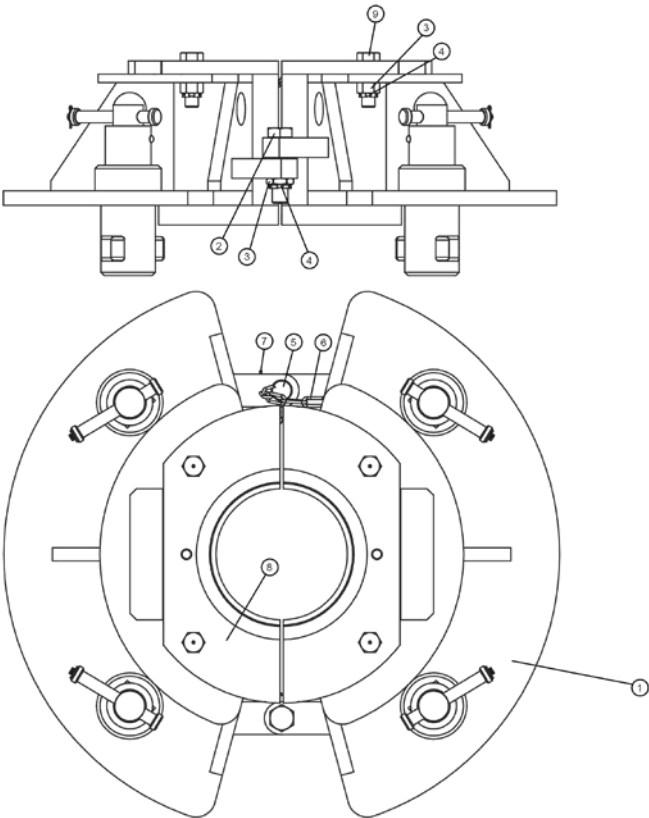


Fig. 141: Illustration Top Wear Guide

Parts list 776750

Pos.	Qty.	P/N	Description
1	1	776750-13	Frame Assembly
2	1	752337	Screw
3	5	752338	Castle Nut
4	5	611009	Split Pin
5	1	776750-7	Hinge pin
6	1	755621	Sling Chain
7	1	752301	Safety Spring
9	4	776750-15	Screw

5.3.9.3 Pipe Wiper Assembly

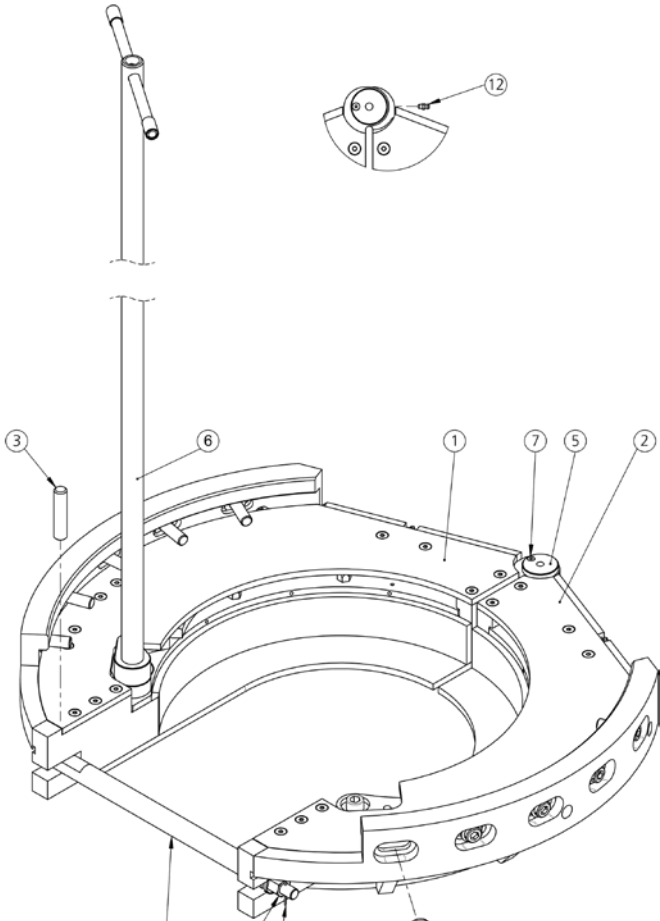


Fig. 142: Illustration Pipe Wiper Assembly

Parts list 756750

Pos.	Qty.	P/N	Description
1	1	756751	Housing Left Assembly
2	1	756752	Housing Right Assembly
3	1	756753	Hinge Pin
4	1	756754	Screw
5	1	756793-3	Bolt
6	1	756785	Nut
7	1	645181	Split Pin
8	1	756775	Bolt
9	1	756757	Tool for Pipe Wiper System
10	10	645602-11	Screw
11	1	671052	Safety Wire
12	1	756790	Lubricating Nipples

5.3.9.4 Top-Cover

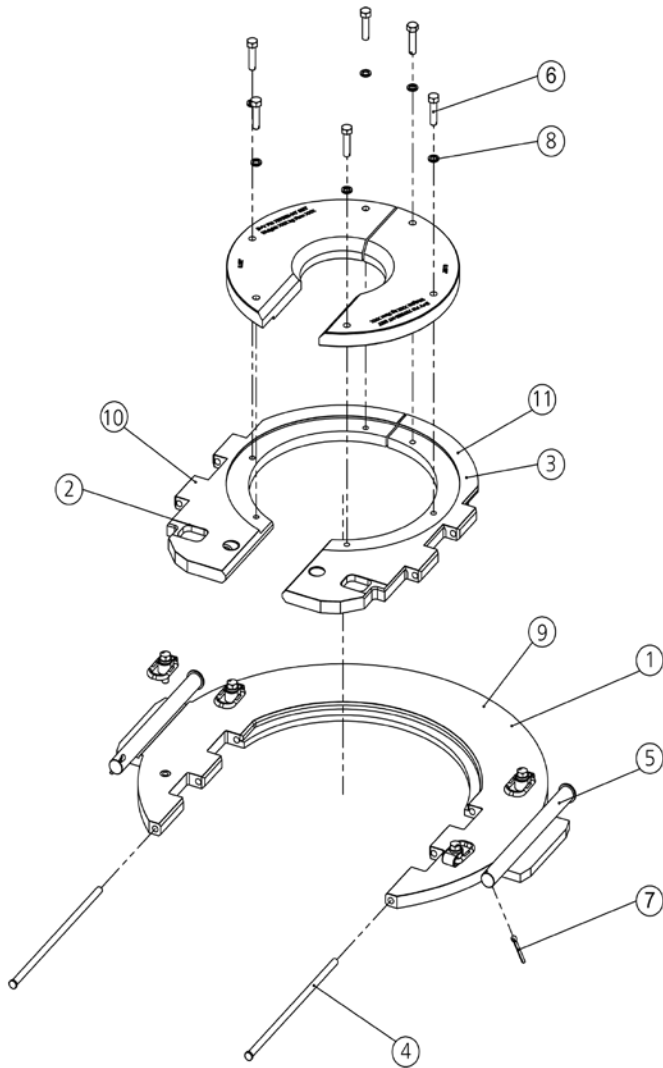


Fig. 143: Illustration Top-Cover

Parts list 757520

Pos.	Qty.	P/N	Description
1	1	757521	Cover Base Plate
2	1	757522	Flap left
3	1	757523	Flap right
4	2	757524	Flap pin
5	2	757525	Cover pin
6	6	611926	Screw
7	2	613556-35	Split Pin
8	6	792106	Washer
9	1	757521-1	Safety Walk
10	1	757522-1	Safety Walk (Left)
11	1	757523-1	Safety Walk (Right)

5.3.9.5 Hand Slip Top Bowl

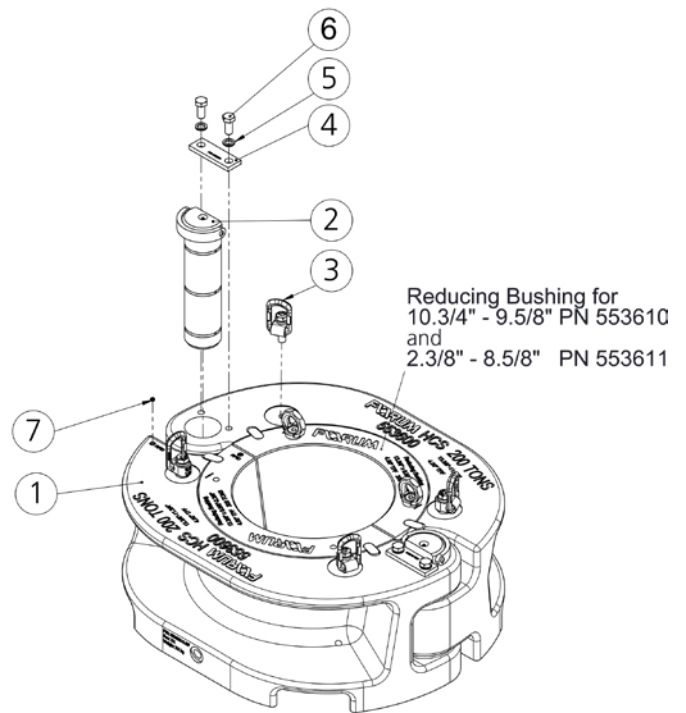


Fig. 144: Illustration Hand Slip Top Bowl

Parts list 553600-X

Pos.	Qty.	P/N	Description
1	1	553600-X-BF	Hinged Casing Spider (HCS)
2	2	553602	Hinge Pin Assembly
3	4	553468	Lifting eye
4	2	615009	Securing Plate for Latch Pin
5	4	792106	Washer
6	4	710541	Screw
7	1	1150376	RFID Plug

5.4 Spare Parts

5.4.1 PS-500

P/N 756000-RSP

Pos.	Qty.	P/N	Description
1	1	756099	Set Hydraulic Cylinder PS-500
2	2	755706	Set Hydraulic Cylinder For Hcgs
3	2	756097	Set Guide Plates
-	2	755334	Split Pin
5	2	756096-1	Washer
6	2	756067	Hinge Pin
7	14	70064	Grease Nipple
8	10	612515	Grease Nipple
9	3	756018	Carrier Securing Assembly
10	2	756096-4	Bolt For Roller
11	2	752210	Roller
12	2	613720	Retaining Ring
13	2	70116	Washer
14	2	755709	Cylinder For Guide Plates
15	4	612936	Coupling, Flat Face, Male
16	4	612937	Coupling, Flat Face, Female
17	4	612965	Coupling, Flat Face, Male
18	4	612966	Coupling, Flat Face, Female
19	2	775811	Grease Barrel

5.4.2 PS-500

P/N 757000-RSP

Pos.	Qty.	P/N	Description
1	1	757006	Bolt Assembly
1	1	757097	Set Guide Plates
2	2	756095	Upper Bolt, Part 1
3	2	756096	Upper Bolt, Part 2
4	2	756096-1	Washer
5	2	755334	Split Pin
6	2	725348	Screw
7	2	756025	Lower Bolt
8	2	775096-3	Washer for Clevis Pin
9	2	70864	Split Pin
10	4	70064	Grease Nipple
1	1	756018	Carrier Securing Assembly
1	1	756024	Securing Latch for Carrier
2	1	756017	Pin for Securing Latch
3	1	775026	Washer
4	1	775027	Washer
5	1	775028	Spring
6	1	775029	Stopper
7	1	775015-1	Nut
8	1	612515	Grease Nipple
9	1	775019	Screw
10	1	775015-3	Set screw
11	1	88240-4	Spring-type Straight Pin
12	1	643801-1	Rope Clamp
13	1	643801	Wire line
14	1	643801-11	wire line clamp 3 mm
15	1	643663	Screw
1	1	757094	Spare Parts for Feedback Assembly
1	1	757680-2	Plunger
2	1	775090	Spring
1	1	757092	Spare Parts for HCS Assembly
1	4	756730	Grooved Pin
2	4	756067	Hinge Pin for Cover
3	4	70064	Grease Nipple
4	36	756351	Screw
5	4	553468	Lifting Eye
6	36	792104	Washer
1	1	757093	Spare Parts for Slip Assembly
1	2	756014	Hinge Pin
2	2	756014-1	Hinge Pin Spring
3	2	756096-4	Bolt for Roller
4	2	752210	Roller
5	2	613720	Retaining ring
6	2	70116	Washer

5.4.3 PS-500 P/N 757000-RSP-H

Pos.	Qty.	P/N	Description
1	1	757095	Spare Parts for Hose Assembly
1	1	756800-40	Set of Hydraulic Hoses
1	1	757096	Spare Parts for Valves
1	1	2010	Load-lowering Valve
2	1	2007	Sequence Valve
3	1	2002	Directional Control Valve
4	1	2013	Control Valve
5	1	775088	Directional Poppet Valve

5.4.4 PS-500 P/N 756000-RSP

Pos.	Qty.	P/N	Description
1	1	756099	Set Hydraulic Cylinder PS-500
2	2	755706	Set Hydraulic Cylinder For Hcgs
3	2	756097	Set Guide Plates
-	2	755334	Split Pin
5	2	756096-1	Washer
6	2	756067	Hinge Pin
7	14	70064	Grease Nipple
8	10	612515	Grease Nipple
9	3	756018	Carrier Securing Assembly
10	2	756096-4	Bolt For Roller
11	2	752210	Roller
12	2	613720	Retaining Ring
13	2	70116	Washer
14	2	755709	Cylinder For Guide Plates
15	4	612936	Coupling, Flat Face, Male
16	4	612937	Coupling, Flat Face, Female
17	4	612965	Coupling, Flat Face, Male
18	4	612966	Coupling, Flat Face, Female
19	2	775811	Grease Barrel

5.4.5 PS-500 P/N 757500-RSP

Pos.	Qty.	P/N	Description
1	1	757006	Bolt Assembly
1	1	757097	Set Guide Plates
2	2	756095	Upper Bolt, Part 1
3	2	756096	Upper Bolt, Part 2
4	2	756096-1	Washer
5	2	755334	Split Pin
6	2	725348	Screw
7	2	756025	Lower Bolt
8	2	775096-3	Washer for Clevis Pin
9	2	70864	Split Pin
10	4	70064	Grease Nipple
1	1	756018	Carrier Securing Assembly
1	1	756024	Securing Latch for Carrier
2	1	756017	Pin for Securing Latch
3	1	775026	Washer
4	1	775027	Washer
5	1	775028	Spring
6	1	775029	Stopper
7	1	775015-1	Nut
8	1	612515	Grease Nipple
9	1	775019	Screw
10	1	775015-3	Set screw
11	1	88240-4	Spring-type Straight Pin
12	1	643801-1	Rope Clamp
13	1	643801	Wire line
14	1	643801-11	wire line clamp 3 mm
15	1	643663	Screw
1	1	757093	Spare Parts for Slip Assembly
1	2	756014	Hinge Pin
2	2	756014-1	Hinge Pin Spring
3	2	756096-4	Bolt for Roller
4	2	752210	Roller
5	2	613720	Retaining ring
6	2	70116	Washer

5.4.6 Pipe Wiper P/N 756750-RSP

Pos.	Qty.	P/N	Description
1	2	756760	Pipe Wiper 19"
2	1	756757	Tool for Pipe Wiper System
3	1	756793	Latch Assembly
4	1	756785	Nut
5	2	645181	Split Pin
6	1	756753	Hinge Pin
7	10	645602-11	Screw
8	6	756791	Lubricating nipples
9	8	756790	Lubricating nipples
10	1	756787	Interchange Part
11	1	756775	Bolt
12	5	671052	Safety Wire

INSPECTION / MAINTENANCE

INSPECTION /
MAINTENANCE

6 Inspection / Maintenance

This chapter contains important information on how to service your PS-500 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 PS-500 will be increased by following the instructions in this OMM.



Ensure that only sufficiently qualified and trained personnel accomplish setup and installation work.



Read these instructions carefully before servicing the PS-500.



WEAR EYE PROTECTION!



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!



⚠ WARNING

Lubricants can pose a health hazard!

Lubricants irritate skin and eyes.
» Avoid contact with lubricants.

Prerequisites for maintenance work

1. Ensure that the PS-500 is on a good supporting surface.
2. Provide for sufficient lighting at the workplace.
3. The PS-500 must be removed from the Rotary Table.
4. Ensure that PS-500 is disconnected from hydraulic system.

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 exclusively the FORUM Handling Tools Service Department or an authorized repair company observing the FORUM Handling Tools welding instructions performs welding work on cast parts.
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 PS-500.
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 PS-500, can be removed by grinding (Refer to Critical Areas).
6. Always check the repaired part in a suitable manner to ensure that the defect has been remedied.

6.1 Lubrication



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!

INFO



The specified lubricants can be obtained through FORUM Handling Tools. Contact your local representative.

INFO



Do not APPLY GREASE TO:

- » Back and front of Inserts.
- » Dovetail guide of Insert Carrier.
- » Use a waxy anti corrosion protection like CORROFERN VL.

Lubrication Points

The sliding surfaces of the PS-500 and thus also of the Slip Assembly are lubricated by the automatic lubrication system. Interval and duration are freely adjustable according to personal requirements.

All other shown lubrication points must be lubricated with a manual or pneumatic lubrication pump.

- 1 Connection for Automatic Lubrication System
- 2 Hinge Pin HCGS Lock
- 3 Hinge Pin HCGS
- 4 Insert Carrier Securing Assembly
- 5 Hinge Pin Slip Assembly
- 6 Hinge Pin Door (right)
- 7 Hinge Pin Door (left)
- 8 Sliding Surface PS-500 Body
- 9 Sliding Surface Slip Interior
- 10 Sliding Surface Insert Carrier

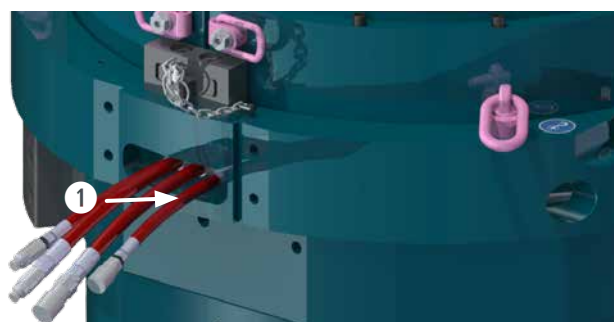


Fig. 145: Lubrication points I

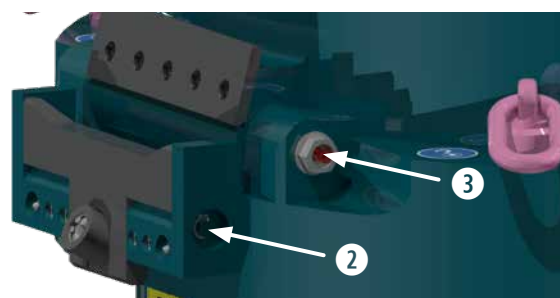


Fig. 146: Lubrication points II

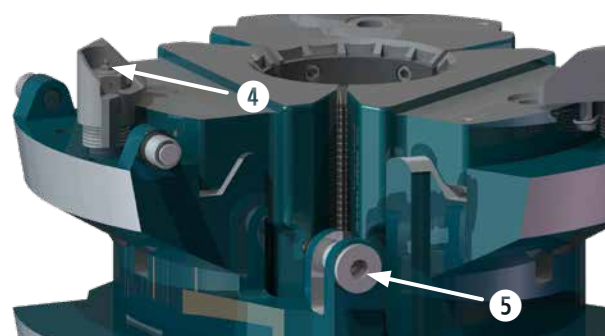


Fig. 147: Lubrication points III

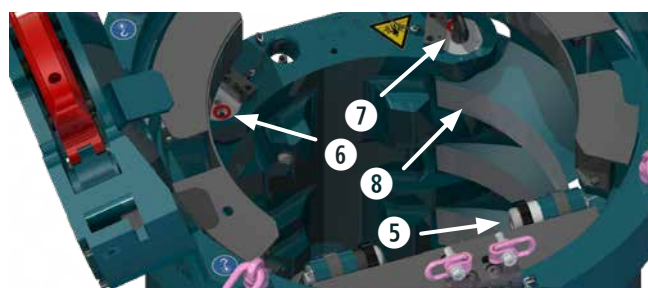


Fig. 148: Lubrication points IV

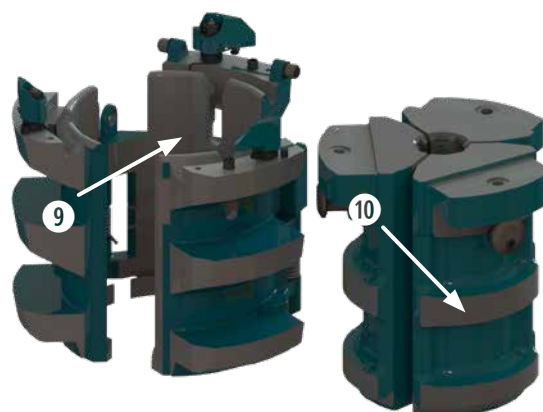


Fig. 149: Lubrication points V

6.2 Inspections

FORUM Handling Tools recommends to perform inspections in compliance with API RP 7L at specified intervals and in inspection categories. Otherwise, the frequency of required inspections depends on the conditions of use of the PS-500.

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 has to be documented.

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 Power Slip PS-500s 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	Intervals	Preparatory measures
I	Daily	PS-500 mounted to Rotary Table.
II	Weekly	PS-500 mounted to Rotary Table.
III	Semiannually	PS-500 removed from Rotary Table. PS-500 partly dismantled.
IV	Annually	PS-500 removed from Rotary Table. PS-500 completely dismantled.

INFO

The above-mentioned inspection intervals refer to a 100% use of the PS-500 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. All inspection categories are in accordance with the latest API RP 7L.



Ensure that only sufficiently qualified and trained personnel accomplish maintenance work.

6.2.1 Inspection of Hydraulic Equipment

Check the hydraulic equipment daily for leakages. If unacceptably, high leakages occur 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 drill pipe wedges.
- Pulling wedged drill strings.
- Holding heavy drill pipes / drill strings.
- Jarring.
- Operation at very low ambient temperatures (< - 20°C to - 4°F).

6.2.3 Inspection Following Removal

Generally, the PS-500 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 PS-500 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 only FORUM Handling Tools or an authorized service company in compliance with the welding specifications issued by FORUM Handling Tools accomplishes welding work on cast parts.
- If the field inspection indicates that further inspection work is required, remove the PS-500 and have it inspected in an appropriately equipped workshop.

6.3 Inspection Categories

6.3.1 Inspection Category I

Observe the PS-500 during operation. Recognizing inadequate performance and apparent defects is the goal of this category.

Scope/Prerequisites/Procedure:

- Daily visual inspection of the PS-500 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 PS-500 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:

- Non-Destructive Testing (NDT) of selected critical areas and verification of all wear limits.
- Before carrying out an NDT test, remove all foreign material such as dirt, paint, lubricants, oil and abrasion from the affected parts. Use suitable methods such as pickling, steam cleaning and sandblasting.

6.3.4 Inspection Category IV

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

Scope/Prerequisites/Procedure:

- Before carrying out an NDT test, remove all foreign material such as dirt, paint, lubricants, oil and abrasion from the affected parts. Use suitable methods such as pickling, steam cleaning and sandblasting.
- Non-destructive material testing (NDT) of all critical areas and replacement of selected consumables and hydraulic components.

6.3.5 Inspection intervals and Inspection tasks

Pos.	Task	Daily	Weekly	Semiannually	Annually
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 PS-500.	✗	✓	✓	✓
9	Checking the condition of the overall structure (Rotary Table, hydraulic system) and the interaction of all components and possible attachments with the PS-500.	✗	✓	✓	✓
10	Checking wear limits (component measurement).	✗	✗	✓	✓
11	NDT tests of selected components (PS-500 is largely assembled).	✗	✗	✓	✓
12	Complete NDT test of all critical areas (PS-500 is completely disassembled).	✗	✗	✗	✓
13	Exchange of selected hydraulic components.	✗	✗	✗	✓
14	Replacement of wear-intensive components (recommended spare parts).	✗	✗	✗	✓

INFO

NDT Non-destructive testing



- Magnetic Particle Inspection (MPI)
- Ultrasonic Measurement Methods (UT)
- Eddy Current Testing (ET)
- Dye Penetrant Inspection (DPI)

✓ Necessary

✗ Unnecessary

6.3.6 Inspection Checklist

INFO



The following checklist serve as a copy template for inspections to be performed in compliance with API RP 7L. Performed inspections must Always be documented and stored safely.



Ensure that only sufficiently qualified and trained personnel accomplish maintenance work.

Power Slip Model: _____

Serial number: _____

☐ Inspection Category I

Date / Place of Inspection:

Result

OK

NOK

Name of Inspection Operator / Supervisor:

Sign:

☐
☐

Remarks:

☐ Inspection Category II

Date / Place of Inspection:

Result

OK

NOK

Name of Inspection Operator / Supervisor:

Sign:

☐
☐

Remarks:

☐ Inspection Category III

Date / Place of Inspection:

Result

OK

NOK

Name of Inspection Operator / Supervisor:

Sign:

☐
☐

Remarks:

☐ Inspection Category IV

Date / Place of Inspection:

Result

OK

NOK

Name of Inspection Operator / Supervisor:

Sign:

☐
☐

Remarks:

6.4 Critical Areas

Check critical areas shown according to inspection checklists.

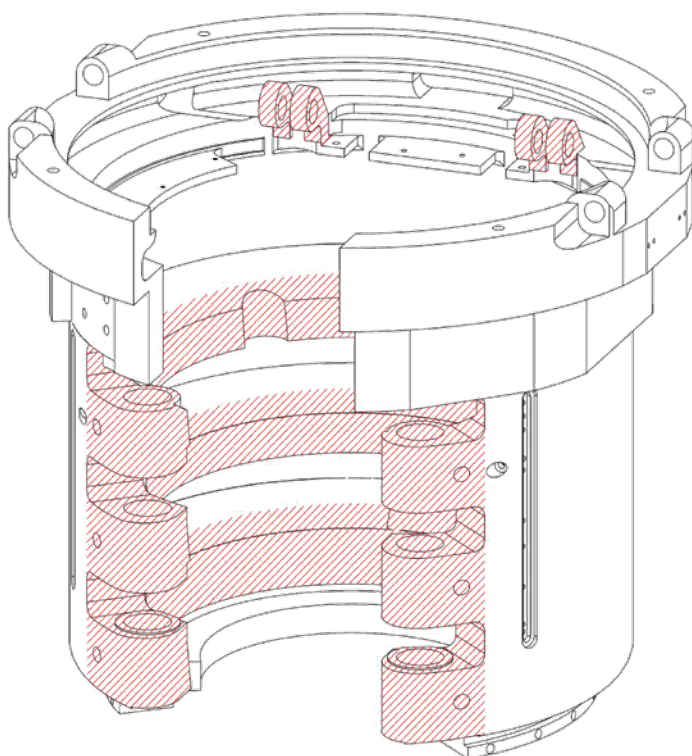


Fig. 150: Critical Areas Body

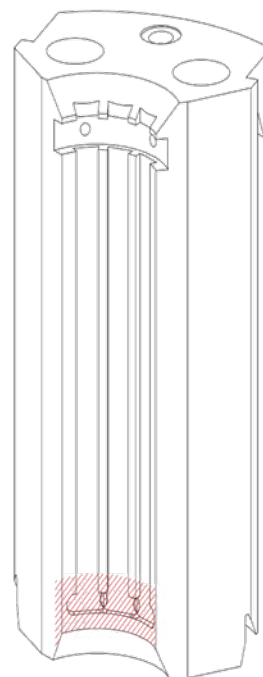


Fig. 151: Critical Areas Insert Carrier

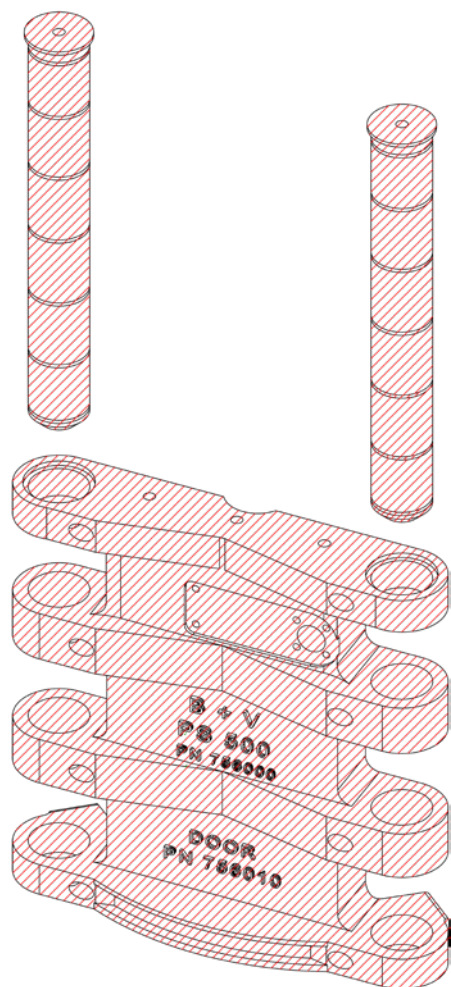


Fig. 152: Critical Areas Door

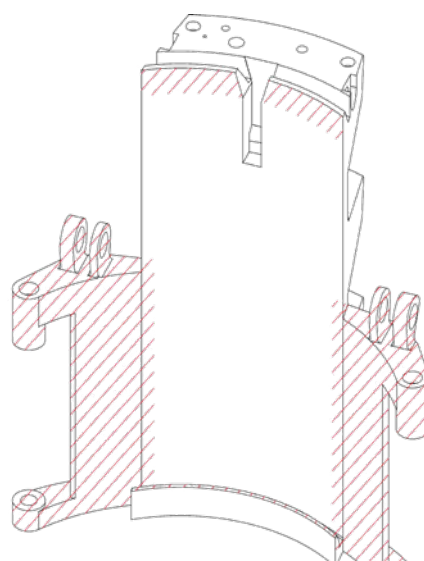


Fig. 153: Critical Area Slip I

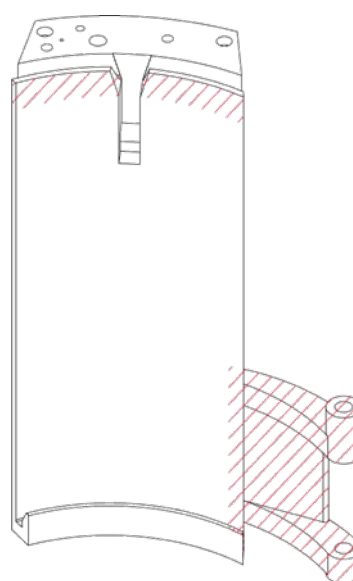


Fig. 154: Critical Area Slip II

6.5 Wear limits

Check the wear limits as specified in the inspection checklists.

Door Hinge Pin ①		inch [mm]
Pin Ø (New-Min)		3.14 [79.80]
Bore Ø (New-Max)		3.15 [80.10]
Total Clearance "A"		0.04 [1]

Slip Pin ②		inch [mm]
Pin Ø (New-Min)		0.97 [24.70]
Bore Ø (New-Max)		0,99 [25.03]
Total Clearance "A"		0.08 [2]

Cylinder Connection ③		inch [mm]
Pin Ø (New-Min)		1.41 [35.96]
Bore Ø (New-Max)		1.42 [36.05]
Total Clearance "A"		0.06 [1.5]

Guide Plate					
P/N	New Min. inch [mm]	Worn Max. inch [mm]	P/N	New Min. inch [mm]	Worn Max. inch [mm]
756420	6,02 [153]	5,63 [143]	757421	5,79 [147]	5,39 [137]
756421	5,79 [147]	5,39 [137]	757422	4,92 [125]	4,53 [115]
756422	4,92 [125]	4,53 [115]	757423	4,13 [105]	3,74 [95]
756423	4,13 [105]	3,74 [95]	757424	5,41 [137,5]	5,02 [127,5]
756424	5,41 [137,5]	5,02 [127,5]	757426	3,44 [87,5]	3,05 [77,5]
756425	4,53 [115]	4,13 [105]	757427	2,85 [72,5]	2,46 [62,5]
756426	3,44 [87,5]	3,05 [77,5]	757428	1,97 [50]	1,57 [40]
756427	2,85 [72,5]	2,46 [62,5]	757472	2,17 [55]	1,77 [45]
756428	1,97 [50]	1,57 [40]	757473	7,28 [185]	6,89 [175]
756470	5,91 [150]	5,51 [140]	757474	6,69 [170]	6,3 [160]
756471	2,56 [65]	2,17 [55]	757475	6,5 [165]	6,1 [155]
756472	2,17 [55]	1,77 [45]	757476	6,1 [155]	5,71 [145]
756473	7,28 [185]	6,89 [175]	757477	3,94 [100]	3,54 [90]
756474	6,69 [170]	6,3 [160]			
756475	6,5 [165]	6,1 [155]			
756476	6,1 [155]	5,71 [145]			
756477	3,94 [100]	3,54 [90]			

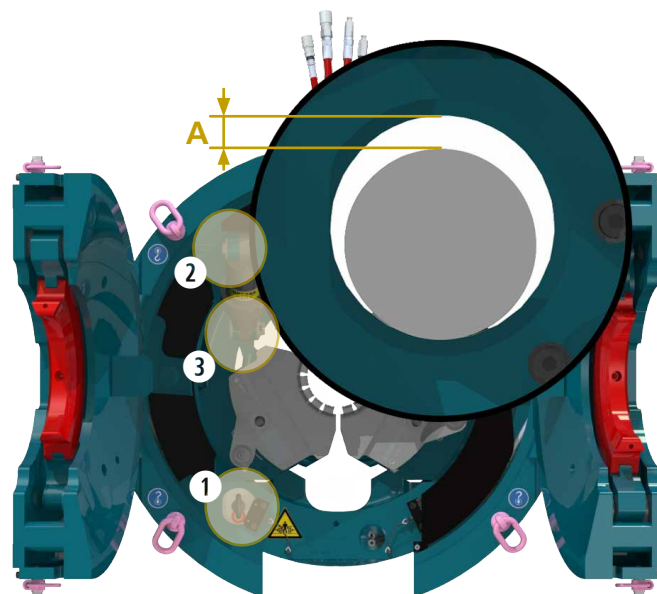


Fig. 155: Dimensions: Hinge bore in body and body hinge pin

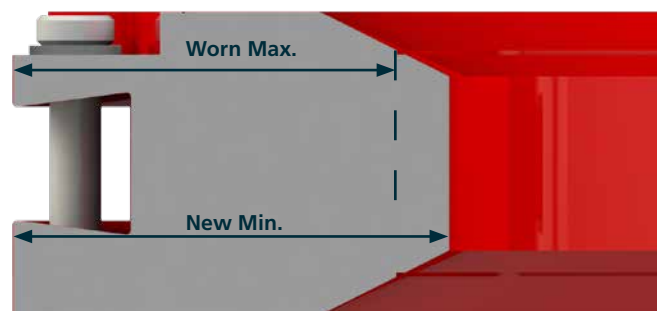


Fig. 156: Wear Limits for Guide Plates

All kind of repairs not performed by FORUM Handling Tools should Nevertheless be done in accordance with their methods and procedures or with their agents. Minor cracks or defects, which may be removed without reducing safety or operation of the PS-500, can be removed by grinding (see critical areas). Following the repair, the parts should again be inspected by an appropriate method to ensure that the defect has been completely removed

6.6 Functional Testing of PS-500 - Paper Test

Preparation

- The PS-500 has been removed from the Rotary Table.
- The PS-500 is placed on a level and supporting surface.
- Select the correct test pipe.
- Clean the PS-500 and testing equipment.
- The HCGS/Top-Cover is raised and secured.

Procedure

Functional Testing Procedure

1. Wrap the test pipe with brown craft paper or similar heavyweight paper.
- » **Do not** overlap the paper!
2. Raise the Slip Assembly of the PS-500.
3. Place the test pipe in the middle of the PS-500.
4. Set the Slip Assembly.
5. Apply a load to the test pipe. Do not exceed 10 tons.
6. Hold the applied load on the PS-500 for 30 seconds.
7. After 30 seconds, slowly release the applied load from the test pipe.
8. Raise the Slip Assembly.
9. Remove the test pipe and evaluate the test result!
All rows of Inserts should make full contact.

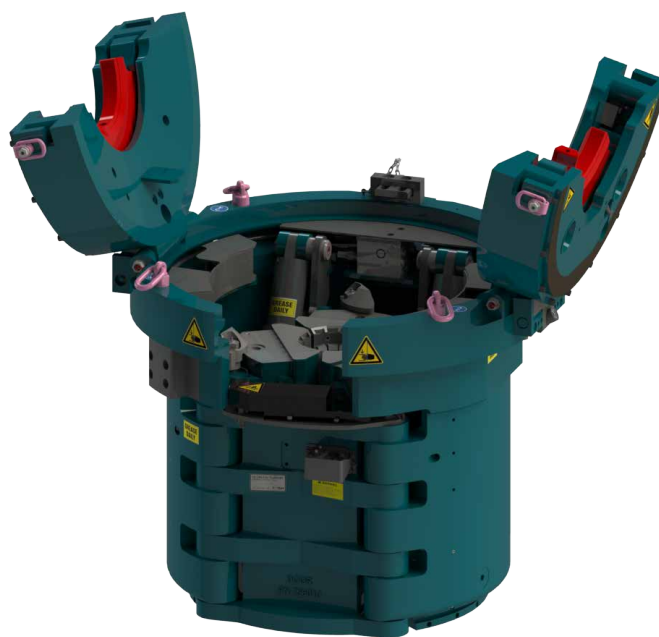


Fig. 157: Testing Procedure - Step I



Fig. 158: Testing Procedure - Step II



Fig. 159: Testing Procedure - Step III

Evaluation Examples

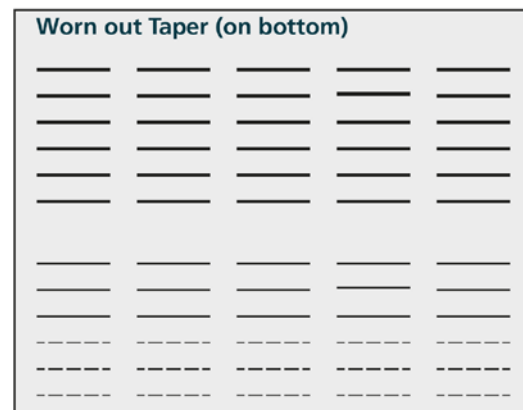
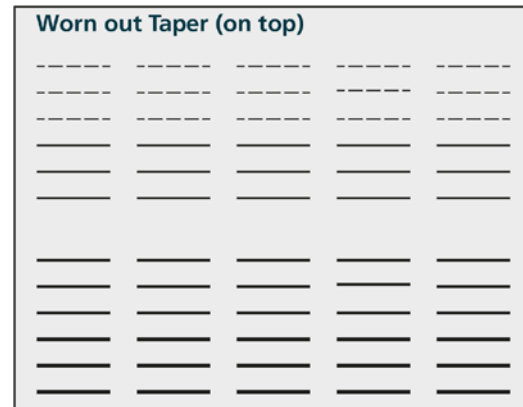
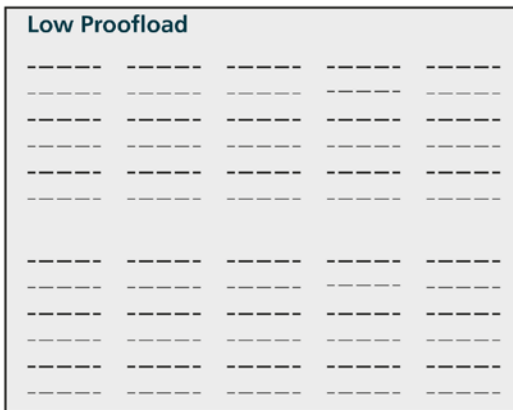
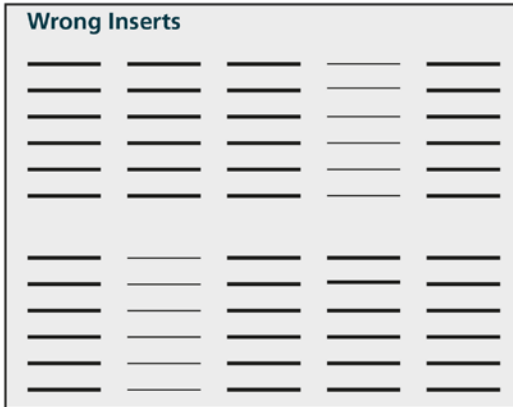


Fig. 160: Evaluation criteria I

Fig. 162: Evaluation criteria III

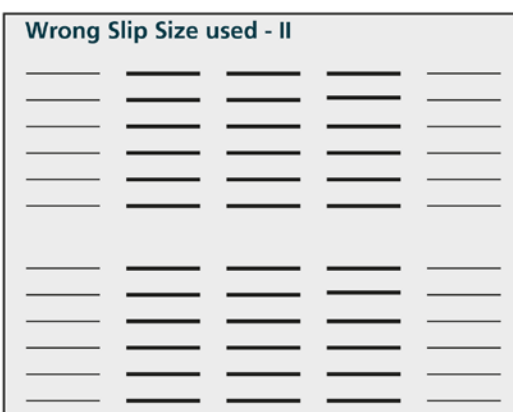
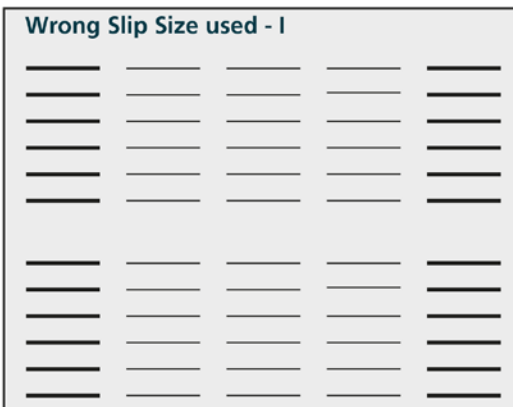


Fig. 161: Evaluation criteria II

INFO

If evaluation paper result shows poor contact marks then



1. Check condition of Inserts.
2. Check for correct seating of the Insert Carrier.
3. Consult FORUM Handling Tools service Team for further help and support (refer to section XI "Contact Worldwide" on page 12).

6.7 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!

The operating conditions and operating environment result in contamination on the PS-500. Remove this contamination regularly to prevent incrustation and to ensure safe operation of the PS-500. Clean contamination from drilling from the PS-500 regularly. The PS-500 should be cleaned thoroughly at the end of each shift at the latest. FORUM Handling Tools recommends cleaning the PS-500 with a high-pressure steam cleaner.

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STORAGE / DISPOSAL

STORAGE /
DISPOSAL

7 Storage / Disposal

This chapter deals with procedures to be taken to the storage after the decommissioning of the PS-500. The aim is to protect the Equipment, the environment and people from damages. Therefore, FORUM Handling Tools recommends to read and implement the following procedure accurately.

7.1 Storage of the entire device

Storage procedure

1. Store the equipment on a pallet located on an even, supporting surface.
 - » Observe the weight specifications in the technical data.
2. Ensure that the equipment is stored so that no person can be injured by moving parts or sharp edges.
3. Secure the equipment with tensioning cables or in another manner to prevent it from slipping or tipping when moved.
4. Lubricate the equipment as described in chapter "Lubrication".
5. Conserve all bare 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.
6. Protect the equipment against water penetration with a plastic tarp

Intermediate Storage

Lubrication

- | | |
|-------------------------|--|
| Protection of equipment | <ul style="list-style-type: none"> • Clean the equipment roughly. • Apply lubricant to all bare surfaces (e.g. cylinder). • Protect all other bare surfaces with Tectyl Type 864 or an equivalent agent. • Place PS-500 only on surrounded pallets and secure them with tensioning cables and anti-slip mat. |
|-------------------------|--|

- | | |
|--------------------|---|
| Ambient Conditions | <ul style="list-style-type: none"> • Store in dry surroundings (maximum humidity 80%). |
|--------------------|---|

Longer Storage

Lubrication

- | | |
|-------------------------|---|
| Protection of equipment | <ul style="list-style-type: none"> • Clean the equipment carefully and thoroughly. • Apply lubricant to all bare surfaces (e.g. cylinder). • Protect all other bare surfaces with Tectyl Type 864 or an equivalent agent. • Place PS-500 only on surrounded pallets and secure them with tensioning cables and anti-slip mat. • Protect the PS-500 against water penetration with a plastic tarp. • Drain the hydraulic oil, if applicable. |
|-------------------------|---|

- | | |
|--------------------|---|
| Ambient Conditions | <ul style="list-style-type: none"> • Store in dry surroundings (maximum humidity 80%). |
|--------------------|---|

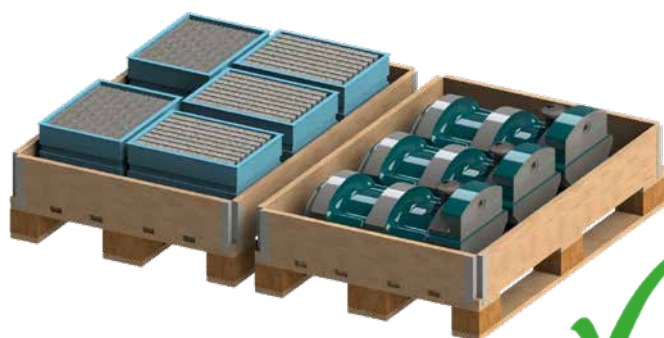


Fig. 163: Correct Storage I



Fig. 164: Correct Storage II

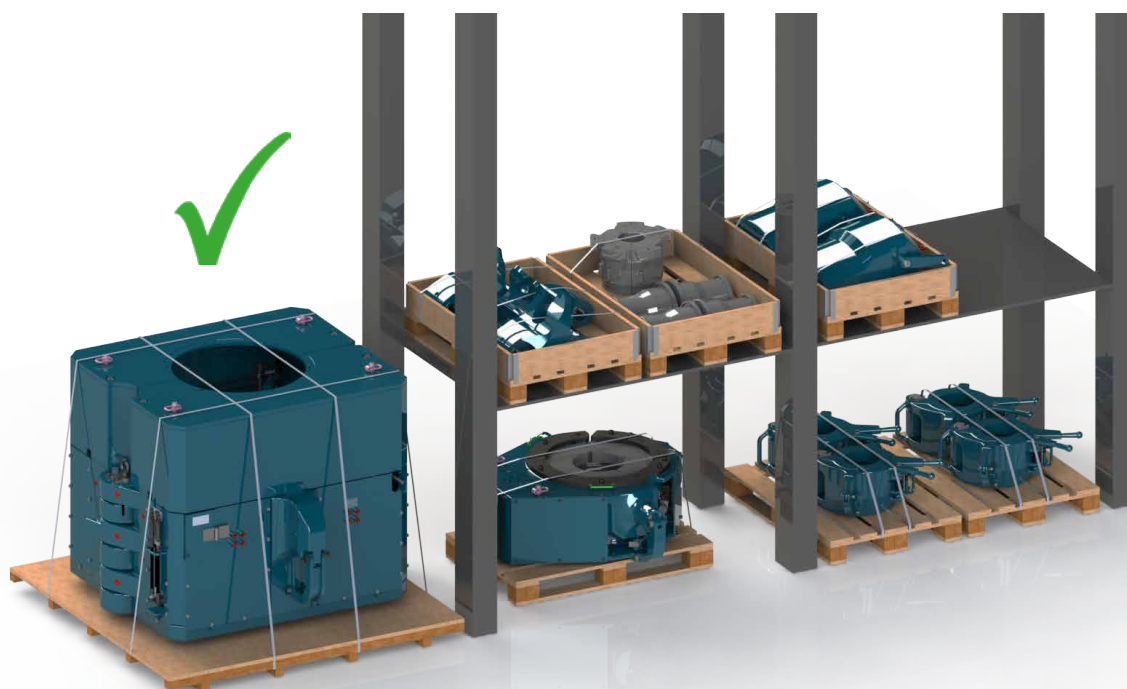


Fig. 165: Correct Storage III

7.2 Disposal

When used properly the Equipment does not pose any hazard for users or the environment.

However, operation of FORUM Handling Tools equipment requires use of hydraulic fluids, lubricants and/or cleaning agents, which can pollute the environment. For this reason Always ensure that such substances are disposed of properly in accordance with international, national and local regulations.

Never dispose of hydraulic fluids, oils, 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 FORUM Handling Tools 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.	SAMPLE OF EC DECLARATION	PAGE 151
B.	THIRD PARTY DOCUMENTS	PAGE 152
I	SAFETY DATA-SHEET	PAGE 152
II	COMPONENTS	PAGE 153

A. Sample of EC Declaration



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: **Hydraulic Operated Power Slips PS-250 - PS-1250**

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

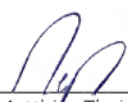
Product / Device Type:	[refer to data book]
Rated Capacity:	[refer to data book]
Part Number:	[refer to data book]
Serial Number:	[refer to data book]
Delivery date:	[refer to data book]
Order No.:	[refer to data book]
Marking:	CE  II 2G T5

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
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 33 033
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. 166: EC Certificate of Conformity Sample

B. 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	
[Lubricant] Thermaplex Hi Temp Bearings	
[Paint] Paint Gallon	
[Paint] Paint Marker	

Material Name	Link to file
[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	

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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