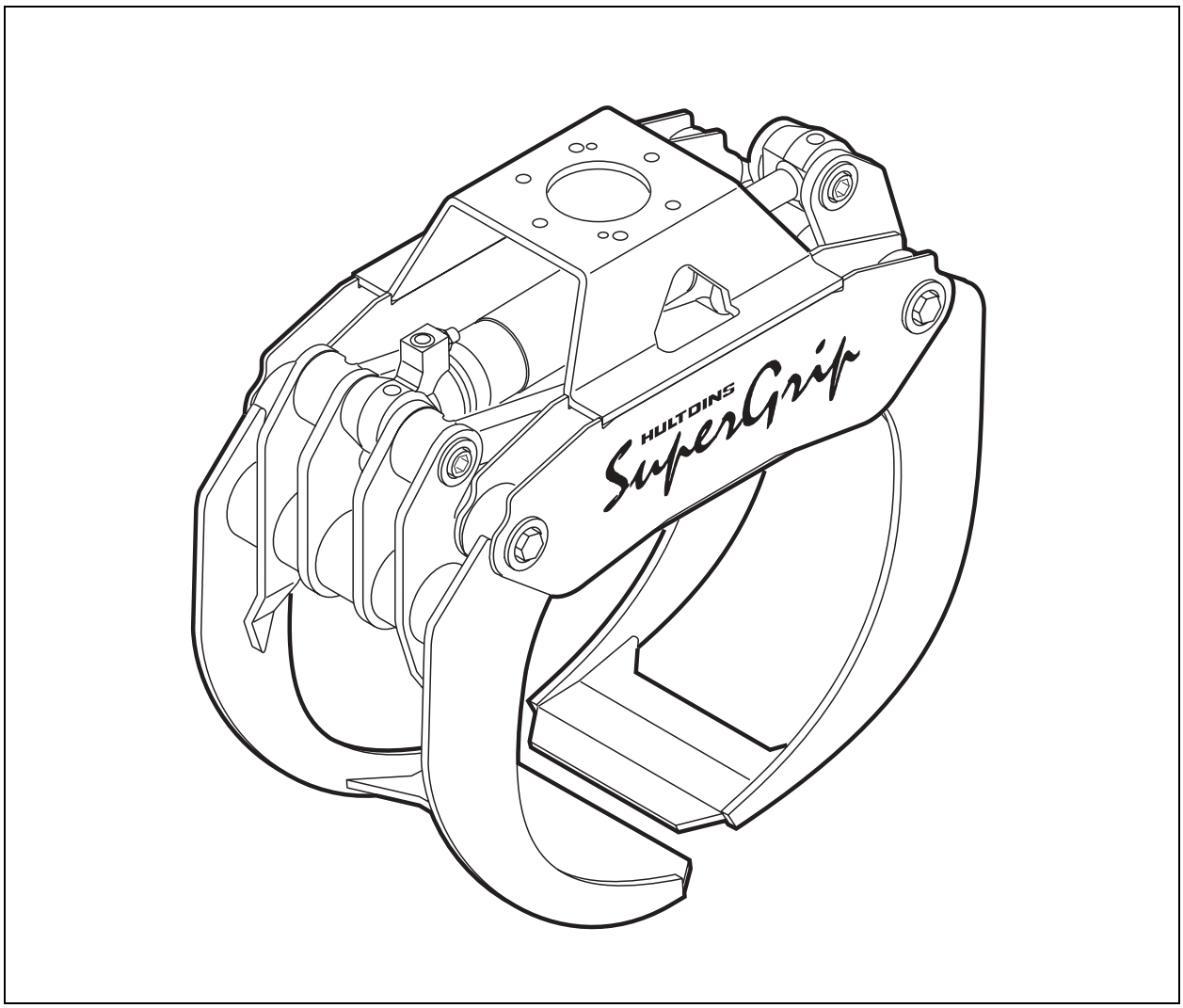
HULTDINS SuperGrip™



HULTDINS

SuperGrip SG

Service manual

This publication contains instructions for the maintenance of the *SuperGrip SG* grapples. The instructions cover both general information for all models, and procedures or specifications applicable to individual models. If doubt should arise concerning the validity of the instructions please consult the nearest dealer for more detailed information.

Illustrations, technical information and specifications were, as far as we have been able to judge, correct at the time of print. However, we reserve the right to, without prior notice, revise specifications, instructions, equipment, etc. as a result of ongoing product improvement activities.

Even if all conceivable measures have been taken to make the contents as complete as possible, HULTDIN SYSTEM AB takes no responsibility for possible damages that may arise as a result of the instructions not being followed or improper use of the product.

⚠ Important!

The parts and components used in HULTDIN SYSTEM AB's products are specifically chosen. Therefore original spare parts are always the best alternative in a possible need of repairs or upgrading.

All service and repairs should be carried out by qualified service personnel or an authorized repair shop with suitable tools and lifting devices.

This publication is published by: HULTDIN SYSTEM AB
Skolgatan 12
Se-930 70 Malå
SWEDEN

This publication applies to the following models:

SG 260/-R	S/N 026-5050 and up
SG 260S	S/N 044-0280 and up
SG 360/-R/-S	S/N 027-4460 and up
SG 420/-R	S/N 028-2530 and up
SG 520/-R/-S	S/N 029-1770 and up

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Safety instructions

This page describes important safety instructions, which the operator's of Hultdins SuperGrip SG, SuperGrip TL and Compact grapples should have a good knowledge of before the equipment is used.

The service manual should be available at all times so that the operator is able to follow safety regulations and the procedures of maintenance activities.

Note! Read carefully and understand the following information with concerns to safe operation practices before operating this equipment.

Important!
The owner and the operator are responsible for following all safety regulations and that the machine is safely equipped.

Important!
Check the grapple for damages at the beginning of each shift. Tighten all fasteners regularly.

Important!
Make sure that the hydraulic pressure in the grapple cylinder is adjusted according to the specifications. If the pressure is too low the grapple will not be able to carry its load. If the pressure is too high, the grapple will be overloaded, which could result in structural failures

Important!
All service and repairs should be carried out by qualified personnel or an authorized repair shop with suitable tools and lifting devices.

Important!
Consider the environment. Plug all open connections to avoid unnecessary spill of oil.

Warning!
The grapple must not be used for lifting personnel.

Warning!
The grapple is not designed for handling rocks, heavy spare parts, etc. It is also not designed to be used when mounting or removing tracks.

If used as described above the grapple arms or other parts of the grapple could fail, resulting in injury.

Warning!
The load of the grapple must not exceed the recommended maximum rating as structural failure could occur, resulting in injury and damaged equipment.

Warning!
Before performing any maintenance or service work, lower the grapple to the ground and shut off the engine. Turn off any master shut-offs and do not allow personnel in the cab.

Warning!
Never touch or stand close to the pressurized cylinders and hydraulic hoses.

Warning!
The grapple has sharp edges. Use proper wrenches and protective gloves when working on the grapple.

Warning!
When operating this equipment ensure all other personnel remain at least 50 feet (15 meters) clear of the machine. Turn the machine off immediately if anyone enters this safety zone.

Warning!
To avoid injury always place the grapple lying down on it's side when not mounted on the boom.

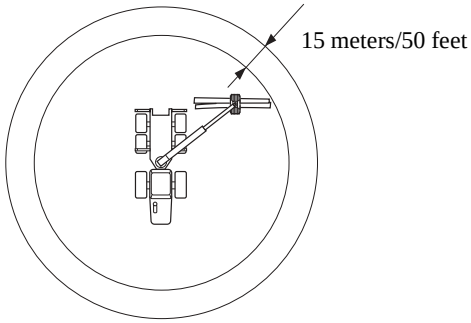

Fig. 1 The operating area of the grapple and the recommended safety distance

Warning!
Personnel being inside the danger zone must be well protected against falling load.

Warning!
The operator should be aware that the load, or parts of the load, could fall at any time due to a wrong maneuver, logs slipping out, or logs falling uncontrolled from the load.

Welding

In case of a structural repair of the equipment, when welding may be needed, consult the dealer for recommended instructions.

When welding on the grapple the following steps must be taken:

- Make sure that fire-extinguishing equipment is available.
- Clean the area around the welding area to eliminate any fire hazard.
- Connect the ground wire so the welding current does not pass over any bushings.
- Place the ground wire as close to the welding area as possible.
- When welding close to bushings, dissassemble the bushings asthey are made of a plastic compound-material which high temperatures may damage.

Modifying the grapple

It is not approved to:

- Modify the grapple without the consent of HULTDIN SYSTEM AB.
- Alter the function of the grapple without the consent of HULTDIN SYSTEM AB.
- Use spare parts other than original HULTDINS parts.

System overview

The *SuperGrip SG* is made up of the following main parts.
All parts are replaceable.

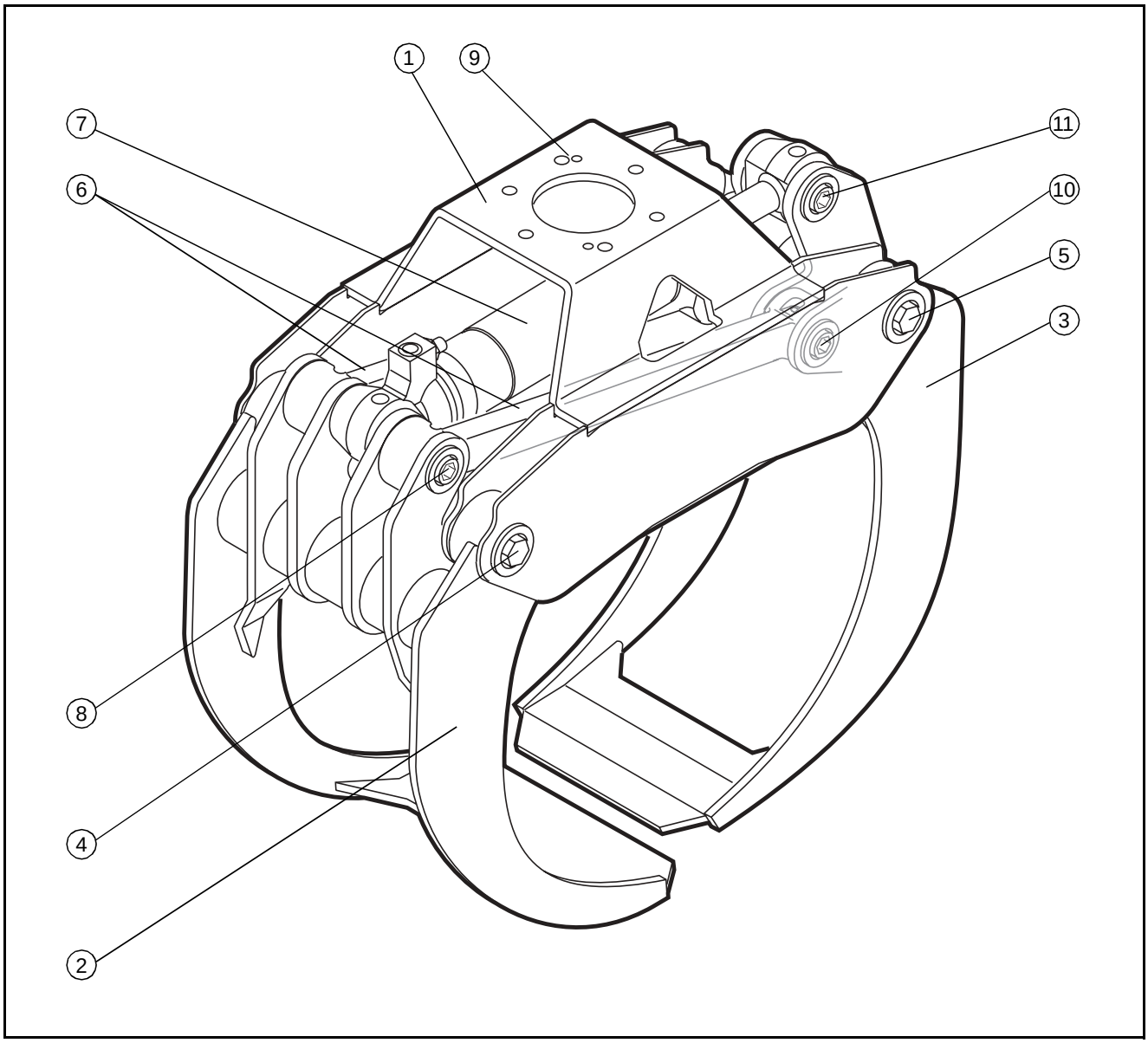

Fig. 1 System overview

1 Frame
2 Female grapple arm
3 Male grapple arm
4 Pin-joint system type A, stand-female grapple arm
5 Pin-joint system type A, stand-male grapple arm
6 Rod
7 Hydraulic cylinder
8 Pin-joint system type B, grapple arm-rod-hydraulic cylinder
9 Drill holes for rotator bracket
10 Pin-joint system type A, rod-male grapple arm
11 Pin-joint system type A, piston rod-male grapple arm

Product description

The *SuperGrip SG* is a short wood grapple that is generally mounted on cranes/booms intended for on road- and off road-vehicles. The *SuperGrip SG* is only intended to be used for timber, cut-to-length, whole-tree and waste wood systems.

The *SuperGrip SG* must not be used when lifting rocks or when performing equivalent lifts as there is a risk that the grapple arms or other parts of the grapple may fail, which could result in injury or damaged equipment.

Labeling

The *SuperGrip SG* is labeled with a welded product label, serial number and a CE-label according to the following figure.

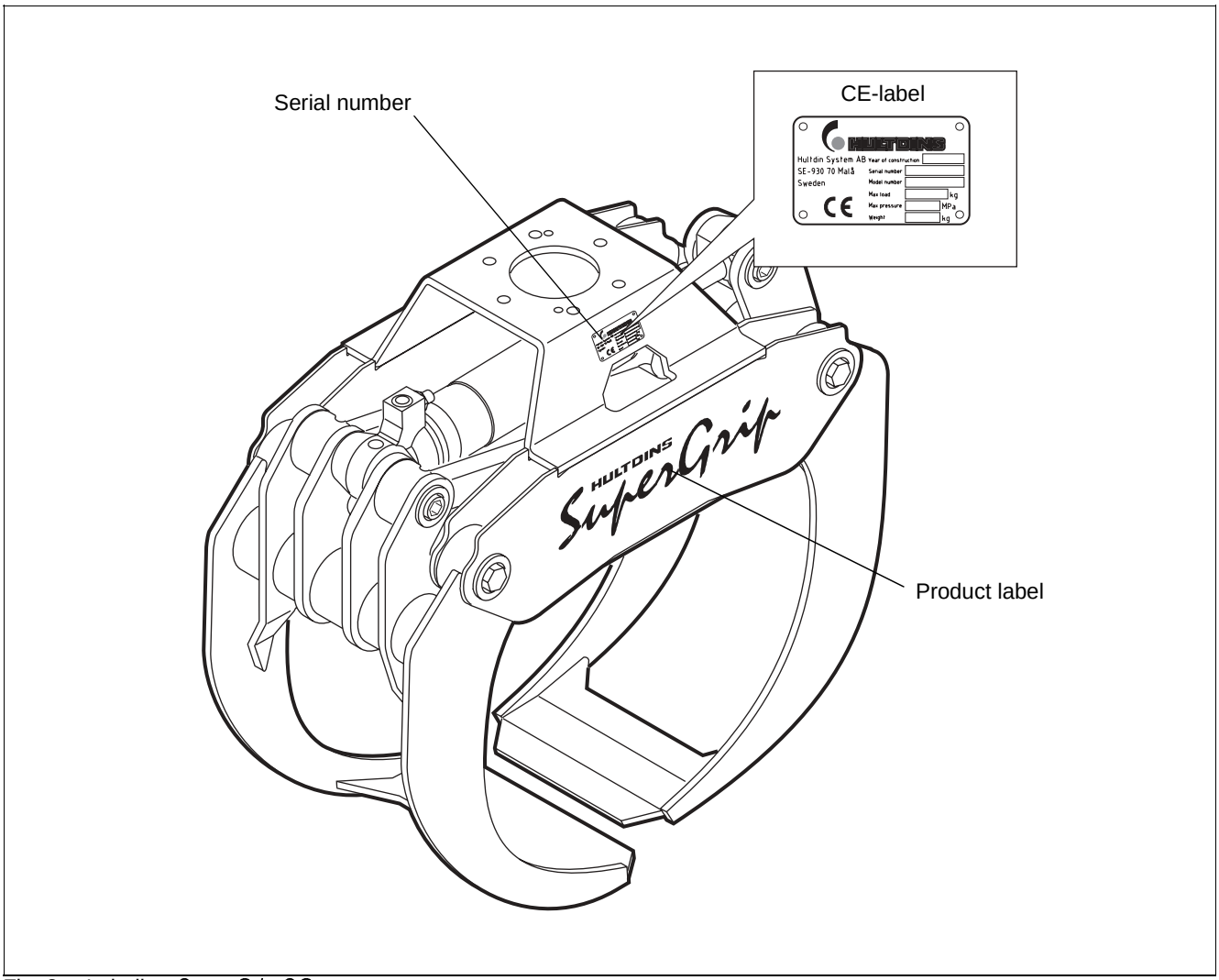

Fig. 2 Labeling *SuperGrip SG*

Technical data

SuperGrip SG

Special tools

Description	Diam.	Order no.
Mandrel, pin-joint system	50 mm	0660 207
	60 mm	0683 010
	70 mm	0660 208
	80 mm	0683 011
Mandrel, bushing	50 mm	0660 290
	60 mm	0683 150
	70 mm	0660 290
	80 mm	0683 150

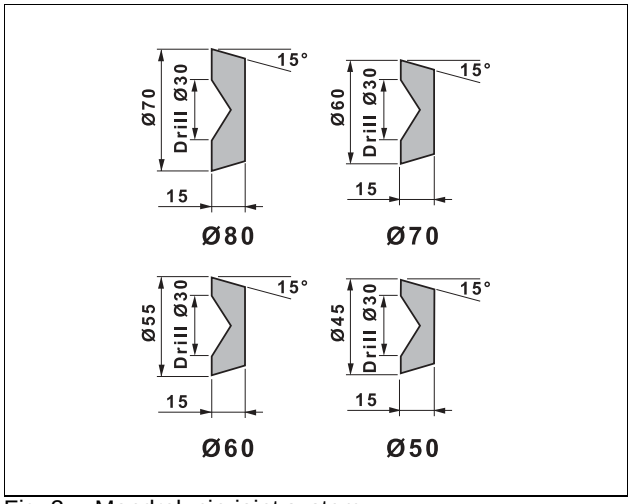

Fig. 3 Mandrel, pin-joint system

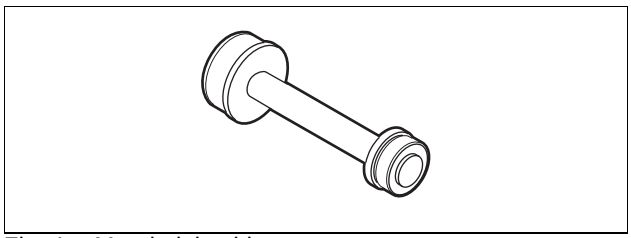

Fig. 4 Mandrel, bushing

Grease and Loc-Tite

Grease	Use a mineral oil based grease thickened with, or mixable with a lithium soap. The grease should be classified as L-XCCIB2 according to ISO 6743-9. Molybdendisulfid content max 3 %. Base fluid viscosity 170 to 220 cSt at 40°C. NLGI class2.
Thread sealant	Loc-Tite 270

Greasing intervals

Every 1000 hours of use.

Hydraulic hoses

The cylinder hoses should be 1/2” (13,0 mm) according to DIN 20022; SAE 100 R2AT rating. Hose assemblies should be sized for burst pressure with at least a triple safety factor (three times the working pressure).

SG 260

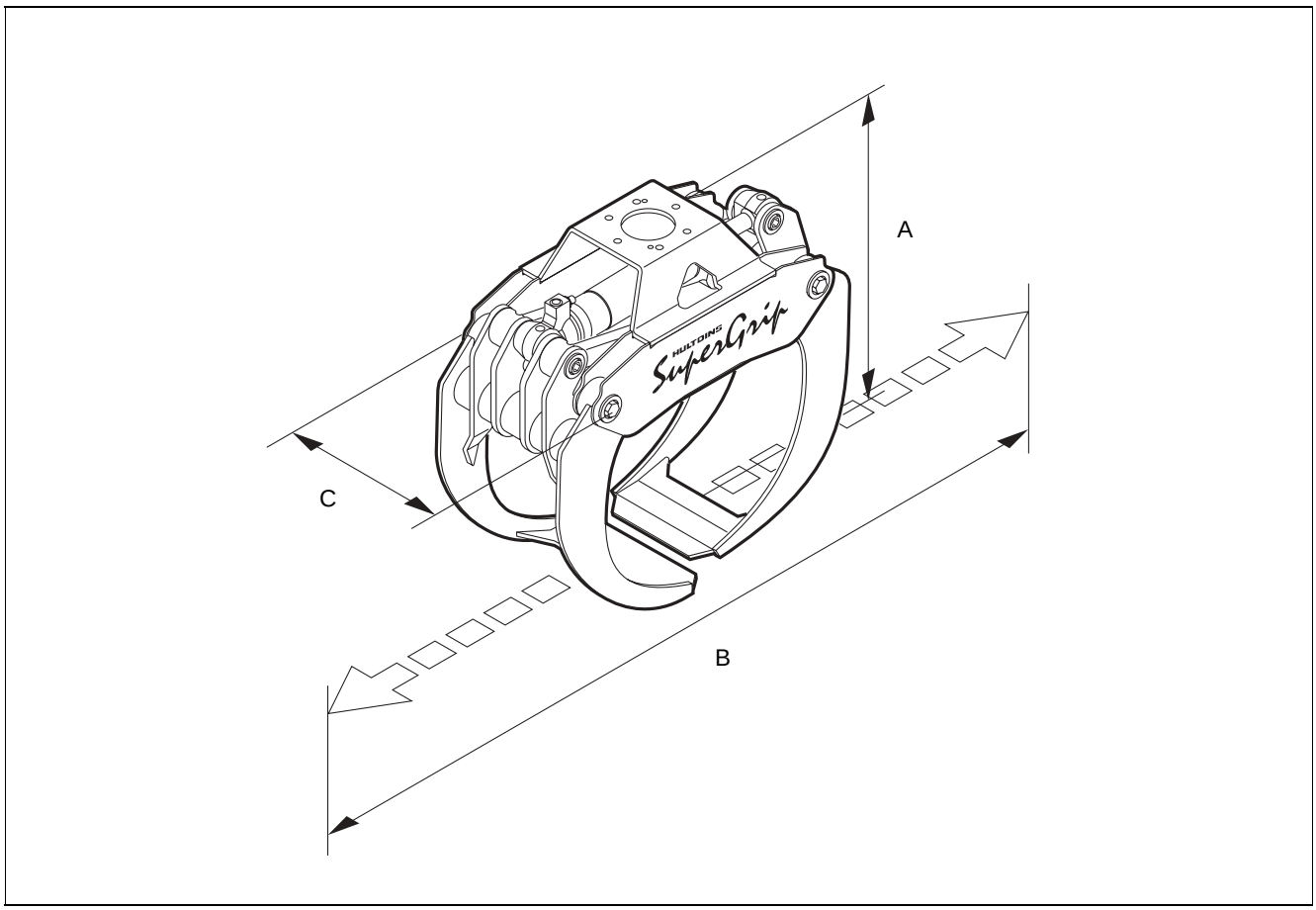

Fig. 5 Dimensions

	SG 260 LP	SG 260 HP	SG 260LP-R	SG 260HP-R	SG 260LP-S	SG 260HP-S
Gripping area, tip-tip	0.26 m^2	0.26 m^2	0.26 m^2	0.26 m^2	0.26 m^2	0.26 m^2
Max. gripping width (B).....	1 525 mm	1 525 mm	1 536 mm	1 536 mm	1 525 mm	1 525 mm
Min. gripping diameter.....	90 mm	90 mm	90 mm	90 mm	90 mm	90 mm
Max. load.....	3 500 kg	3 500 kg	3 500 kg	3 500 kg	3 500 kg	3 500 kg
Weight.....	168 kg	168 kg	181 kg	181 kg	195 kg	195 kg
Height, arms closed	550 mm	550 mm	550 mm	550 mm	550 mm	550 mm
Height, arms tip-tip (A)	867 mm	867 mm	850 mm	850 mm	867 mm	867 mm
Overall grapple width (C)...	430 mm	430 mm	430 mm	430 mm	430 mm	430 mm
Cylinder size.....	80/56	70/40	80/86	70/40	80/56	70/40
Cylinder connections	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16	BSP 1/2”(-) BSP 3/4”(+)	UNF 1.1/16	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16

Operating pressure

	80/56	70/40 (HP)
Max. working pressure	20 MPa	25 MPa

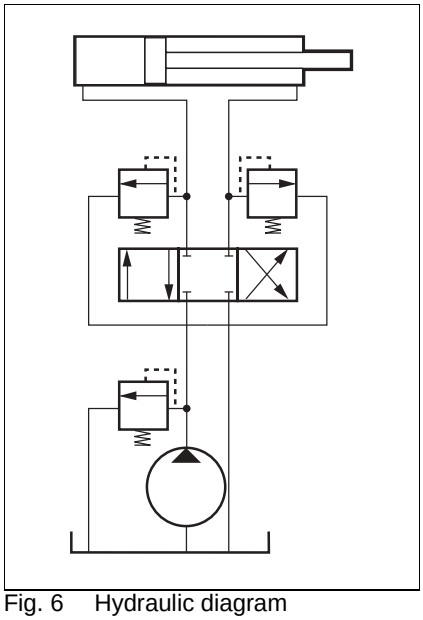

Fig. 6 Hydraulic diagram

Torque and socket/wrench sizes

			Torque	Socket/wrench size
MC6S	16	12.9	333 Nm	14 mm
M6S	20	10.9	541 Nm	30 mm
MC6S	20	12.9	649 Nm	17 mm
Piston (80/56).....			700 Nm	60 mm
Piston (70/40).....			600 Nm	-
Gland (80/56).....			700 Nm	80 mm
Gland (70/40).....			600 Nm	-
Nut M16.....				24 mm
Nut M20.....				30 mm

SG 260

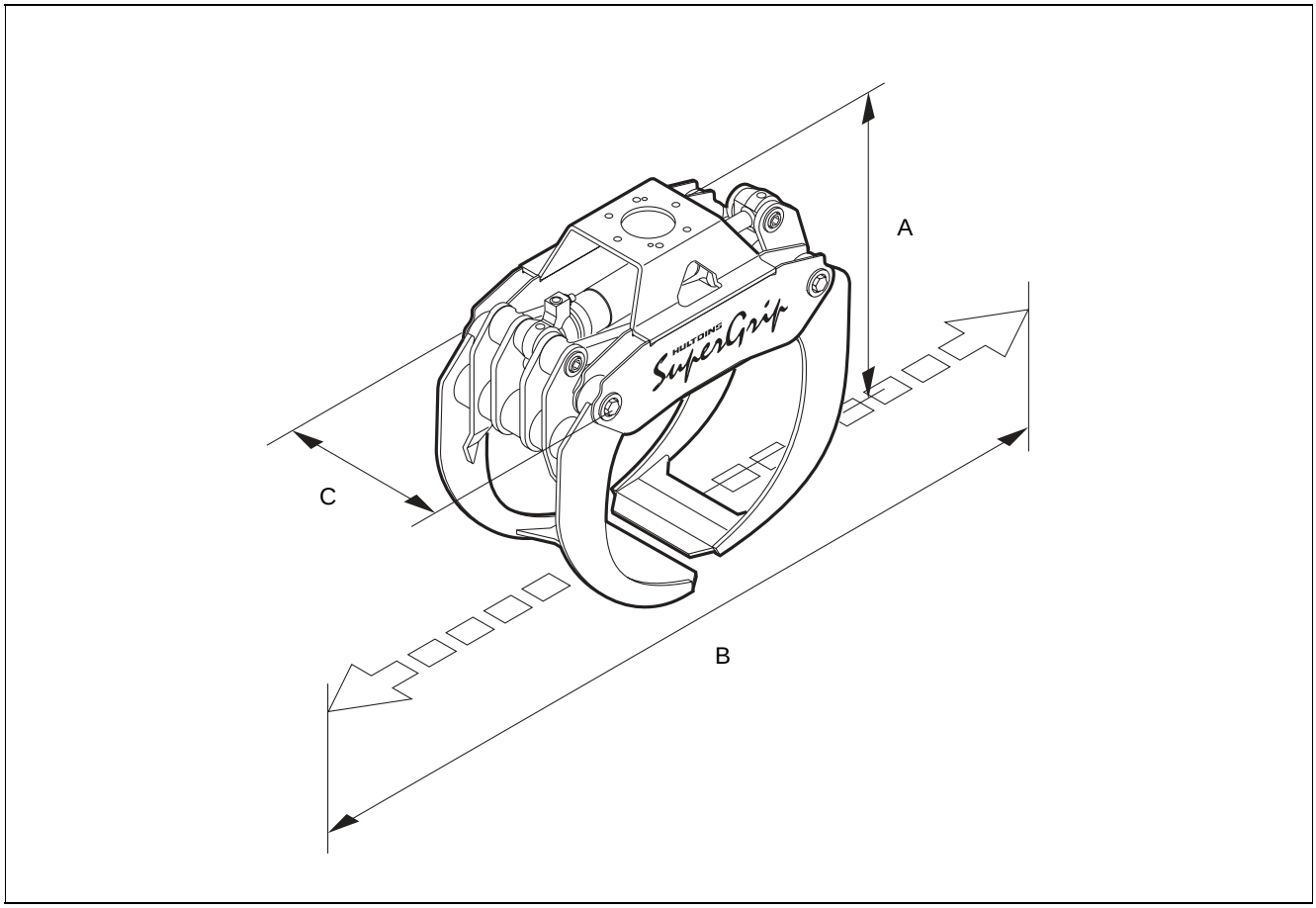

Fig. 7 Dimensions

	SG 260 LP	SG 260 HP	SG 260LP-R	SG 260HP-R	SG 260LP-S	SG 260HP-S
Gripping area, tip-tip	2.80 FT^2	2.80 FT^2	2.80 FT^2	2.80 FT^2	2.80 FT^2	2.80 FT^2
Max. gripping width (B).....	60 IN	60 IN	60.5 IN	60.5 IN	60 IN	60 IN
Min. gripping diameter.....	3.5 IN	3.5 IN	3.5 IN	3.5 IN	3.5 IN	3.5 IN
Max. load.....	7 700 LB	7 700 LB	7 700 LB	7 700 LB	7 700 LB	7 700 LB
Weight.....	370 LB	370 LB	398 LB	398 LB	429 LB	429 LB
Height, arms closed	21.6 IN	21.6 IN	21.6 IN	21.6 IN	21.6 IN	21.6 IN
Height, arms tip-tip (A)	34.1 IN	34.1 IN	33.5 IN	33.5 IN	34.1 IN	34.1 IN
Overall grapple width (C)...	16.9 IN	16.9 IN	16.9 IN	16.9 IN	16.9 IN	16.9 IN
Cylinder size.....	80/56	70/40	80/86	70/40	80/56	70/40
Cylinder connections	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16	BSP 1/2”(-) BSP 3/4”(+)	UNF 1.1/16	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16

Operating pressure

	80/56	70/40 (HP)
Max. working pressure	2900 psi	3625 psi

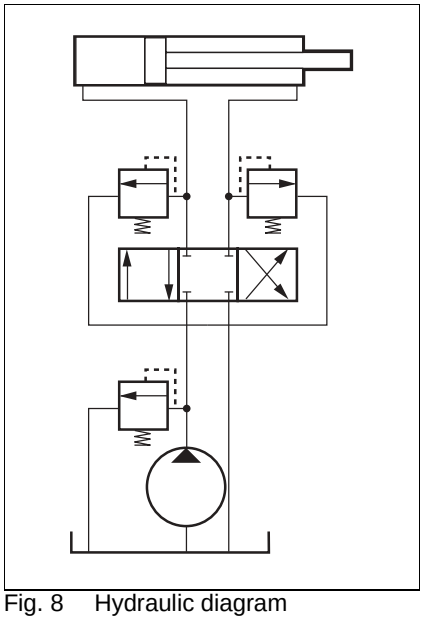

Fig. 8 Hydraulic diagram

Torque and socket/wrench sizes

			Torque	Socket/wrench size
MC6S	16	12.9.....	250 FT.LB.	14 mm
M6S	20	10.9.....	406 FT.LB.	30 mm
MC6S	20	12.9.....	487 FT.LB.	17 mm
Piston (80/56).....			525 FT.LB.	60 mm
Piston (70/40).....			450 FT.LB.	-
Gland (80/56).....			525 FT.LB.	80 mm
Gland (70/40).....			450 FT.LB.	-
Nut M16.....				24 mm
Nut M20.....				30 mm

SG 360

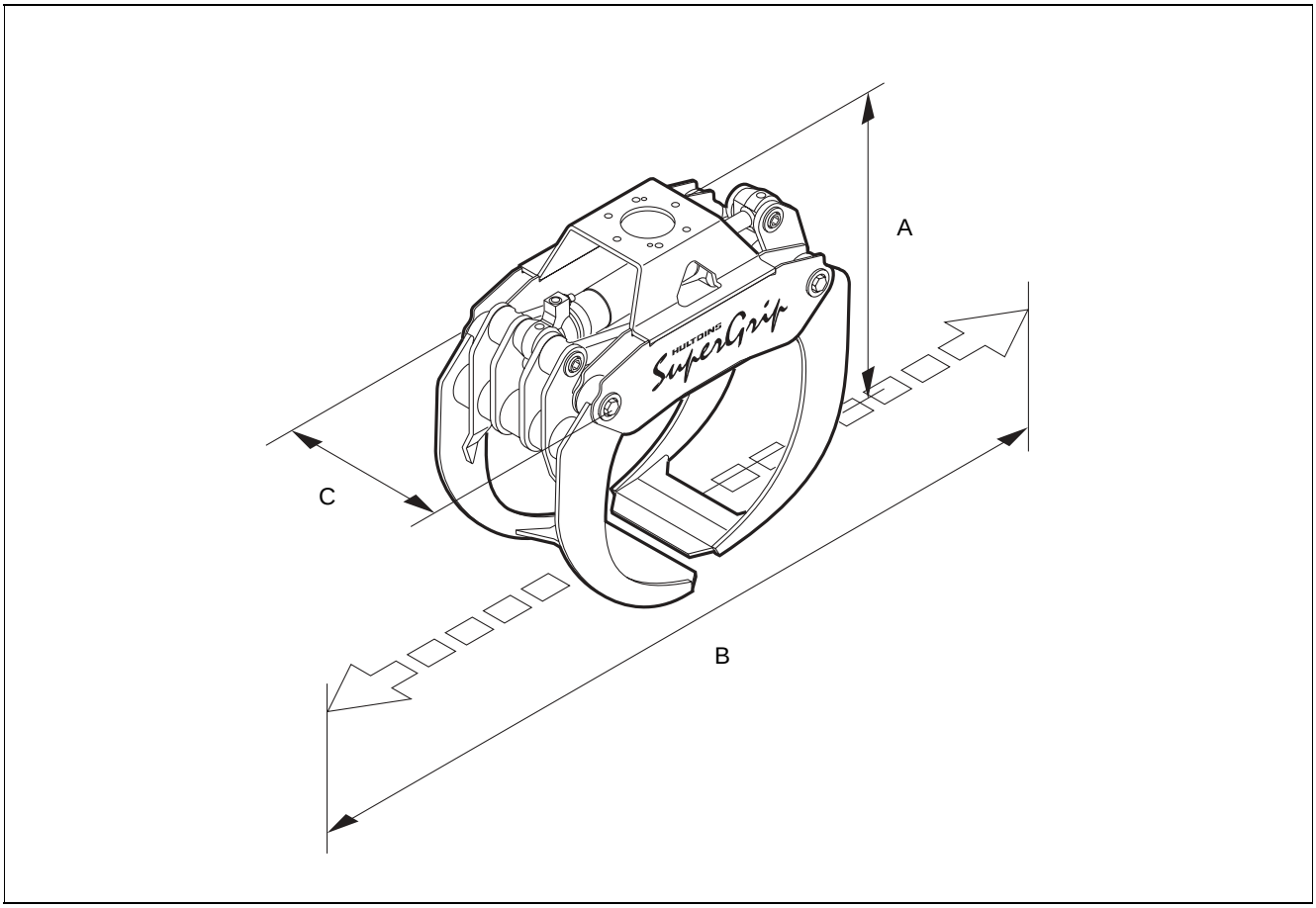

Fig. 9 Dimensions

	SG 360 LP	SG 360 HP	SG 360LP-R	SG 360HP-R	SG 360LP-S	SG 360HP-S
Gripping area, tip-tip	0.36 m^2	0.36 m^2	0.36 m^2	0.36 m^2	0.36 m^2	0.36 m^2
Max. gripping width (B).....	1 870 mm	1 870 mm	1 855 mm	1 855 mm	1 870 mm	1 870 mm
Min. gripping diameter.....	110 mm	110 mm	110 mm	110 mm	110 mm	110 mm
Max. load.....	5 000 kg	5 000 kg	5 000 kg	5 000 kg	5 000 kg	5 000 kg
Weight.....	248 kg	248 kg	285 kg	285 kg	370 kg	370 kg
Height, arms closed	627 mm	627 mm	627 mm	627 mm	656 mm	656 mm
Height, arms tip-tip (A)	962 mm	962 mm	962 mm	962 mm	998 mm	998 mm
Overall grapple width (C)...	510 mm	510 mm	510 mm	510 mm	522 mm	522 mm
Cylinder size.....	90/56	80/56	90/56	80/56	90/56	80/56
Cylinder connections	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16	BSP 1/2”(-) BSP 3/4”(+)	UNF 1.1/16	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16

Operating pressure

	90/56	80/56 (HP)
Max. working pressure	20 MPa	25 MPa

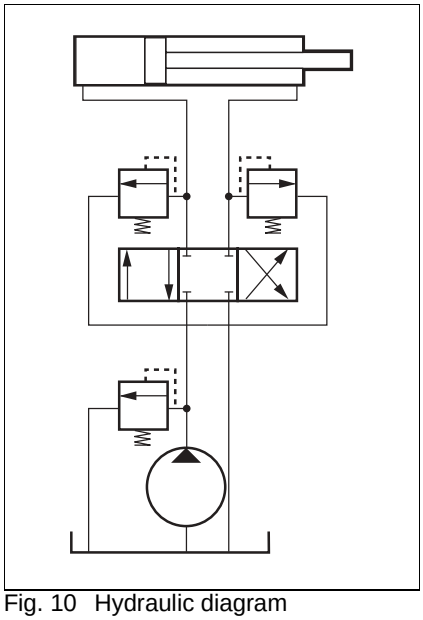

Fig. 10 Hydraulic diagram

Torque and socket/wrench sizes

			Torque	Socket/wrench size
MC6S	16	12.9	333 Nm	14 mm
M6S	20	10.9	541 Nm	30 mm
M6S	24	10.9	935 Nm	36 mm
Piston (90/56).....			850 Nm	70 mm
Piston (80/56).....			600 Nm	-
Gland (90/56).....			850 Nm	90 mm
Gland (80/56).....			600 Nm	-
Nut M16.....				24 mm
Nut M20.....				30 mm
Nut M24.....				36 mm

SG 360

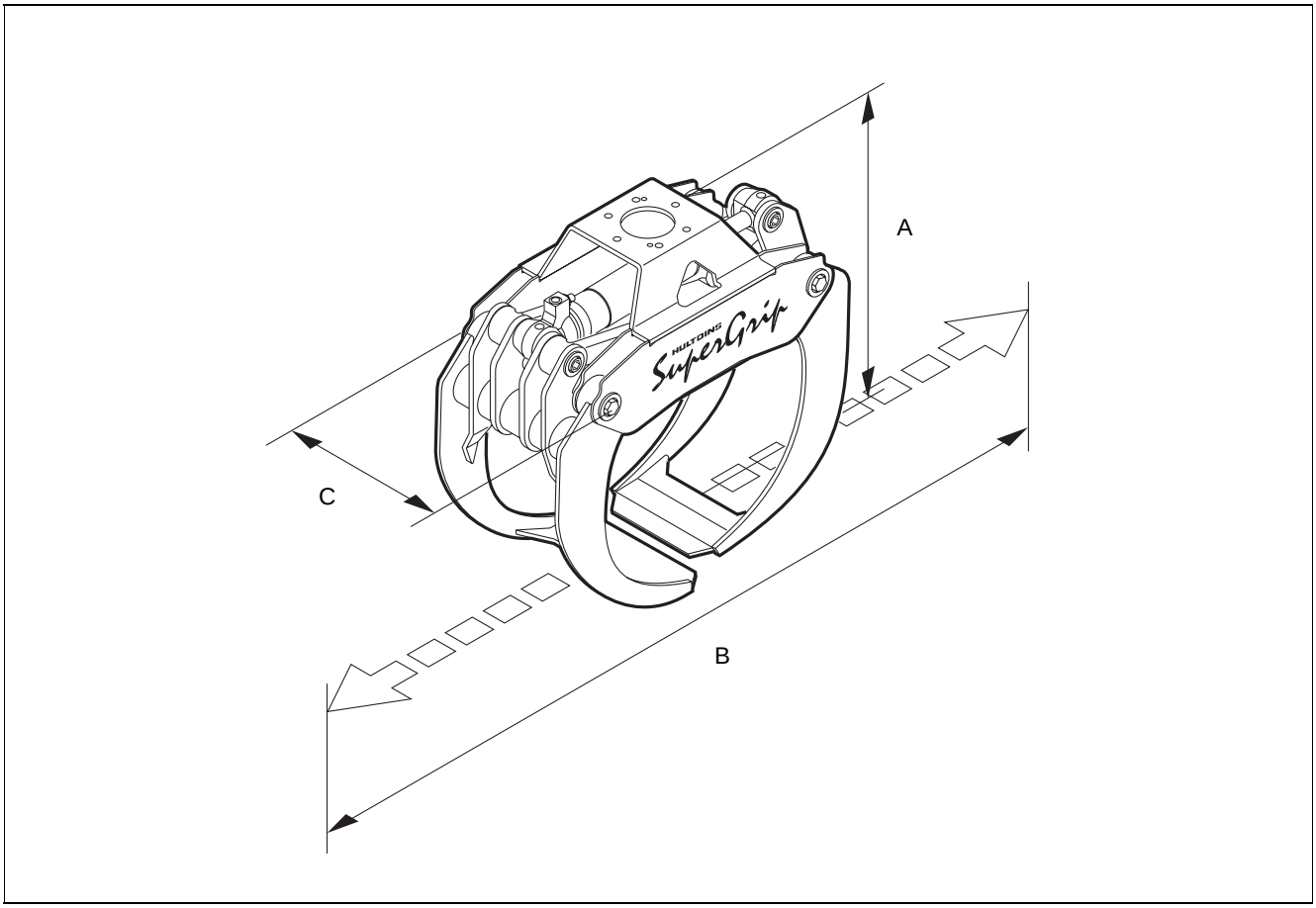

Fig. 11 Dimensions

	SG 360 LP	SG 360 HP	SG 360LP-R	SG 360HP-R	SG 360LP-S	SG 360HP-S
Gripping area, tip-tip	3.87 FT^2	3.87 FT^2	3.87 FT^2	3.87 FT^2	3.87 FT^2	3.87 FT^2
Max. gripping width (B).....	73.6 IN	73.6 IN	73.0 IN	73.0 IN	73.6 IN	73.6 IN
Min. gripping diameter.....	4.3 IN	4.3 IN	4.3 IN	4.3 IN	4.3 IN	4.3 IN
Max. load.....	11 000 LB	11 000 LB	11 000 LB	11 000 LB	11 000 LB	11 000 LB
Weight.....	545 LB	545 LB	627 LB	627 LB	814 LB	814 LB
Height, arms closed	24.7 IN	24.7 IN	24.7 IN	24.7 IN	25.8 IN	25.8 IN
Height, arms tip-tip (A)	37.9 IN	37.9 IN	37.9 IN	37.9 IN	39.3 IN	39.3 IN
Overall grapple width (C)...	20.0 IN	20.0 IN	20.0 IN	20.0 IN	20.6 IN	20.6 IN
Cylinder size.....	90/56	80/56	90/56	80/56	90/56	80/56
Cylinder connections	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16	BSP 1/2”(-) BSP 3/4”(+)	UNF 1.1/16	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16

Operating pressure

	90/56	80/56 (HP)
Max. working pressure	2900 psi	3625 psi

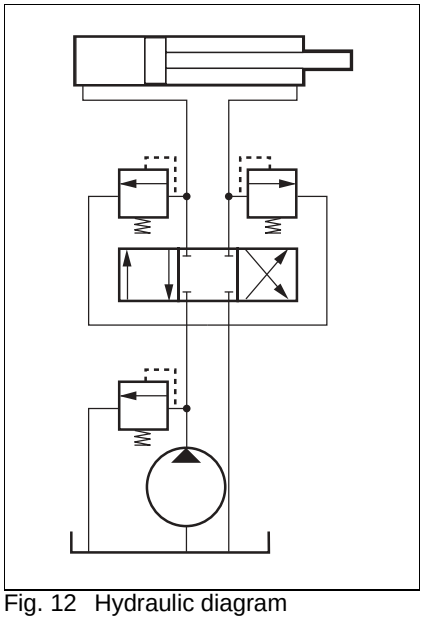

Fig. 12 Hydraulic diagram

Torque and socket/wrench sizes

			Torque	Socket/wrench size
MC6S	16	12.9.....	250 FT.LB.	14 mm
M6S	20	10.9.....	406 FT.LB.	30 mm
M6S	24	10.9.....	701 FT.LB.	30 mm
Piston (90/56).....			638 FT.LB.	70 mm
Piston (80/56).....			450 FT.LB.	-
Gland (90/56).....			638 FT.LB.	90 mm
Gland (80/56).....			450 FT.LB.	-
Nut M16.....				24 mm
Nut M20.....				30 mm
Nut M24.....				36 mm

SG 420

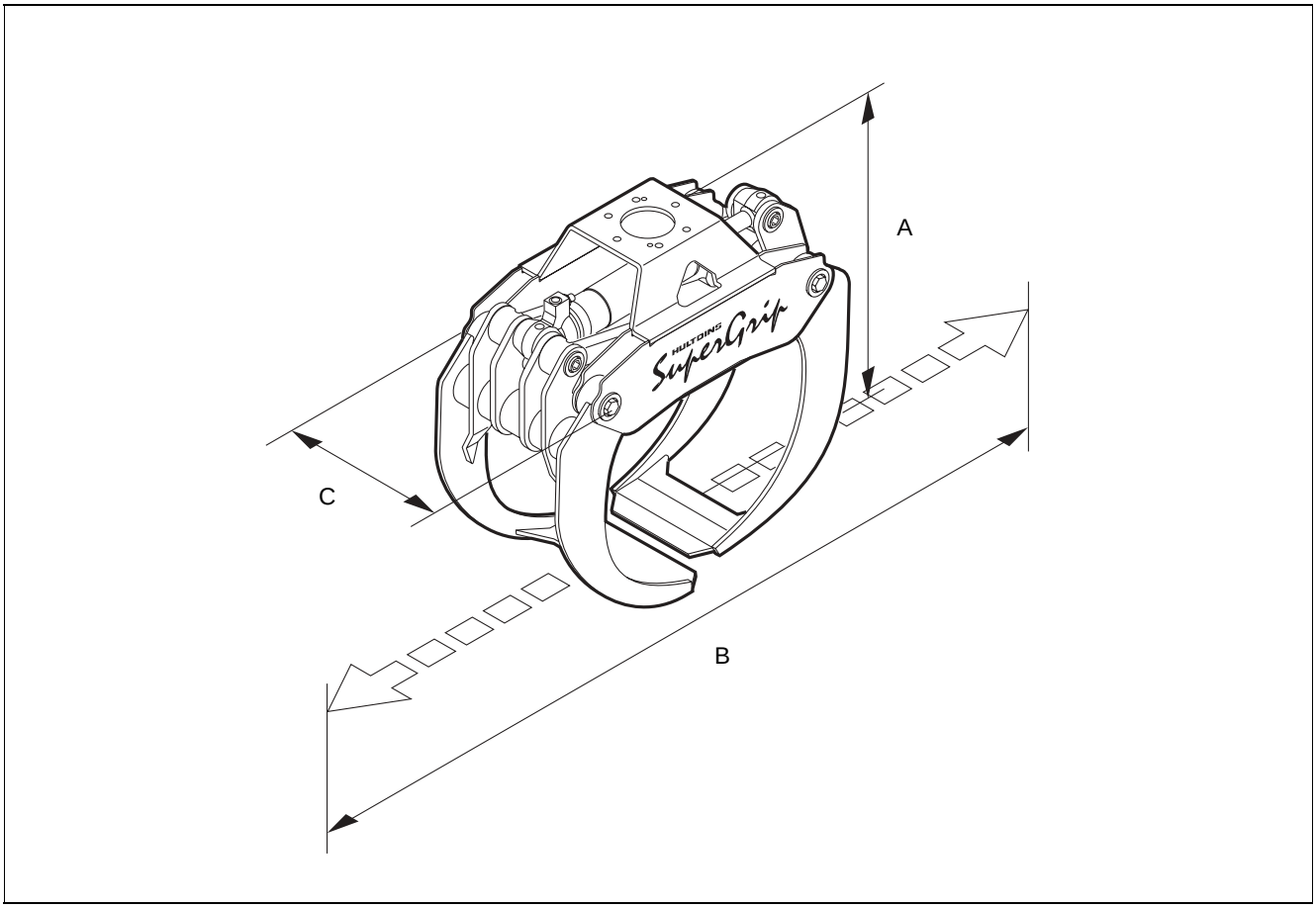

Fig. 13 Dimensions

	SG 420 LP	SG 420 HP	SG 420LP-R	SG 420HP-R
Gripping area, tip-tip	0.42 m^2	0.42 m^2	0.42 m^2	0.42 m^2
Max. gripping width (B).....	2 075 mm	2 075 mm	2 072 mm	2 072 mm
Min. gripping diameter.....	120 mm	120 mm	120 mm	120 mm
Max. load.....	5 500 kg	5 500 kg	5 500 kg	5 500 kg
Weight.....	276 kg	276 kg	308 kg	308 kg
Height, arms closed	649 mm	649 mm	649 mm	649 mm
Height, arms tip-tip (A)	1 040 mm	1 040 mm	1 040 mm	1 040 mm
Overall grapple width (C)...	510 mm	510 mm	510 mm	510 mm
Cylinder size.....	100/63	90/56	100/63	90/56
Cylinder connections	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16	BSP 1/2”(-) BSP 3/4”(+)	UNF 1.1/16

Operating pressure

	100/63	90/56 (HP)
Max. working pressure	20 MPa	25 MPa

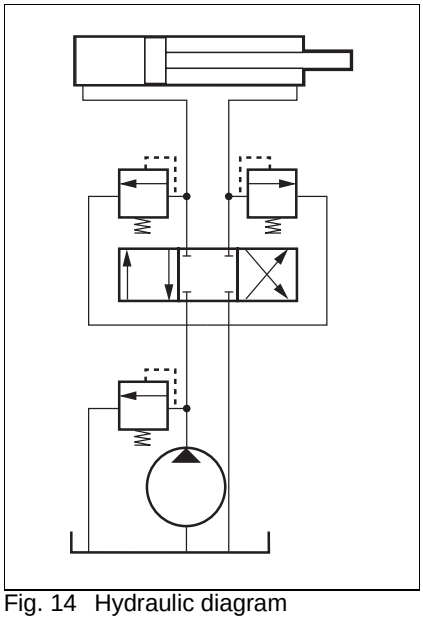

Fig. 14 Hydraulic diagram

Torque and socket/wrench sizes

			Torque	Socket/wrench size
MC6S	16	12.9.....	333 Nm	14 mm
M6S	20	10.9.....	541 Nm	30 mm
Piston (100/63).....			850 Nm	80 mm
Piston (90/56).....			600 Nm	-
Gland (100/63).....			850 Nm	100 mm
Gland (90/56).....			600 Nm	-
Nut M16.....				24 mm
Nut M20.....				30 mm

SG 420

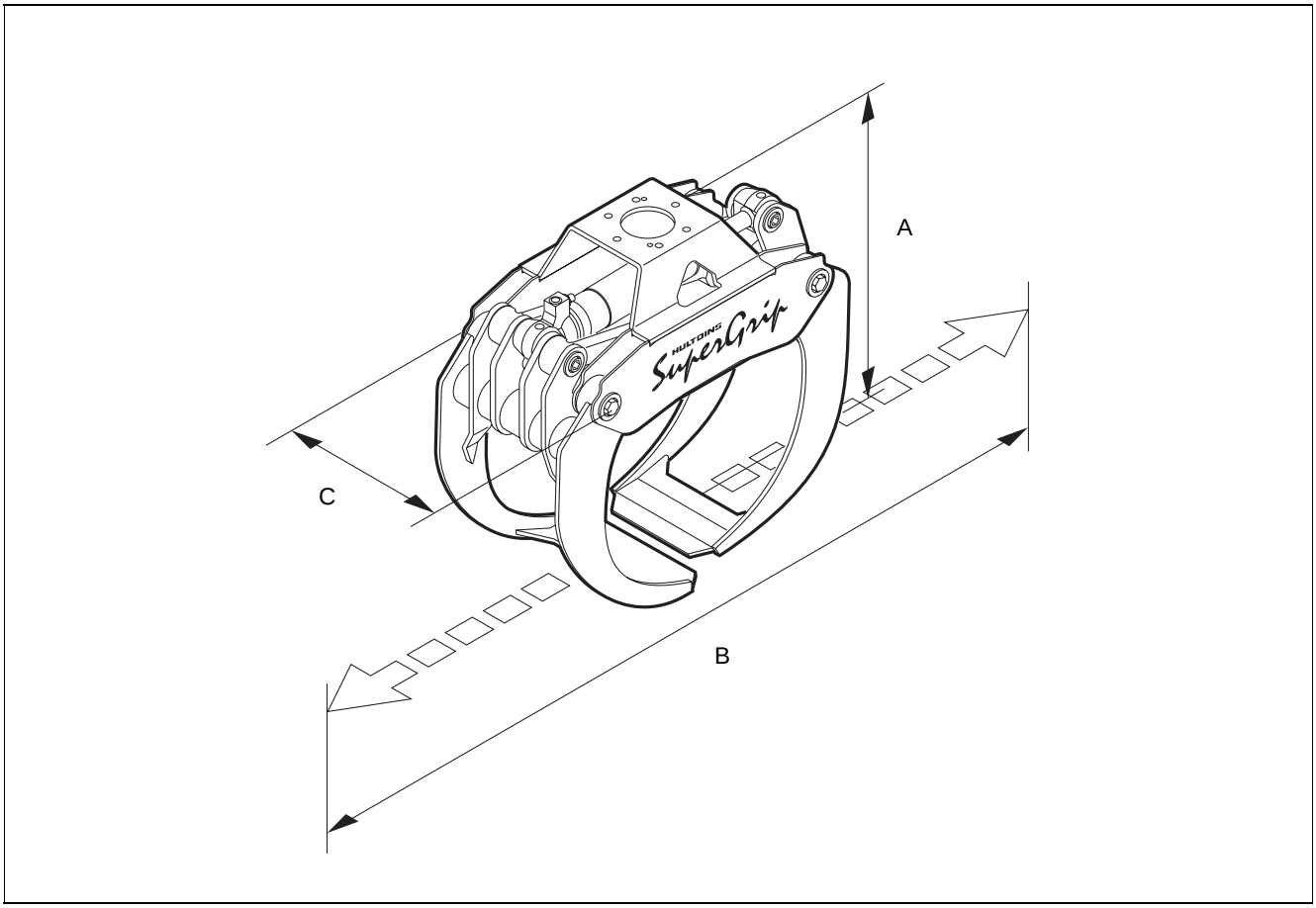

Fig. 15 Dimensions

	SG 420 LP	SG 420 HP	SG 420LP-R	SG 420HP-R
Gripping area, tip-tip	4.52 FT^2	4.52 FT^2	4.52 FT^2	4.52 FT^2
Max. gripping width (B).....	81.7 IN	81.7 IN	81.6 IN	81.6 IN
Min. gripping diameter.....	4.7 IN	4.7 IN	4.7 IN	4.7 IN
Max. load.....	12 100 LB	12 100 LB	12 100 LB	12 100 LB
Weight.....	607 LB	607 LB	677 LB	677 LB
Height, arms closed	25.6 IN	25.6 IN	25.6 IN	25.6 IN
Height, arms tip-tip (A)	40.9 IN	40.9 IN	40.9 IN	40.9 IN
Overall grapple width (C)...	20.0 IN	20.0 IN	20.0 IN	20.0 IN
Cylinder size.....	100/63	90/56	100/63	90/56
Cylinder connections	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16	BSP 1/2”(-) BSP 3/4”(+)	UNF 1.1/16

Operating pressure

	100/63	90/56 (HP)
Max. working pressure	2900 psi	3625 psi

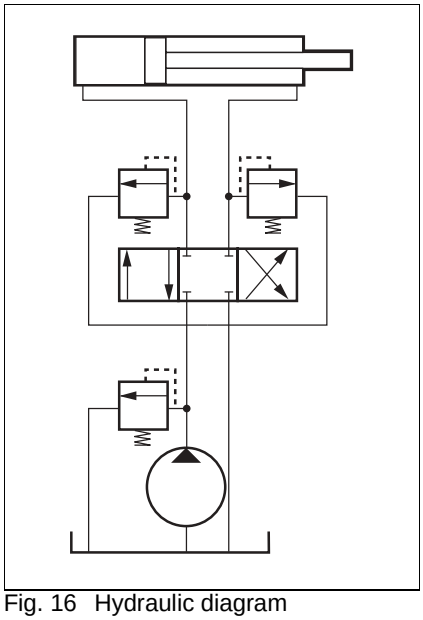

Fig. 16 Hydraulic diagram

Torque and socket/wrench sizes

			Torque	Socket/wrench size
MC6S	16	12.9.....	250 FT.LB.	14 mm
M6S	20	10.9.....	406 FT.LB.	30 mm
Piston (100/63).....			638 FT.LB.	80 mm
Piston (90/56).....			450 FT.LB.	-
Gland (100/63).....			638 FT.LB.	100 mm
Gland (90/56).....			450 FT.LB.	-
Nut M16.....				24 mm
Nut M20.....				30 mm

SG 520

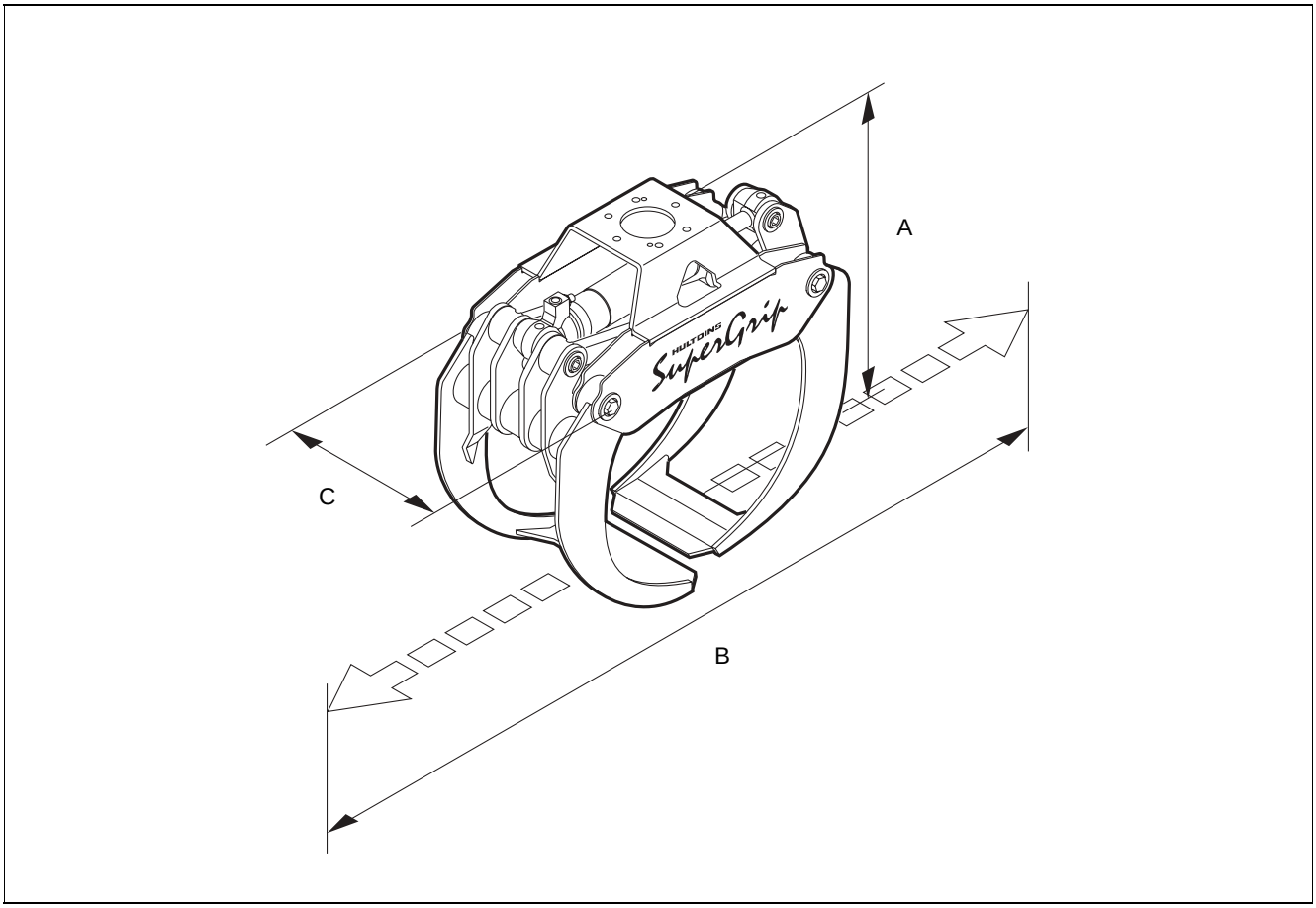

Fig. 17 Dimensions

	SG 520 LP	SG 520 HP	SG 520LP-R	SG 520HP-R	SG 520LP-S	SG 520HP-S
Gripping area, tip-tip	0.52 m^2	0.52 m^2	0.52 m^2	0.52 m^2	0.52 m^2	0.52 m^2
Max. gripping width (B).....	2 322 mm	2 322 mm	2 317 mm	2 317 mm	2 322 mm	2 322 mm
Min. gripping diameter.....	170 mm	170 mm	170 mm	170 mm	170 mm	170 mm
Max. load.....	7 000 kg	7 000 kg	7 000 kg	7 000 kg	7 000 kg	7 000 kg
Weight.....	330 kg	330 kg	395 kg	395 kg	397 kg	397 kg
Height, arms closed	747 mm	747 mm	747 mm	747 mm	747 mm	747 mm
Height, arms tip-tip (A)	1 155 mm	1 155 mm	1 155 mm	1 155 mm	1 155 mm	1 155 mm
Overall grapple width (C)...	514 mm	514 mm	514 mm	514 mm	514 mm	514 mm
Cylinder size.....	100/63	90/56	100/63	90/56	100/63	90/56
Cylinder connections	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16	BSP 1/2”(-) BSP 3/4”(+)	UNF 1.1/16	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16

Operating pressure

	100/63	90/56 (HP)
Max. working pressure	20 MPa	25 MPa

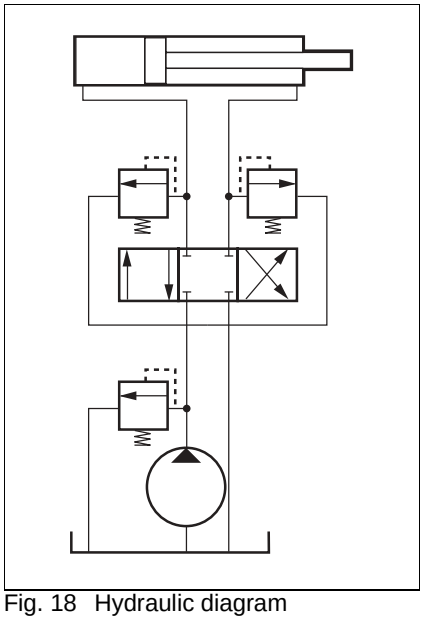

Fig. 18 Hydraulic diagram

Torque and socket/wrench sizes

			Torque	Socket/wrench size
M6S	20	10.9.....	541 Nm	30 mm
M6S	24	10.9.....	935 Nm	36 mm
M6S	30	10.9.....	1840 Nm	46 mm
Piston (100/63).....			850 Nm	80 mm
Piston (90/56).....			600 Nm	-
Gland (100/63).....			850 Nm	100 mm
Gland (90/56).....			600 Nm	-
Nut M20.....				30 mm
Nut M24.....				36 mm

SG 520

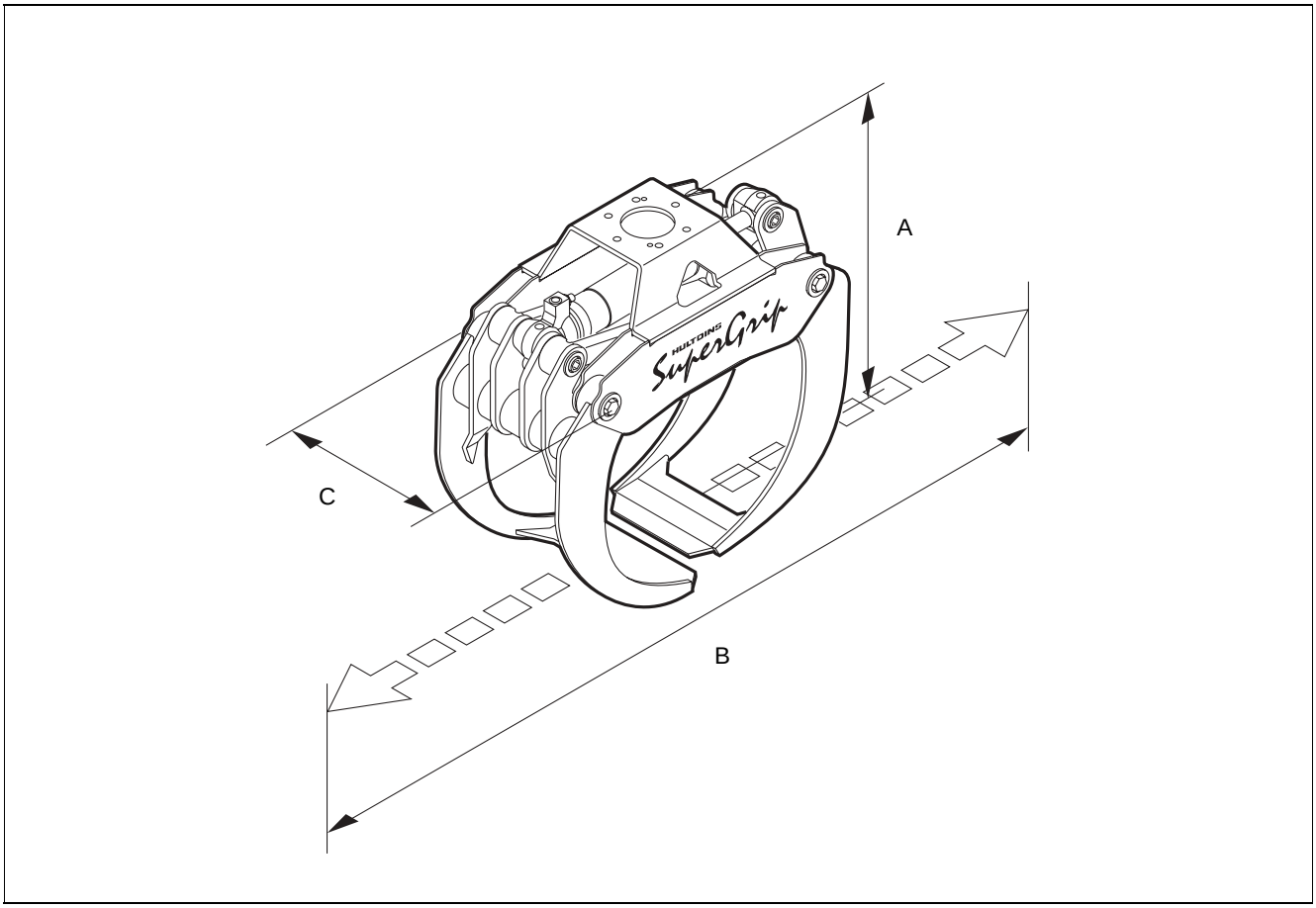

Fig. 19 Dimensions

	SG 520 LP	SG 520 HP	SG 520LP-R	SG 520HP-R	SG 520LP-S	SG 520HP-S
Gripping area, tip-tip	5.59 FT^2	5.59 FT^2	5.59 FT^2	5.59 FT^2	5.59 FT^2	5.59 FT^2
Max. gripping width (B).....	91.4 IN	91.4 IN	91.2 IN	91.2 IN	91.4 IN	91.4 IN
Min. gripping diameter.....	6.7 IN	6.7 IN	6.7 IN	6.7 IN	6.7 IN	6.7 IN
Max. load.....	15 400 LB	15 400 LB	15 400 LB	15 400 LB	15 400 LB	15 400 LB
Weight.....	725 LB	725 LB	870 LB	870 LB	875 LB	875 LB
Height, arms closed	29.4 IN	29.4 IN	29.4 IN	29.4 IN	29.4 IN	29.4 IN
Height, arms tip-tip (A)	45.5 IN	45.5 IN	45.5 IN	45.5 IN	45.5 IN	45.5 IN
Overall grapple width (C)...	20.2 IN	20.2 IN	20.2 IN	20.2 IN	20.2 IN	20.2 IN
Cylinder size.....	100/63	90/56	100/63	90/56	100/63	90/56
Cylinder connections	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16	BSP 1/2”(-) BSP 3/4”(+)	UNF 1.1/16	BSP 1/2” (-) BSP 3/4” (+)	UNF 1.1/16

Operating pressure

	100/63	90/56 (HP)
Max. working pressure	2900 psi	3625 psi

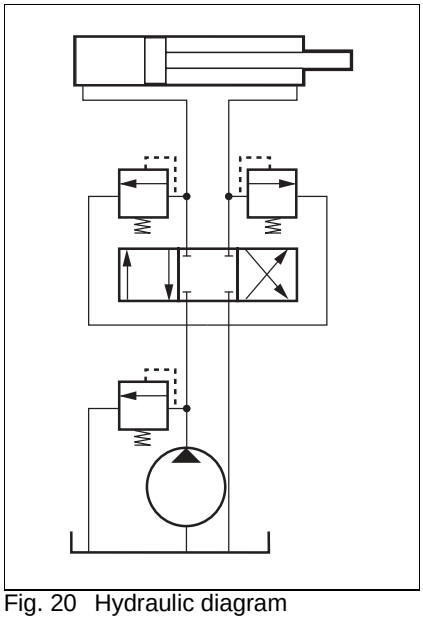

Fig. 20 Hydraulic diagram

Torque and socket/wrench sizes

			Torque	Socket/wrench size
M6S	20	10.9.....	406 FT.LB.	30 mm
M6S	24	10.9.....	701 FT.LB.	36 mm
M6S	30	10.9.....	1380 FT.LB.	46 mm
Piston (100/63).....			638 FT.LB.	80 mm
Piston (90/56).....			450 FT.LB.	-
Gland (100/63).....			638 FT.LB.	100 mm
Gland (90/56).....			450 FT.LB.	-
Nut M20.....				30 mm
Nut M24.....				36 mm

Functional description

The *SuperGrip SG* is made up of one stand/frame (1) and two grapple arms, female grapple arm (2) and male grapple arm (3). The stand and the grapple arms are fixed together in four pin-joint systems (4).

The design is equipped with two rods (5) that are mounted in two pin-joint systems (6) and (10). The rods transfer a controlled movement between the male and female grapple arm.

A cylinder (7), connected with hydraulic pressure and flow, transfers power to the grapple arms. The hydraulic cylinder is equipped with hydraulic dampening for ”Soft Stop” to eliminate shock loads. The hydraulic cylinder is mounted in pin-joint systems on the barrel side (6) and the piston rod side (9).

The cylinder works as a mechanical stop for max. opening of the grapple arms. The grapple arms work as a mechanical stop for min. opening of the grapple arms.

The grapple is suited for flange mounting of most rotators on the market (8).

All bushings in the grapple are made from a plastic compound-material with self-lubricating abilities. The bushings are designed with a built in lip seal for an effective protection against dust and dirt.

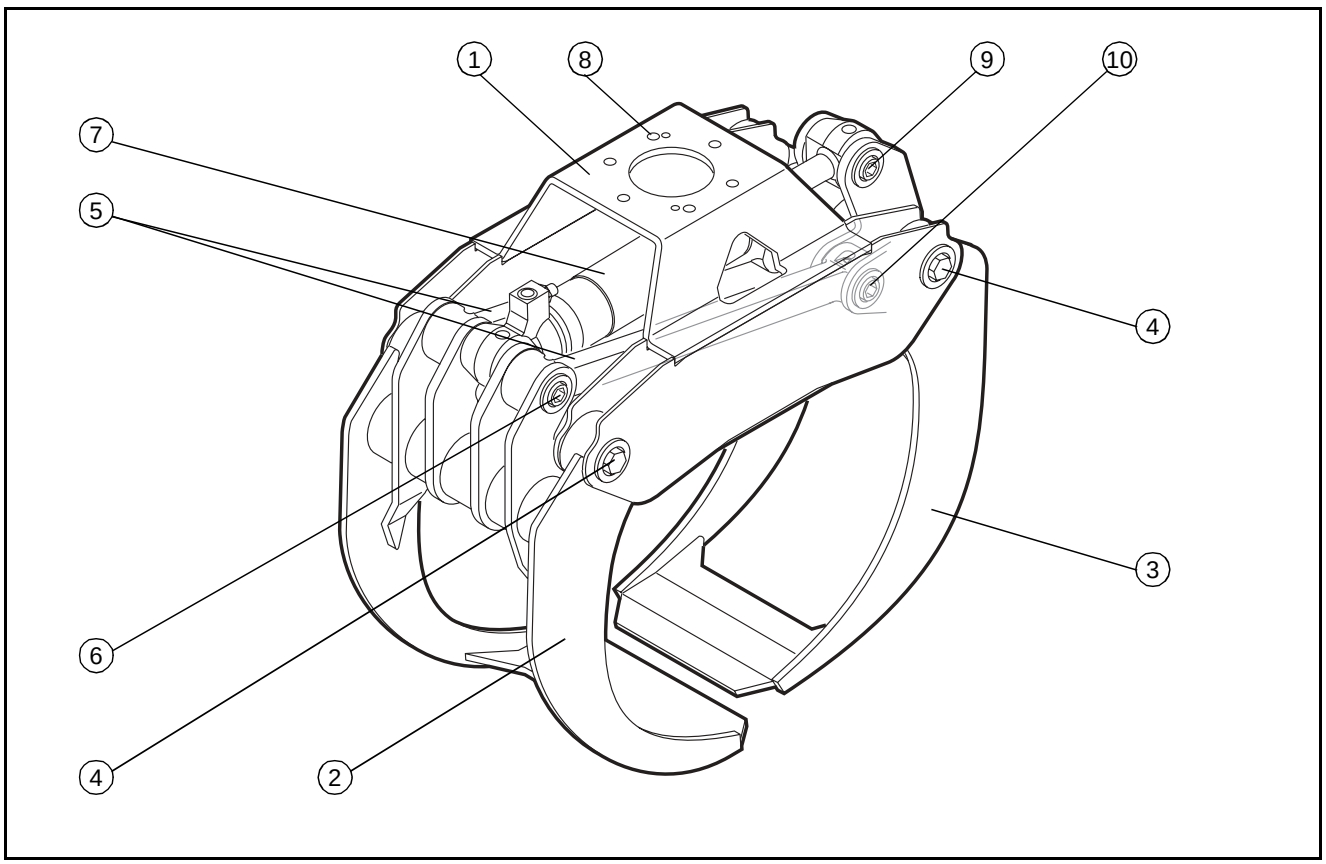

Fig. 21 Design SuperGrip SG

1 Frame
2 Female grapple arm
3 Male grapple arm
4 Pin-joint system type A, grapple arms
5 Rods
6 Pin-joint system type B, grapple arm-rod-cylinder
7 Hydraulic cylinder
8 Drill holes for rotator fastening
9 Pin-joint system type A, piston rod
10 Pin-joint system type B, rod

Assembly and disassembly

Important!
All service and repairs should be carried out by qualified personnel or an authorized repair shop with suitable tools and lifting devices.

Installing the rotator

Note! Nail blocks to the pallet base to prevent the grapple from falling during transportation or service. Tie a strap around the stand for safe lifting. *See Fig. 22.*

Warning!
The grapple has sharp steel edges. Use protective gloves, and proper wrench sizes when working on the grapple.

1. Place the grapple on a firm base. *See Fig. 22.*
2. Make sure that the pressure of the grapple function is in accordance with specifications. See *Technical data*.

   If needed, correct the hydraulic pressure of the grapple function.
3. Place the rotator on the grapple.

   Turn the rotator´s hose connections in the direction as shown in adjoining figure. *See Fig. 23.*

   Note! Also review the corresponding rotator supplier's installation instructions if supplied.
4. Connect the hydraulic hoses. *See Fig. 23.*
   1 Connect the rotator function 'grapple close' to the base end of the cylinder.
   2 Connect the rotator function 'grapple open' to the rod side of the cylinder.

   The connection of the rotator for 'grapple open' is labeled '0' or 'G0'.
5. Make sure that the grapple functions correspond with the order of the joysticks at the operator seat.
6. Cautiously operate all functions to make sure that everything performs normally.

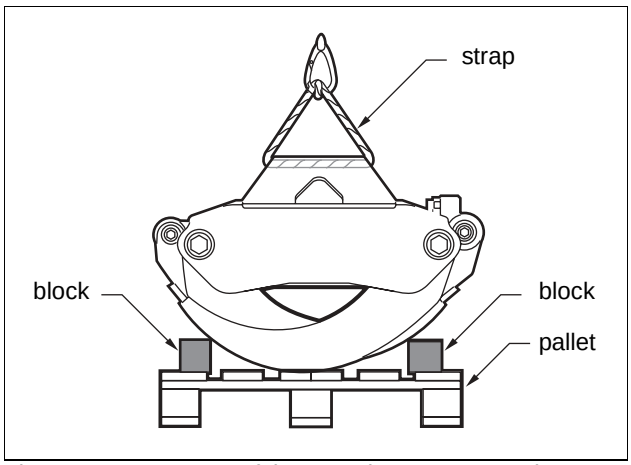

Fig. 22 Arrangement of the grapple at transportation or service

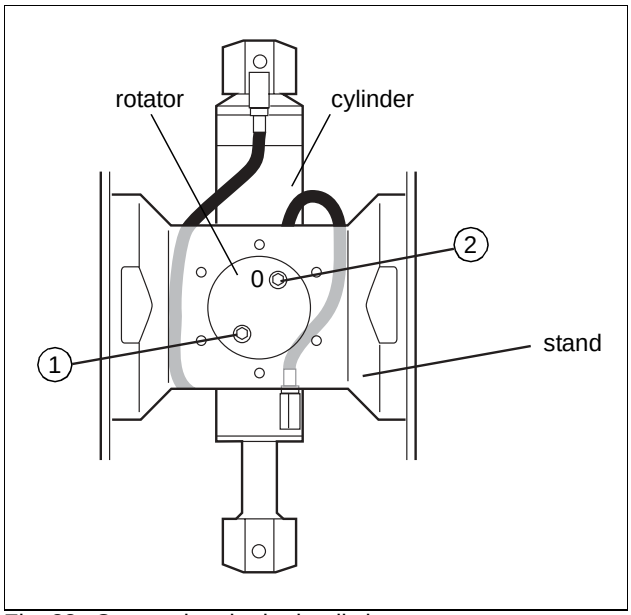

Fig. 23 Connecting the hydraulic hoses

Replacing seals

Replacing grapple cylinder seals

Important!
All service and repairs should be carried out by qualified personnel or authorized repair shop with suitable tools and lifting devices.

Warning!
The attachment has sharp edges. Use proper wrenches and protective gloves when working on the attachment.

1. Close the grapple completely.
2. Place the felling head in tilt-up position securely on the ground.
3. Shut down the machine or the power source.

Warning!
Make sure that there is no hydraulic pressure on the grapple function

4. Remove the grapple cylinder.
5. Fasten the cylinder in a vise. *See Fig. 24.*
6. Loosen the lock in the gland. *See Fig. 25.*

   Loosen the lock by by bending up the tab on the recessed portion of the gland.
7. Loosen the gland.

   Use a spanner wrench with a lenght of at least one meter (3 Ft.)

   Note! The gland and the piston are equipped with machined tightening grooves or holes and are torque set at the factory. Therefore Hultdins recommend s that tools of high quality are used when disassembling. For proper wrench size and torque, *See Technical data*

Important!
Only the tightening grooves/holes may be used when disassembling/assembling piston and gland.

8. Remove the gland and pull out the piston rod assembly.
9. Fasten the piston rod assembly in a vise and place a support under the piston rod. *See Fig. 26.*
10. Remove the piston seals.

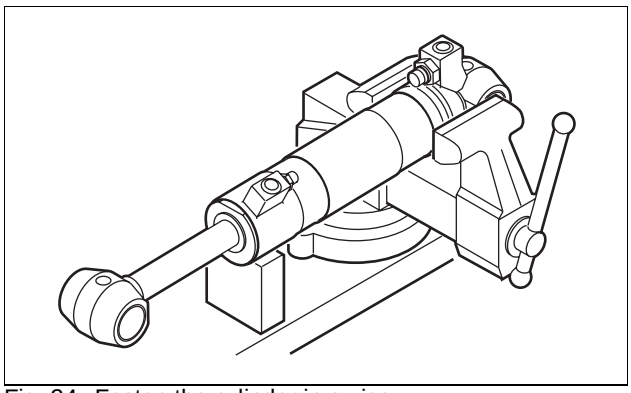

Fig. 24 Fasten the cylinder in a vise

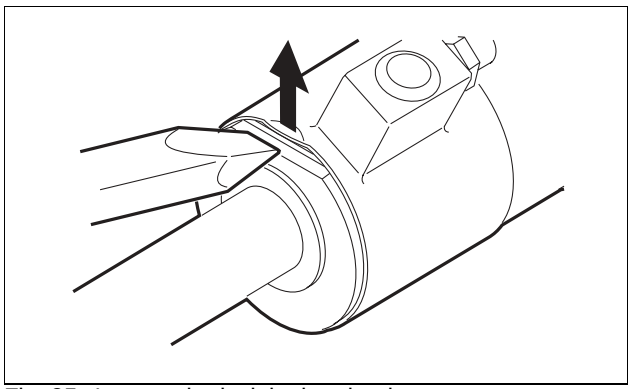

Fig. 25 Loosen the lock in the gland

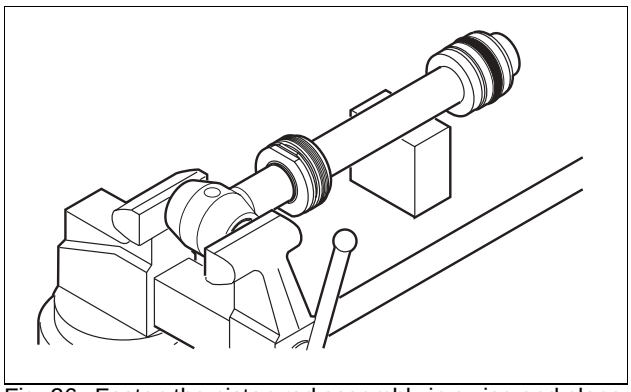

Fig. 26 Fasten the piston rod assembly in a vise and place a support under the piston rod

11. Loosen the lock in the piston. *See Fig. 27.*

Loosen the lock by by bending up the tab.

12. Loosen the piston.

Use a spanner wrench with a lenght of at least one meter (3 Ft.)

For proper wrench size and torque, *See Technical data*

13. Remove the gland.

14. Remove all seals from the gland.

15. Carefully clean the inside of the barrel and the threads on the gland, the piston and on the piston rod.

16. Make sure that there are no damages on the barrel, the piston rod, the piston and the gland.

Replace any worn or damaged parts.

17. Replace worn out bushings in the barrel and the piston rod.

18. Lubricate the piston.

19. Replace the piston seal and the piston ring.

See Fig. 28.

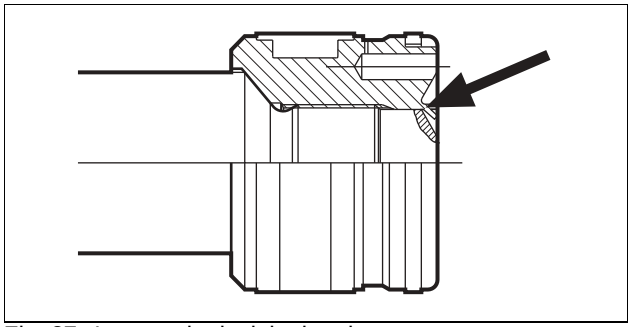

Fig. 27 Loosen the lock in the piston

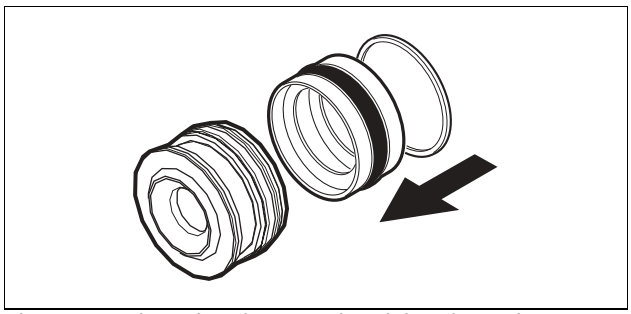

Fig. 28 Replace the piston seal and the piston ring

20. Assemble the dust seal, the seal and the retainer ring to the gland. *See Fig. 29.*

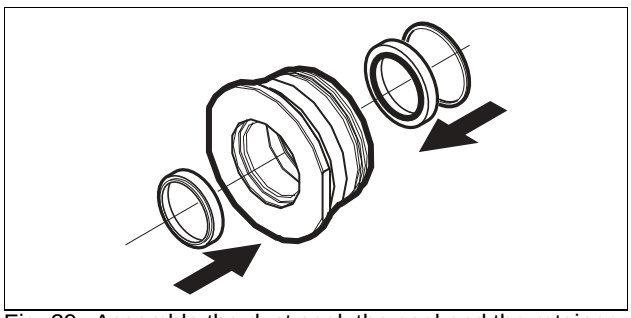

Fig. 29 Assemble the dust seal, the seal and the retainer ring to the gland

21. Assemble the o-rings and the backup ring to the gland. *See Fig. 30.*

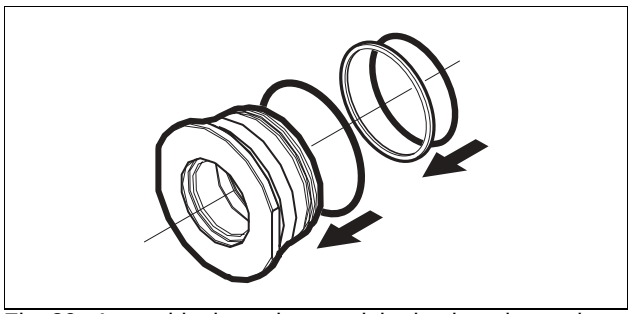

Fig. 30 Assemble the o-rings and the backup ring to the gland

22. Lubricate the piston rod.

23. Push the gland over the piston rod. *See Fig. 31.*

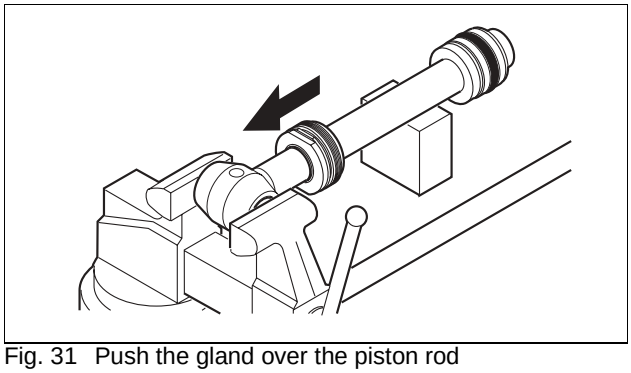

Fig. 31 Push the gland over the piston rod

24. Assemble the piston. *See Fig. 32.*

25. Torque the piston.

For a proper torque, *See Technical data*

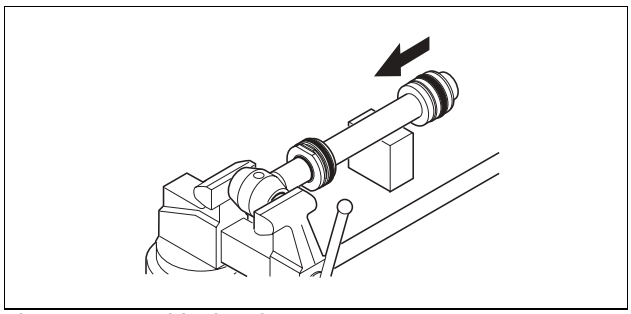

Fig. 32 Assemble the piston

26. Lock the piston. *See Fig. 33.*

Lock the piston by striking down the locking tab against the machined flat on the piston rod.

27. Lubricate the barrel and the and the piston.

28. Push the piston and the piston rod into the barrel.

29. Thread the gland into the barrel.

30. Torque the gland.

For a proper torque, *See Technical data*

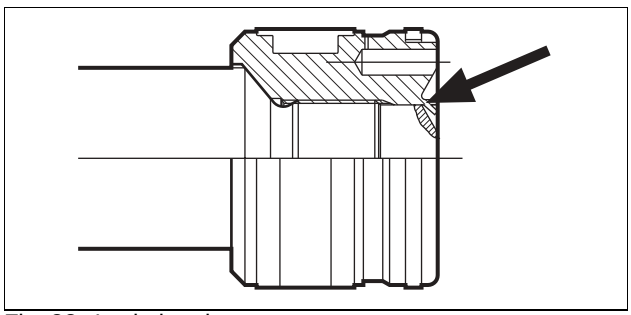

Fig. 33 Lock the piston

31. Lock the piston. *See Fig. 34.*

Lock the gland by striking down the locking tab against the machined flat on the gland.

32. Install the cylinder to the felling head.

33. Assemble the hydraulic hoses.

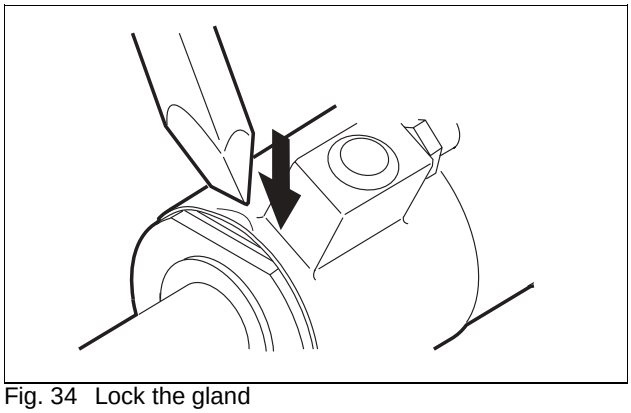

Fig. 34 Lock the gland

Replacing bushings

Preparation steps

The pin diameter should with in (+) 0,4 mm (0.015”) or (-) 0,15 mm (0.006”) of the nominal diameter.

Note! An accurate instrument should be used when measuring the wear.

Warning!
The grapple has sharp steel edges. Use proper wrenches and protective gloves when working with the grapple.

1. Close the grapple completely.
2. Place the grapple on a firm base. *See Fig. 35.*

   Note! Nail blocks on the pallet base to prevent the grapple from rolling off during service.
3. Shut down the machine or powers source.

Warning!
Make sure there is no hydraulic pressure to the grapple.

4. Remove the grapple from the crane/boom.

   Note! Consider the environment and plug hose connections to avoid unnecessary spill of oil.
5. Disconnect the hydraulic hoses from the cylinder.
6. Plug hydraulic hoses and connections.

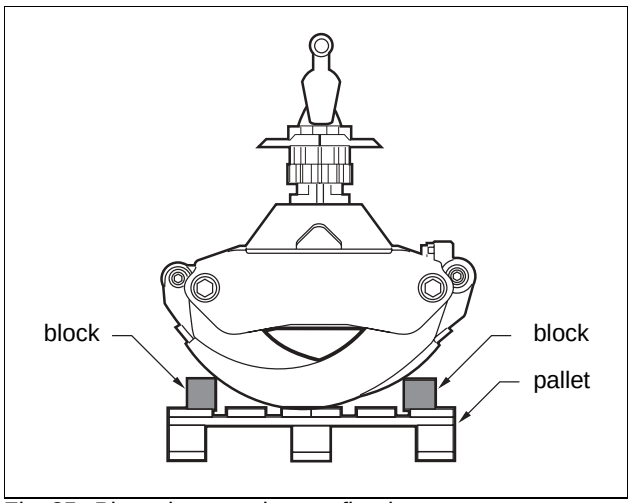

Fig. 35 Place the grapple on a firm base

Replacing bushings in the grapple arm

Warning!
The grapple has sharp steel edges. Use protective gloves, and proper wrench sizes when working on the grapple.

1. Do *Preparation steps, Replacing bushings*.
2. Hang the grapple in a safe way on a lifting strap in a suitable and approved lifting method as shown in the figure.
3. Remove the plugs on the cylinder.

   Note! When removing the plugs, oil will leak from the cylinder.
4. Manually open the grapple completely.
5. Place the grapple on the floor with the lift strap stretched out.
6. Disassemble the rod, the cylinder and the grapple arms.

   See *Disassembly of pin-joint system, type A* and *Disassembly of pin-joint system, type B*.
7. Remove the bushings. *See Fig. 37.*

   Use the corresponding assembly mandrels and tap out the old bushings. See *Technical data* regarding plungers.

Important!
To make sure the sealing abilities of the bushings work, make sure the edges of the bushings are not damaged.

8. Insert the new bushings.

   Insert the new bushings with the corresponding assembly mandrels.
9. Assemble the grapple arms.

   See *Assembly of pin-joint system, type A* and *Assembly of pin-joint system, type B*.
10. Assemble the rods and the cylinder.

    See *Assembly of pin-joint system, type A* and *Assembly of pin-joint system, type B*.
11. Install the cylinder hoses.

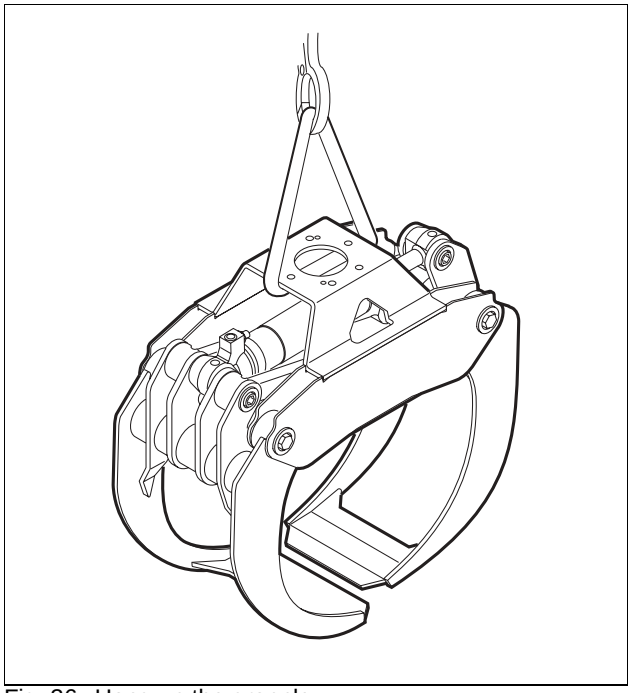

Fig. 36 Hang up the grapple

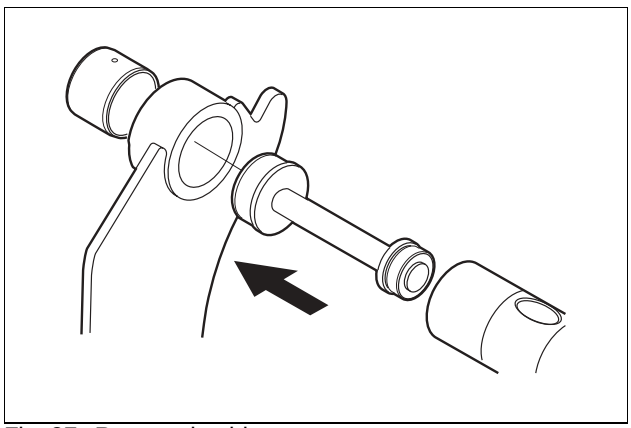

Fig. 37 Remove bushings

Replacing bushings in rods

Warning!
The grapple has sharp steel edges. Use protective gloves, and proper wrench sizes when working on the grapple.

1. Close the grapple completely
2. Place the grapple on a firm base. *See Fig. 38.*

   Note! Nail blocks on the pallet base to prevent the grapple from rolling off during service.
3. Remove the rods.

   See *Disassembly of pin-joint system, type A* and *Disassembly of pin-joint system, type B*.
4. Remove the bushings. *See Fig. 39.*

   Use the corresponding assembly mandrels and tap out the old bushings. See *Technical data* regarding plungers.

Important!
To make sure the sealing abilities of the bushings work, make that the edges of the bushings are not damaged.

5. Insert the new bushings.

   Insert the new bushings with the corresponding assembly mandrels.
6. Assemble the rods.

   See *Assembly of pin-joint system, type A* and *Assembly of pin-joint system, type B*.

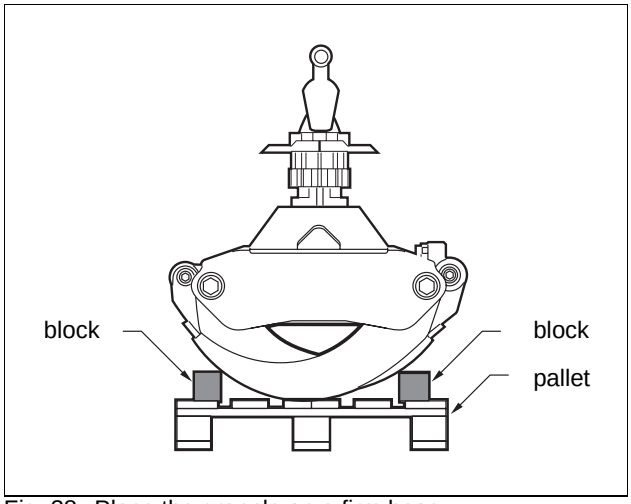

Fig. 38 Place the grapple on a firm base

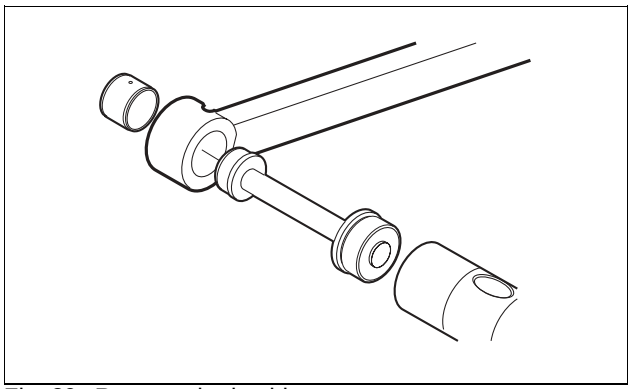
Fig. 39 Remove the bushings

Replacing bushings in the cylinder

Warning!
The grapple has sharp steel edges. Use protective gloves, and proper wrench sizes when working on the grapple.

1. Close the grapple completely
2. Place the grapple on a firm base. *See Fig. 40.*

   Note! Nail blocks on the pallet base to prevent the grapple from rolling off during service.
3. Remove the cylinder.

   See *Disassembly of pin-joint system, type A* and *Disassembly of pin-joint system, type B*.
4. Remove the bushings. *See Fig. 41.*

   Use the corresponding assembly mandrels and tap out the old bushings. In both piston rod and cylinder tube there are two bushings each. See *Technical data* regarding tools.

Important!
To make sure that the sealing abilities of the bushings work, make sure that the edges of the bushings are not damaged.

5. Insert new bushings. *See Fig. 42.*

   Insert the new bushings with the corresponding assembly mandrels.
6. Remove the grease nipples on the piston rod and the cylinder tube.
7. Drill a 4 mm (3/16) diameter hole through the bushings.

   To make lubrication work after replacing bushings it is very important that lubrication holes are drilled in the new bushings.
8. Install the grease nipples on the piston rod and the cylinder tube
9. Install the cylinder.

   See *Assembly of pin-joint system, type A* and *Assembly of pin-joint system, type B*.

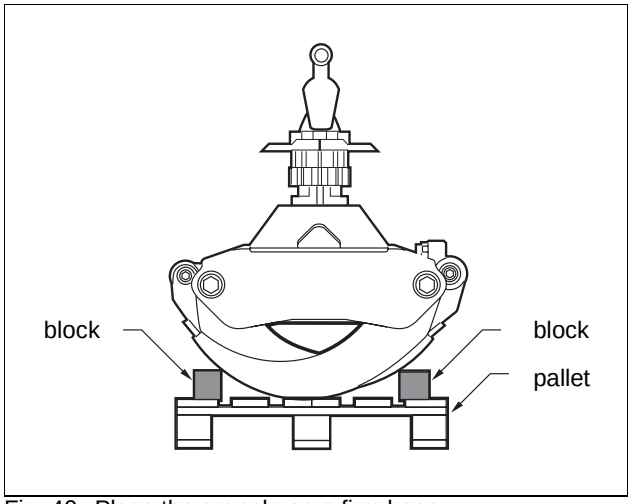

Fig. 40 Place the grapple on a firm base

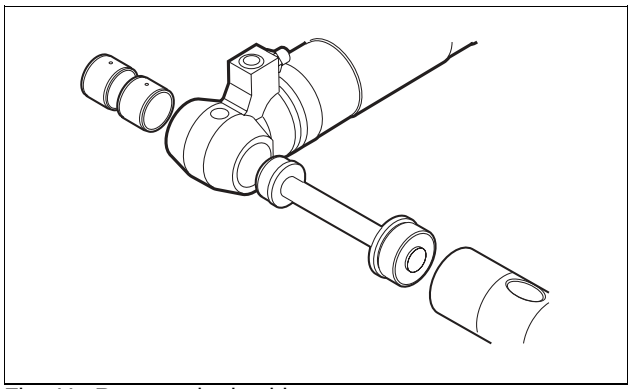
Fig. 41 Remove the bushings

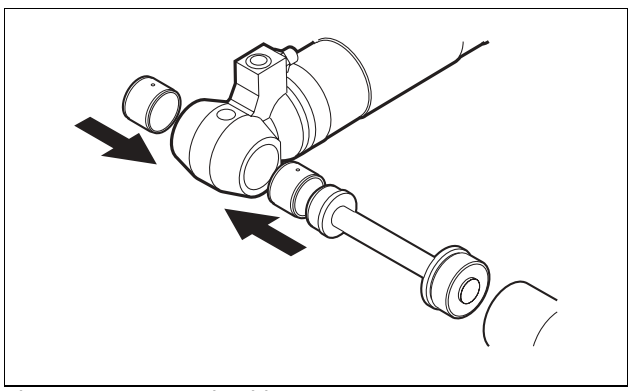
Fig. 42 Insert new bushings

Disassembly of pin-joint system, type A

1. Remove the nut and the capscrew. *See Fig. 43.*

   See *Technical data* regarding proper wrenches and torque.
2. Remove the washers. *See Fig. 43.*
3. Strike out the pin-joint. *See Fig. 44.*

   Use a brass mandrel and be **very careful** not to damage the bushing and the taper on the pin-joint.

   A helpful tool can be made or ordered from Hultdins. Also see *Technical data* regarding pin-joint diameter and order number.

Assembly of pin-joint system, type A

1. Make sure the holes are clean and free of any burrs.

   Clean and file away burrs if needed.
2. Grease the bushings and pins.

   Note! Use recommended grease according to *Technical data*.
3. Assemble the pin-joint. *See Fig. 45.*

   Use a brass mandrel and be **very careful** not to damage the bushing and the taper on the pin-joint, also see *Disassembly of pin-joint system, type A, step 3.*
4. Lubricate the capscrew, the nut, and the washers.
5. Insert one of the washers and the capscrew. *See Fig. 46.*
   1 Place one of the washers on the capscrew.
   2 Install the capscrew, with the washer, in the pin-joint.
6. Insert the other washer and the nut. *See Fig. 46.*
   1 Install the other washer in the pin-joint.
   2 Install the nut on the capscrew.
7. Torque the nut.

   Note! It is very important that the nut is properly torqued to ensure there is no play in the pin-joint. See *Technical data* regarding torque.

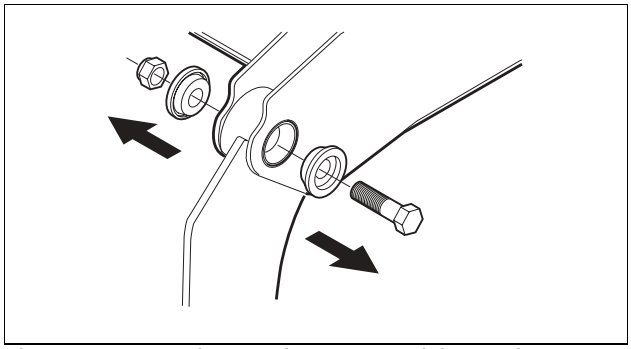

Fig. 43 Remove the nut, the screw and the washer

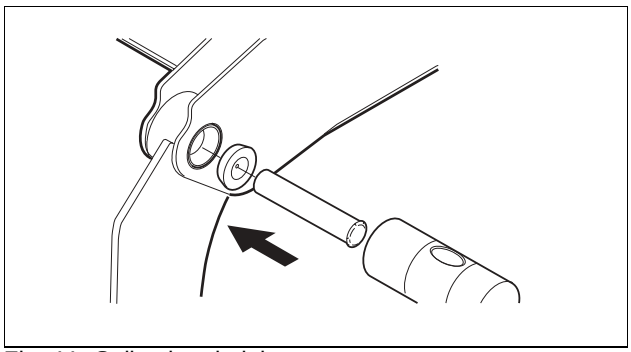

Fig. 44 Strike the pin-joint out

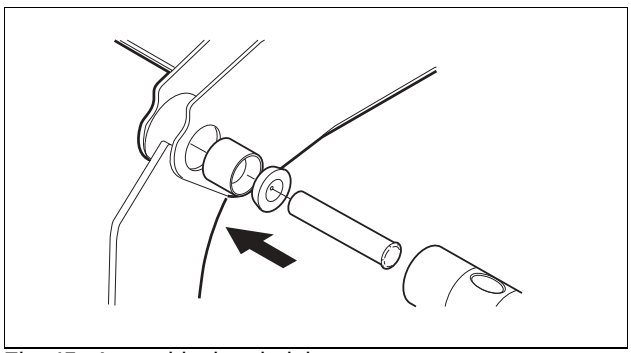

Fig. 45 Assemble the pin-joint

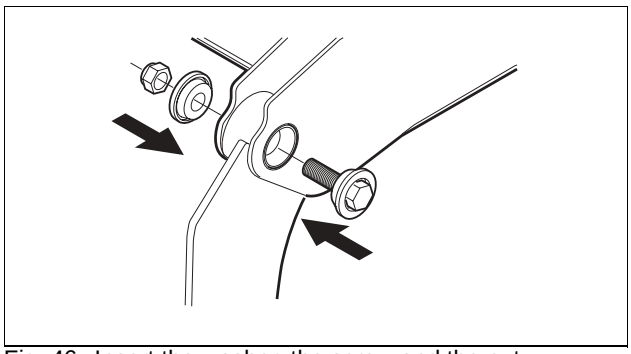

Fig. 46 Insert the washer, the screw and the nut

Disassembly of pin-joint system, type B

1. Remove the capscrews. *See Fig. 47.*

   See *Technical data* regarding proper wrenches and torque.

2. Remove the washers. *See Fig. 47.*

3. Strike out the pin-joint. *See Fig. 48.*

   Use a brass mandrel and be **very careful** not to damage the bushing and the taper on the pin-joint.

   A helpful tool can be made or ordered from Hultdins. Also see *Technical data* regarding pin-joint diameter and order number.

⚠ **Warning!**
When pulling the mandrel out the cylinder, the rods will fall down.

4. Carefully pull the pins out.

   Pull the pins out carefully to prevent the cylinder and the rods falling down uncontrolled.

Assembly of pin-joint system, type B

1. Make sure the holes are clean and free of burrs.

   Clean and file away any burrs if needed.

2. Grease the bushings and pins.

   Note! Use recommended grease according to *Technical data*.

3. Assemble the pin-joint. See Fig. 43.

   Use a brass mandrel and be **very careful** not to damage the bushing and the taper on the pin-joint, also see *Disassembly of pin-joint system, type B, step 3.*

   1 Lift rod to assembly position.

   2 Lift cylinder to assembly position.

   3 Lift rod to assembly position.

4. Lubricate the capscrews, the nut, and the washers.

5. Pre-assembly one of the capscrews, the washer, and the nut.

   1 Install one of the washers on one of the capscrews.

   2 Thread the capscrew on to the nut approx. 30 mm. (1.2 in.)

   Note! The nut is equipped with an outer groove on the side that should be pre-assembled.

6. Insert the pre-assembled capscrew, nut, and washer in the pin-joint. *See Fig. 50.*

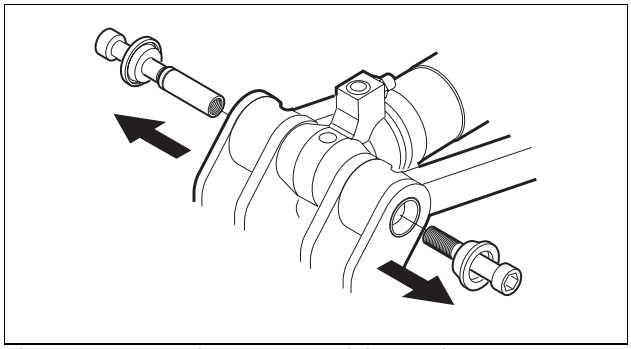

Fig. 47 Remove the screws and the washers

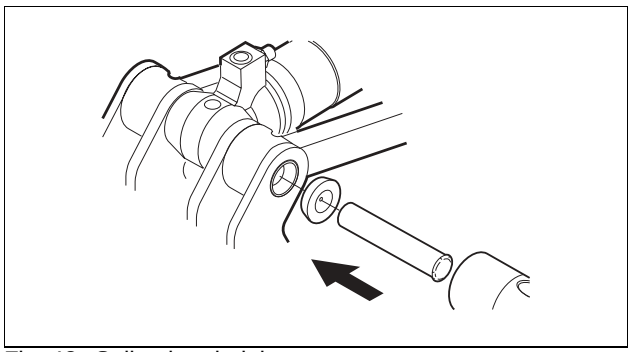

Fig. 48 Strike the pin-joint out

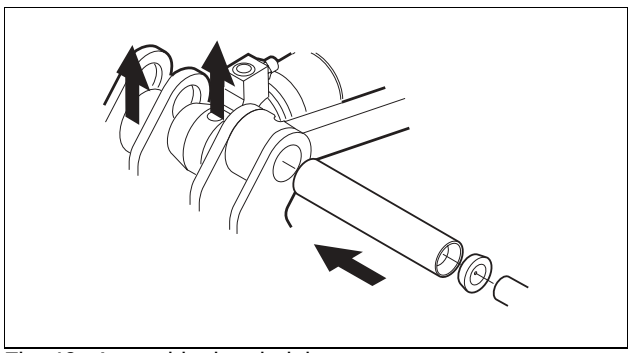

Fig. 49 Assemble the pin-joint

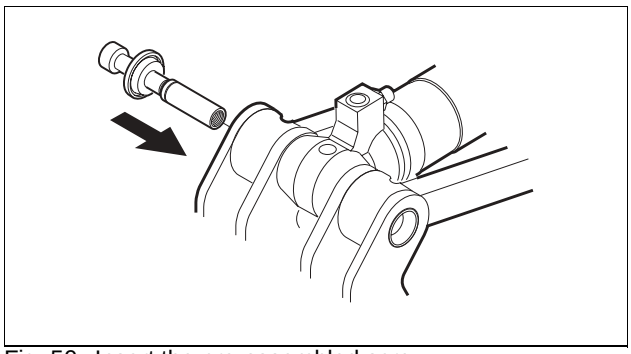

Fig. 50 Insert the pre-assembled screw

7. Insert the other screw and the washer.
   1 Install the other washer on the other capscrew.
   2 Install the capscrew with the washer in the pin-joint.
   3 Thread the capscrew on to the nut.
8. Torque the nut.

   Note! It is very important that the nut is properly torqued to ensure there is no play in the pin-joint. See *Technical data* regarding torque.

Maintenance instructions

Warning!
Close the grapple and place it solid on the ground and shut down the machine or power source that normally operates the grapple before commencing service.

Warning!
The grapple has sharp steel edges. Use protective gloves, and proper wrench sizes when working on the grapple.

Warning!
Never touch or stand close to the pressurized cylinder and its hydraulic hoses.

Regular maintenance

Daily maintenance

Make sure that:

- Nothing abnormal has happened to the grapple regarding fastener joints and hydraulic hoses.
- No damages or cracking have occurred on the grapple.
- There is no leakage on the grapple.

Tighten any loose items and repair any damages.

Every 250 hours of operation

Make sure that:

- No fasteners are loose.
- The hydraulic hoses are not damaged.
- No damages or cracking have occurred on the grapple.
- There is no leakage on the grapple.

Tighten any loose items and repair any damages.

Lubrication

The grapple should be lubricated every 1000 hours of operation as the figure here shows.

Note! Use a mineral oil based grease thickened with, or mixable with a lithium soap. The grease should be classified as L-XCCIB2 according to ISO 6743-9. Molybdendisulfid content max 3 %. Base fluid viscosity 170 to 220 cSt at 40°C. NLGI class2.

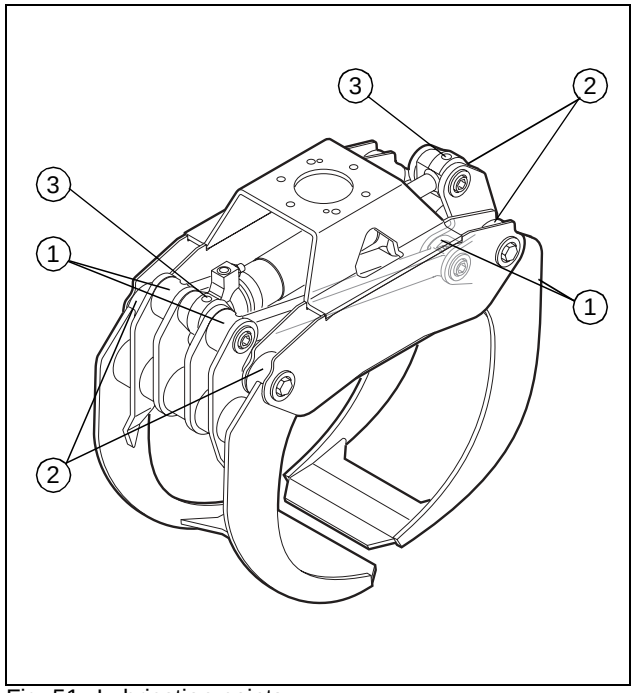

Fig. 51 Lubrication points
1 Rods 4 pcs
2 Grapple arm 4 pcs
3 Cylinder 2 pcs

Fastener joints and hydraulic hoses

Make sure at daily maintenance of the crane/boom that nothing abnormal has occurred with the grapple regarding fastener joints and hydraulic hoses.

The first month of operation

Fasteners

Tightening of the rotator fasteners should be made once a week during the first month of operation.

See *Technical data* regarding wrench size and torque.

Troubleshooting

Note! Place the grapple on a firm base and stop the machine before beginning the troubleshooting.

⚠ **Warning!**
Use safety glasses when troubleshooting.

Symptom	Probable reason	Action
The grapple drops its load.	Too low hydraulic pressure.	Check the hydraulic pressure.
	Broken hydraulic hoses.	Broken hydraulic hoses. Replace hoses if needed.
	Control valve problem.	Check control valve regarding leakage, according to the instructions of the supplier.

	Rotator problem.	Check rotator regarding internal leakage.
		• Connect the grapple hoses bypasing the rotator.
		  • If the problem ceases – repair the rotator according to the instructions of the supplier.
		  • If the problem remains – check the cylinder.

	Cylinder problem.	Check piston seal. 1. Disassemble hydraulic hose for ‘grapple close’. 2. Pressurize hydraulic hose for ‘grapple open’. If oil flushes out of the hydraulic hose there is probably a problem with the piston seal. 3. Replace piston seal if needed. 4. Make sure that no other damages have occurred in the cylinder tube.
Hydraulic hoses wear abnormally.	Sharp edges on equipment.	Grind any sharp edges.
	Hydraulic hoses routing.	Change the routing of the hydraulic hoses so that they are not too close to sharp edges.

HULTDINS SuperGrip™

Hultdin System AB
Skolgatan 12, SE-930 70 MALÅ, Sweden
Tel +46 953 418 00, Fax +46 953 418 01
E-mail: sales@hultdins.se

0101 - 7000101

US

Hultdins Inc.
P.O. Box 1205, 22 Morton Ave. East
Brantford, Ontario, Canada N3T 5T3
Tel (519) 754-0044, Fax (519) 754-1569
E-mail: info@hultdins.com