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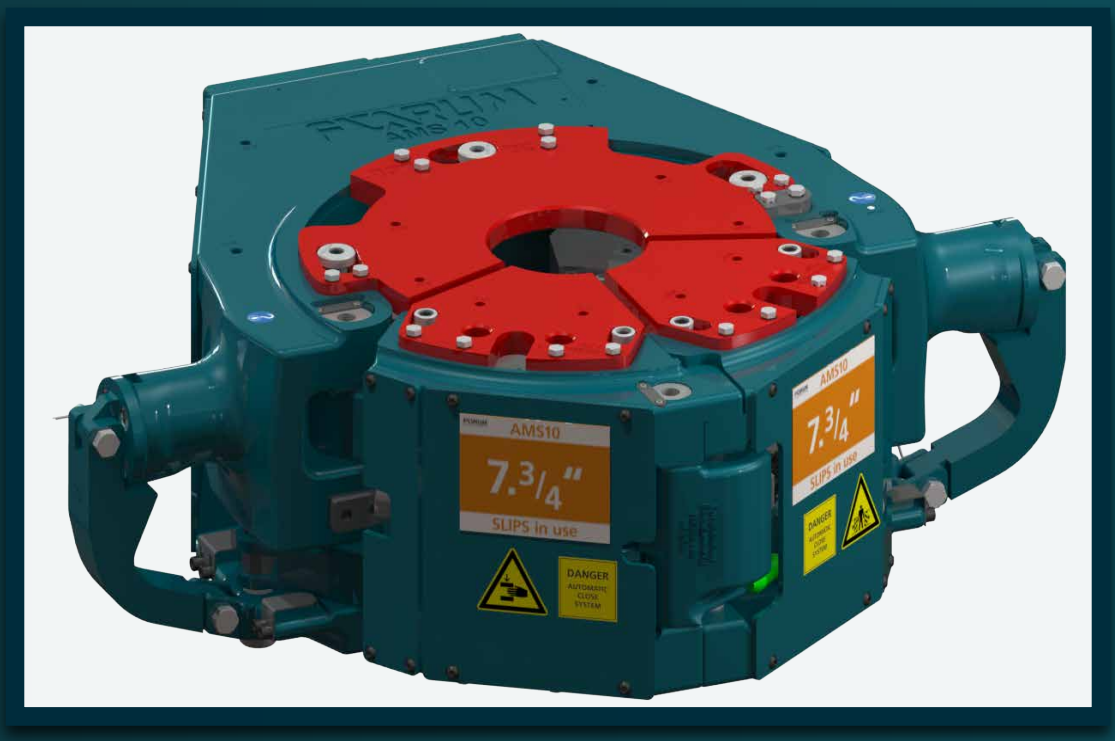
FORUM ENERGY TECHNOLOGIES

Operation Maintenance Manual • Handling Equipment • Hoisting Equipment

Automated Multi-Pipe Slip Elevator

AMS-10

Hydraulic operated Elevator with Elevator Rotator



Operating Instructions

Original Operating Instructions

Manual PN 638310-Y Revision: 00, 07-2018

FORUM Handling Tools

Revision history

Version	Date	Author	Changes
00	07-2018	Forum B + V Oil Tools, ROK, St.S	Initial Release

Document Approval

Version	Author	Eng. Check	Appoval Check
00	FORUM Handling Tools St.S 07-2018	FORUM Handling Tools AG 10-2018 FS 10-2018 JK 07-2018	FORUM Handling Tools AV 10-2018

7K-0001
8C-0037

All data in this manual takes place using best knowledge. This operation maintenance manual is based on the latest product information that was available at the time of printing. Depending on ongoing technical improvements (ISO 9001), FORUM Handling Tools reserves the right to 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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Table of contents

A. General

This operation manual (hereinafter called OMM) refers to the Automated Multi-Pipe Slip Elevator-10 (hereinafter called AMS-10) from FORUM Handling Tools for use on oil drilling platforms and rigs.

This OMM covers only one FORUM Handling Tools model from the Automated Multi-Pipe Slip Elevator Type Series. When installed in potentially explosive atmospheres, the instructions that follow the Ex symbol must be followed. Personal injury and/or damages to the AMS-10 may occur, if these instructions are not followed.

This OMM is intended for the operator of the AMS-10. It is intended to ensure safe operation and must be read carefully and kept where it is accessible for AMS-10 users at all times.

This OMM contains all information on safe and proper operation of the AMS-10. Observance of these instructions is required for safe operation.

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

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

I Intended Use

The AMS-10 is designed to be used in hanging Elevator-Links. The AMS-10 handles 7.3/4" to 17" Non-Upset drill pipes without Tool Joints and connects the Top Drive via Elevator-Links with the drill pipes. The load capacity of the AMS-10 is limited to 10 metric ton.

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 AMS-10 is allowed for the intended use only. The FORUM Handling Tools AMS-10 is designed in accordance with the latest version of the API 8C.

INFO

The abbreviation **t** and the word **ton**, which are used in this OMM, describe short 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

II Improper Use

INFO

Improper use of the AMS-10 releases FORUM Handling Tools from any liability for personal injury or property damage resulting therefrom.

The AMS-10 is intended exclusively for handling specified pipes. Always observe the specifications („1.2 Technical Data“ on page 19).

The following is specifically prohibited:

- Holding pipe with diameter for which use is not specified.
- Exceeding the load rating/limit of the AMS-10.
- Any use of the AMS-10, which is not intended.

Moreover, operation of the AMS-10 is prohibited under the following conditions:

- When the AMS-10 is used for applications other than intended.
- When the pipe to be hold is rotated for pipe joining or drilling.
- When the hydraulic equipment is not installed properly.
- When the AMS-10 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 AMS-10 is not operating properly.
- When humans or foreign objects are located in the hazard area of the AMS-10.
- When conversions or modifications have been performed without previous, written approval by FORUM Handling Tools.
- When equipment not approved by FORUM Handling Tools are 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 AMS-10.

Observe also the section „IV Warranty and Liability“.

III 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 AMS-10 or service procedures contained within this OMM must be completely satisfied that personal and/or AMS-10 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 AMS-10 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 AMS-10 in methods not intended. The AMS-10 should be used ONLY in the methods described in this OMM.

IV Warranty and Liability

IV-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 AMS-10 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.

IV-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 operating manual regarding safe conduct;
- Impermissible structural and/or functional modifications;
- Use of replacement parts not approved by FORUM Handling Tools;
- Normal wear or insufficient inspection of components subject to wear;
- External effects or force majeure;
- Lubricating the AMS-10 with lubricants other than those recommended by FORUM Handling Tools.

INFO

Any structural or functional modification to the AMS-10 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.

V Obligations of the Operating Company

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 AMS-10 must be trained by the operating company for the work performed on and with the AMS-10. All personnel must have read and understood the OMM.

V-01 Minimizing Risk of Injury

The following principles apply to minimize the risk of injury:

- Ensure that only qualified personnel perform work on the AMS-10.
- 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 AMS-10. 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 AMS-10 must be complete and easily legible. For this purpose, WARNING signs and information are to be cleaned regularly and replaced as required.

V-02 Trouble-free Operation

The following principles apply for trouble-free operation:

- Keep the complete OMM at the location where the AMS-10 is in operation where it is easily accessible for everyone and in an easily legible condition.
- Use the AMS-10 exclusively for its intended purpose.
- Use the AMS-10 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.

V-03 Requirements for Operator

Basic knowledge of safe handling and use of the AMS-10 includes knowledge of the general safety precautions. Ensure that the AMS-10 is operated only in compliance with the general safety precautions and other instructions in this OMM.

V-04 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 AMS-10 is familiar with the required procedures and safety precautions.

V-05 Minimum Qualifications

All work on the AMS-10 requires special knowledge and qualifications on the part of the operating personnel. All personnel working on AMS-10 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 AMS-10.
- Sufficient qualifications for working on the AMS-10 under supervision and at the instructions of a trained specialist.

VI User Groups

This OMM is subdivided into the following user groups:

Personnel	Personnel
Operating personnel	Sufficiently trained in: - Functional procedures on the AMS-10. - Operating procedures. Knowledge: - Competency and responsibility in regard to the work to be performed. - Behavior in emergencies.
Service personnel	Basic knowledge of: - Mechanics. - Hydraulic. Authorizations (according to standards of safety engineering): - Starting up AMS-10. - Grounding AMS-10. - Marking of AMS-10. - Basic knowledge of installation and operation of the AMS-10.

VII 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.

VIII Safety Symbols

The safety precautions in this OMM contain standardized depictions and symbols. Four 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.

VIII-01 Preliminary Safety Precautions

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

VIII-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. ...

VIII-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. ...

IX 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.

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

For example:

1. Unscrew nuts on machine feet.
2. Lift equipment.
3. ...

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

Fig. 1: Illustration Example AMS-10

INFO

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

X Personal Protective Equipment (PPE)

The following symbols located at appropriate points in this 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!

XI Conformity

The AMS-10 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 AMS-10. The EC Declaration of Conformity is delivered together with the AMS-10. Keep these instructions and the associated documents for later use.

XII 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

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.blohmvoss-oiltools.com

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Fax: +1.337.369.6893

FORUM ENERGY TECHNOLOGIES Drilling-Service-Standorte
Email: ForumDP.Sales@f-e-t.com

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Nr. 106, 3903 - 75 Ave
Leduc, Alberta T9E 0K3
Tel: + 1 780.980.0345
Fax: + 1 780.986.3278

Mexico

Avenida Avante Monterrey N 300
Parque Industrialxico
Tel: + 52.81.8245.6800

Scottland

Peregrine Road, Westhill
Aberdeenshire, AB32 6JL
Tel: + 44,1224.744000

United Arabic Emirates

Oilfields Supply Center
Building B-45
Jebel Ali Free Zone Dubai UAE
Tel: + 971.4.883.5266

Singapore

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

XIII Online Technical Document access

XIII-01 Information via homepage

INFO

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

A digital version of the OMM as well as the operation instructions, safety- and update notes for other FORUM Handling Tools products can be reached via the blohmvoss-oiltools 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 ❶ on **www.blohmvoss-oiltools.com**.

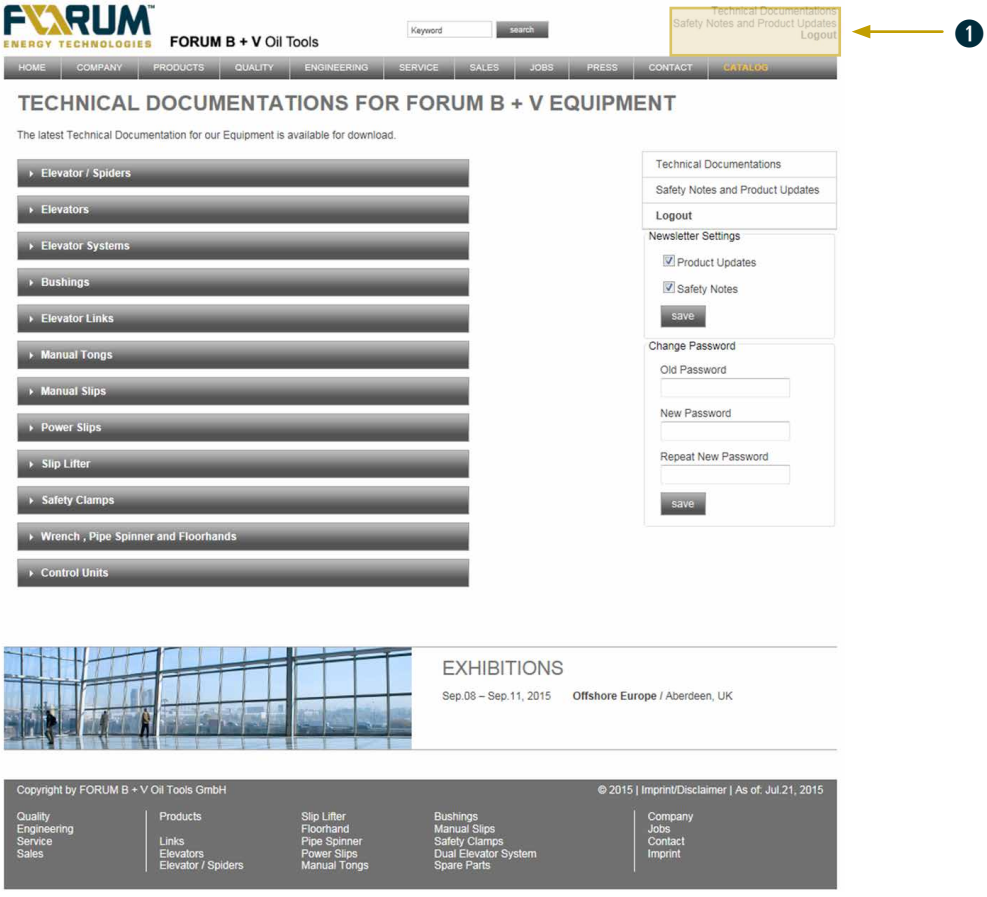

Fig. 2: Illustration Service–Homepage

XIII-02 Information via Extranet

INFO

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

A digital version of the OMM as well as the operation instructions, safety – and update notes for other FORUM Handling Tools products can be reached via the Extranet. To join our Internet Technical Documentation service with the latest updates on new technical documentation in a casual way, you must register to our service with your email-address and name in the customer-login ❶ area on **https://www.accessoiltools.com/fx/**.

Fig. 3: Illustration Service–Extranet

XIV 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**	kilop Pascal
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	**kN**	kilo Newton (load)
min	minimum	**oz**	ounce(s)
no	number	**psi**	pounds per square inch
Tbg	tubing	**sh T**	short ton
w/	with	**t**	Metric Ton
w/o	without	**SWL**	Safe Working Load
w/Zip	with Zip groove		

DESCRIPTION

1 Description

The FORUM Handling Tools AMS-10 is designed with strength and safety factors in accordance with API 8C - standards and will be used for handling long, heavy strings of tubular. The AMS-10 is manufactured with a Latch and a Lock to secure the Latch mechanism against accidental opening to ensure safe pipe holding while minimizing the possibility of damages to the pipe.

Features and Benefits

- Easy, safe and quick installation of Guide Plates and Slip segments.
- High safety due to innovative hydraulic circuit structure.
- Additional feedback signal that can be evaluated in the Top Drive.
- Guaranteed synchronicity of all Slip cylinders.
- Visual indication that doors and latch are securely locked.
- Larger pipe range than common tools. The AMS-10 handles 7.3/4" to 17" Non-Upset drill pipes without Tool Joints.
- Each Slip is operated individually.
- Compatible with Control Unit and Elevator Rotator System.

INFO

Please note the Slip Assembly can only hold the load after the AMS-10 has been closed and latched properly and the feedback signal has been registered by the system/operator.

1.1 AMS-10 Main Assemblies

The AMS-10 consists of the assemblies described below.

INFO

Please note that this illustration does not reflect the scope of delivery.

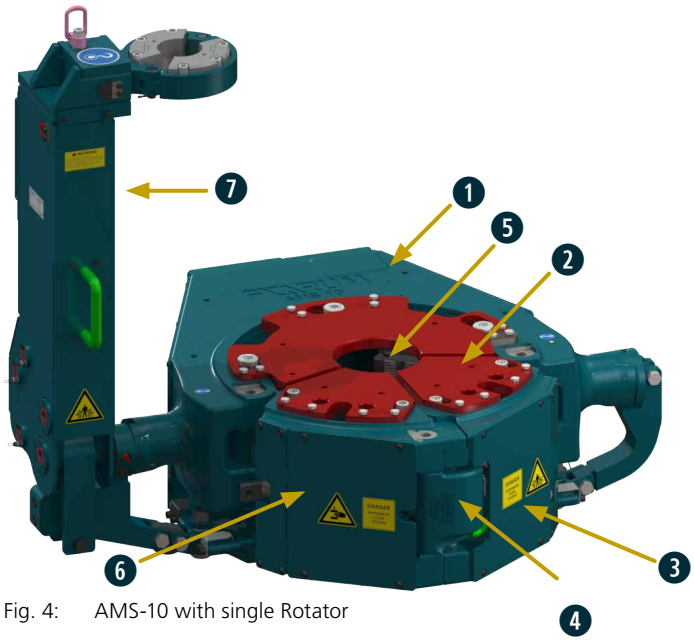

Fig. 4: AMS-10 with single Rotator

Pos.	Description	Pos.	Description
1	Frame	2	Guide Plates
3	Door right	4	Latch
5	Slip Assembly	6	Door left
7	Single Elevator Rotator (optional)		

A catalog with complete general drawings and parts lists for the assemblies of the AMS-10 can be found in chapter 5 in this OMM.

1.1.1 AMS-10 Frame with Doors and Latch

The AMS-10 frame, doors and latch are made of high-quality, heat-treated and tested steel castings to meet the high demands and satisfy the strong safety requirements.

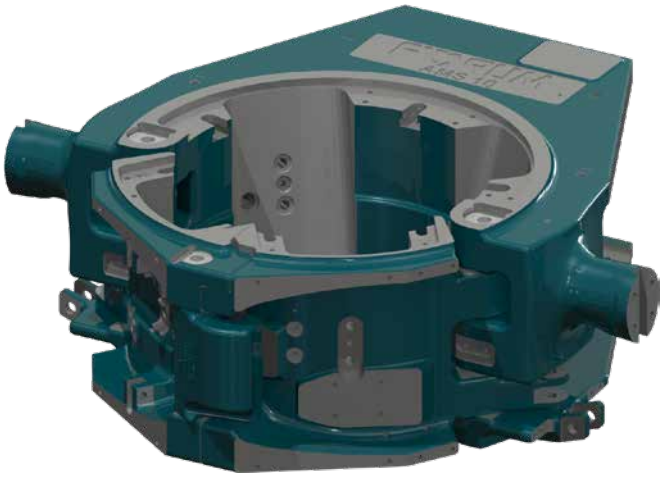

Fig. 5: AMS-10 Frame

1.1.2 Slip Assembly

The Slip Assembly consists of four separate Slips. The Slip Assembly provides direct contact with the drill string over the Inserts. Each Slip is lifted and lowered by one hydraulic cylinder.

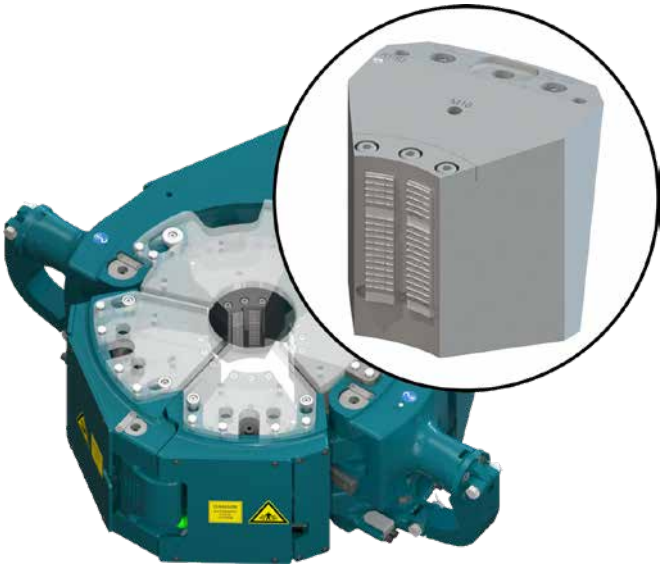

Fig. 6: AMS-10 Slip Assembly

1.1.3 Guide Plates

Guide Plates are used to prevent the drill string from hitting against the Inserts. They are located at the bottom and on top of the AMS-10 and can be exchanged easily.

Fig. 7: AMS-10 Guide Plates

1.1.4 Hydraulic Assembly

Hydraulic Components

The hydraulic system is completely added and integrated to the AMS-10 frame. The hydraulic system essentially consists of eight hydraulic cylinders, which are actuated by a complex hydraulic control, which consists of valve blocks, hoses and fittings.

Feedback

In order to provide more safety, the AMS-10 is equipped with a feedback, which indicates the safe setting of the Slip Assembly "Slips are set".

Hoses and Couplings

All supply connections are equipped with quick connection couplings of the size 3/8" or 1/4". The used quick couplings by FORUM Handling Tools fulfill the ISO 16028 standards and 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. To operate the AMS-10 all hydraulic couplings have to be connected to all hydraulic supply lines.

Port	Pos.	Description
P	1	Pressure Line
FL	2	Float mode
XP	3	Pilot Line (open/close/feedback elevator closed)
T	4	Tank Line
XP2	5	Feedback Slips set
Slip	6	Raising/Lowering the Slip Assembly

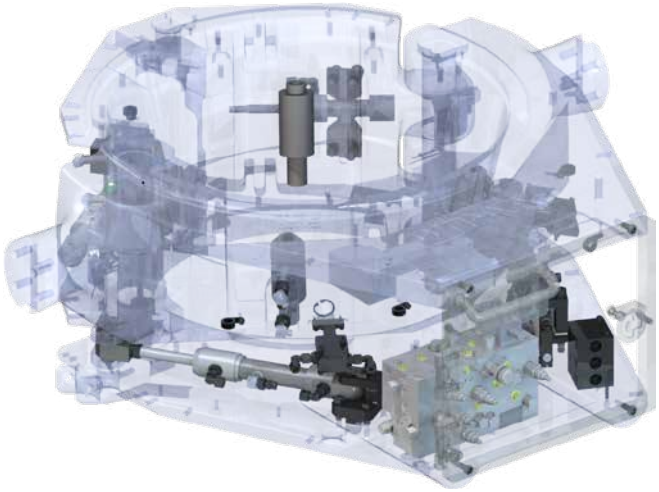

Fig. 8: AMS-10 Hydraulic connections

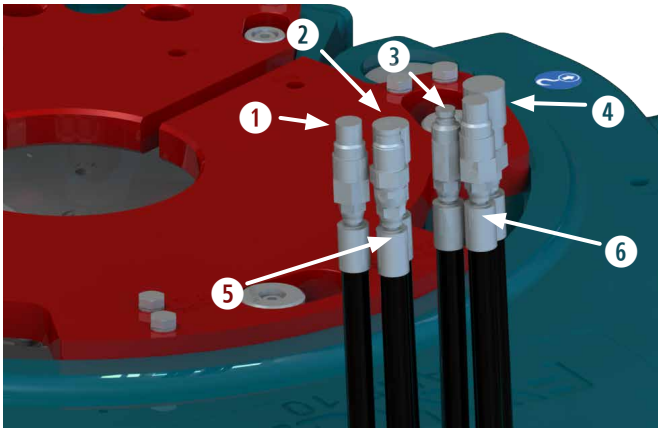

Fig. 9: AMS-10 Hydraulic connections

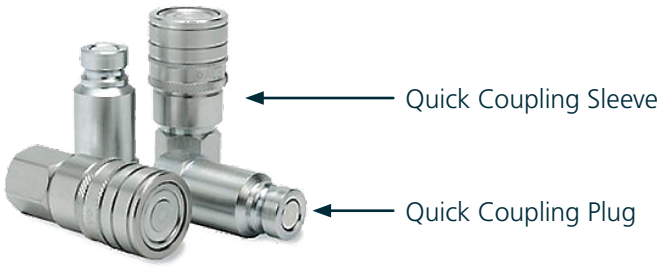

Fig. 10: AMS-10 Hydraulic connections

1.2 Technical Data

Name	AMS-10
Pipe Range	7.3/4" - 17"
Load Capacity	10 metric ton
Safe Working Load horizontal and vertical acc. to NORSOK R002	73,8 kN
Part number	638310-Y
Rotation System	678801-350 [Single acting Rotator] 678800-350 [Double acting Rotator]
Slip Assembly	638315-BC
Elevator Links	2.3/4" (350 sh ton) - 3.1/2" (500 sh ton)
Weight lb [kg] with Slips without Slips	3130,56 [1420] 2480,2 [1125]
Operating Pressure	Min. 160 bar (2321 Psi), Max. 210 bar (3046 Psi)
Operating Flow rate	Min. 5 Gpm (18,9 l/m) Max. 10 Gpm (37,9 l/m)
Feedback Pressure	85 bar (1233 Psi)
Feedback Flow rate	Min. 5 Gpm (18,9 l/m) Max. 10 Gpm (37,9 l/m
Temperature working range AMS-10	- 20°C to + 45°C - 4°F to + 113°F
Temperature working range Control Unit P/N 638900	0°C to + 40°C + 32°F to + 104°F

Main Dimensions

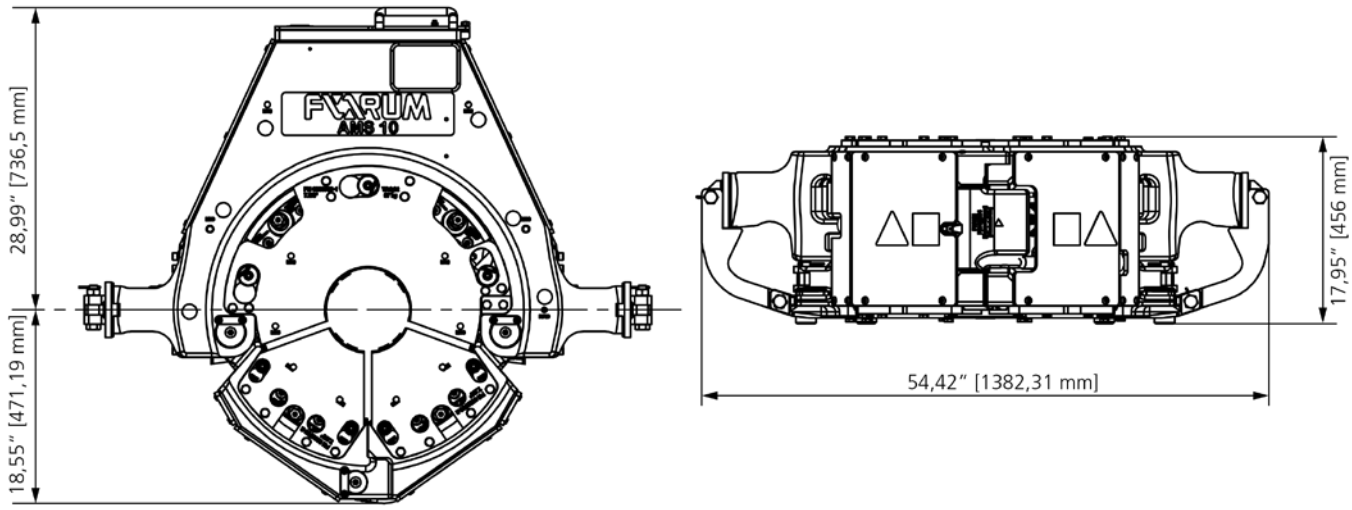

Fig. 11: AMS-10 Dimensions

1.3 Elevator Rotator System

The FORUM Handling Tools Elevator Rotators are designed to be used for rotating an Elevator. The control unit delivered by FORUM Handling Tools can use the rotation angle proportionally. For use with the AMS-10, a specially designed Adapter Kit must be installed.

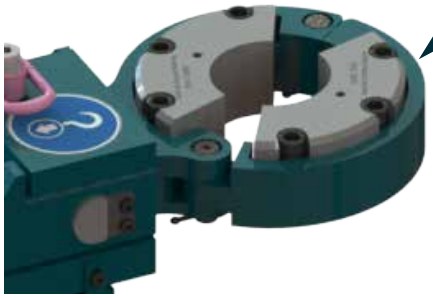

Fig. 12: Single Elevator Rotator Link Bushing

Fig. 13: Rotator Adapter

Fig. 14: AMS-10 with Single Rotator

Single Elevator Rotator System Main Dimensions

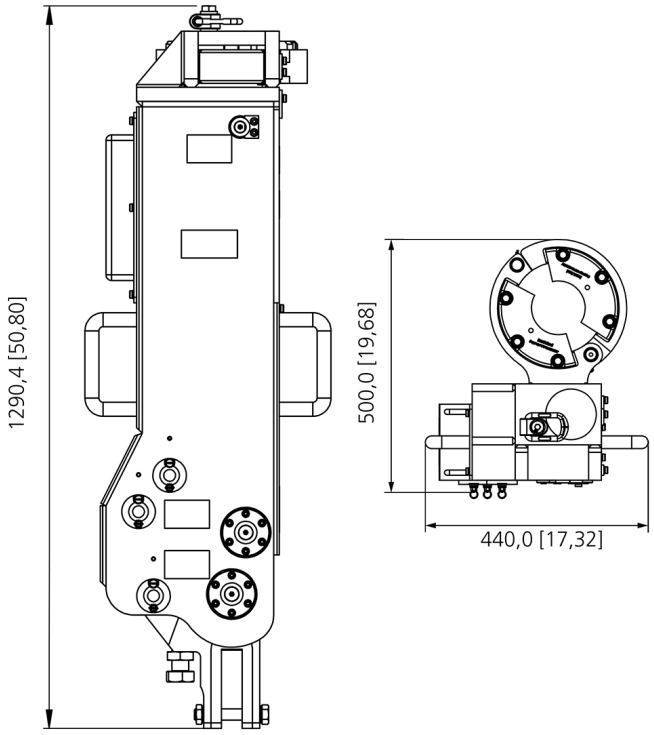

Fig. 15: Single Rotator Main Dimensions

⚠ Warning

Be aware that the correct size of Rotator Link Bushing is used.

- It is off-limits to use the Single Elevator Rotator with a not matching component size (i.e. 4.1/2" Bushing Assembly with a 4.3/4" Elevator-Link), as the clearance between the Rotator Link Bushing and Elevator-Link diameter must be exact.
- If the Rotator Link Bushing is too close to the Elevator-Link and is not able to move upwards and downwards freely, the Rotator could get damaged.

» Never operate the Single Elevator Rotator without or with incorrect Link Bushings.

1.4 Control Unit for AMS-10

The FORUM Handling Tools Control Unit allows simple and convenient control of the AMS-10 and contains all controls and regulating elements required for operation of the AMS-10.

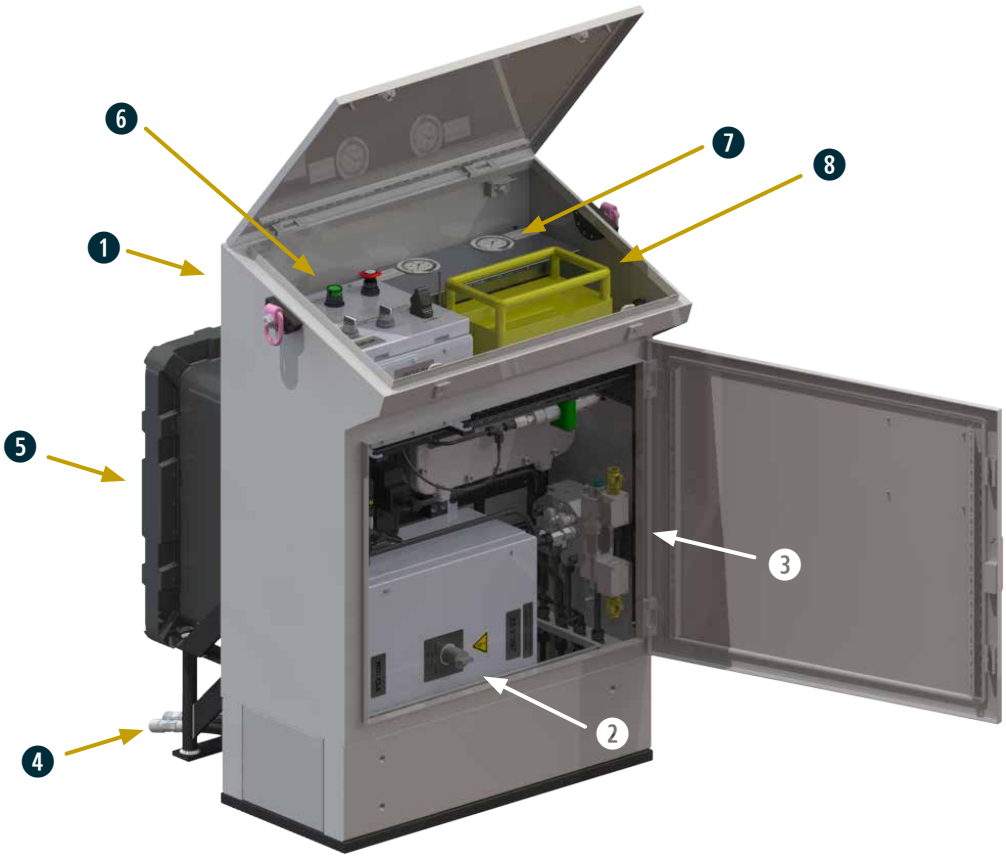

Fig. 16: Control Unit Main Assemblies

Pos.	Description	Pos.	Description
1	Frame with Door and Cover	2	Control Box for operation mode
3	Hydraulic Components	4	Hydraulic Supply/Connections
5	Main Control Box for SPS	6	Control Panel
7	Pressure gauges	8	Bellypack

Control Unit Main Dimensions

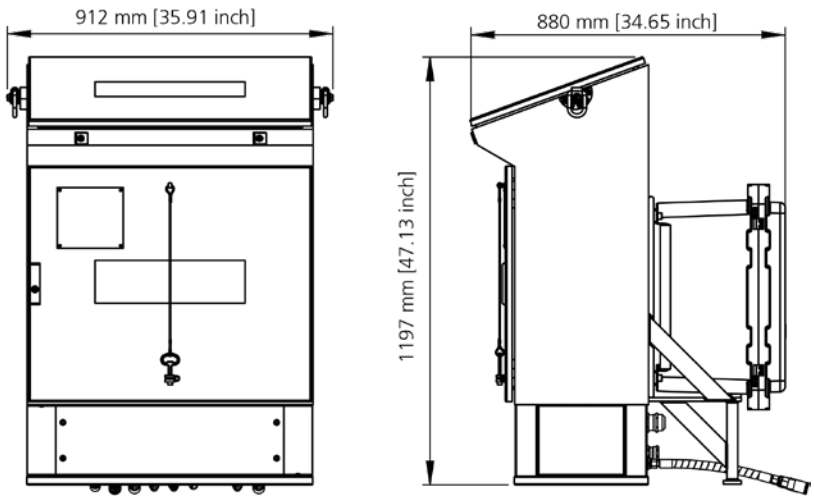

Fig. 17: Control Unit Main Dimensions

1.5 Optional Accessories

To ease the handling and to support the AMS-10 functions following accessories are available for the AMS-10. Please contact your local FORUM Handling Tools representative for detailed information.

- **Grease Pump, manual** **PN 755667-3**
  Manual grease pump to apply grease to the AMS-10 grease points.

- **Control Unit** **PN 638900**
  The Control Unit allows simple and convenient control of the AMS-10 and contains all controls and regulating elements required for operation of the AMS-10.

Fig. 18: Stand Alone Control Unit for AMS-10

- **Hook Up Kit / Elevator Tool Kit**

The Hook Up Kit 638310-HUK for the AMS-10 contains all tools required for transport, setup and startup.

1

Fig. 19: Lifting tackle

2

Fig. 20: Hose Assembly

3

Fig. 21: Hose Assembly 70

4

Fig. 22: Lifting Handle

Pos.	Qty.	P/N	Description
1	1	638311	Lifting tackle
2	1	638649	Service Loop (length: 32,5 m) incl. quick connector
3	1	638659-70	Hose Assembly 70
4	2	645234	Lifting Handles
5*	1	775814	Case for Hook up Kit tools
6	1	675162	Toolset
7*	1	757121	Manometer
8	4	553468	Lifting eye
9*	1	757123	Adapter
10*	1	645833	Coupling, Flat Face
11*	2	755368	Equal Tee
12*	2	755367	L-Adapter

* not shown

6

Fig. 27: Toolset

8

Fig. 28: Lifting Eye

1.6 Recommended Hydraulic Fluid

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

Brand	Name	Temperature range	Remarks
Finke	Aviaticon XRF Low-Viscosity Lubricant	- 20 to + 29 °C (- 4 to + 84,2 °F)	NLGI 0
Fuchs	NESSOS SF0 EP Lubricant 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 Lubricant	- 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 EP@	- 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 using lubricants in consistency class NLGI 2.

1.7 Recommended Lubricants

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

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

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

1.8 Operational Environment

The AMS-10 is designed and constructed for use in the drilling industry on ships and platforms. The AMS-10 complies with the Machinery Directive 2006/42/EC.

The AMS-10 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 according to CE (with reference to the ATEX guideline) is as followed:

CE Ex II 2G IIB T5 for hydraulic and pneumatic equipment with

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 serve for traceability and provide general information about the component/equipment. All markings are in compliance to the latest API 8C and at least include the following information:

General Markings according to API 8C

- 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.
- Equipment weight.
- CE-ATEX marking.
- Country of manufacture.
- The email address of the manufacturer is given on the support sticker if service is required.

Markings according to NORSOK R002

- Safe Working Load - SWL.
- Optical working range indicator (Magnetic signs).

Fig. 23: Contact with Technical Support

1.10 Component Sizes

The pipe diameters and matching components for the AMS-10 are listed with part numbers.

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

Slip Assembly and Guide Plates

API Pipe Size	Slip Assembly c/w Inserts		Guide Plates	
	P/N	Weight* kg [lbs]	P/N	Weight* kg [lbs]
7.5/8"	638315-231	216 [477]	638316-231	129 [285]
7.3/4"	638315-269	215 [474]	638316-269	128 [283]
9.7/8"	638315-265	198 [437]	638316-265	120 [265]
10.3/4"	638315-238	183 [404]	638316-238	115 [254]
11.3/4"	638315-239	178 [393]	638316-239	110 [243]
13.5/8"	638315-259	155 [342]	638316-259	99 [219]
17"	638315-267	100 [221]	638316-267	75 [166]

* Weight from CAD models.

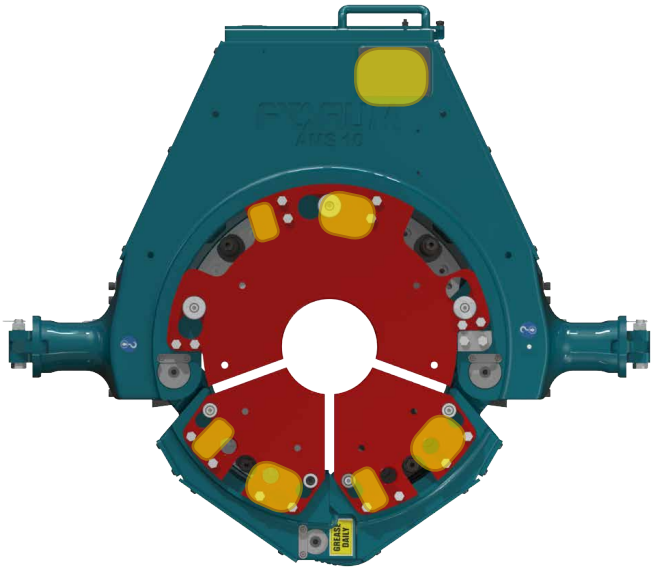

Fig. 24: Position of Equipment Markings

Fig. 25: Position of the Magnetic Signs

Fig. 26: Position of Equipment Markings

1.11 RFID-Chip Equipped Handling Tool 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 („XI Online Technical Document access“ on page 12).

Frequently Asked Questions (FAQ)

- How do I know if my equipment has RFID?

» RFID tags are embedded and clearly marked (“RFID”) on equipment in inconspicuous locations generally at the upper visible part of the equipment.

- What type of RFID tag are we using?

» The RFID tags used in FORUM equipment operate on the UHF Frequency.

- How can I scan the tag?

» Standard NFC UHF Frequency Reader (available through Forum).

- What is on the tag/chip?

» The chip identification number is the only information physically on the chip. All other information is stored on the cloud-based database associated with the chip identification number.

- Whom do I contact to get Tier I access or to inquire about Tier II access?

» Forum Sales personnel can help with basic access and upgrade information.

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SAFETY

2 Safety

SAFETY IS EVERYONES RESPONSIBILITY BUT IT STARTS WITH YOU!

The AMS-10 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 AMS-10. 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 AMS-10. The AMS-10 as to be used only for its intended purpose. Rectify all faults immediately, which could have a negative effect on safety.

2.1 General Safety Precautions

Ensure that work on the AMS-10, particularly installation, maintenance and repair work, is performed only by personnel with the necessary qualifications and who are familiar with the associated risks („V Obligations of the Operating Company“ on page 7). For safe and proper operation of the AMS-10, it is essential that all personnel working on the AMS-10 take the prescribed safety measures and observe the safety precautions specified in this OMM. Before switching on and before working on the AMS-10 Always ensure that no one is put in a hazardous situation. All safety features must be installed completely before switching on the AMS-10. Safety features may be released only when:

1. The entire AMS-10 is switched off.
2. Switching back on unintentionally is not possible.

The AMS-10 contains components subject to wear. After longer periods of operation, the safety can be reduced due to wear. Service the AMS-10 regularly in compliance with the maintenance chart (refer to „Inspections“ on page 86) 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 AMS-10 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 AMS-10 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 AMS-10 is equipped with various safety features for protection of the operating personnel:

- The hydraulic lines are connected with safety quick-release couplings.
- Hazard points on the AMS-10 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 Latch is secured with a Latch Lock.
- Every single action of the AMS-10 is secured by interrogating additional signals (pressures).
- A Feedback signal indicates that the Slip Assembly has been set and the door is closed and locked.
- Easily replaceable magnetic signs for quick recognition of the used Slips and Guide Plates.

» Never open the AMS-10 when load is still suspended by the AMS-10.

» 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.

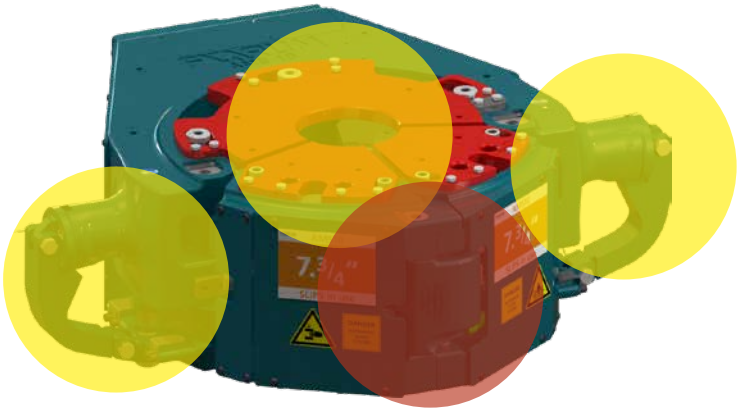

Fig. 29: Hazardous locations on AMS-10

⚠ Warning

Reuse of safety components can cause accidents.

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

» Replace such components with new safety parts.

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

⚠ DANGER

Suspended load!

This indicates injury risks from transporting heavy components.

⚠ DANGER

Tipping hazard for components!

This indicates injury risks from tipping components.

⚠ WARNING

Danger of pinching/crushing hands!

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

⚠ WARNING

Danger of pinching/crushing feet!

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

⚠ WARNING

Danger of pinching/crushing body!

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

⚠ WARNING

Separated hydraulic 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.

⚠ WARNING

Health hazards from service products!

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

⚠ Caution

Risk of stumbling/tripping!

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

2.3.2 Warning and Safety Signs on AMS-10

INFO

Ensure that warning and safety signs are Always present and readable. They must be in an easily legible state and replaced as required.
Refer to our Service department with the part numbers given on this page.

Fig. 30: Warnign and Safety Signs on AMS-10

1

⚠ WARNING

Danger of pinching/ crushing hands!

WARNING Sign
"Hazard – Hand Injury"
ANSI Z535.4
PN 671640-1

2

⚠ WARNING

Danger of pinching/ crushing body!

WARNING Sign
"Body crushing"
ANSI Z535.4
PN 671641

3

⚠ WARNING

DANGER
AUTOMATIC CLOSE SYSTEM

WARNING against unintended closing.

WARNING Sign
"Closing"
ANSI Z535.4
P/N 671639

4

⚠ NOTE

Lifting point locations are marked on the AMS-10, where slings can be securely fastened. Thus, the safe transport of FORUM Handling Tools equipment is ensured.

2.4 Safety Precautions for Protection against Remaining Hazards

The AMS-10 was designed and produced in consideration of the safety precautions specified in EC Directive 2006/42/EC on Machinery.
The AMS-10 may be used only for:

- Its intended purpose.
- When it is in a technically safe state.

Nevertheless, it is not possible to completely exclude all hazardous situations, which could arise when the AMS-10 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 troubleshooting tasks, like such as clamping components, the use of metal equipment 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.

INFO

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

⚠ WARNING

Danger of igniting gases!

Switching sparks can ignite critical gas mixtures.

» Change battery in safe area only!

» Never change battery in ATEX critical areas!

⚠ Warning

Collapse of the supply voltage!

Put all switches in the safe state position before reconnecting, switching on or restarting the Control Unit.

» Stay away from the AMS-10 after a power outage!

» Approach the AMS-10 only after reaching the safe state!

2.4.1 Incorrect Handling of Hydraulic Equipment

⚠ WARNING

Defective hydraulic lines pose an injury hazard!

Hydraulic lines are subjected to wear and may be damaged during operation.

» Route hydraulic lines safely and check regularly for damages.

» Provide lines with chafe protection.

» Replace defective lines immediately.

⚠ WARNING

Separated hydraulic lines pose an injury hazard!

Hydraulic fluid can escape under high pressure.

» Always relieve pressure in hydraulic equipment before working on AMS-10.

» Check hydraulic connections regularly to ensure that they are properly fastened.

⚠ WARNING

Hydraulic fluid can pose a health hazard!

Hydraulic fluids can lead to skin and eye injury and poisoning symptoms upon contact.

» Avoid direct contact with hydraulic fluids.

WEAR EYE PROTECTION!

WEAR PROTECTIVE GLOVES!

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.

For this reason Always

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

Always wear your personal protective equipment.

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

2.4.2 Danger of Pinching/Crushing

⚠ WARNING

Danger of pinching/crushing hands!

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

» Never reach between moving components.

⚠ WARNING

Danger of pinching/crushing feet!

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

» Never stand below moving components.

⚠ WARNING

Danger of pinching/crushing body!

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

» Never stand between moving components.

During assembly, set-up and conversion work as well as during operation pinching/crushing hazards can be posed. Pay attention to hands, feet and body when performing the work specified. Always ensure that no one is in a hazardous position.

» Always wear your personal protective equipment.

2.5 Human Error

Ignorance of hazards, inattentiveness and limited reactions can lead to hazard situations while working with the AMS-10.

Safe Work

1. All personnel working on the AMS-10 are responsible for paying attention to their colleagues.
2. Consumption of alcohol and drugs is prohibited.
3. Work on the AMS-10 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 AMS-10, to allow communication via hand signals.
5. The personal protective equipment must Always be kept and used in perfect condition.
6. All personnel working on the AMS-10 must be familiar with and observe the safety precautions in this OMM and on the AMS-10.
7. The instructions for handling and maintenance intervals specified in this OMM must be observed.
8. Keep a copy of this OMM in the vicinity of the AMS-10, where it is accessible at all times.

2.6 Organizational Measures

The operating company is responsible for ensuring that all legally and officially prescribed approvals for operation of the AMS-10 are present and in compliance with national laws and regulations. The required personal protective equipment („VIII Personal Protective Equipment (PPE)“ on page 10) must be provided by the company operating the AMS-10. All safety features present must be checked regularly in compliance with national and local requirements. Warning signs and safety notices on the AMS-10 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 AMS-10 at all times The operating company is responsible for ensuring that the AMS-10 with Rotator and the Control Unit are connected to the ground to avoid electric charging.

Personal Protective Equipment

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

The following PPE is recommended:

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

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

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TRANSPORT/ INSTALLATION

3 Transport / Setup

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

Read these instructions carefully before setting up the AMS-10 and putting it into service.

3.1 Delivery

The AMS-10 and all accessory parts are shipped in a transport crate. 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

The scope of delivery includes all components required for the intended operation of the AMS-10.

INFO

The contract documents and shipment papers specify the precise scope of delivery. Check these documents carefully at the time of delivery. In the event of any discrepancies please contact the FORUM Handling Tools representative („X Contact worldwide“ on page 11).

3.1.2 Unpacking and Disposal of Packing Material

Remove the transport packaging and transport aids before hoisting the AMS-10 to final site.

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

If the AMS-10 has been damaged during transport or the shipment is incomplete, please notify the manufacturer immediately („X Contact worldwide“ on page 11). Dispose of the packaging material ecologically in compliance with all applicable regulations.

3.1.3 Intermediate Storage

If intermediate storage of the AMS-10 is necessary, observe the following:

- Leave the AMS-10 in the transport packaging. This provides sufficient protection against external influences.
- Secure the AMS-10 to prevent it from Slipping or falling due to motion.

Fig. 31: Fixed AMS-10

3.2 Transport

⚠ DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

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

WEAR PROTECTIVE HELMET!

WEAR PROTECTIVE GLOVES!

WEAR SAFETY SHOES!

INFO

Safe Lifting Points!

- Lifting point locations are marked on the AMS-10.
- Make Sure all load hooks are fully installed in the lifting point

» Thus, the safe transport of FORUM Handling Tools equipment is ensured.

INFO

Internal transport on site!

- It is advised to use pallets for longer component transports.

» Use a pallet for transport.

» Detailed weight specifications are given in the Chapter „1.2 Technical Data“ on page 19.

Principles for transport

1. Ensure that transport routes are sufficiently dimensioned.
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. Ensure that visual and audio contact exists between the crane operator and operating personnel.
6. Secure the area against unauthorized entry. If necessary mark the area with information signs to warn of maintenance and repair work.
7. Secure moving parts in suitable manner.
8. Use only approved slinging and transport equipment, which is in perfect condition and suitable for the intended purpose. Observe specified load limits.
9. Secure to be equipment against slipping/sliding. Observe equipment weight. Observe center of gravity.
10. Never stand under suspended loads.
11. Transport the equipment carefully. Do not fasten, lift or pull equipment on parts, which could be damaged. Avoid sudden stops.
12. Always use hoisting equipment (slings, hoisting cables, shackles, etc.), which has been inspected and is sufficiently dimensioned.
13. Ensure that all installation and hoisting procedures comply with recognized rules of practice and industrial standards.

3.3 Lifting arrangements

This chapter shows save lifting arrangements.It may show the AMS-10 in different assembled states, refer to the suitable set-up chapter for assemble tasks.

Hoist the equipment safely

1. Attach the AMS-10 only at the attachment points provided for transport.
2. Only use approbate lifting material with a load carrying capacity suitable to the weight of the elevator / spider.
3. Attach the hoisting ropes so that they are tensioned straight without kinks.
4. Use hoisting cables and load hooks with sufficient supporting capacity.

INFO

Lifting angle limited to 45°!

The hoisting eyes installed are suitable for 1500kg each.
Therefore, the lifting angle of the hoisting equipment might not succeed 45°.

INFO

When transporting the AMS-10, Always use only the attachment points located at the AMS-10 arms.

⚠ DANGER

Safe Lifting!

» Always installed load hooks completely to lifting points before lifting the AMS-10.

⚠ DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

» Never stand under suspended loads.

» Never stand in the swing area of suspended loads.

3.3.1 AMS-10 Lifting Arrangement

1. Fasten the lifting material on AMS-10 lifting points.
2. Lift the AMS-10 slightly to tension the lifting material.

⚠ **WARNING** Danger of collision with swinging loads!
Ensure that no one is present in the swing range of the AMS-10.

3. Lift the AMS-10.
4. Move the AMS-10 to the installation location.
5. Set the AMS-10 down carefully on a suitable subsurface.

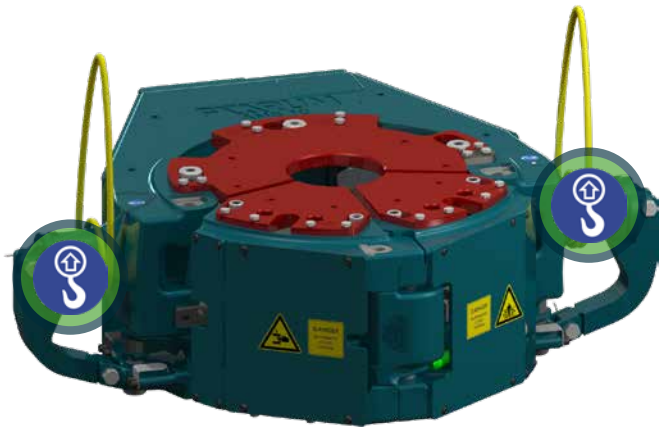

Fig. 32: Attachment points on AMS-10

3.3.2 Lifting arrangement for Slip Segments

1. Fasten the lifting material on Slip segment lifting point.
2. Lift the segment slightly to tension the lifting material.

⚠ **WARNING** Danger of collision with swinging loads!
Ensure that no one is present in the swing range of the segment.

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

Fig. 33: Attachment points on AMS-10 Slip segments

3.3.3 Single Rotator Lifting Arrangement

1. Fasten the lifting material on Single Rotator lifting points.
2. Lift the Single Rotator slightly to tension the lifting material.

WARNING Danger of collision with swinging loads!
Ensure that no one is present in the swing range of the Rotator.

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

Fig. 34: Attachment points on Single Rotator

3.3.4 Control Unit Lifting Arrangement

1. Fasten the lifting material on Control Unit lifting points.
2. Lift the Control Unit slightly to tension the lifting material.

WARNING Danger of collision with swinging loads!
Ensure that no one is present in the swing range of the Control Unit.

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

Fig. 35: Attachment points on Control Unit

3.4 Setup

DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

» Never stand under suspended loads.

» Never stand in the swing area of suspended loads.

WARNING

Pinching/crushing hazard from lowering!

Severe pinching/crushing up to loss of limbs.

» Never step over edge of rotary table with feet.

WARNING

Danger of pinching/crushing hands!

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

WEAR PROTECTIVE HELMET!

WEAR PROTECTIVE GLOVES!

WEAR SAFETY SHOES!

The AMS-10 is completely assembled before shipment, so that it can be installed immediately after unpacking at the installation site.

3.4.1 Mounting the AMS-10 to Elevator-Links

Preparation

1. Remove the transport packaging and transport aids from the AMS-10.
2. Position the AMS-10 on the rig, near the Elevator-Links.

Procedure

1. Place the AMS-10 on a plane surface.

Fig. 36: Installation step I

2. Open the Link Adapter ❶ by removing the upper Link Block screw, washer and cotter pin.

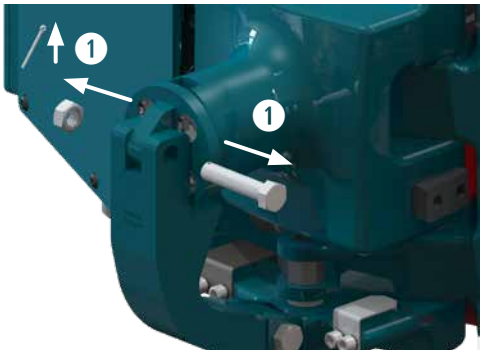

Fig. 37: Installation step II

3. Move the Link Block ❷ downwards.
4. Carefully guide the Elevator-Link to the AMS-10 ❸. Make sure, the Elevator-Link is mounted and placed correctly.

WARNING Pinching and crushing!
The Elevator-Links must be handled and guided from the outside of the ear opening of the AMS-10. Use ropes to adjust the Elevator-Links.

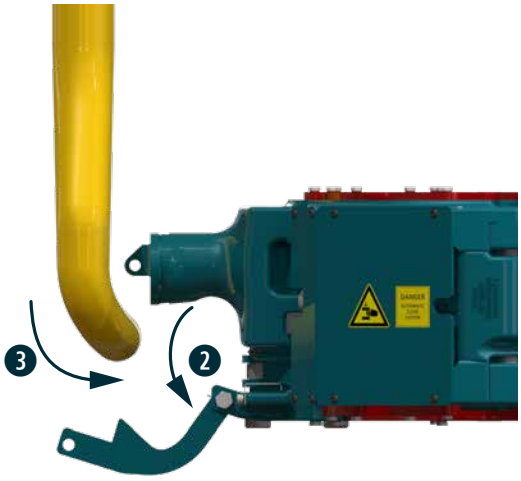

Fig. 38: Installation step III

5. Move the Link Block upwards. Secure the Link Block with screw, washer and cotter pin ❹.
6. Repeat step 2 to 5 or the second Elevator-Link.

Removal

1. Perform installation procedure in reversed order.

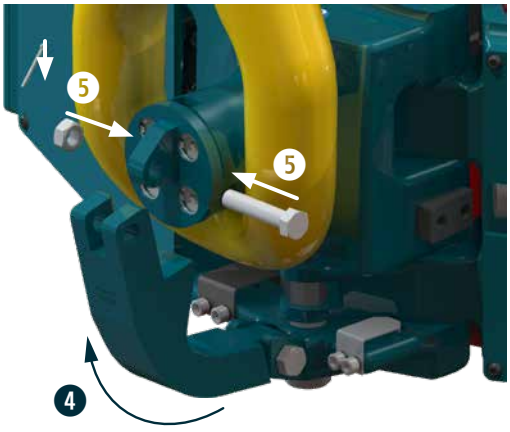

Fig. 39: Installation step IV

3.4.2 Installation of the Single Elevator Rotator

⚠ WARNING

Never operate the Rotator without suitable Elevator Rotator Adapter!

Equipment

- Approbate lifting equipment to lift the Single Elevator Rotator.
- Screw wrench.

Procedure

1. Place the AMS-10 on a plane surface.
2. Dismantle the Link Block, by removing all screws, washers, cotter pins and retaining rings ❶.
3. Install the approbate Rotator Adapter to the AMS-10 and secure the Rotator Adapter with screw, nut and cotter pin ❷.
4. Carefully guide the Elevator-Link to the AMS-10 ❸. Make sure, the Elevator-Link is mounted and placed correctly.

⚠ WARNING Pinching and crushing!
The Elevator-Links must be handled and guided from the outside of the ear opening of the AMS-10. Use ropes to adjust the Elevator-Links.

5. Move the Rotator Adapter upwards ❹. Secure the Rotator Adapter with a screw ❺.

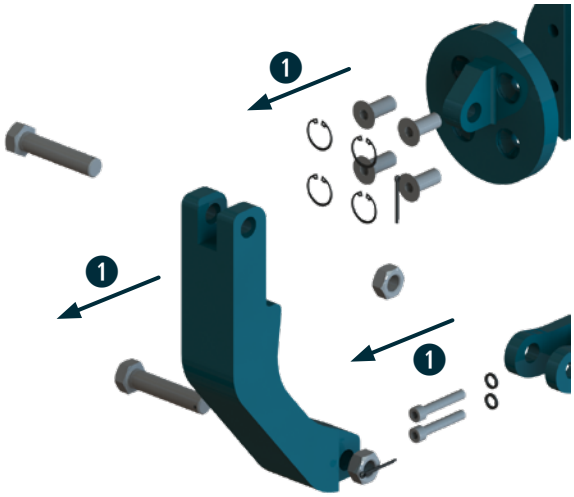

Fig. 40: Installation step I

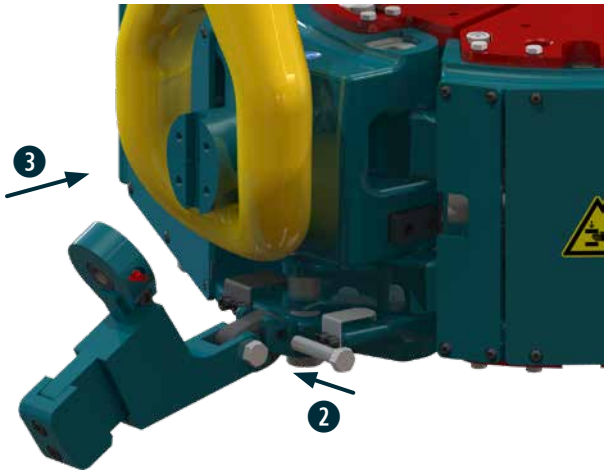

Fig. 41: Installation step II

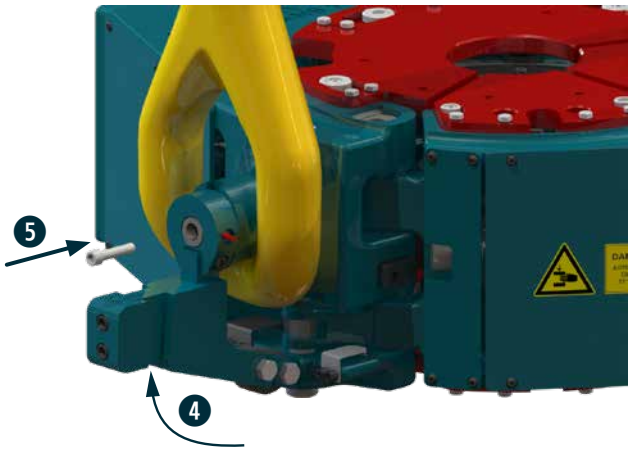

Fig. 42: Installation step III

6. Attach the Single Elevator Rotator to the crane ❻ and lift it gently until it is hanging freely in the air.

7. Open Bushing Assembly of the Single Rotator ❼. Therefore, remove the cotter pin, nut and washer.

⚠ **WARNING** Be aware that the correct size of Rotator Link Bushing is used. It is off-limits to use a Rotator Bushing assembly for 4.1/2" Elevator-Links with a 4.3/4" Elevator-Link and vice versa. There must be enough clearance between the Rotator Bushing and the diameter of the Elevator-Link. Never operate the Single Elevator Rotator without or with incorrect sized Bushings.

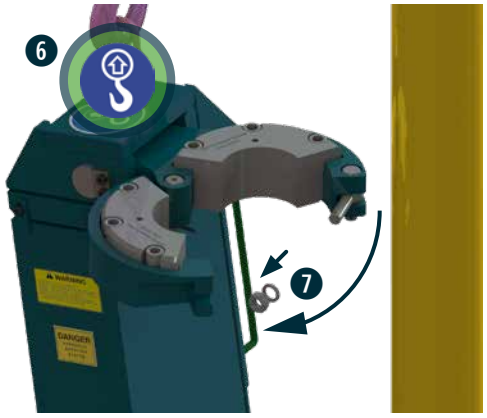

Fig. 43: Installation step V

8. Slowly lift and guide the Single Elevator Rotator towards the Elevator Link and AMS-10.

9. Connect the Single Rotator with the Hydraulic Supply.

10. Apply pressure to the Single Rotator and align the arm of the Single Rotator to the Rotator Adapter.

11. Lift the Single Elevator Rotator above the Link Block. Position the Single Rotator arm in the recess of the Rotator Adapter ❽.

12. Secure the Rotator with a screw, nut and a cotter pin.

Fig. 44: Installation step VI

13. Close the Bushing Assembly of the Single Rotator. Use washer, nut and cotter pin to secure the Bushing Assembly ❾.

» The Single Elevator Rotator is installed to the AMS-10.

Fig. 45: Installation step VIII

Removal

1. Perform installation procedure in reversed order.

⚠ **NOTE** Positioning of the Single Rotator!
Make sure the Single Rotator arm is pointing downwards. This is the only way to pull out the Single Rotator out of the Rotator Adapter safely.

3.5 Installation Checklist

The AMS-10 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 AMS-10.
OK	☐	Lifting equipment has been removed.
OK	☐	All assemblies, parts, areas and surfaces, which have to be lubricated, are lubricated.
OK	☐	All AMS-10 hydraulic lines are alligned correctly.
OK	☐	The right size Inserts and Slips 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	☐	No visual damages recognizable.
OK	☐	The AMS-10 is mounted properly to Elevator-Links.
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 Elevator Rotator is installed correctly [if applicable].
OK	☐	The Control Unit is placed and installed correctly [if applicable].
OK	☐	The right size Bushing Assembly is in use [if applicable].
OK	☐	Both Bushing segments have the identical serial number [if applicable].

INFO

The Installation Checklist shown above contains only essential points and main contents of an Installation process. Check at least the mentioned points on your AMS-10. For further questions or complete Installation Checklists (templates), please contact the Technical Support from FORUM Handling Tools.

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COMMISSIONING / OPERATION

4 Commissioning and Operation

Ensure that the AMS-10 is operated only by personnel trained for this work and familiar with the risks involved in operating the AMS-10.

Read these instructions carefully before putting the AMS-10 into service.

INFO

FORUM Handling Tools recommends having the AMS-10 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!

» Hydraulic fluid can escape under high pressure.

» Always relieve pressure in hydraulic equipment before working on AMS-10.

» Check hydraulic connections regularly to ensure that they are properly fastened.

⚠ WARNING

Defective hydraulic lines pose an injury hazard!

» Route hydraulic lines safely and check regularly for damage.

» Provide lines with chafe protection.

» Replace defective lines immediately.

⚠ WARNING

Hydraulic fluid can pose a health hazard!

» Hydraulic fluids can lead to skin and eye injury and poisoning symptoms upon contact.

» Avoid direct contact with hydraulic fluids.

⚠ DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

» Never stand under suspended loads.

» Never stand in the swing area of suspended loads.

⚠ WARNING

Danger of pinching/crushing body!

» Do not step between the unsecured shells of the doors.

» Do not stand within the opening range of the door while it is being opened or closed!

⚠ 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.

4.1.1 Safety Considerations

Safety considerations for operation

1. Do not touch the AMS-10 during operation.
2. During operation, keep a safe distance from the AMS-10.
3. Before initial start-up and before every start of operation, check for the proper function of the Feedback signals in order to avoid accidents during operation!

4.1.2 Safety checks before initial operation

Safety checks before initial operation

4. All covers are attached and completely screwed down.
5. All screw connections tightened properly.
6. All screw retainers are present.
7. Serial numbers of Guide Plates are identical.
8. All components correspond to type/size of pipe used.
9. All hydraulic connections are correctly connected and securely laid.
10. No hydraulic lines damaged.
11. All lubrication points lubricated properly („6.1 Lubrication“ on page 49).

Safe dies check prior operation

The drill pipe might slip through the equipment if the grip of the dies is weak.

1. In Order to inspect the dies, clean the Slip segment (wire brush or steam).
2. Inspect the dies for wear to make be sure that biting edges are not worn excessively and capable of biting effectively.

» Look for cracked, chipped or uneven wear of dies, mark worn dies for replacement

3. Examine dies for sharpness.

» Mark dull dies for replacement.

4. Replace marked dies.

» Refer to „Changing the Inserts“ on page 52.

5. Check that die retainers are in place and secured.

4.1.3 Connecting the Hydraulic System

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

Read these instructions carefully before performing any work on the hydraulic system.

⚠ WARNING

Hydraulic fluid can pose a health hazard!

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

» Do not touch hydraulic fluids.

» Always wear appropriate protective equipment.

WEAR EYE PROTECTION!

WEAR PROTECTIVE GLOVES!

⚠ **NOTE** During installation, when setting up and taking down as well as during operation of the AMS-10 ensure that the hydraulic lines Do not chafe. If necessary, provide hydraulic lines with chafe guard.

INFO

Bleeding

The hydraulic system in the AMS-10 is bled at the factory. Ensure that the rig's own supply connections are bled before connecting the AMS-10.

Installation Schematics

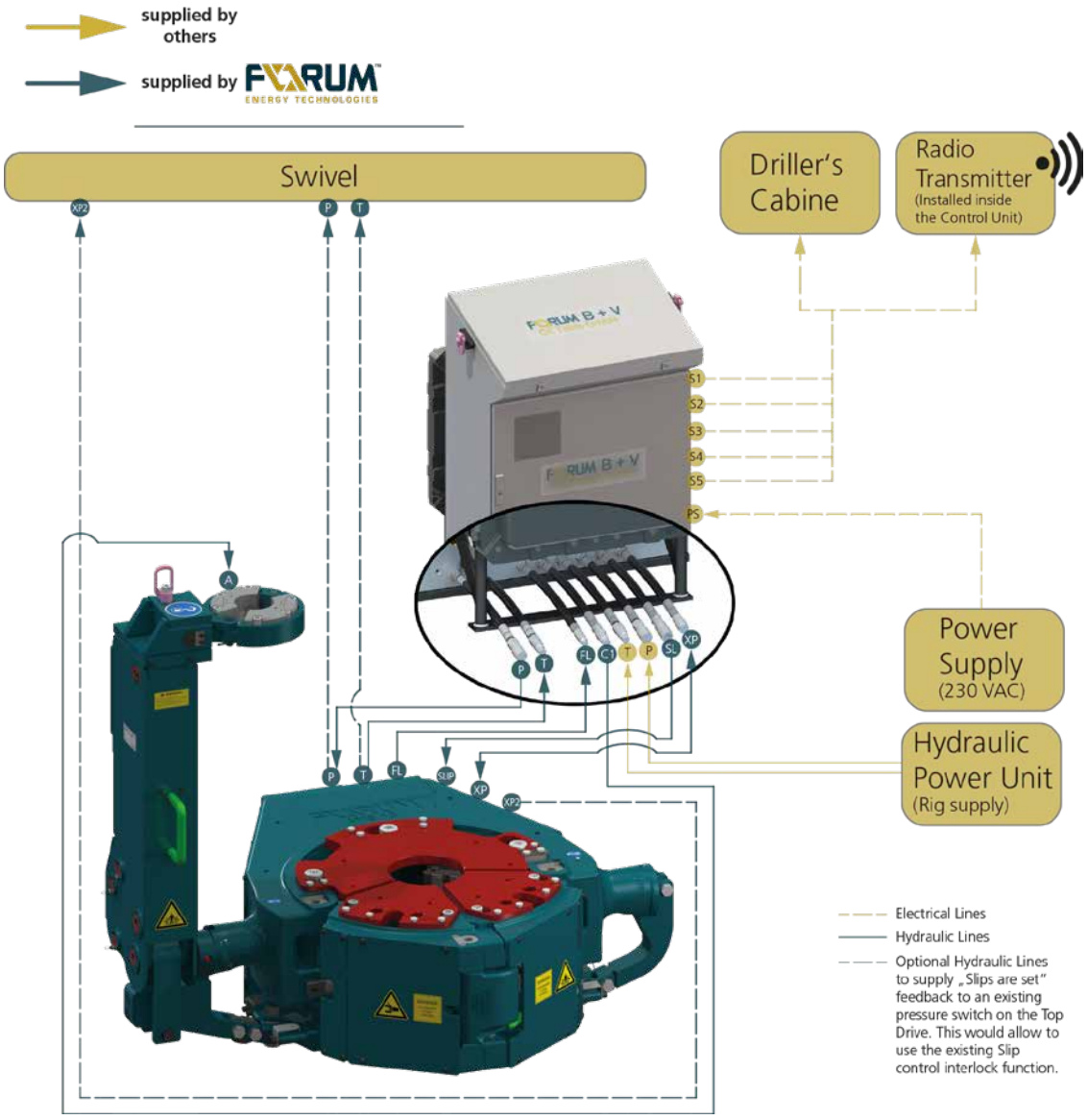

Fig. 46: Hydraulic Connections for AMS-10

INFO

This illustration shows a typical arrangement of the AMS-10. The particular arrangement may vary according to individual requirements.

Hydraulic Characteristics

160 - 210 bar (2031 - 3046 psi)	Operating pressure
85 bar (1233 psi)	Feedback pressure "Slips are SET"
210 bar (3046 psi)	"Slips Down"
160 - 210 bar (2031 - 3046 psi)	Pilot Pressure Doors open / Slips UP
18.9 - 37,9 l/min (5 - 10 GPM)	Volumetric Flow
160 - 210 bar (2031 - 3046 psi)	Pressure Float
NAS 7	Minimum required hydraulic oil clearness

Electric Connections

S1	Signal "Open/Close AMS-10"
S2	Signal "Raise/Lower Slips"
S3	Feedback for "Slips have been set"
S4	Signal "Rotate Upwards"
S5	Signal "Rotate Downwards"
PS	Power Supply for Control Unit

Hydraulic Connections

P	Pressure Line
T	Tank Line
XP	Pilot Line (open/close/feedback elevator closed)
XP2	Additional line for feedback "Slips set"
FL	Line for Float mode
SLIP	Raising/Lowering the Slip Assembly.
C1	Rotates the Elevator-upwards

4.1.4 Commissioning Checklist

FORUM Handling Tools strongly recommends accomplishing 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 AMS-10 and its additional equipment.
OK	☐	The entire operating personnel went through the OMM.

Check Installation and Lubrication

OK	☐	AMS-10 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 and components (lifting equipment, etc.), which are 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 (2321 PSI) - 210 bar (3046 PSI)
OK	☐	Volumetric flow:	18.9 l/min (5 GPM) - 37.9 l/min (10 GPM)
OK	☐	Min. required hydraulic Oil clearness:	NAS 7
OK	☐	Correct Hydraulic connection/line arrangement.	

Function Test AMS-10

OK	☐	The doors are open after supplying pressure to connection “P” + “XP”.
OK	☐	The doors are close after releasing pressure from connection “XP”. The doors have to be closed to operate the Slips.
OK	☐	Slip Assembly is set after releasing pressure from connection "SLIP". Feedback signal appears in line “XP” and “XP2” - 85 bar (1233 PSI).
OK	☐	Slip Assembly is raised after supplying pressure to connection "SLIP".
OK	☐	Rotate the AMS-10 using the Single Rotator. Close the doors and set the Slips. The AMS-10 is now in Float mode. Check that the AMS-10 now automatically lowers to a horizontal position.

Function Test Rotator

OK	☐	The Rotator starts to rotate upwards after supplying pressure to connection “C1”.
OK	☐	The Rotator starts to rotate downwards after releasing pressure from connection “C1”.

Function Test Control Unit

OK	☐	Both operation modes (Podium/Belly Pack) are functional and selectable.
OK	☐	The E-Stop can be actuated and unlocked again. No movement of the AMS-10 is possible after actuating the E-Stop.
OK	☐	The doors open/close when actuating the Rotary switch - ELEVATOR DOOR.
OK	☐	The Slips raise/set when actuating the Rotary switch - ELEVATOR SLIPS.
OK	☐	The Rotator rotates upwards/downwards when actuating the Toggle switch - ROTATE.

INFO

This commissioning Checklist contains only essential points and main contents of an internal commissioning. Check at least the mentioned points on your AMS-10. For further questions or complete Commissioning Checklists (templates), please contact the Technical Support from FORUM Handling Tools.

4.2 Operation

Ensure that the AMS-10 is operated only by personnel trained for this work and familiar with the risks involved in operating the equipment.

Read these instructions carefully before operating the AMS-10.

⚠ WARNING

Danger of pinching/crushing body!

The body may fall shut.

» Do not step between the unsecured shells of the open body.

» Do not remove the spreading equipment BEFORE closing the body and securing it with the hinge pin.

⚠ 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.

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 AMS-10 smoothly and carefully.
3. Do not touch the AMS-10 while in operation.
4. All hoses have to be laid so that they can not interfere with your work or that you can stumble upon them.
5. It is recommended to have the AMS-10 operated by the driller.
6. Slips are set on the correct section of the pipe.
7. The Feedback appears when it 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 AMS-10 without Guide Plates.
10. Do not operate the AMS-10 without magnetic signs.

4.2.1 Changing the Slips

Preparation

1. AMS-10 is removed from the Elevator-Links and placed on a level and supporting surface.

2. Remove Upper Guide Plates from AMS-10 („Changing the Upper Guide Plates“ on page 53).

Removal Procedure

1. Mount a lifting eye or other suitable lifting material to the Slip segment ❶.

2. Attach the Slip to the crane.

3. Lift the Slip slightly to tension the lifting material.

4. Loosen and remove Bolt Assembly ❷.

⚠ **NOTE** The Slips must Always be suitable to the Guideplates. Never install different Slip- and Guideplate sizes!

5. Remove the Slip by first pulling it away from the AMS-10 Body and then lifting it out of the AMS-10 ❸.

Installation Procedure

1. Perform Removal Procedure in reversed order.

⚠ **NOTE** Always pay attention to the correct position of the bolt.

Fig. 47: Step I

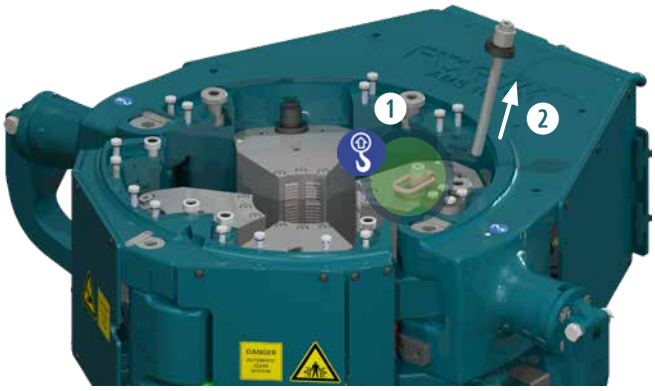

Fig. 48: Step II

Fig. 49: Step III

Fig. 50: Correct Slip Installation

4.2.2 Changing the Inserts

Proceed as follows to replace Inserts:

Preparation

1. Remove Slips from AMS-10 („4.2.1 Changing the Slips“ on page 51).

Removal and Installation Procedure

1. Loosen and remove all screws ❶ from Insert Retainer.
2. Remove Insert Retainer ❷.

Fig. 51: Step I

3. Remove Half Basic Inserts first ❸ and Basic Inserts afterwards ❹ from dovetail guide and place to side separate from new parts.
4. Clean the dovetail guide and insert new Inserts into dove-tail guide.
5. Reinstall Insert Retainer by mounting screws to the Slip.

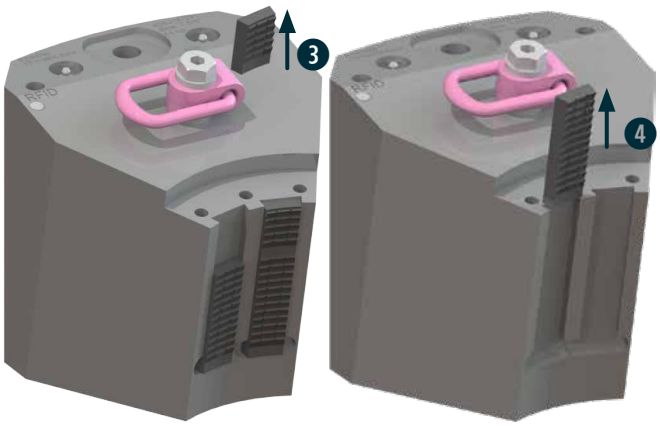

Fig. 52: Step II

NOTE Observe installation direction of Inserts. Ensure that sharp edges of Inserts point upwards. Otherwise the holding function of the AMS-10 is not guaranteed.

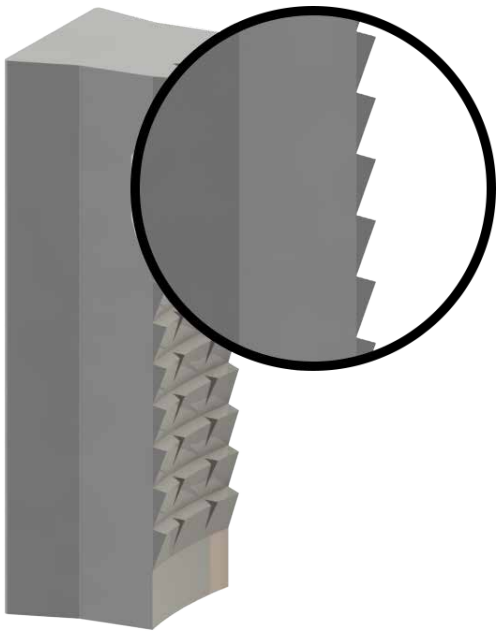

Fig. 53: Correct Insert direction

4.2.3 Changing the Upper Guide Plates

Proceed as follows to remove the upper Guide Plates:

Preparation

1. AMS-10 is removed from the Elevator-Links and placed on a level and supporting surface.

Removal Procedure

1. Loosen and remove all screws and washers ❶.

Fig. 54: Step I

2. Mount Lifting Handles or other suitable lifting material to the Guide Plate ❷.

Fig. 55: Step II

3. Slide the Guideplate into the center of the AMS-10 ❸.

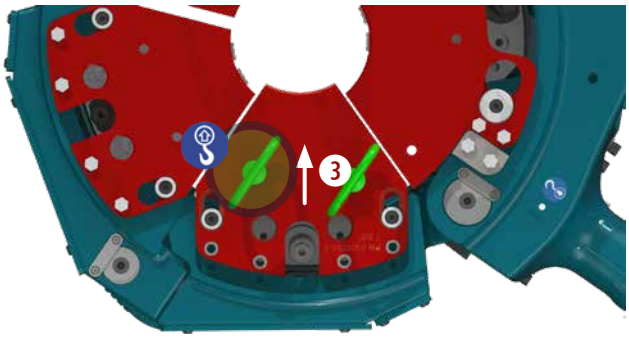

Fig. 56: Step III

4. Lift the Guide Plate out of the Bearing Bolt Bracket ❹.

NOTE The Slips must Always be suitable to the Guideplates. Never install different Slip- and Guideplate sizes!

Installation Procedure

1. Perform Removal Procedure in reversed order.

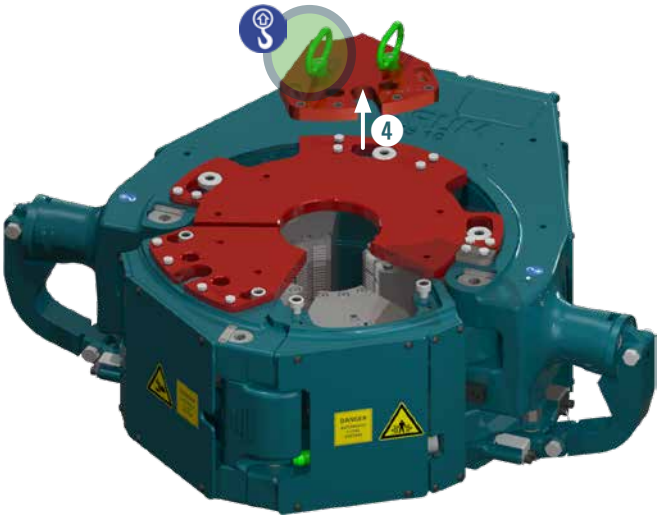

Fig. 57: Step IV

4.2.4 Changing the Bottom Guide Plates

Proceed as follows to remove the bottom Guide Plates:

Preparation

1. AMS-10 is removed from the Elevator-Links and placed on a level and supporting surface.

Removal Procedure

1. Remove the shown screw and washer from left Door Cover ❶.

2. Mount a lifting eye or other suitable lifting material to the right Door Cover and the AMS-10 ears ❷.

3. Attach the Lifting Tackle to the lifting eye and lifting slings ❸.

Fig. 58: Preparation

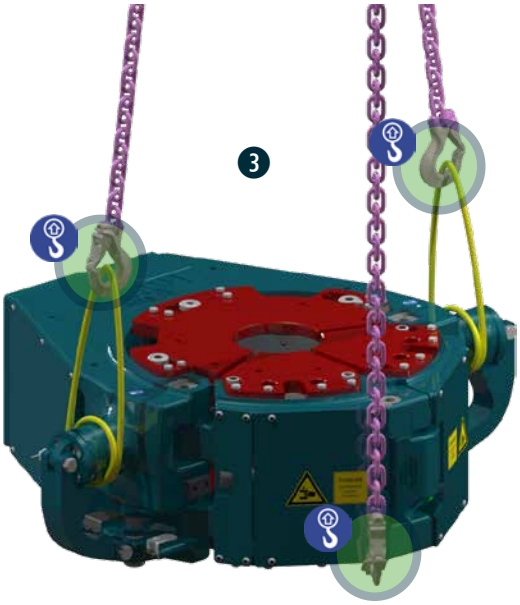

Fig. 59: Correct Insert direction

4. Turn the AMS-10 about 105 ° by pulling the chain ❹.

5. Perform step 1 to 4 from chapter „Changing the Upper Guide Plates“ on page 53 to remove the bottom Guide Plates.

Installation Procedure

1. Perform Removal Procedure in reversed order.

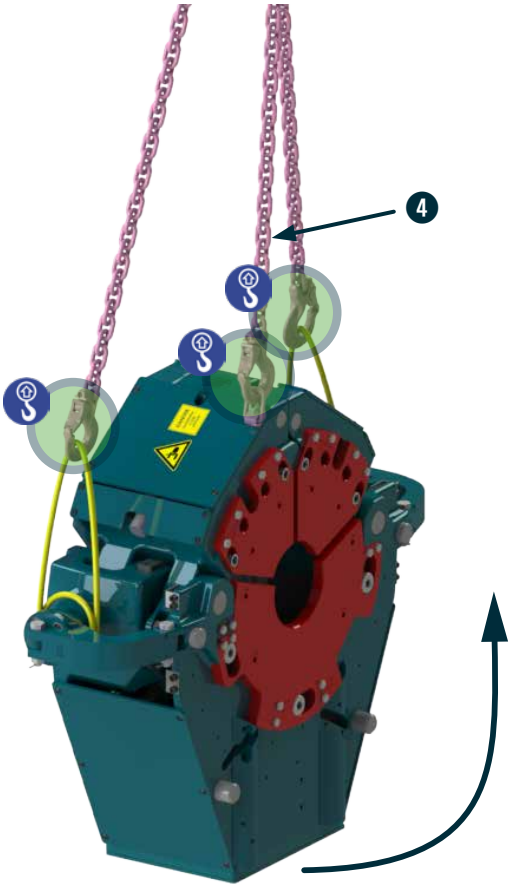

Fig. 60: Correct Insert direction

4.2.5 Changing the Magnetic Signs

Preparation

1. The Guide Plates have been completely replaced by Guide Plates, which are different to the previous ones.

Removal Procedure

1. Remove the magnetic sign on the front and on the back of the AMS-10.

2. Clean all surfaces.

3. Attach the appropriate magnetic sign, which correspond to the Guide Plate size.

Fig. 61: AMS-10 front end

Fig. 62: AMS-10 back end

4.2.6 Operating the Control Unit

4.2.6.1 Control Panel Operation

Signal light green ❶ - SLIPS SET

Appears when Slips have reached the lower end position. Signal light serves as an optical feedback.

Signal light green ❷ - PRESSURE

Appears when the correct working pressure is applied to the Control Unit. This signal light only appears when the AMS-10 is operated by the Control Unit. Signal light serves as an optical feedback.

Emergency Stop ❸ - E-STOP

Emergency stop snaps in when actuated. The electric system is now voltage-free and the hydraulic pressure will be released. No operation is possible now.

Rotary switch ❹ - ELEVATOR DOOR

Opens and closes the AMS-10 doors.

- Switches valve (door open).
- Switches valve (door close).

Rotary switch ❺ - ELEVATOR SLIPS

Raises and sets the AMS-10 Slips.

- Switches valve (Slips raise).
- Switches valve (Slips set).

Toggle switch ❻ - ROTATE

Rotates the Rotator.

↑ Switches valve (Rotator rotates upwards).

↓ Switches valve (Rotator rotates downwards).

Fig. 63: Control panel top view

4.2.6.2 Bellypack Operation

Toggle switch ❶ - ELEVATOR SLIPS

Raises and sets the AMS-10 Slips.

↑ Switches valve (Slips raise).

↓ Switches valve (Slips set).

Toggle switch ❷ - ELEVATOR DOOR

↑ Switches valve (door open).

↓ Switches valve (door close).

Emergency Stop ❸ - E-STOP

Emergency stop snaps in when actuated. The electric system is now voltage-free and the hydraulic pressure will be released. No operation is possible now.

Toggle switch ❹ - ELEVATOR DOOR

Opens and closes the AMS-10 doors.

↑ Switches valve (Rotator rotates upwards).

↓ Switches valve (Rotator rotates downwards).

Signal light red ❺ - Battery Status

Appears when battery reaches critical state of charge.

⚠ **WARNING** Switching sparks can ignite critical gas mixtures. Change battery in safe areas only.

Signal light green ❻ - WIFI Connection

Appears when Bellypack is connected to Control Panel.

Signal light green ❼ - SLIPS SET

Appears when Slips have reached the lower end position. Signal light serves as an optical feedback.

Signal light red ❽ - EMERGENCY STOP

Appears when Emergency Button has been actuated.

Signal light green ❾ - PRESSURE

Appears by reaching the correct working pressure. This signal light only appears when the Bellypack operates the AMS-10. Signal light serves as an optical feedback.

Switch - POWER SWITCH ON BELLYPACK SIDE

NOT SHOWN

Turns the Bellypack on and off.

↑ Position On.

↓ Position OFF.

Fig. 64: Bellypack top view

4.2.7 Hydraulic Adjustments on AMS-10

Valve ❶ - Load Retention Valve

Keeps the doors of the AMS-10 open.

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

Valve ❷ - Load Retention Valve

Keeps the doors of the AMS-10 close.

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

Valve ❸ - Directional Valve

Closing sequence of the left Door and the Latch.

- Enhance pressure - Door will close later.
- Reduce pressure - Door will close arlier.

Valve ❹ - Pressure Control Valve

Pressure for feedback Slips set.

- Enhance pressure.
- Reduce pressure.

Valve ❺ - Directional Valve

Pressure on XP.

- Enhance pressure.
- Reduce pressure.

Valve ❻ - Direct-active Relief Valve

Opening sequence of the Latch.

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

Valve ❼ - Directional Valve

Opening sequence of the left door.

- Enhance pressure - Door retract later.
- Reduce pressure - Door retract earlier.

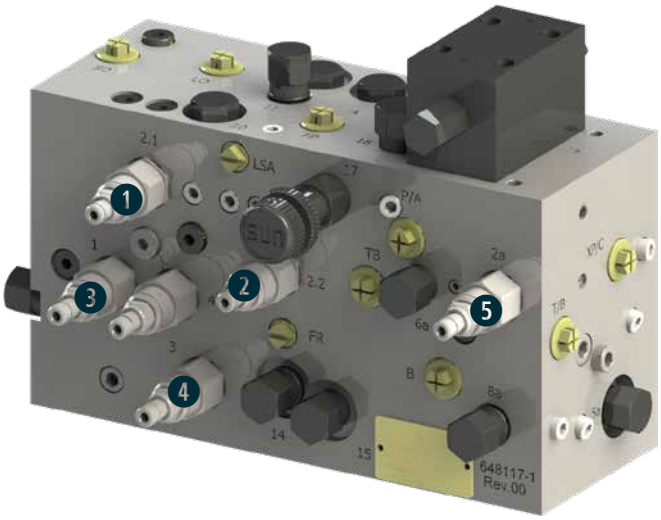

Fig. 65: AMS-10 Valve Block I

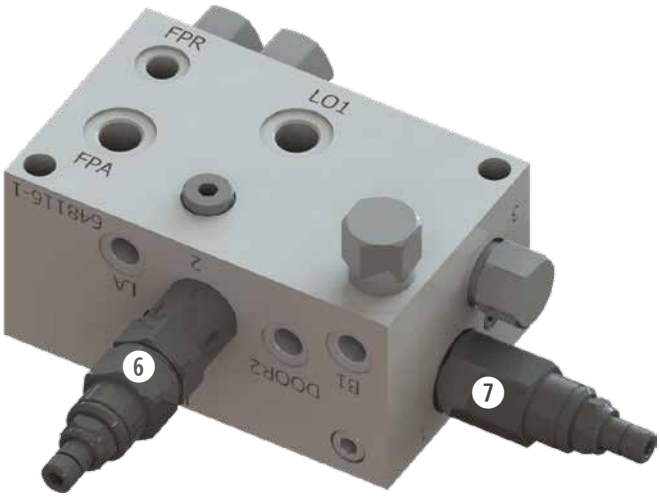

Fig. 66: AMS-10 Valve Block II

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SERVICE

5 Service

INFO

Operational safety and readiness of the AMS-10 Do not only depend on your skill, but also on maintenance and servicing of the AMS-10. Insist on using original spare parts when carrying out maintenance and repair work. This ensures operational safety and readiness of your AMS-10, and maintains its value.

5.1 Malfunction

If a malfunction occurs or the AMS-10 does not operate as expected, trouble shoot 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 whether the hydraulic unit is switched on.
3. Check whether the Slip Assembly and Inserts have been installed for the size/type of pipe used.
4. Check for proper lubrication of the AMS-10.
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 (refer to „Contact worldwide“ on page 11).

5.2 Repair

5.2.1 Repair by Customer

It is only permissible for the customer/company operating the AMS-10 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 guarantee.

5.2.2 Repair by Manufacturer

Ensure that only FORUM Handling Tools or an authorized service company performs any repair work required on the AMS-10.

INFO

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

5.2.3 Securing Screws with Nord Lock washers

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

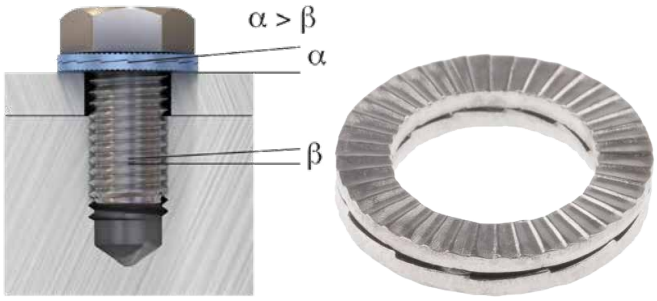


Fig. 67: Nord Lock Washer principle illustration

Tightening torques for Nord Lock lock washers

Several Nord Lock bolt securing systems are used on the AMS-10 to generate safely lock bolted joints. Regarding the fact that different sizes and metric grades are applied detailed information from Nord Lock is given in the annex („Third Party Documents“ on page 100) to generate safe maintenance by the user.

If the tightening torque needed to fasten a screw/nut is not explicitly written in this OMM, please check the screw/nut head an 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. 68: 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 „Third Party Documents“ on page 100.

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

INFO

As a result from tests the NORD LOCK washers were safely secured even after reuse 30 times. Only a limited part of the clamp load was lost due to normal settlements between contact surfaces. The cam edges of the washers got rounded off but were still intact after the reuse test. The best thing to do is to make ocular inspection of the washers during every maintenance. Make sure that the cams (cam tops) look good and that the teeth are not worn off. Lubricate the joint and the mating surfaces if possible so that the friction conditions Do not change. When reassembling, care should be taken that the two washer halves are mated correctly. If all these criteria are met, the washers can be safely reused.

5.3 Drawing, Parts Break Down and Spare Parts

INFO

Please contact the FORUM Handling Tools Technical Support or one of the authorized service companies (refer to „Contact worldwide“ on page 11) to order replacement parts or in the event of any questions.

5.3.1 Drawings and Parts Lists for the AMS-10

5.3.1.1 AMS-10 P/N 638310-Y

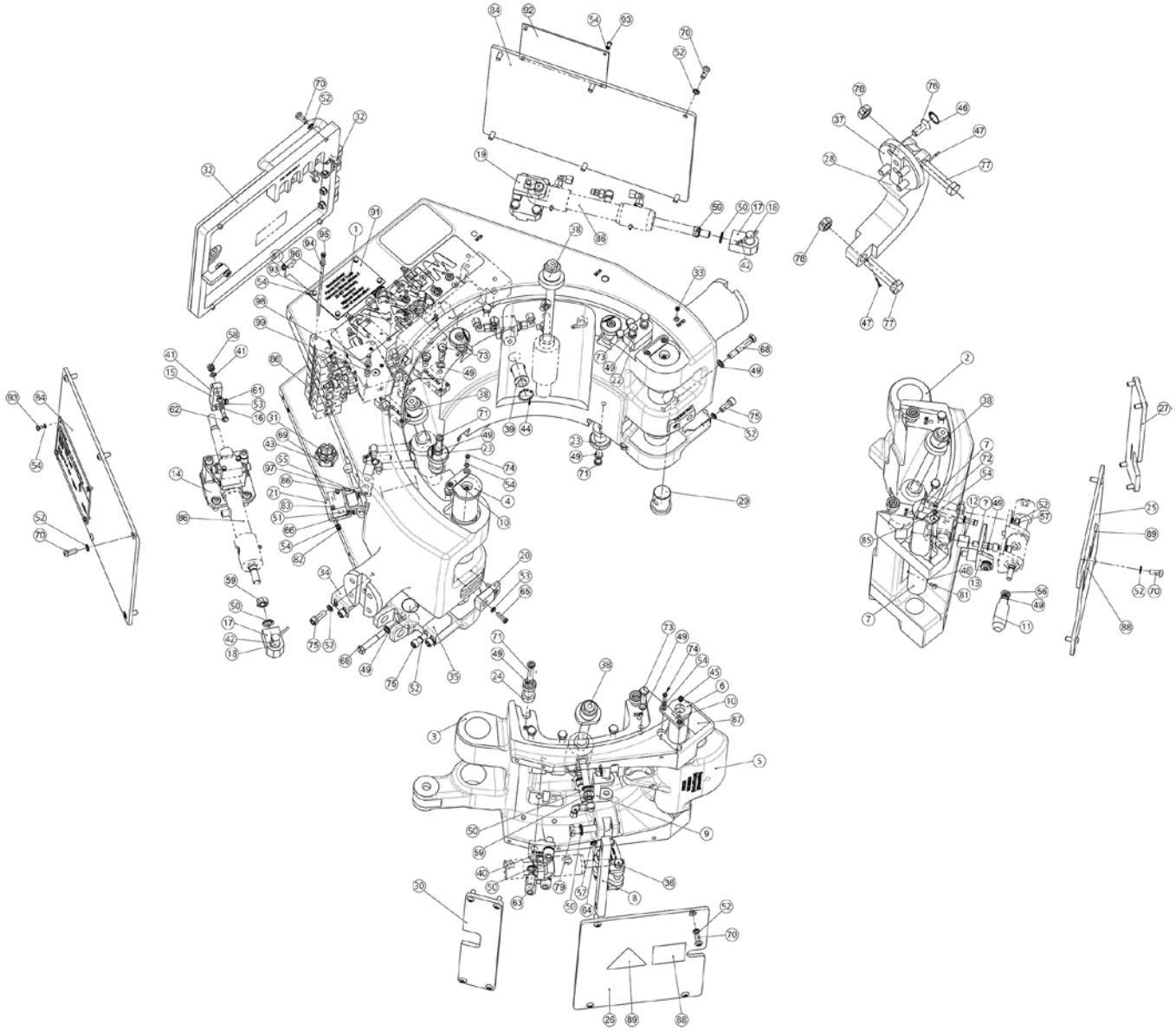


Fig. 69: 638310-Y Drawing I

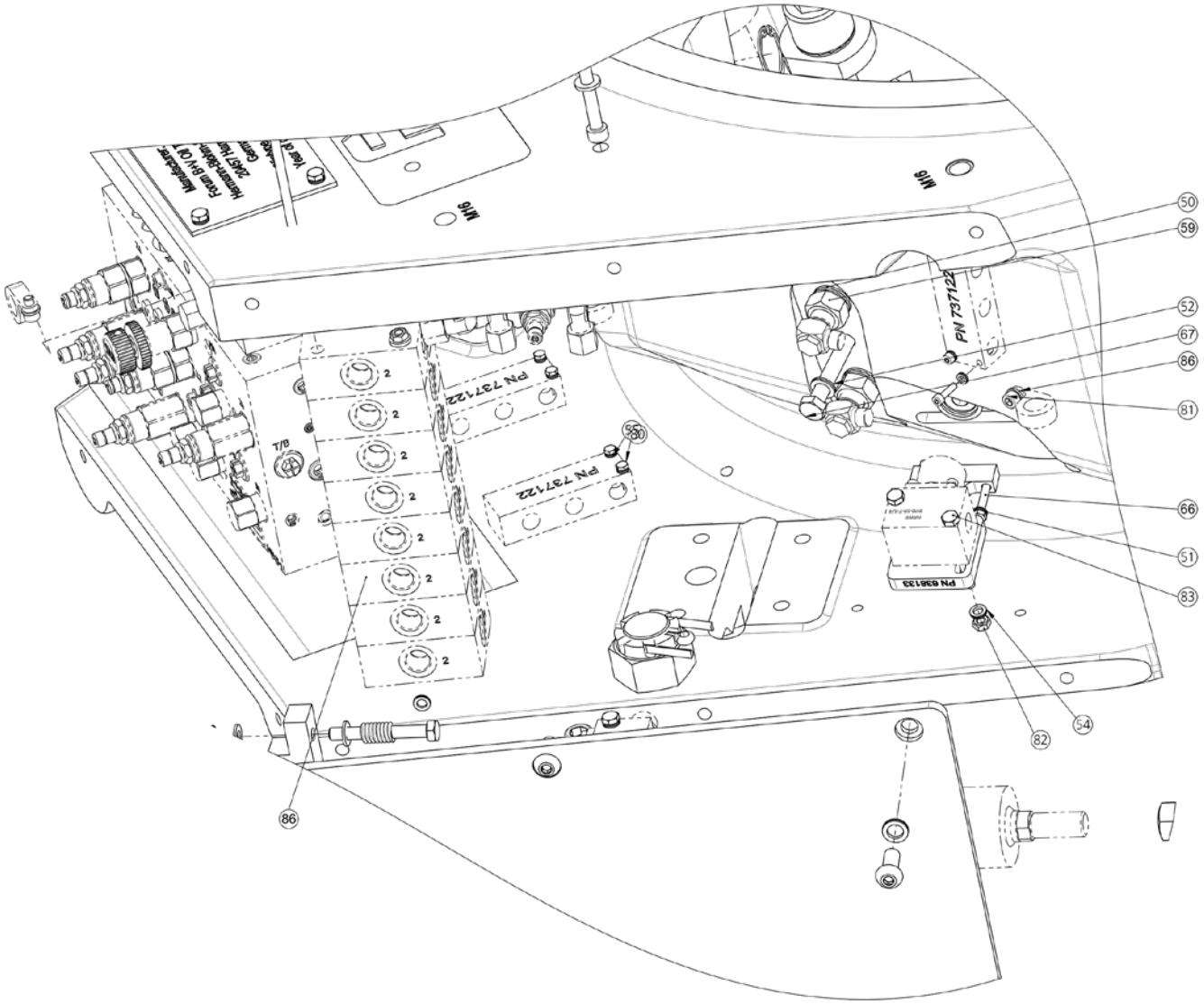


Fig. 70: 638310-Y Drawing II

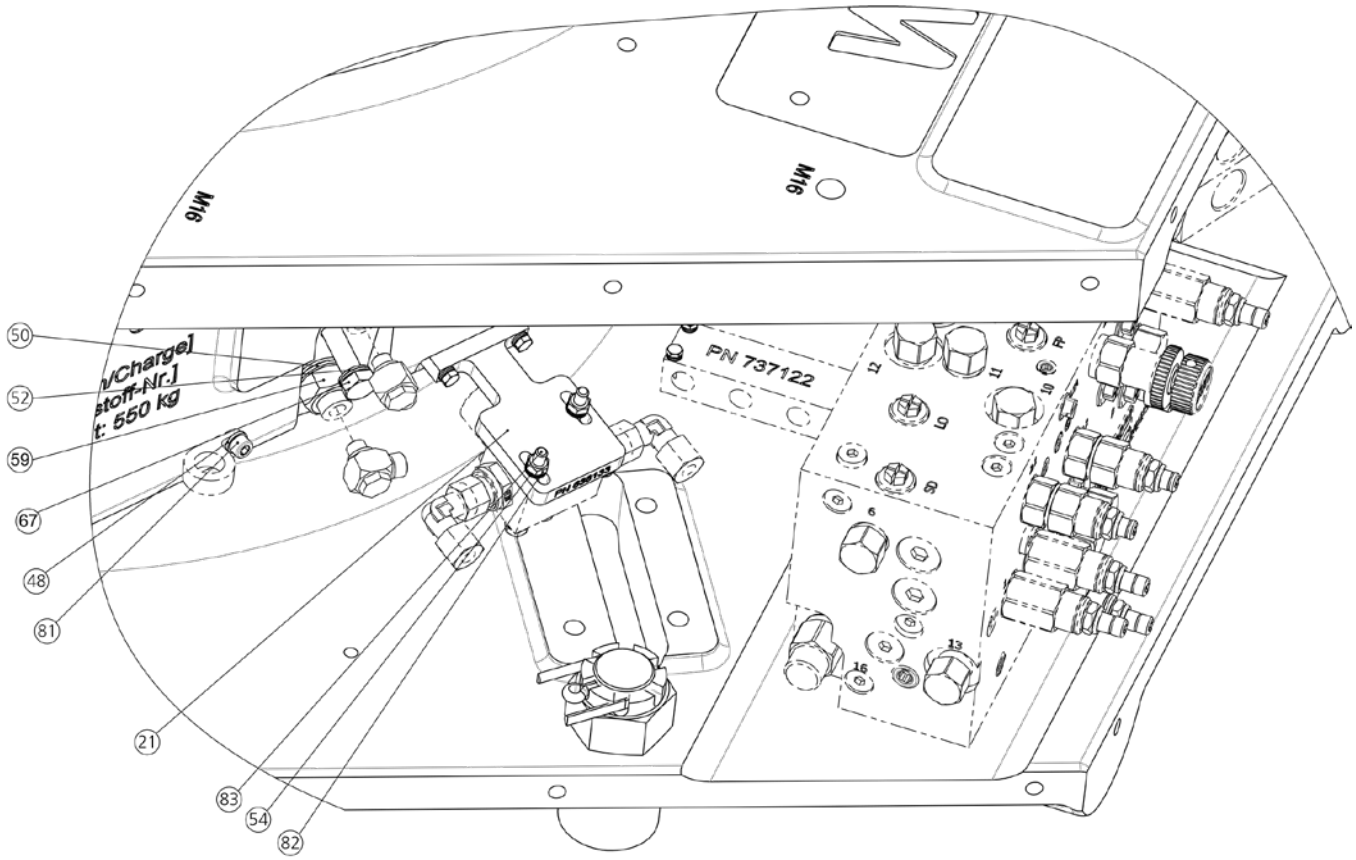


Fig. 71: 638310-Y Drawing III

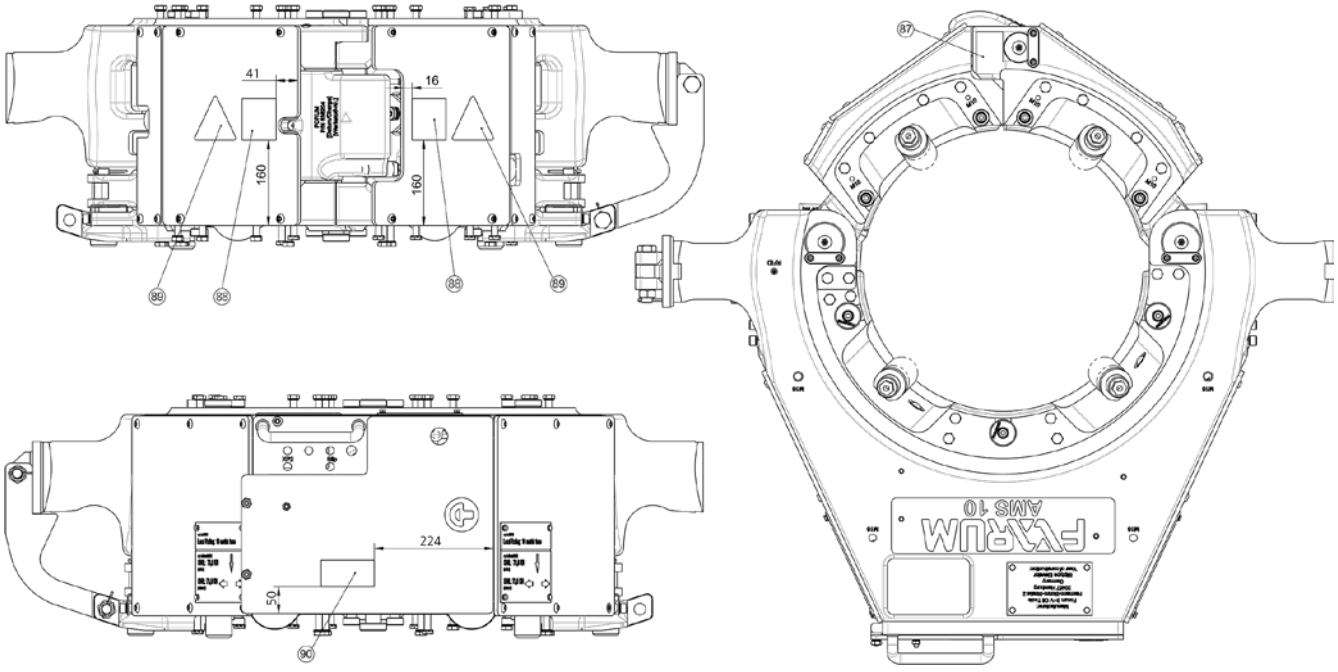


Fig. 72: 638310-Y Drawing IV

Parts List

Pos.	Qty.	P/N	Description
1	1	638601-BF	Body
2	1	638602-BF	Door, Right
3	1	638603-BF	Door, Left
4	2	638277	Hinge Pin
5	1	638204-BF	Latch
6	1	638278	Latch Pin
7	1	638278-1	Door Pin
8	1	638255-2	Latch Mechanism Flange
9	1	638292-3	Cylinder Fork
10	3	648079	Pin Securing Plate
11	1	638293-1	Verification Pin
12	2	638328	Bushing
13	1	688040	Feedback Valve Assembly
14	1	638250	Cylinder Console Assembly
15	1	648153	Latch Valve Actuating Block
16	1	752219	Overload Spring
17	2	638290-1	Pivot
18	2	638276-1	Cylinder Pin
19	1	638270	Cylinder Console Assembly
20	2	638254	Stop Block
21	2	638133	Bracket
22	2	648082	Securing Plate
23	6	648089	Bearing Bolt
24	8	648090	Bearing Bolt
25	1	638283-1	Door Cover, Right
26	1	638283-2	Door Cover, Left
27	1	638283-3	Door Cover, Right
28	1	638280	Link Block
29	2	638094	Foot, Middle
30	1	638283-4	Door Cover, Left
31	2	638096	Foot, Rear
32	1	638184	Rear Door Assembly
33	1	1150376	Duraplug 9.5 Uhf, Infochip
34	2	638284	Bracket
35	2	638285	Bracket
36	1	638255	Latch Mechanism Assembly
37	1	638282	Link Block Adapter
38	4	638212-6	Bolt Assembly
39	2	638430	Sensor
40	2	638294-2	Cylinder Flange
41	2	645683	Washer
42	2	70263	Cotter Pin
43	2	735404	Split Pins
44	2	792318	Safety Ring
45	3	70064	Grease Fitting
46	4	645697	Retaining Ring
47	2	752339	Cotter Pin
48	7	621433	Washers For Studs, Finish Coarse
49	55	792104	Washer
50	16	792106	Washer
51	4	792114	Washer
52	49	792103	Washer
53	5	792112	Washer
54	24	792111	Washer
55	6	792175	Washer
56	1	660568	Nut
57	4	612666	Screw
58	2	613633	Nut
59	10	792317	Hexagon Nuts
60	2	671056	Screw
61	1	735852	Screw

Pos.	Qty.	P/N	Description
62	1	613786	Screw
63	4	735324	Cap Screw
64	2	89126	Screw
65	4	792134	Screw
66	4	710647	Screw
67	2	645158	Hexagon Screw
68	2	638222	Screw
69	2	645019	Castle Nut
70	32	688099	Screw
71	14	757410	Screw
72	1	612671	Hexagon Screw
73	36	753059	Screw
74	6	88233	Screw
75	8	87556	Hexagon Socket Head Cap Screws
76	4	645620	Screw
77	2	613623-11	Screw
78	2	613556-41	Nut
79	2	671017	Hexagon Bolts With Thread To The Head
80	4	710648	Screw
81	7	612670	Hexagon Socket
82	4	755251	Nut
83	4	645136	Screw
84	2	638283	Cover Sheet
85	1	648179	Pin Securing Plate
86	1	638659	Hydraulic Assembly
87	1	671642	Warning Sign Grease Daily
88	2	671639	Danger Automatic Close System
89	2	671641	Warning Sign "Squeeze Danger"
90	1	671638	Warning Sign
91	1	638041	Manufacturer Plate
92	2	638042	Swl Direction Sign
93	13	725135	Screw
94	2	792111-1	Washer
95	2	755251	Hexagon Nuts
96	1	88241	Gewindestange
97	2	792174	Screw
98	2	651585	Washer
99	2	645670-7	Cylinder Screw

5.3.1.2 Slip Assembly P/N 638315-BC

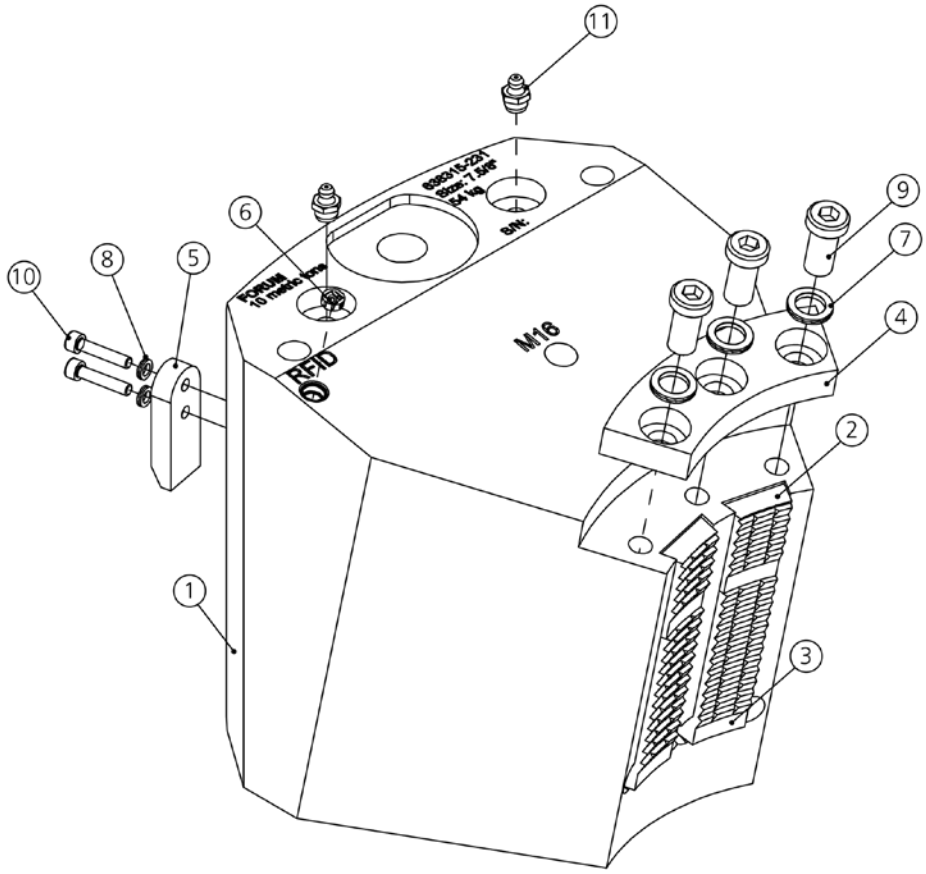


Fig. 73: 638315-BC Drawing

Parts List

Pos.	P/N	Description	P/N 638315-231 Qty.	P/N 638315-269 Qty.	P/N 638315-265 Qty.	P/N 638315-238 Qty.
1	638315-BC	Slipbody	1	1	1	1
2	350111	Basic Insert	2	2	3	-
2	350912	Basic Insert	-	-	-	2
3	350111-1	Half Basic Insert	2	2	3	-
3	350912-1	Half Basic Insert	-	-	-	2
4	638315-1-BC	Safety Plate	1	1	1	1
5	638612-4	Feedback Trigger	1	1	1	1
6	1150376	RFID PLUG 9.5-UHF-001	1	1	1	1
7	792104	Washer	3	3	3	3
8	792114	Washer	2	2	2	2
9	613548	Screw	3	3	3	3
10	612692	Screw	2	2	2	2
11	70064	Grease Nipple	2	2	2	2

Pos.	P/N	Description	P/N 638315-239 Qty.	P/N 638315-259 Qty.	P/N 638315-267 Qty.
1	638315-BC	Slipbody	1	1	1
2	350112	Basic Insert	3	-	-
2	350113	Basic Insert	-	5	6
3	350112-1	Half Basic Insert	3	-	-
3	350113-1	Half Basic Insert	-	5	-
4	638315-1-BC	Safety Plate	1	1	1
5	638612-4	Feedback Trigger	1	1	1
6	1150376	RFID PLUG 9.5-UHF-001	1	1	1
7	792104	Washer	3	3	3
8	792114	Washer	2	2	2
9	613548	Screw	3	3	3
10	612692	Screw	2	2	2
11	70064	Grease Nipple	2	2	2

5.3.1.3 Guide Plates P/N 638316-BC

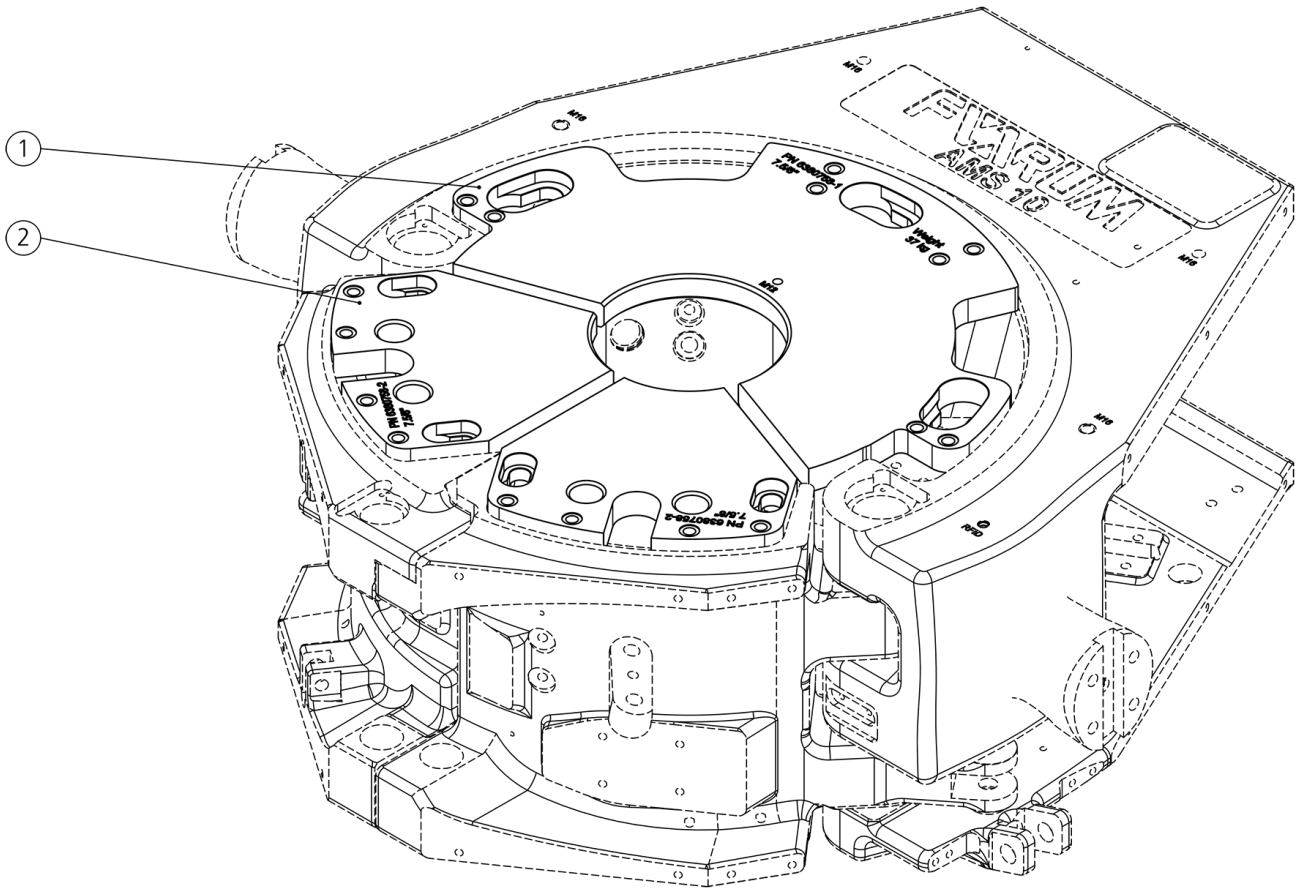


Fig. 74: 638316-BC Drawing

Parts List

Pos.	Qty.	Description	7.3/4" P/N 638316-269	7.5/8" P/N 638316-231	9.7/8" P/N 638316-265	10.3/4" P/N 638316-238
1	2	Guide Plate Body	6381134-1	6380758-1	6380978-1	6381034-1
2	4	Guide Plate Door	6381134-2	6380758-2	6380978-2	6381034-2

Pos.	Qty.	Description	11.3/4" P/N 638316-239	13.5/8" P/N 638316-259	17" P/N 638316-267
1	2	Guide Plate Body	6381134-1	6381358-1	6381700-1
2	4	Guide Plate Door	6381134-2	6381358-2	6381700-1

5.3.1.4 Rear Door Assembly P/N 638184

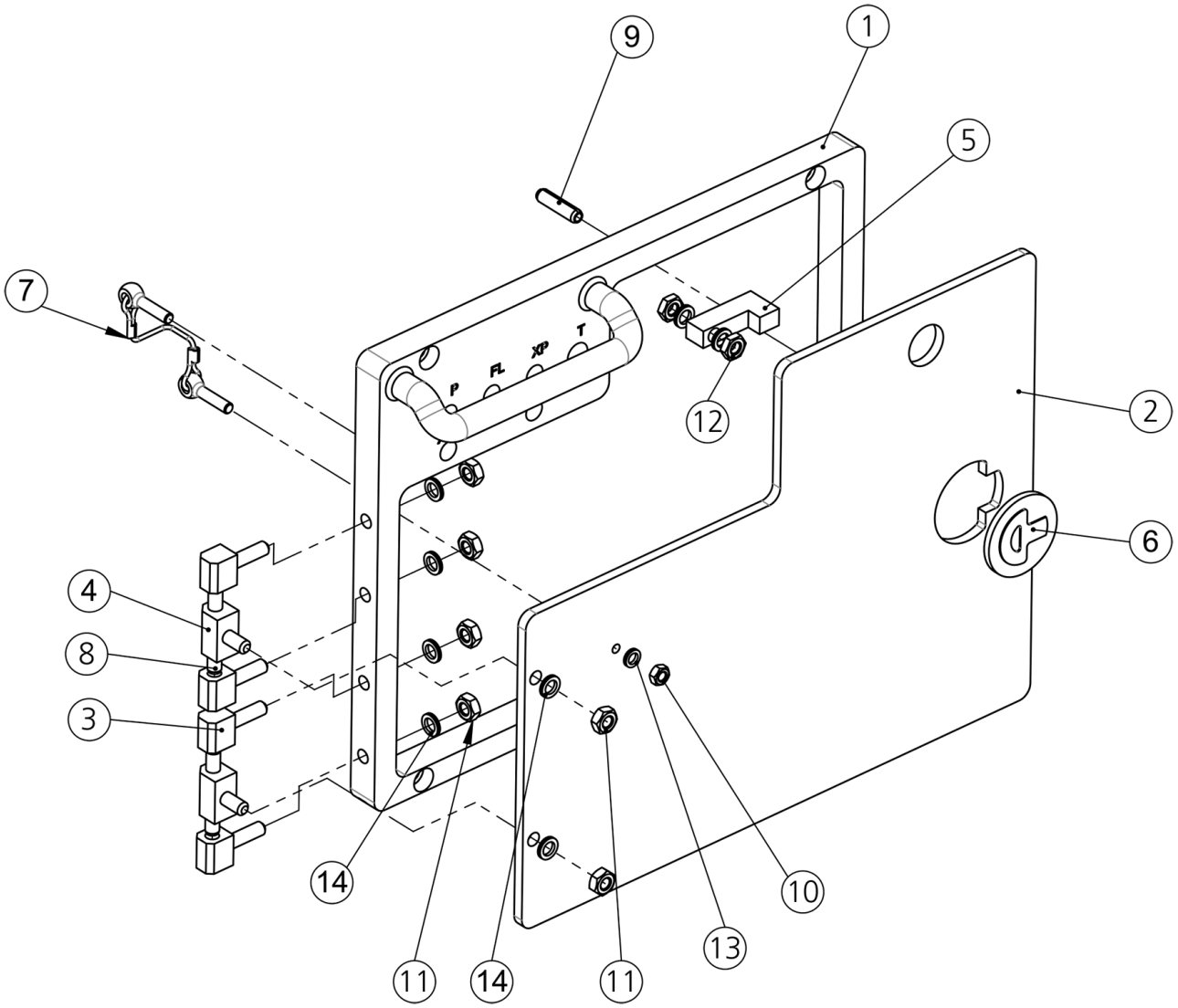


Fig. 75: 638315-BC Drawing

Parts List

Pos.	Qty.	P/N	Description
1	1	638184-2	Rear Door
2	1	638184-1	Rear Frame
3	4	648184-3	Hinge, Part 1
4	2	648184-4	Hinge, Part 2
5	1	678184-5	Closing Hook
6	1	648164	Closing Device
7	1	688084-3	Safety Rope
8	2	645638	Parallel pin
9	1	621109	Spring-type Straight Pin
10	1	613633	Nut
11	6	735846	Nut
12	2	641576	Nut
13	1	792112	Washer
14	8	792103	Washer

5.3.1.5 Bolt Assembly P/N 638212-6

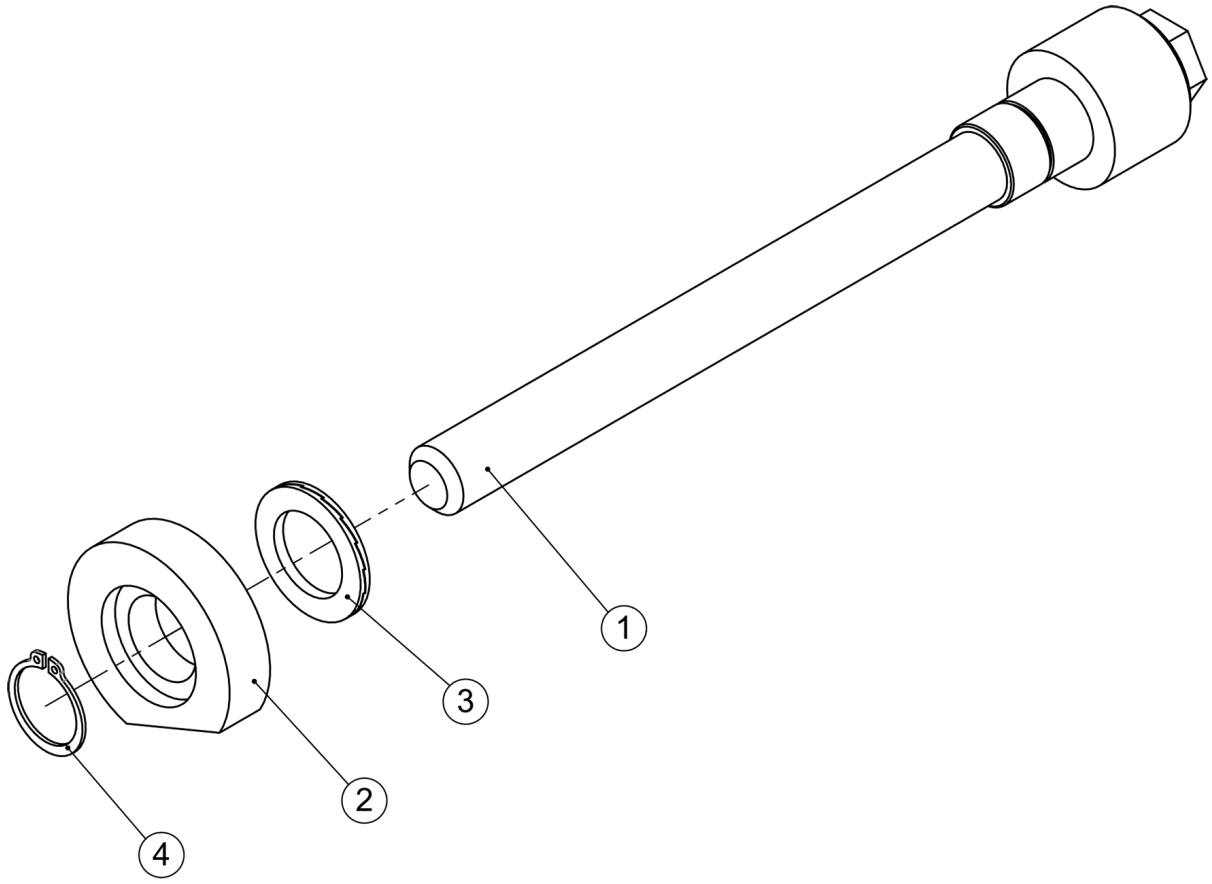


Fig. 76: 638316-BC Drawing

Parts List

Pos.	Qty.	P/N	Description
1	1	638212-1	Guidance Bolt
2	1	638212-7	Safety Plate
3	1	792110	Washer
4	1	725314	Retaining Ring

5.3.1.6 Feedback Sensor P/N 638430

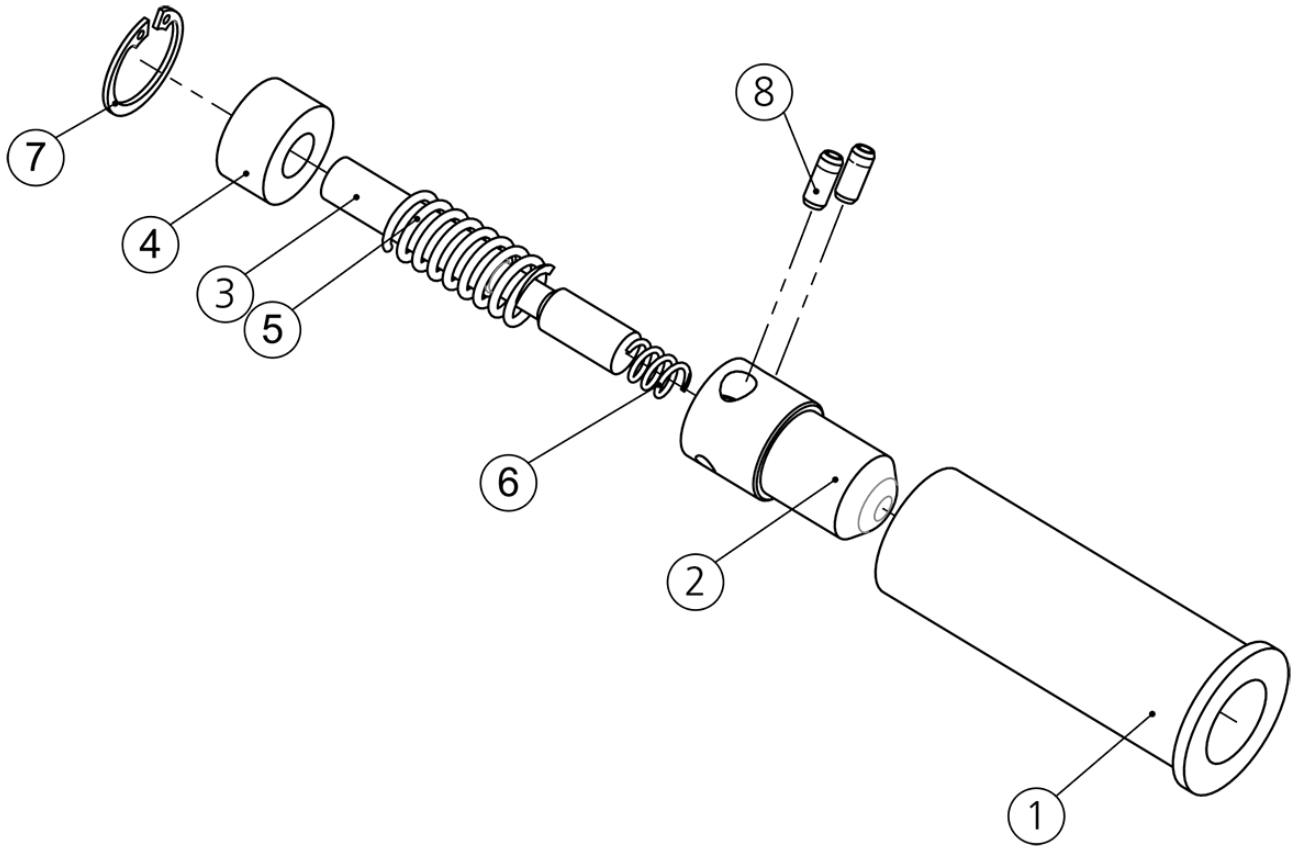


Fig. 77: 638316-BC Drawing

Parts List

Pos.	Qty.	P/N	Description
1	1	638431	Feedback Casing
2	1	638332	Sensor Bolt
3	1	638435	Feedback Trigger Pin
4	1	638434	Washer for Feedback Trigger
5	1	638334	Spring
6	1	638336-1	Spring
7	1	641519	Retaining Ring
8	2	678859	Dowel Pin

5.3.1.7 Latch Mechanism Assembly P/N 638255

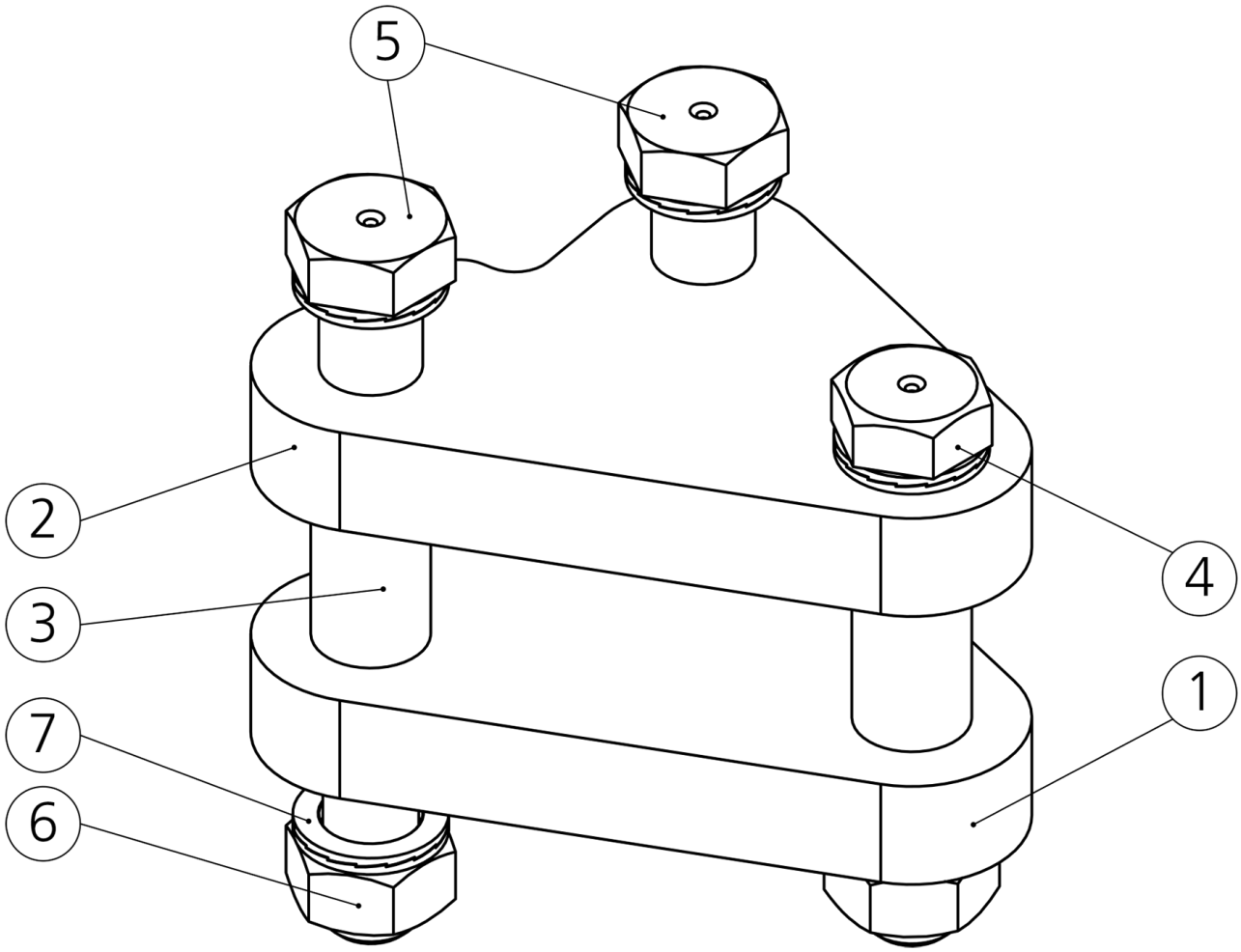


Fig. 78: 638315-BC Drawing

Parts List

Pos.	Qty.	P/N	Description
1	1	638256-1	Latch Mechanism Plate 1
2	1	638256-2	Latch Mechanism Plate 2
3	3	638255-1	Distance Pipe 1
4	1	638222	Screw
5	2	638223	Screw
6	3	612690	Nut
7	6	792104	Washer

5.3.1.8 Feedback Valve Assembly P/N 688040

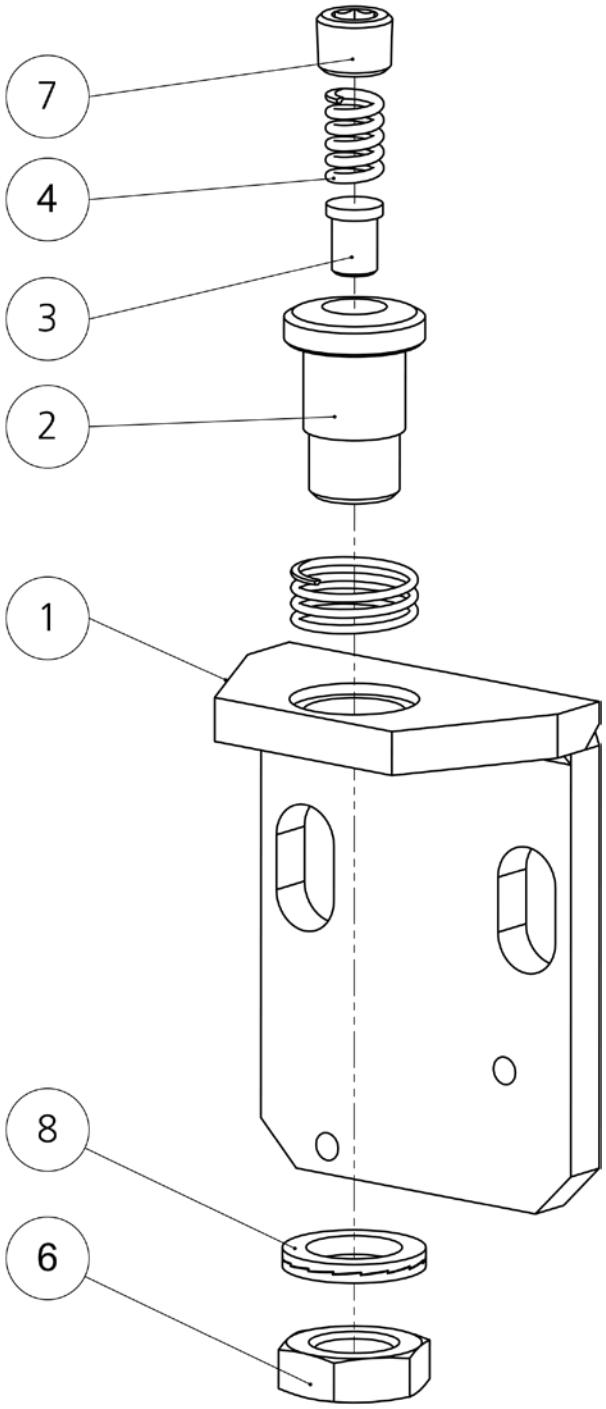


Fig. 79: 638316-BC Drawing

Parts List

Pos.	Qty.	P/N	Description
1	1	688040-1	Mounting Plate
2	1	688040-3	Feedback Pin 1
3	1	688040-4	Feedback Pin 2
4	1	688040-2	Spring
5	1	688040-5	Spring
6	1	792106	Washer
7	1	710348	Nut
8	1	754098	Locking Screw

5.3.1.9 Hydraulic Manifold P/N 648116-1

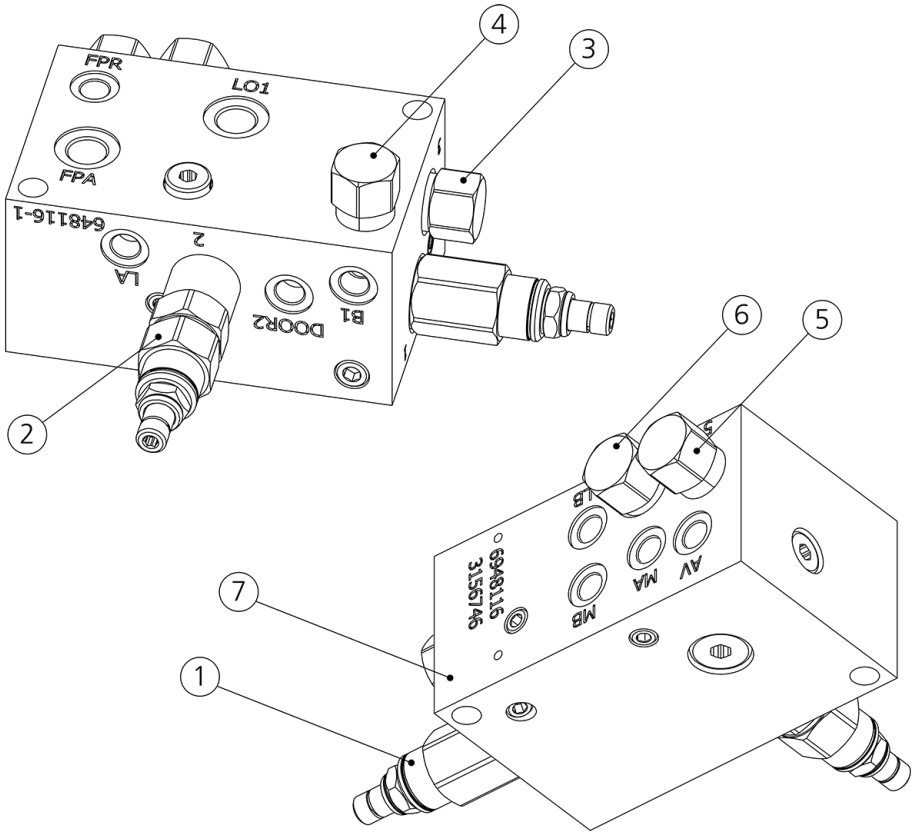


Fig. 80: 648116-1 Hydraulic Manifold

Parts List for 648116-1

Pos.	Qty.	P/N	Description
1	1	2038	Directional Valve
2	1	2037	Direct-active Relief Valve
3	1	2002	Pilot-to-Open Check 3-Port valve
4	1	612952-T	Check Valve
5	1	612952-T	Check Valve
6	1	648187-3-1	Hydraulic Manifold without valves

5.3.1.10 Hydraulic Manifold P/N 648117-1-AMS

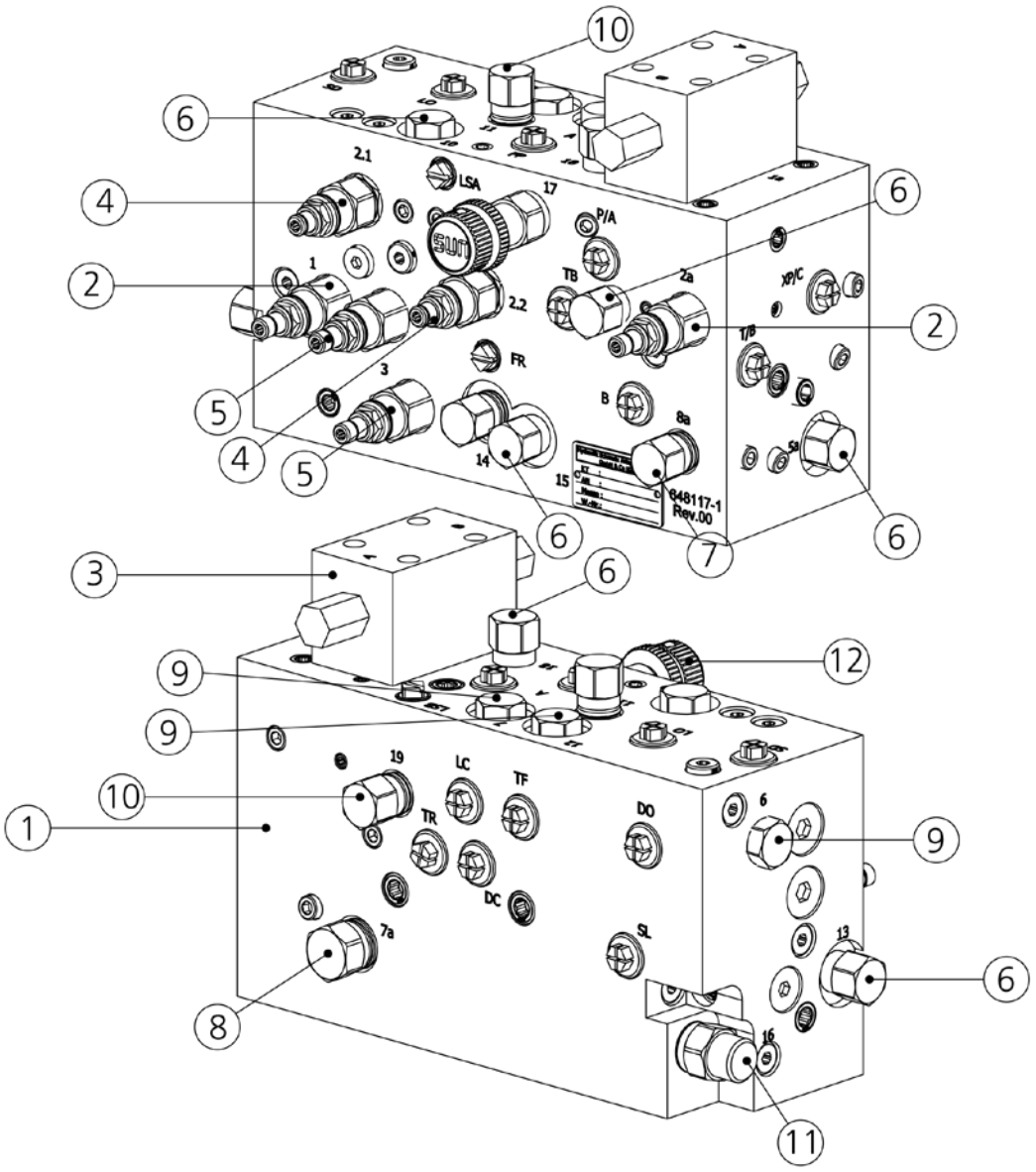


Fig. 81: 648117-1 Hydraulic Manifold Assembly

Parts List

Pos.	Qty.	P/N	Description
1	1	648117	Hydraulic Manifold without Valves
2	2	2038	Directional Valve
3	1	2013	Control Valve
4	2	2010	Load Retention Valve
5	2	2017	Pressure Control Valve
6	6	2067	Check Valve
7	1	2051	Check Valve
8	1	2044	Shuttle Valve
9	4	2068	Check Valve
10	2	2069	Check Valve
11	1	2045	Shuttle Valve
12	1	2070	Needle Valve

5.3.1.11 Hydraulic Assembly P/N 638659

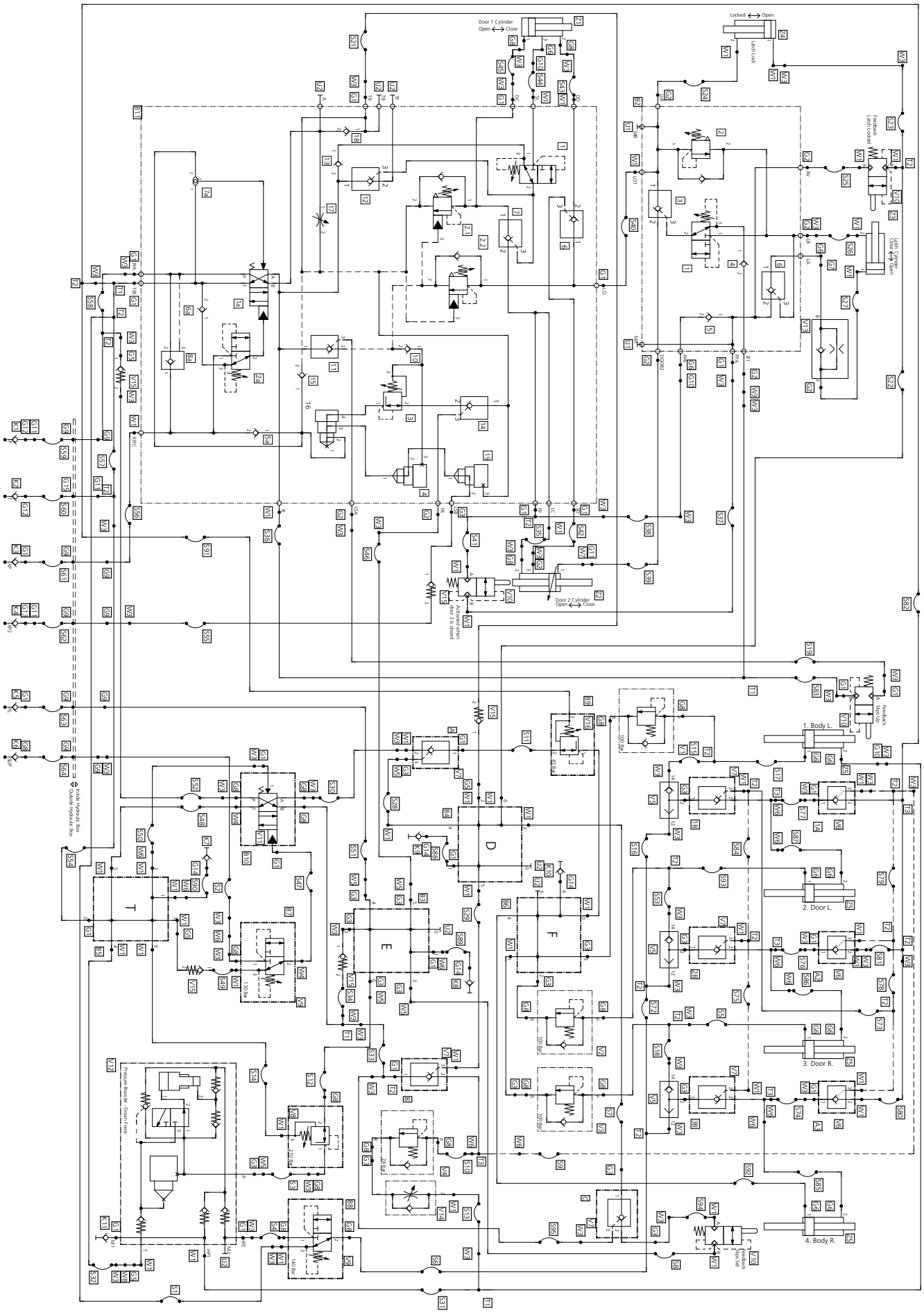


Fig. 82: 638659 Hydraulic Assembly

Parts List

Pos.	Qty.	P/N	Description
1A,1B,2B,3B,A A2,A3,B,C	9	2063	Housing for cartridge valve
B2	1	648116-1	Hydraulic Manifold with valves
B3-B6	4	737122	Manifold Block 2
B7-B9	3	2053	Housing for cartridge valve
B10	1	757156	Base Plate NG6
B11	1	648117-1-AMS	Hydraulic Manifold with valves
G1	24	612944	Straight Connection
G2	9	710653	Straight Connection
G3	17	613946	Straight Connection
G5	4	612945	Straight Connection
G6	11	775094-2	L-Adapter
G7	1	775094-7	Straight Connection
G8	20	613943	Straight Connection
G9	10	645105	Straight Bulkhead Coupling
G10	3	735112	Straight Connection
G11	4	755372	Straight Connection
G12	2	755373	Straight Connection
G13	1	755374	Straight Connection
G14	4	613941	Straight Connection
G15	1	755370	Straight Bulkhead Coupling
K1	1	612936	Coupling, male
K2	1	612937	Coupling, female
K3	1	612965	Coupling, male
K4	1	645834	Coupling, female
K5	1	612966	Coupling, female
K6	1	645833	Coupling, male
K7-K11	5	755361	Pressure Coupling
S1 - S64 S72 - S95	1	638659-70	Hose Assembly
T1	4	645104	T-Connection
T2	18	645095	T-Connection
T3	5	615933	T-Connection
U1	2	710642	Locking Screw
U2	7	612929	Blind Screw
V1-V4	4	790109	Pressure Control Valve
V5	3	756320	Shuttle Valve
V6	3	2051	Check Valve
V7	6	2002	Pilot-to-Open Check 3-Port Valve
V8	1	2017	Reducing/Relieving 3-Port Direct Acting Valve
V9	2	2038	3-way Direct-acting Directional valve
V10	4	87997	Directional Control Valve
V11	1	2013	$4/2$ Way Valve
V12	1	774619	Mini Booster with Control Block
V13	1	558074	Check Valve
V14	1	612934	Throttle
V15	5	645110	Check Valve
V16	1	88417	Reducing/Relieving 3-Port Direct Acting Valve (2-55 bar)
W1	45	613945	L-Adapter
W3	57	645096	L-Adapter
W4	2	559260	L-Adapter
W5	6	755738	L-Adapter
W6	12	774510	Adjustable 45° Connector
W7	1	755365	L-Adapter
W8	1	645106	L-Adapter
Z1	1	638290	Cylinder, hdyr
Z2	1	638291	Cylinder, hdyr
Z3	1	638292	Cylinder, hdyr
Z4	1	638293	Cylinder, hdyr
Z5	4	668299	Double Acting Hydraulic Cylinder for Slip actuation AMS-10

5.3.2 Elevator Rotation Systems - Drawings and Parts Lists

5.3.2.1 Single Elevator Rotation System (single acting) P/N 678801

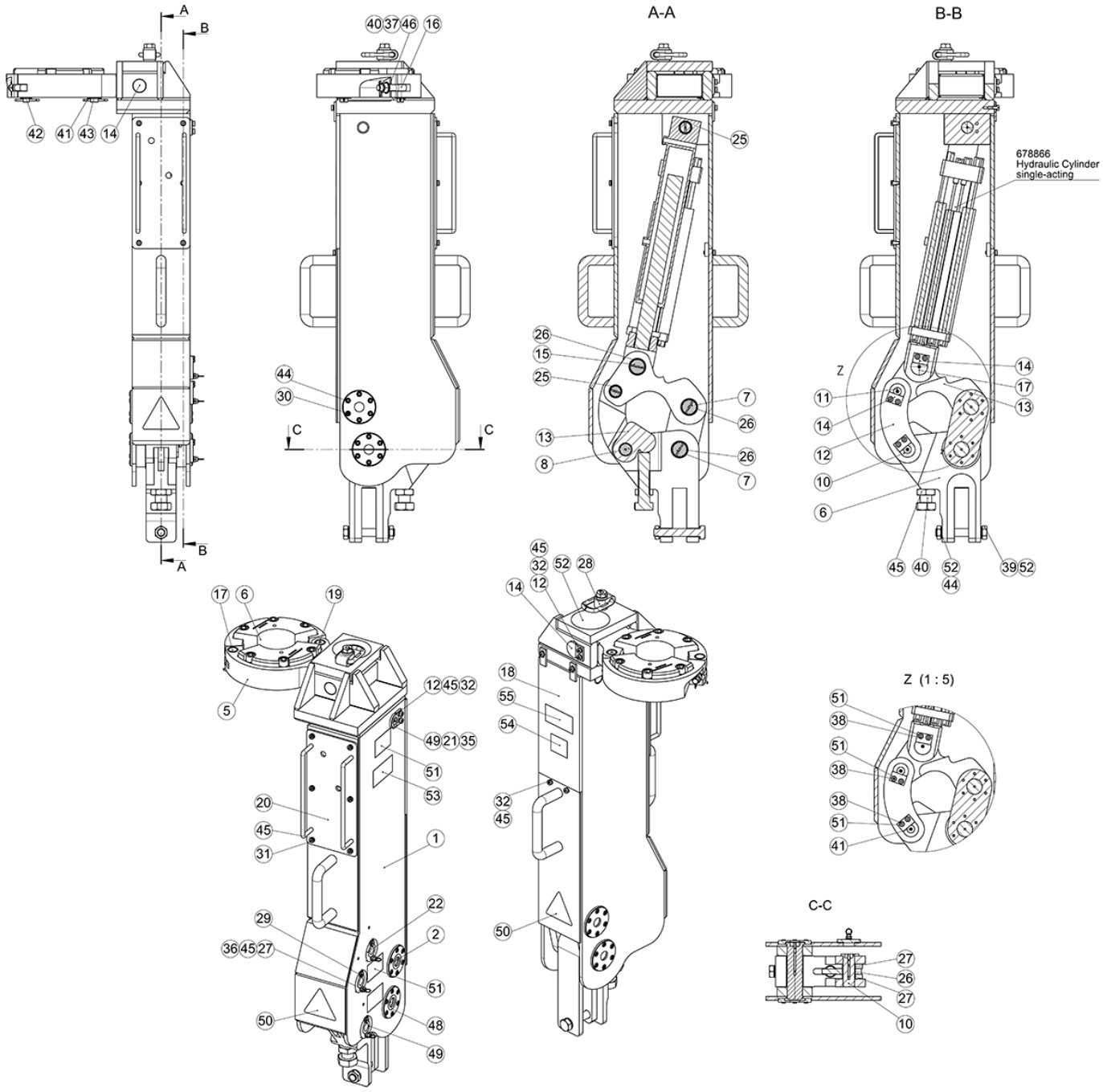


Fig. 83: 678801 Single Elevator Rotation System Drawing I

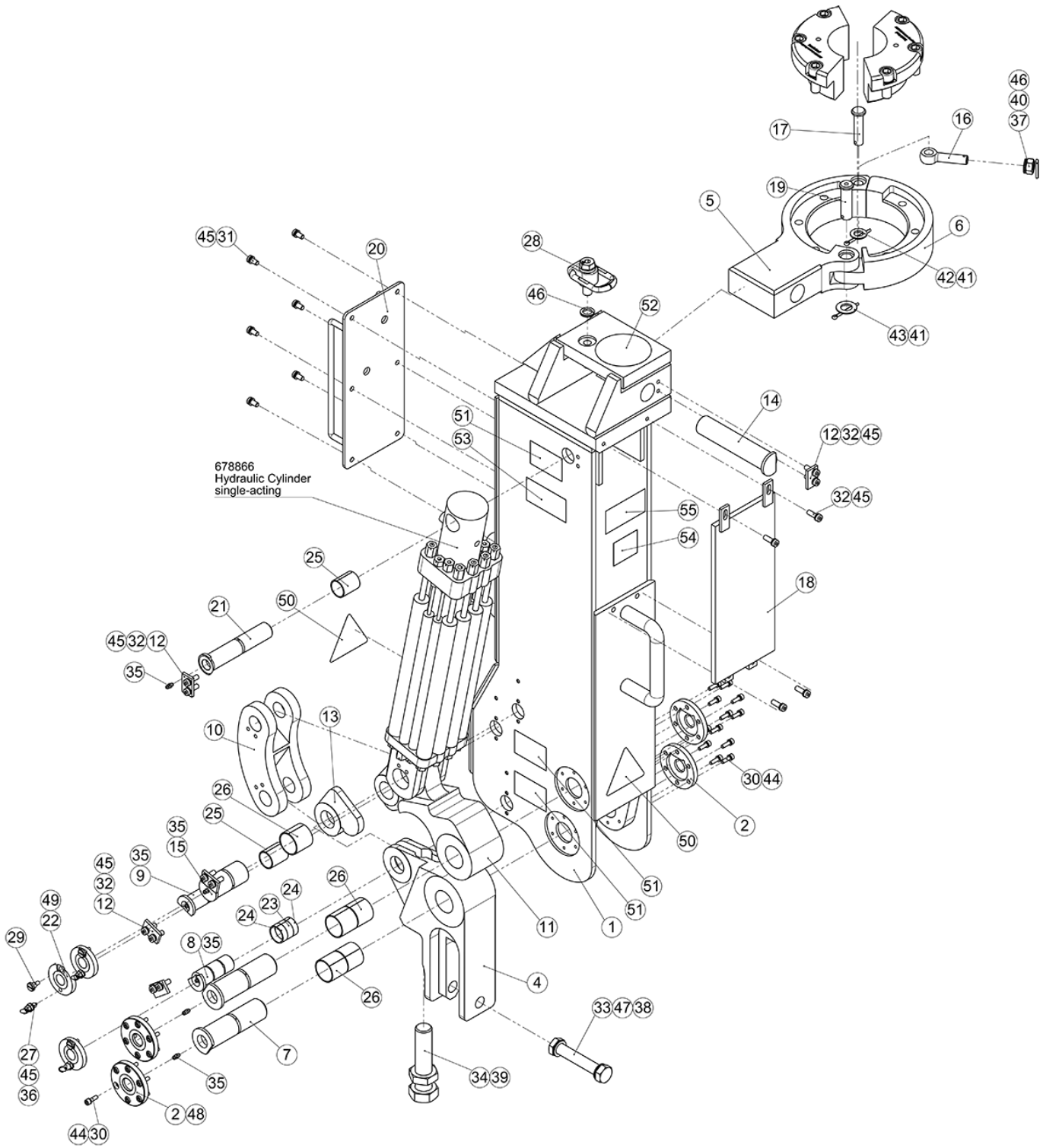


Fig. 84: 678801 Single Elevator Rotation System Drawing II

Parts List

Pos.	Qty.	P/N	Description
1	1	678810	Cover For Amp Rotator
2	4	678812	Cap
3	1	678801-H	Hydraulic Assembly
4	1	678813	Link Block Connector
5	1	678815	Link Clamp Fix
6	1	678817	Link Clamp Movable
7	2	678818	Pin
8	1	678854	Pin
9	1	678819	Pin
10	1	678831	Rotating Lever
11	1	678832	Rotating Lever
12	5	678833	Security Plate
13	1	678834	Stopper
14	1	678838	Pin
15	1	678839	Fork Pin
16	1	678846	Eye Screw
17	1	678847	Cylinder Pin
18	1	678850	Protection Plate
19	1	638276-1	Cylinder Pin
20	1	678853	Zylinder Cover
21	1	678855	Pin
22	3	678890	Plate
23	1	678843	Bushing
24	2	678843-2	Bushing
25	2	678844	Bushing
26	5	678845	Bushing
27	3	678892	Lock Bolt
28	1	553468	Lifting Eye
29	3	678891-1	Screw
30	24	612597	Screw
31	6	726218	Screw
32	14	772878	Screw
33	1	753079	Screw
34	1	790062-1	Screw
35	6	756790	Lubricating Nipples
36	3	678856	Nut
37	1	755137	Nut
38	1	725415	Nut
39	1	87714	Nut
40	1	660416	Split Pin
41	2	70263	Split Pin
42	1	615879	Washer
43	1	612679	Washer
44	24	792111	Washer
45	23	792112	Washer
46	2	792106	Washer
47	2	792108	Washer
48	2	612530-3	Marking Point
49	4	612530-5	Marking Point
50	2	671641	Warning Sign "Squeeze Danger"
51	3	671642	Warning Sign "Grease Daily"
52	1	671646-2	Sign "Lifting Point"
53	1	613129	Sticker Hotline
54	1	645814	Danger Sign
55	1	671638	Warning Sign Forum
56*	1	675170-E	Hose Assembly E

* Not shown on Drawing I and II.

5.3.2.2 Adapter Kit P/N 638220-1

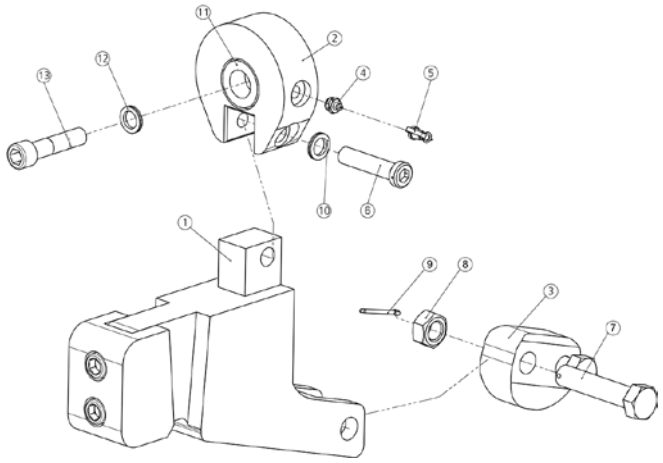
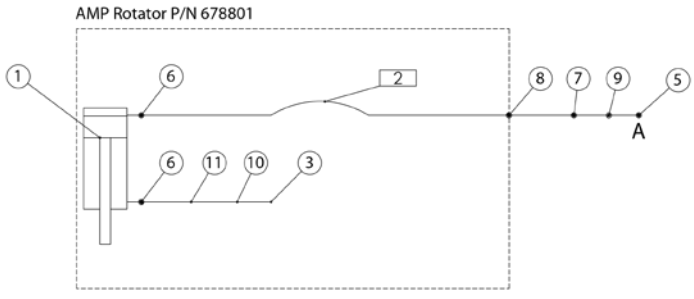


Fig. 85: 638220-1 Adapter Kit

Parts List

Pos.	Qty.	P/N	Description
1	1	727042	Screw
2	1	792106	Washer
3	1	638220-5	Pin
4	1	792106	Washer
5	1	752339	Cotter pin
6	1	613556-41	Hexagon nuts
7	2	613623-11	Screw
8	2	798229	Screw
9	2	612518	Protection Cap
10	1	612515	Grease Nipple
11	1	678816	Connection
12	1	638220-4	Bracket
13	1	638220-2	Link Block Assembly

5.3.2.3 Hydraulic Assembly Single Rotator (single acting) P/N 678801-H



(Connection A - Extend Cylinder, End Position, 90°,Retract Cylinder, Supine Position, -55°)

Fig. 86: 678801-H Hydraulic Assembly Single Rotator (single acting)

Parts List

Pos.	Qty.	P/N	Description
1	1	678866	Hydraulic Cylinder
2	1	678801-H-A	Hose Assembly Connection A L285mm
3	1	678866-1	Filter
4	1	645833	Coupling, Flat Face
5	1	645834	Coupling, Flat Face
6	1	613945	Swivelling Screw Fitting 90°
7	1	613946	Straight connection
8	1	645106	Connection
9	1	613944	Reducing Nipple
10	1	645117	Direct Pipe Fitting
11	1	612945	Straight Connection 8L-8L

5.4 Recommended Spare Parts

5.4.1 678801-RSP - Single Acting Rotator

Pos.	Qty.	P/N	Description
1	553468	1	Lifting eye
2	756790	6	Lubricating nipples
3	753079	1	Screw
4	772878	6	Screw
6	725466	6	Screw
7	755137	1	Nut
8	752137-2	1	Nut
9	70263	4	Split Pin
10	660416	2	Split Pin
11	792108	2	Washer
12	792106	8	Washer (replaces 753700-13)
13	792112	6	Washer
14	612679	4	Washer
15	671646	2	Sign "lifting point" - sticker
16	612530-3	4	Marking Point for Lubrication Fitting
17	612530-5	8	Marking Point for Lubrication Fitting
18	671641	4	Warning sign "squeeze danger"
19	671642	6	Warning sign "GREASE DAILY"
20	678800-H-A	1	Hose Assembly Connection A Lmm
21	678800-H-B	1	Hose Assembly Connection B L285mm
22	645833	1	Coupling, Flat Face
23	645834	1	Coupling, Flat Face
24	678866-1	1	Filter
25	678875	4	Spring
26	678876	6	Spring

INSPECTION / MAINTENANCE

6 Inspection / Maintenance

This chapter contains important information on how to service your AMS-10 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 AMS-10 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 AMS-10.

WEAR EYE PROTECTION!

WEAR PROTECTIVE HELMET!

WEAR PROTECTIVE GLOVES!

WEAR SAFETY SHOES!

Instructions for inspection and maintenance

1. In the event of visible damage or excessive wear contact the FORUM Handling Tools Service Department or an authorized repair company.
2. Ensure that 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 equipment.
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 AMS-10 can be removed by grinding (Refer to Critical Areas).
6. After repair Always check the repaired part in a suitable manner to ensure that the defect has been remedied.

Prerequisites for maintenance work

1. Ensure that the AMS-10 is set down on a good supporting surface so that it could not tip.
2. Provide for sufficient lighting at the workplace.
3. The AMS-10 must be removed from the Elevator-Links.
4. Ensure that AMS-10 is disconnected from hydraulic system.

6.1 Lubrication

⚠ WARNING

Lubricants can pose a health hazard!

Lubricants irritate skin and eyes.

» Avoid contact with lubricants.

WEAR EYE PROTECTION!

WEAR PROTECTIVE GLOVES!

INFO

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

Lubrication Points

The AMS-10 is supplied with grease via lubrication nipples by a manual or pneumatic grease gun.

1. Latch pin
2. Latch mechanism
3. Hinge Pin (2x)
4. Elevator ears
5. Rotator pins
6. Sliding surface of each Slip segment (back)

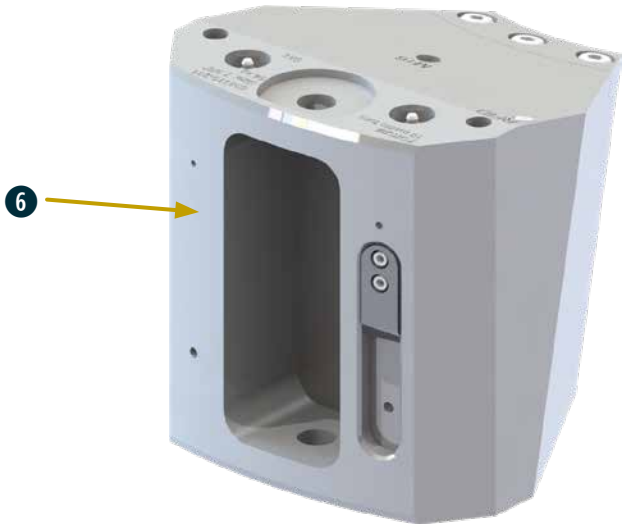


Fig. 87: Lubrication points I

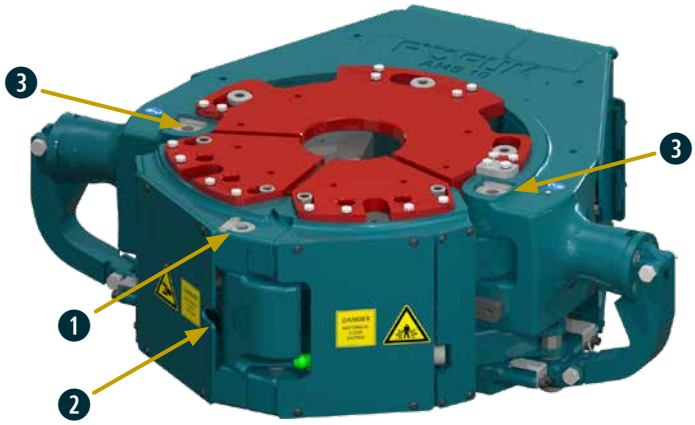


Fig. 88: Lubrication points II

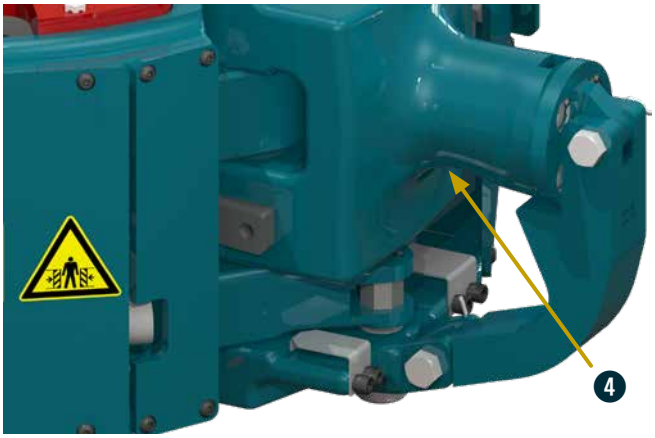


Fig. 89: Lubrication points III

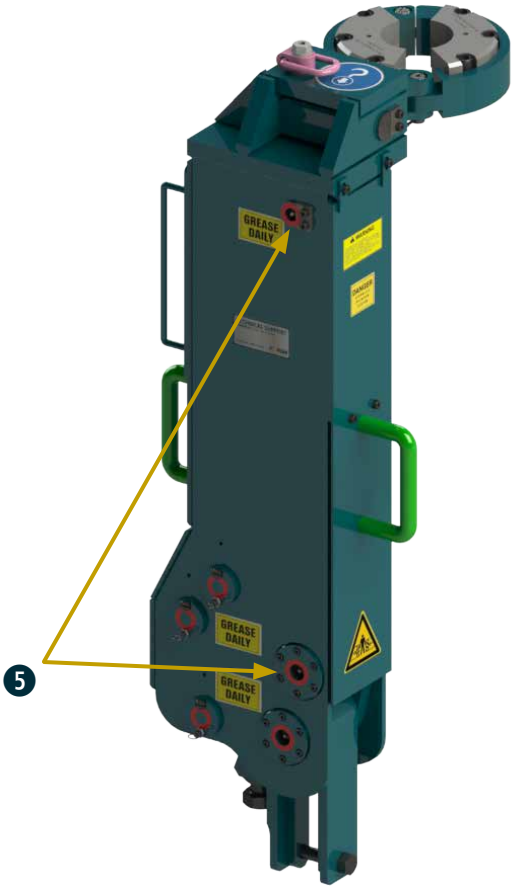


Fig. 90: Lubrication points IV

6.2 Inspections

FORUM Handling Tools recommends to perform inspections in compliance with API RP 8B at specified intervals and in inspection categories. Otherwise, the frequency of required inspections depends on the conditions of use of the AMS-10. 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 Automated Multi-Pipe Slip Elevators 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	AMS-10 mounted to Elevator-Links.
II	Weekly	AMS-10 mounted to Elevator-Links.
III	Semiannually	AMS-10 removed from Elevator-Links. AMS-10 partly dismantled.
IV	Annualy	AMS-10 removed from Elevator-Links. AMS-10 completely dismantled.

INFO

The above-mentioned inspection intervals refer to a 100% use of the AMS-10 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 8B.

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 / - 4°F).

6.2.3 Inspection Following Removal

Generally, the AMS-10 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 AMS-10 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.
- If the field inspection indicates that further inspection work is required, remove the AMS-10 and have it inspected in an appropriately equipped workshop.

6.3 Inspection Categories

6.3.1 Inspection Category I

Observe the AMS-10 during operation. Recognizing inadequate performance and apparent defects is the goal of this category.

Scope/Prerequisites/Procedure:

- Daily visual inspection of the AMS-10 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 AMS-10 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:

- Verification of all wear limits.

6.3.4 Inspection Category IV

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

Scope/Prerequisites/Procedure:

- Exchange of selected hydraulic components.
- Replacement of wear-intensive components.

6.3.5 Inspection intervals und Inspection tasks - AMS-10 Elevator

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 state of lubrication and conservation.	✓	✓	✓	✓
7	Check for no loose components and presence of all warning signs.	✗	✓	✓	✓
8	Check all possible settings (eg. valves) on the AMS-10.	✗	✓	✓	✓
9	Checking the condition of the overall structure (Elevator-Links, hydraulic system) and the interaction of all components and possible attachments with the AMS-10.	✗	✓	✓	✓
10	Checking wear limits (component measurement).	✗	✗	✓	✓
13	Exchange of selected hydraulic components.	✗	✗	✗	✓
14	Replacement of wear-intensive components (recommended spare parts).	✗	✗	✗	✓

✓ Necessary ✗ Unnecessary

6.3.6 Inspection Checklist

INFO

The following checklist serve as a copy templates for inspections to be performed in compliance with API 8B. Performed inspections must Always be documented and stored safely.

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

AMS Model: _____

Serial number: _____

☐ **Inspection Category I**

Date / Place of Inspection:	Result OK ☐	Result NOK ☐	Name of Inspection Operator / Supervisor:	Sign:

Remarks:

☐ **Inspection Category II**

Date / Place of Inspection:	Result OK ☐	Result NOK ☐	Name of Inspection Operator / Supervisor:	Sign:

Remarks:

☐ **Inspection Category III**

Date / Place of Inspection:	Result OK ☐	Result NOK ☐	Name of Inspection Operator / Supervisor:	Sign:

Remarks:

☐ **Inspection Category IV**

Date / Place of Inspection:	Result OK ☐	Result NOK ☐	Name of Inspection Operator / Supervisor:	Sign:

Remarks:

6.4 Wear Data

6.4.1 Minimum Ear Dimensions

Minimum ear dimensions are only valid when the AMS-10 is in otherwise good condition, does not have excessive wear, cracks or other defects, or previous weld repair and has not been misused. These inspection criteria cannot determine the overall condition of the AMS-10 and its suitability for continued use.

Fig. 91: Minimum ear dimensions

AMS-10	mm	inch
Minimum Dimension A	110,50	4,35

6.4.2 Hinge-Pin and Latch-Pin

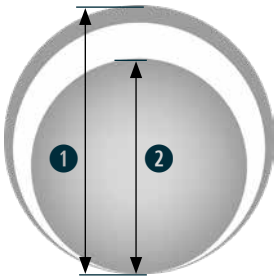


Fig. 92: Measurement wear

Hinge Pin	[P/N 638277] mm	inch
❶ Hinge Pin Diameter New Min.	60.00	2.362
❷ Hinge Pin Diameter worn Max	58.96	2.321
❷ Bore Diameter New max.	60.00	2.362
❶ Bore Diameter Worn max.	60.94	2.399

Latch Pin	[P/N 638278] mm	inch
❶ Latch Pin Diameter New Min.	45.00	1.772
❷ Hinge Pin Diameter worn Max	44.11	1.737
❷ Bore Diameter New max.	45.00	1.772
❶ Bore Diameter Worn max.	45.89	1.807

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 the operational safety of the AMS-10, can be removed by grinding (see critical areas). Following the repair, the parts should again be inspected by an appropriate method to insure that the defect has been completely removed.

6.5 Cleaning

⚠ WARNING

Health hazards from service products!

Splashes of diluted drilling mud and small parts.

» Always wear your personal protective equipment.

WEAR EYE PROTECTION!

WEAR PROTECTIVE GLOVES!

The operating conditions and operating environment result in contamination on the AMS-10. Remove this contamination regularly to prevent incrustation and ensure safe operation of the AMS-10. To clean, shut off the AMS-10, disconnect from hydraulic system and remove from Elevator-Links. Clean contamination from drilling from the AMS-10 regularly. The AMS-10 should be cleaned thoroughly at the end of each shift at the latest. FORUM Handling Tools recommends cleaning the AMS-10 with a high-pressure steam cleaner. Use it to clean the AMS-10 thoroughly from inside and outside.

6.6 Critical Areas

All Load carrying elements of the AMS-10 are free from critical areas and are below the defined value of "Low Stress". According to API 8C, "Low Stress" is defined as follows:

$$\text{Low Stress} \leq \frac{0.1 \cdot YS_{min}}{SF_D}$$

with:

YS_{min} is the specified minimum yield strength.

SF_D is the specified safety factor.

Fig. 93: Testing Procedure - Step I

6.7 Functional Testing of AMS-10 - Paper Test

Preparation

- Select the correct test pipe.
- Clean the AMS-10 and the testing equipment.

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 Slips and open the doors of the AMS-10.
3. Place the test pipe in the middle of the AMS-10.
4. Close the doors of the AMS-10 and set the Slips.
5. Apply a load to the test pipe. Do not exceed 10 ton.
6. Hold the applied load on the AMS-10 for 30 seconds.
7. After 30 seconds, slowly release the applied load from the test pipe.
8. Raise the Slips and open the doors of the AMS-10.
9. Remove the test pipe and evaluate the test result! All rows of Inserts should make full contact.

Fig. 94: Testing Procedure - Step II

Fig. 95: Testing Procedure - Step III

Evaluation Examples

Fig. 96: Evaluation criterion I

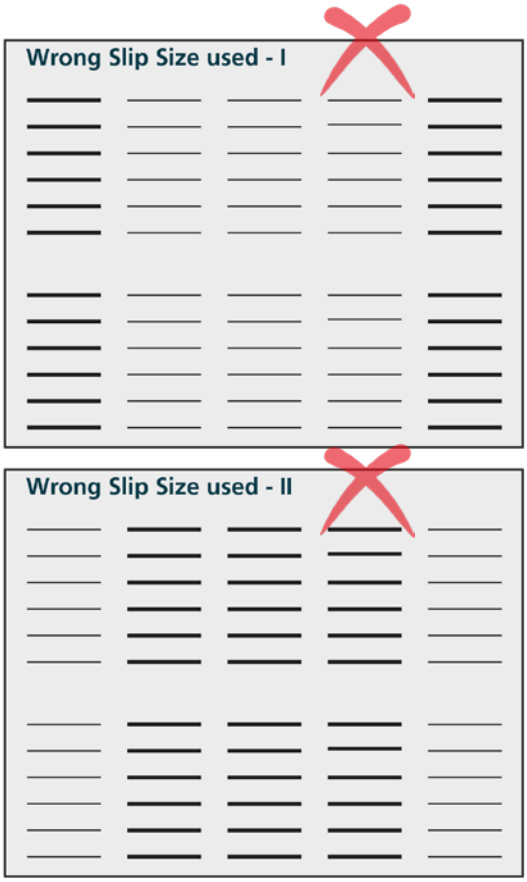


Fig. 97: Evaluation criterion II

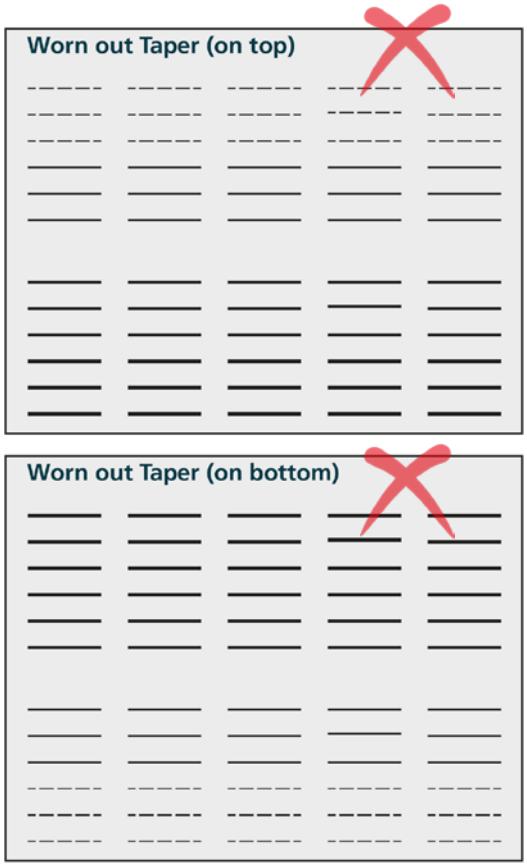


Fig. 98: Evaluation criterion III

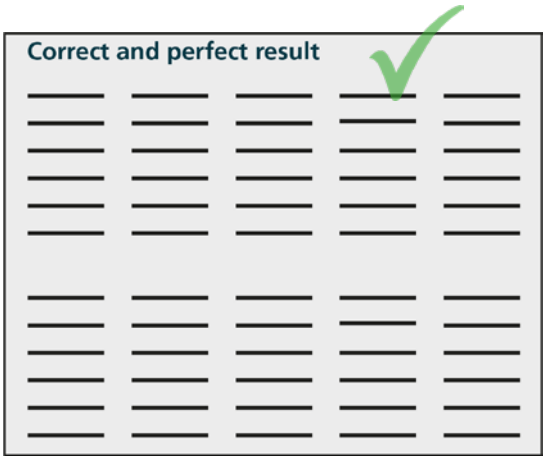


Fig. 99: Evaluation criterion IV

INFO

If evaluation paper result shows poor contact marks then

1. Check seating of AMS-10 in Elevator-Links.
2. Check for correct seating of the Slips.
3. Consult FORUM Handling Tools service Team for further help and support („X Contact worldwide“ on page 11).

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STORAGE / DISPOSAL

7 Storage / Disposal

This section deals with procedures to be taken to the storage after the decommissioning of the AMS-10. The goal is to protect the AMS-10, 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 Equipment

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 section “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	
Protection of equipment	• 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 AMS-10 only on surrounded pallets and secure them with tensioning cables and anti-slip mat.
Ambient Conditions	• Store in dry surroundings (maximum humidity 80%).

Longer Storage	
Protection of equipment	• 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 AMS-10 only on surrounded pallets and secure them with tensioning cables and anti-slip mat. • Protect the AMS-10 against water penetration with a plastic tarp. • Drain the hydraulic oil, if applicable.
Ambient Conditions	• Store in dry surroundings (maximum humidity 80%).

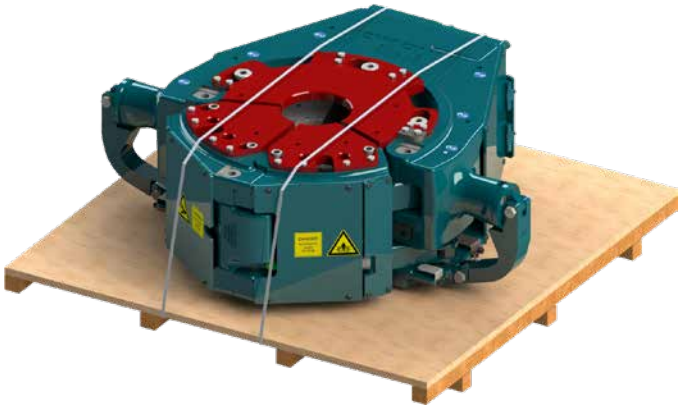

Fig. 100: Correct Storage on pallet

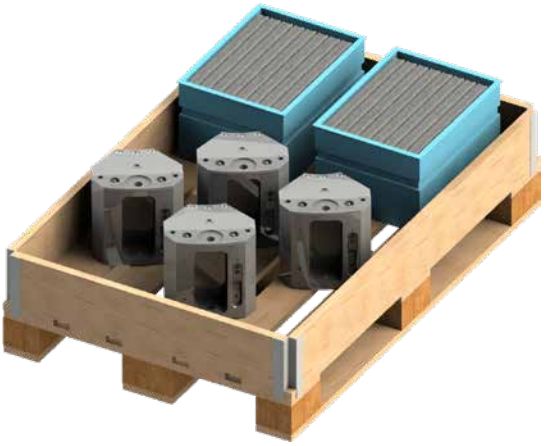

Fig. 101: Correct Storage in pallet boxes

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, lubricants, 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.

Fig. 102: Correct Storage warehouse

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APPENDIX

APPENDIX

8 Appendix

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 Multi-Pipe Elevator Slip Type AMS-10**

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 8C, 5. 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
NORSOK Standard R-002	Lifting Equipment

Description of Product:

The following named lifting accessory will be described in more detail in the accompanying Data Book and/or certificate and the associated Technical Documentation

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

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 fur 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 Representive Name Matthias Theiss
Position Managing Director

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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 DD XXX
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. 103: 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™
ENERGY TECHNOLOGIES

FORUM Handling Tools

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