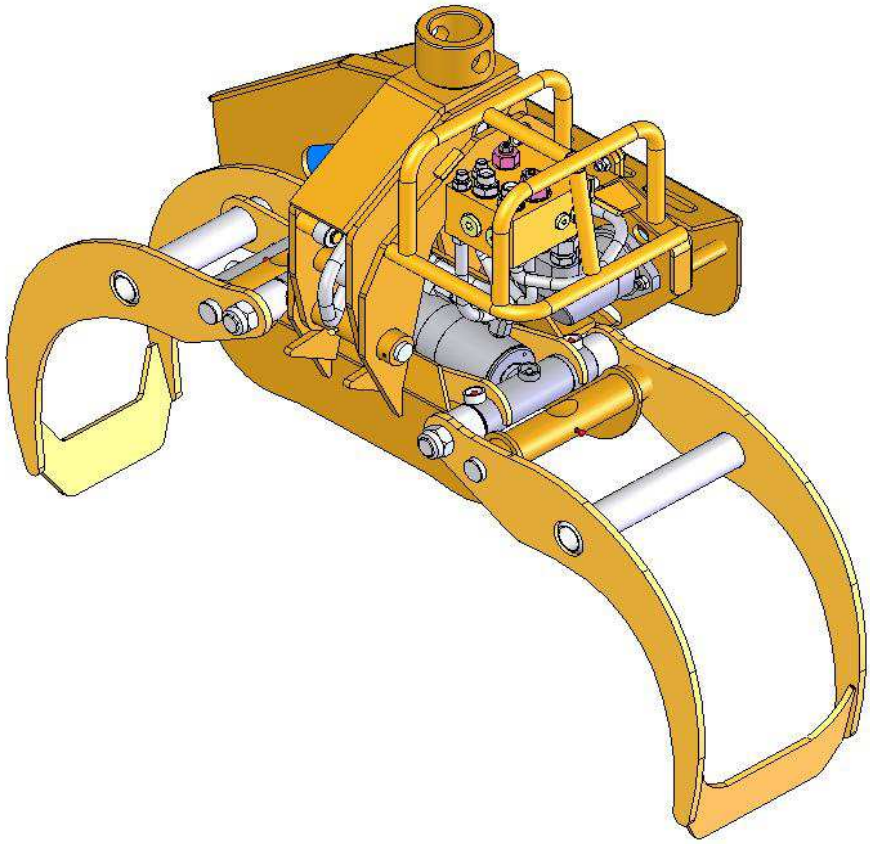
SK 16 FELLING HEAD

OPERATION AND MAINTENANCE MANUAL

LIST OF SPARE PARTS



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1 OVERVIEW

The felling head is designed for usage in the woods to chop down trees, cut them into lengths, and load and unload the timber thus produced. The maximum butt diameter of the felled trees is 370 mm, whereas the maximum diameter when crosscutting trunks of felled trees is 450 mm (which corresponds to the length of the bar of the felling head's integrated chainsaw). However, the felling head's load values (technical specifications) must be taken into consideration and not exceeded.

Loading and unloading the timber will take place in a similar way to when operating a standard timber grapple.

2 USEFUL OPERATING IDEAS

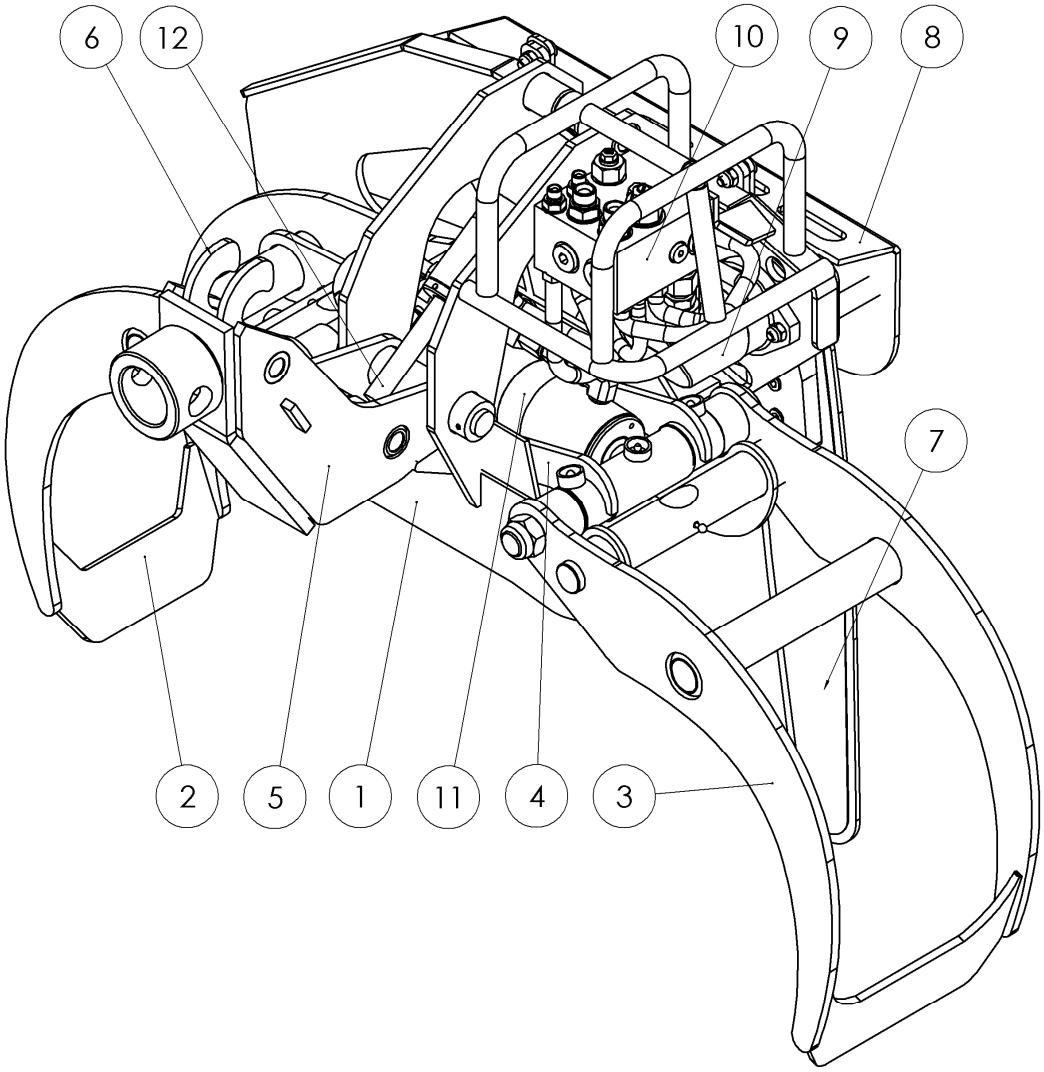
Trees with butt diameters exceeding 25 cm are easier to deal with by first delimbing the lower part of the trunk and then proceeding to cut off the upper section of the trunk at a suitable height (with due consideration for the maximum reach of the loader arms). This results in a decisively lighter butt section to handle when coming back to felling it at the base.

The above procedure is very useful also when operating in small places, e.g. parks, close to buildings and power cables.

NEVER USE THE FELLING HEAD AS A TOOL FOR STRAIGHTENING THE FACE OF TIMBER PILES BY STRIKING PROTRUDING ENDS OF LOGS!

3 SAFETY REGULATIONS

- **ENSURE SUFFICIENT OPERATING ROOM SO THAT DAMAGE TO SURROUNDINGS DOES NOT OCCUR.**
- **NEVER LIFT A LOAD ABOVE ANOTHER PERSON.**
- **DO NOT USE THE FELLING HEAD TO LIFT ANYTHING ELSE EXCEPT GOODS (DO NOT USE IT AS A HOIST TO LIFT PERSONS).**
- **DO NOT USE THE FELLING HEAD TO LIFT THINGS SUPPORTED BY STRAPS, ETC.**
- **NEVER SERVICE, REPAIR OR MAKE ADJUSTMENTS TO THE FELLING HEAD WITH THE ENGINE RUNNING.**
- **ALWAYS BRING THE FELLING HEAD DOWN ON TO GROUND LEVEL WHEN SERVICING AND REPAIRING.**
- **ALWAYS FOLLOW THE MANUFACTURER'S INSTRUCTIONS REGARDING OPERATION, SERVICE AND ADJUSTMENTS TO THE FELLING HEAD.**

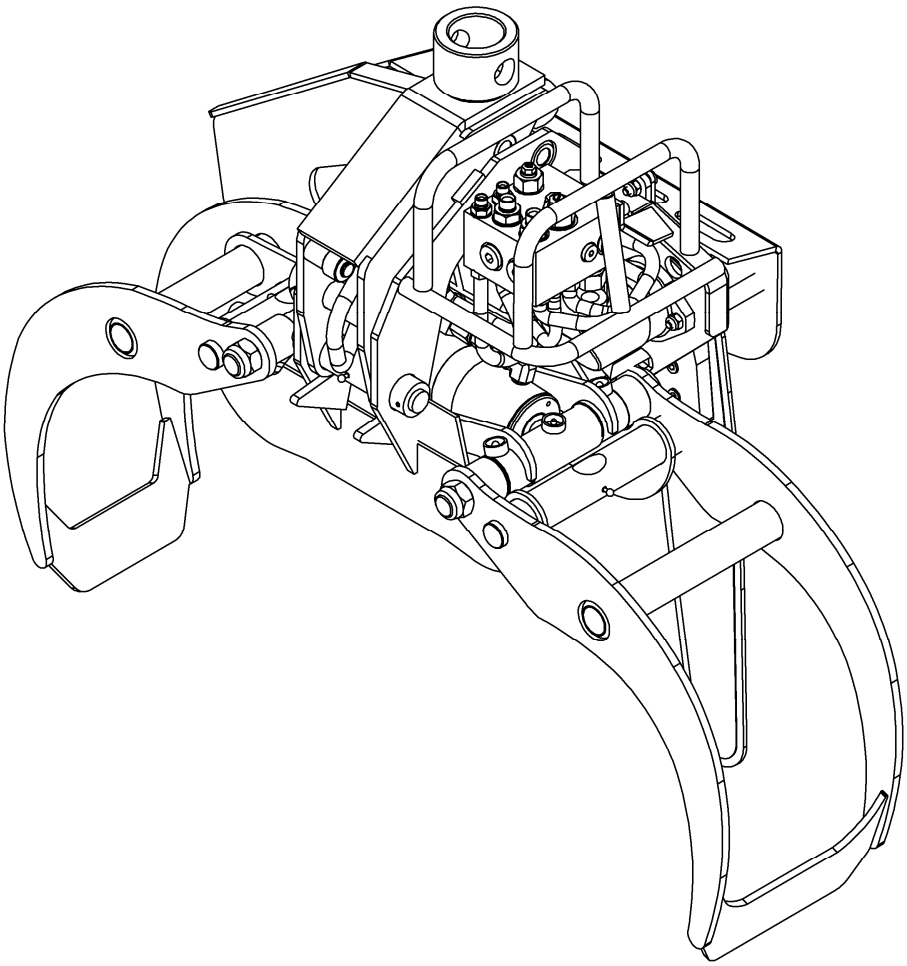


4 PRINCIPAL PARTS OF THE FELLING HEAD

1. Frame
2. Grapple jaw, broad
3. Grapple jaw, narrow
4. Synchronised draw bar
5. Tilt device
6. Tilt function lock
7. Chainsaw chain bar
8. Chain bar guard
9. Hydraulic motor
10. Valve block
11. Grapple cylinder
12. Tilt cylinder

5 TECHNICAL SPECIFICATIONS

Grapple size	0.16 sq. m
Max. height when opened	900 mm
Max. total width	400 mm
Max. jaw width	270 mm
Max. jaw opening	960 mm
Force at jaw tips, min. (200 bar)	6.8 kN
Force at jaw tips, max. (200 bar)	13.5 kN
Minimum butt diameter of tree to be felled	60 mm
Maximum butt diameter of tree to be felled	250 mm
Maximum diameter when cross-cutting tree already felled	450 mm
Hydraulic system output Q min	50 l/min
Hydraulic system output Q max	60 l/min
Operating pressure, max.	230 bar
Chain speed, at 10000-12000 r/min	30-35 m/s
Chain cutting range	90 °
Chain feed rate	0-5 s
Weight	106 kg
Chain lubrication	Adjustable hydraulic oil
Tilt automated locking/opening	



6 MOUNTING

The felling head is appropriate for mounting on loaders of the size class 15….28kNm. It may also be mounted on loaders exceeding this range, but the size class of the felling head itself and its limited load values must then be heeded.

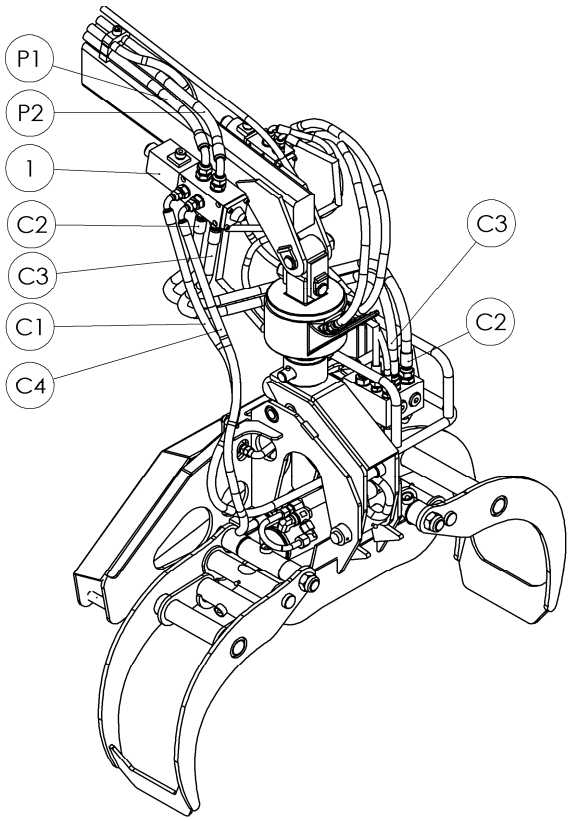
Under no circumstances must the hydraulic pump be allowed to exceed the limit value given in the technical specifications (see Technical Specifications and the hydraulic diagram KS 1605-HV)

This recommendation applies to mounting on hydraulic booms with four hoses. Booms with eight hoses do not require selection valves.

The intermediate pairs of hoses between the boom and the felling head should be provided with spiral hose protection.

6.1 Connecting the chainsaw motor and grapple cylinder

1



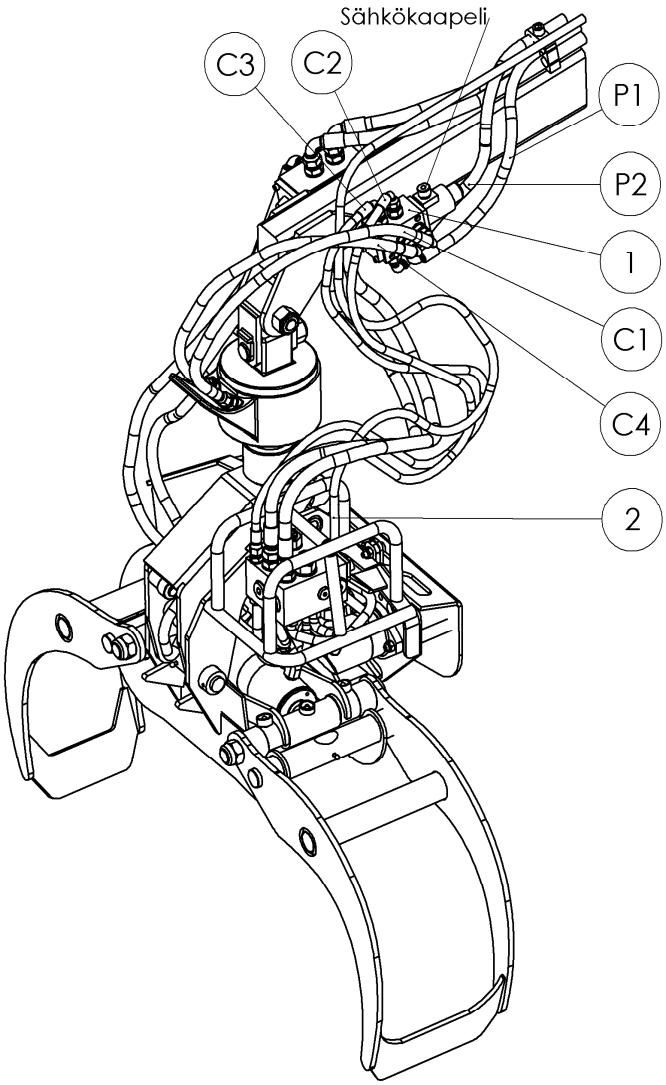
Selection valve E6 212-24VDC or VS 300-24 VDC/D.I
(note aperture markings on valve)

P1 Pressure hose 1/2”
P2 Pressure hose 1/2”
C1 Grapple cylinder hose, arm side 3/8”
C2 Motor rotation, return hose 1/2”
C3 Motor rotation, pressure hose 1/2”
C4 Grapple cylinder hose, base side 3/8”

6.2 Installing grapple rotation and tilt hoses

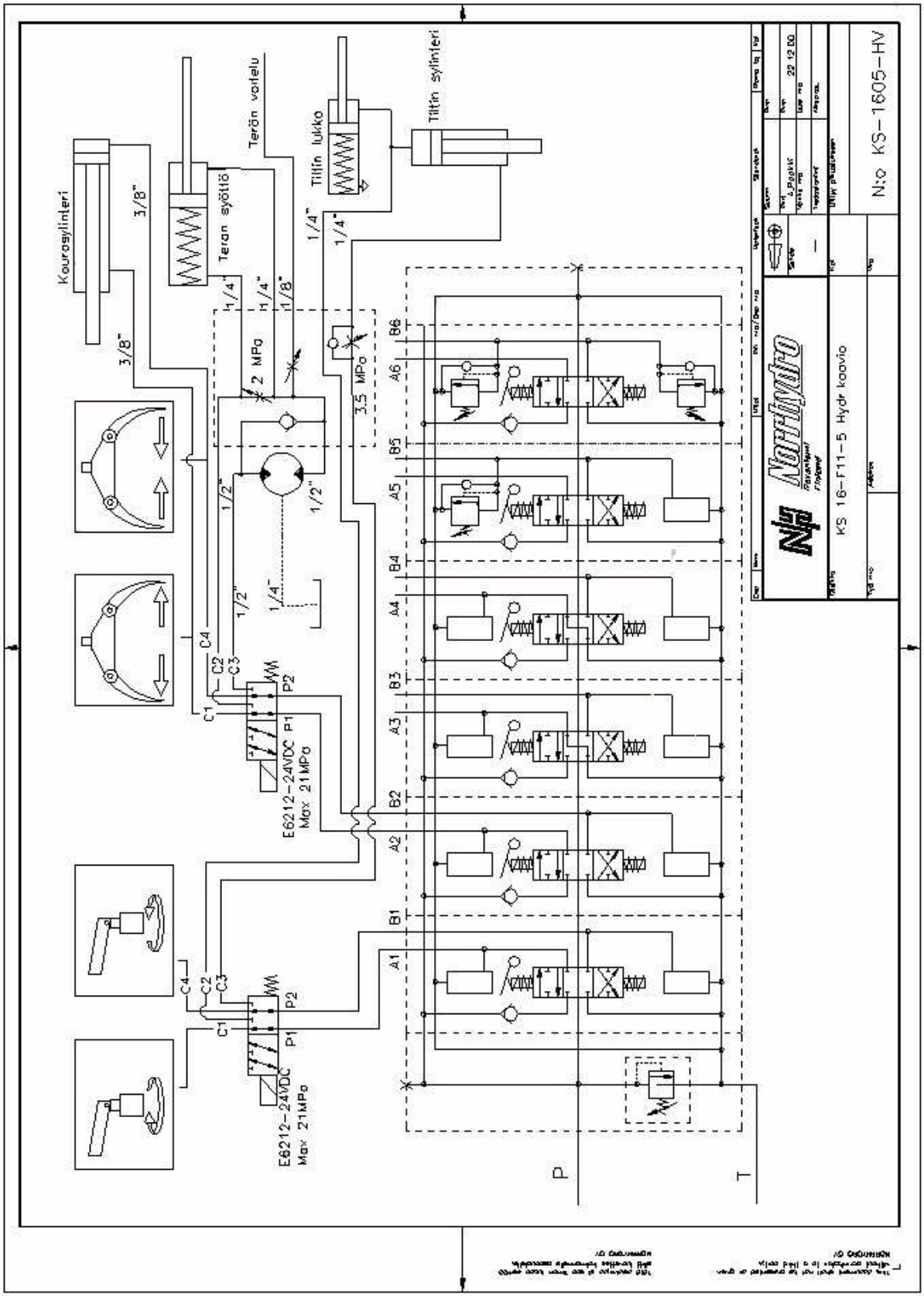
In this case it is possible to use a valve of the same size as for motor rotation. Also the 3/8” valve mentioned later on is sufficient because this side does not require such oil volumes (see hydraulic diagram KS-1605-HV).

(picture text: Sähkökaapeli = Electrical cable)

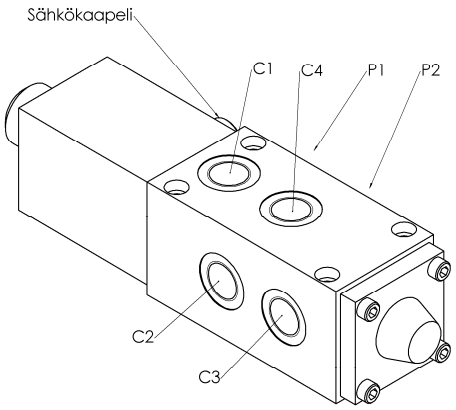


1	Selection valve VS 150-24VDC/D.I. or the same as on the motor side
2	The motor’s enclosure leak hose ¼” must always be led directly into the tank to prevent excessive pressure forming in the motor chamber (max. 8 bar). Remember to top up the motor enclosure with oil via the oil leak connection opening before start up
P1	Pressure hose 3/8”
P2	Pressure hose 3/8”
C1	Rotator hose, rotation to left 3/8”
C2	Tilt hose, grapple into felling position 1/4”
C3	Tilt hose, grapple into loading position 1/4”
C4	Rotator hose, rotation to right 3/8”

Picture text: Kourasylinteri – Grapple cylinder
Terän syöttö – Chain feed
Terän voitelu – Chain lubrication
Tiltin lukko – Tilt lock
Tiltin sylinteri – Tilt cylinder

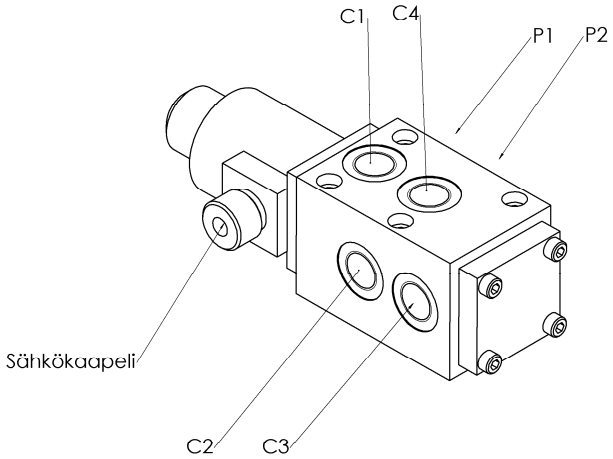


6.3 Selection valve



Valintaventtiili VS 300-24 VDC/D.I.

This can be replaced by E6212 G1/2” Q 75 l/min

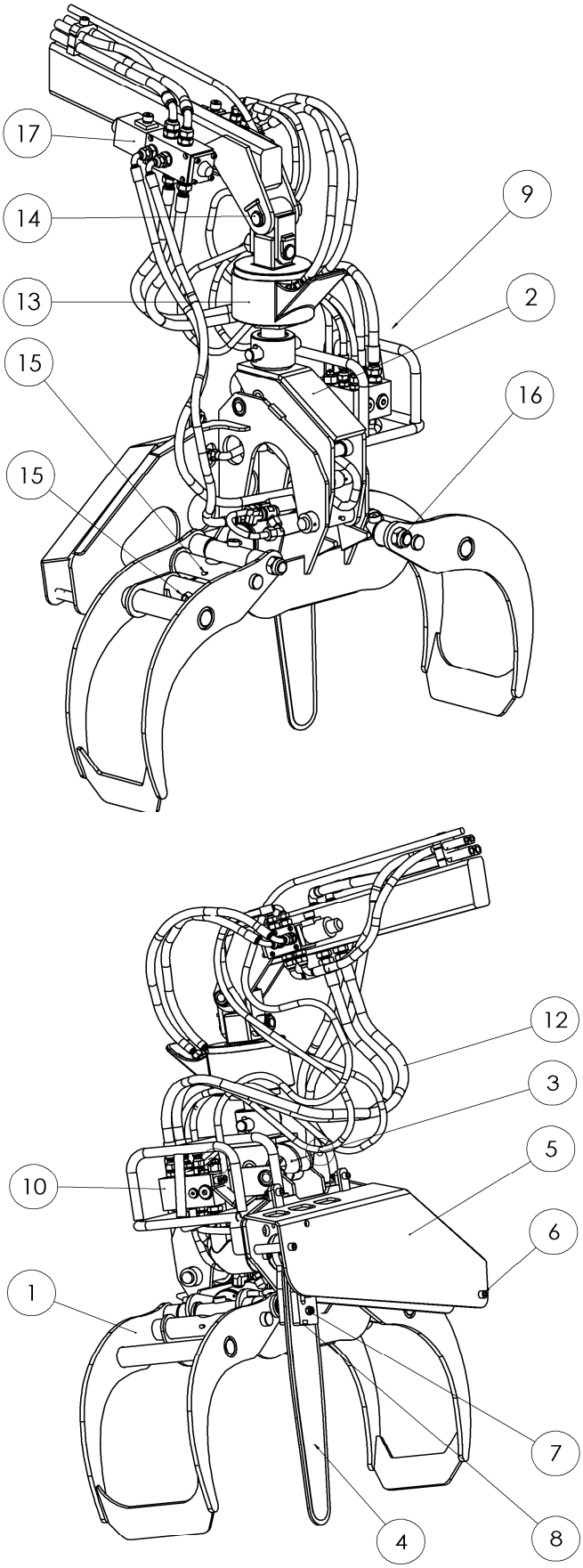


Selection valve VS 150-24VDC/D:I.

This can be replaced by E6238 G3/8” Q40 l/min or E6212 G1/2” Q75 l/min

7 SERVICING

7.1 Servicing points



1 Grapple
- visual inspection daily
- bolts to be tightened (see item 16)
- possible distorted parts, malformations

2 Tilt device
- visual inspection daily
- bolts to be tightened
- possible distorted parts, malformations
- movement

3 Tilt function lock
- visual inspection daily
- fastenings
- check to see that lock secures the tilt

4 Chainsaw
- visual inspection daily
- fastenings
- condition of chainsaw bar and chain
- replacement and tensioning of chain
  - remove chain guard, 4 screws (see item 6)
  - loosen 2 fastening screws (see item 7)
  - turn set screw anticlockwise, chain loosens (see item 8) and comes of over chain bar sprocket easily sideways
  - alter chain by placing new chain carefully over the sprocket and into the groove on the bar
  - tighten set screw clockwise, chain becomes taut
  - chain tension is correct when the chain comes 3-5 mm off the bar when lightly lifted
  - tighten chain bar fastening screws.

5 Chain guard
- visual inspection daily
- fastenings
- malformations

6 – 8
- see item 4

9 Adjustments
- see next page

10
- check for potential leaks
- no service need as such

12 Hoses
- check condition, connections, protection

13 Rotator
- see manufacturer’s instructions

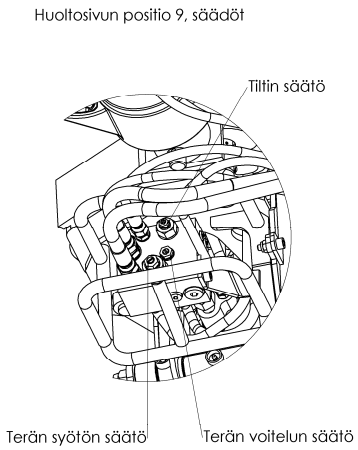
14 Pins, bolts
- fastenings

15 Lubrication nipples (15 in number)
- to be lubricated every 16 hours

16 Grapple pins
- see item 1

17 Selection valve
- see manufacturer’s instructions

7.2 Adjustment screws



(Picture text)
Huoltosivun positio 9, säädöt = Service item 9, adjustments
Tiltin säätö = Tilt adjustment
Terän syötön säätö = Chain feed rate adjustment
Terän voitelun säätö = Chain lubrication adjustment

- the adjustment screws are located in the valve lid
- tilt adjustment
  - loosen the locking nut, which releases the spindle to be freely rotated
  - when the spindle is rotated clockwise, the tilt motion slows down; when rotated anticlockwise, the tilt motion accelerates
  - the tilt motion is changed concurrently in both directions via the adjustment screws
- the chain feed rate adjustment
  - loosen the locking nut, which releases the spindle to be freely rotated
  - when the spindle is rotated clockwise, the chain feed rate speeds up; when rotated anticlockwise, is slows down
  - the chain bar's turning speed must not be too fast so that the chain's speed is sufficient for chipping
  - the chain must achieve a sufficient rotation speed before the chain bar is turned
- the chain's lubrication adjustment
  - loosen the locking nut, which releases the spindle to be freely rotated
  - when the spindle is rotated clockwise, the chain lubrication oil feed is reduced; when rotated anticlockwise, it increases
  - lubrication should not be set to a high volume as this means increased consumption of hydraulic oil
  - oil should not be splashed around nor should it drip down the bar
  - when the chain is running at maximum speed and a fine mist of oil is produced, the rate of lubrication feed is just right

NOTE! NEVER MAKE ADJUSTMENTS TO THE FELLING HEAD WHILE THE ENGINE IS RUNNING.

ALWAYS REMEMBER TO TIGHTEN THE LOCKING NUTS AFTER MAKING ADJUSTMENTS.

7.3 In the event of a malfunction situation

The grapple functions normally, but the chainsaw motor fails to rev up.
Possible cause:
- selection valve does not direct the flow of oil to the chainsaw function
- the coil has jammed
- the motor enclosure seal is damaged
- check the amount of oil leaking from motor enclosure
- valve's safety valve is open or damaged
- turning action for chainsaw bar is adjusted to be too tight
- chainsaw's bar bearings have 'jammed'
- motor shaft has snapped
- chainsaw chain is too tight

Chainsaw bar will not turn.
Possible cause:
- turning action for chainsaw bar is adjusted to be too loose
- return line subject to excessive pressure

Chainsaw bar won't return.
Possible cause:
- turning action for chainsaw bar is adjusted to be too tight
- gas-powered spring damaged
- return line subject to excessive pressure

Tilt doesn't function properly (powerless).
Possible cause:
- selection valve does not direct enough oil to the tilt cylinder function
- the coil is jammed or the tilt setting is too tight (too much counter-pressure)
- intermediate plug leaks
- cylinder gaskets damaged
- structure damaged or jammed

Tilt lock will not open.

Possible cause:

- not enough counter-pressure in tilt cylinder or tilt adjustment too loose
- tilt cylinder gaskets damaged
- tilt lock cylinder gaskets damaged
- tilt cylinder’s vent hole blocked

Tilt lock will not shut.

Possible cause:

- cylinder spring has snapped
- too much counter-pressure in return line
- lock structures twisted

Grapple motions are powerless.

Possible cause:

- grapple cylinder gaskets damaged
- grapple articulation points damaged, cause excessive friction
- grapple structures twisted
- grapple cylinder’s lock valve damaged

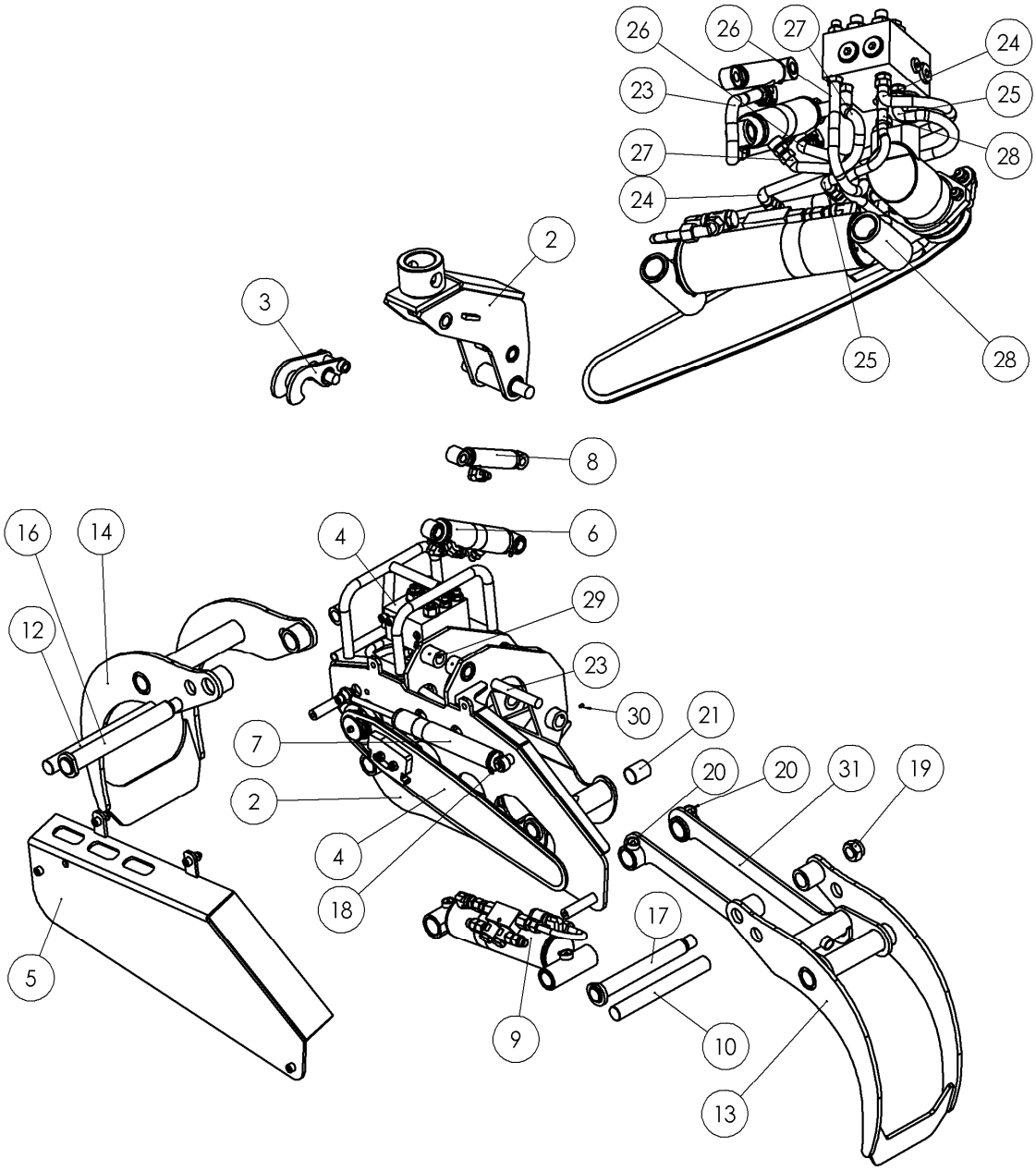
It should also be noted that the prime mover’s hydraulics may be the cause of these malfunction situations.

The hydraulic oil must be kept clean.

Filter and oil changes must be carried out as specified by manufacturers.

8 SPARE PARTS

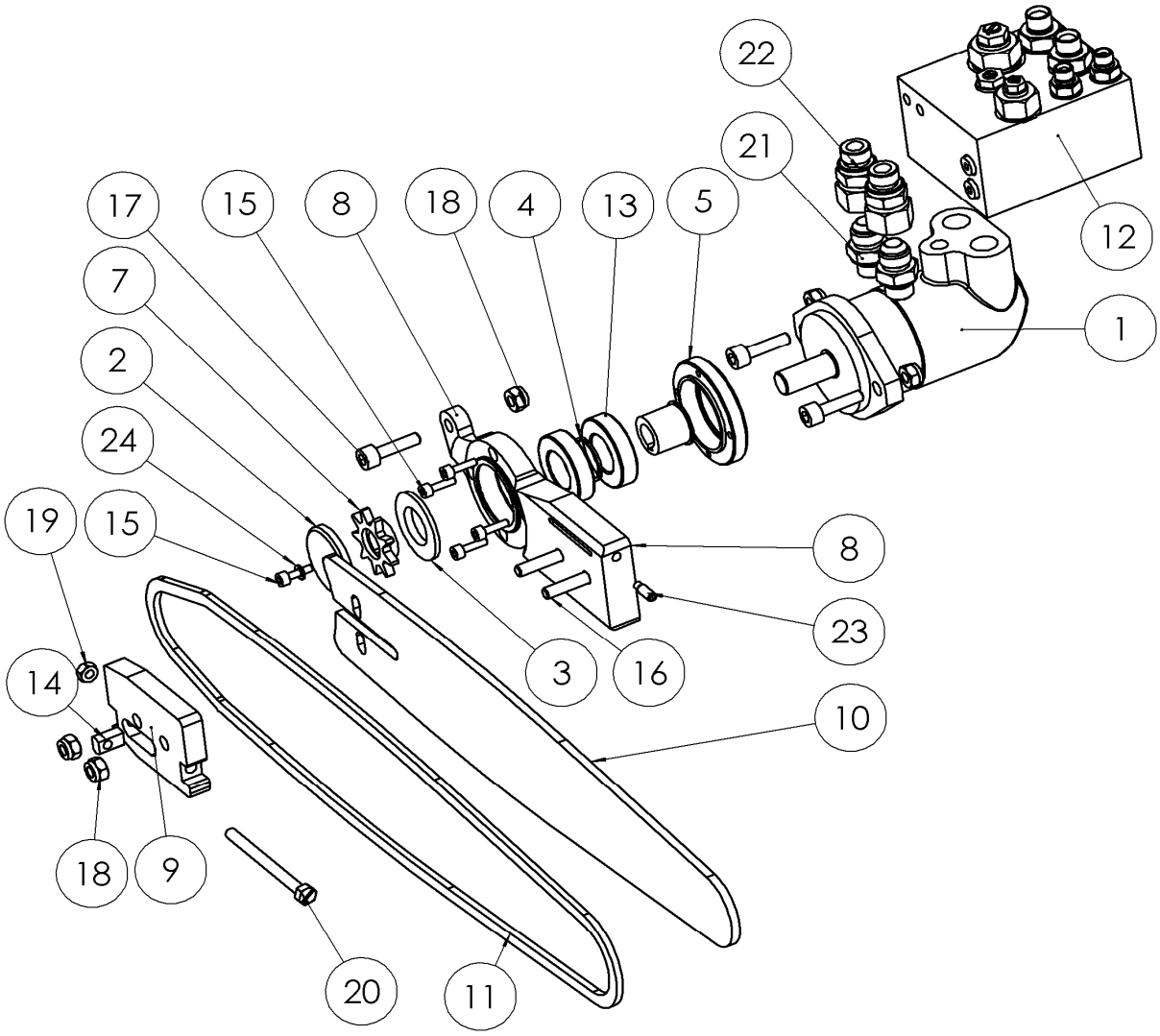
8.1 Principal parts and hoses of the Felling head



Part	Name	Order number	Dimensions	Standard	Nof
1	Frame	KS 1610			1
2	Tilt draw bar	KS 1605			1
3	Lock	KS 1605-10			1
4	Chainsaw (assembly)	KS 1605-60			1
5	Chainsaw bar guard	KS1635-100			1
6	Cylinder	KS 1640			1
7	Cylinder	KS 1632P			1
8	Cylinder	KS 1612			1
9	Cylinder+valve	KR-16737			1
10	Shaft, narrow side	KR 1640-A			1
11	Pin	KS 1635-50			1
12	Shaft, wide side	KR 1641-A			1
13	Grapple jaw arch, narrow	KR 1620			1
14	Grapple jaw arch, broad	KR 1630			1
15	Cylinder pin 1	KR 1643-B			1
16	Cylinder pin 2	KR 1644-A			1
17	Retaining ring	A 10		DIN 471	1
18	Nut	1" UNF		DIN982	2
19	Lubrication nipple	M6			5
20	Sliding bearing	3540		WB802	2
21	Sliding bearing	3040		WB802	4
22	Allen screw	M10x25		DIN 912	2
23	Hose R1/4	KS 1605234901	208110404/F204/105100404 L=490		1
24	Hose R1/4	KS 1605244601	208910404/F204/208910404 L=460/90		1
25	Hose R1/4	KS 1605253801	208910404/E204/208910404 L=380/90		1
26	Hose R1/4	KS 1605263001	208910404/F204/105100404 L=300		1
27	Hose R1/4	KS 1605272601	208410404/F204/105100404 L=260		1
28	Hose R1/8	KS 1605282901	208110402/F204/105100402 L=290		1
29	Retainer screw		M5x8		2
30	Retainer screw		M6x8		2
31	Synchronised draw bar	KS 1620-1			1

Table 1. Principal parts and hoses of the Felling head

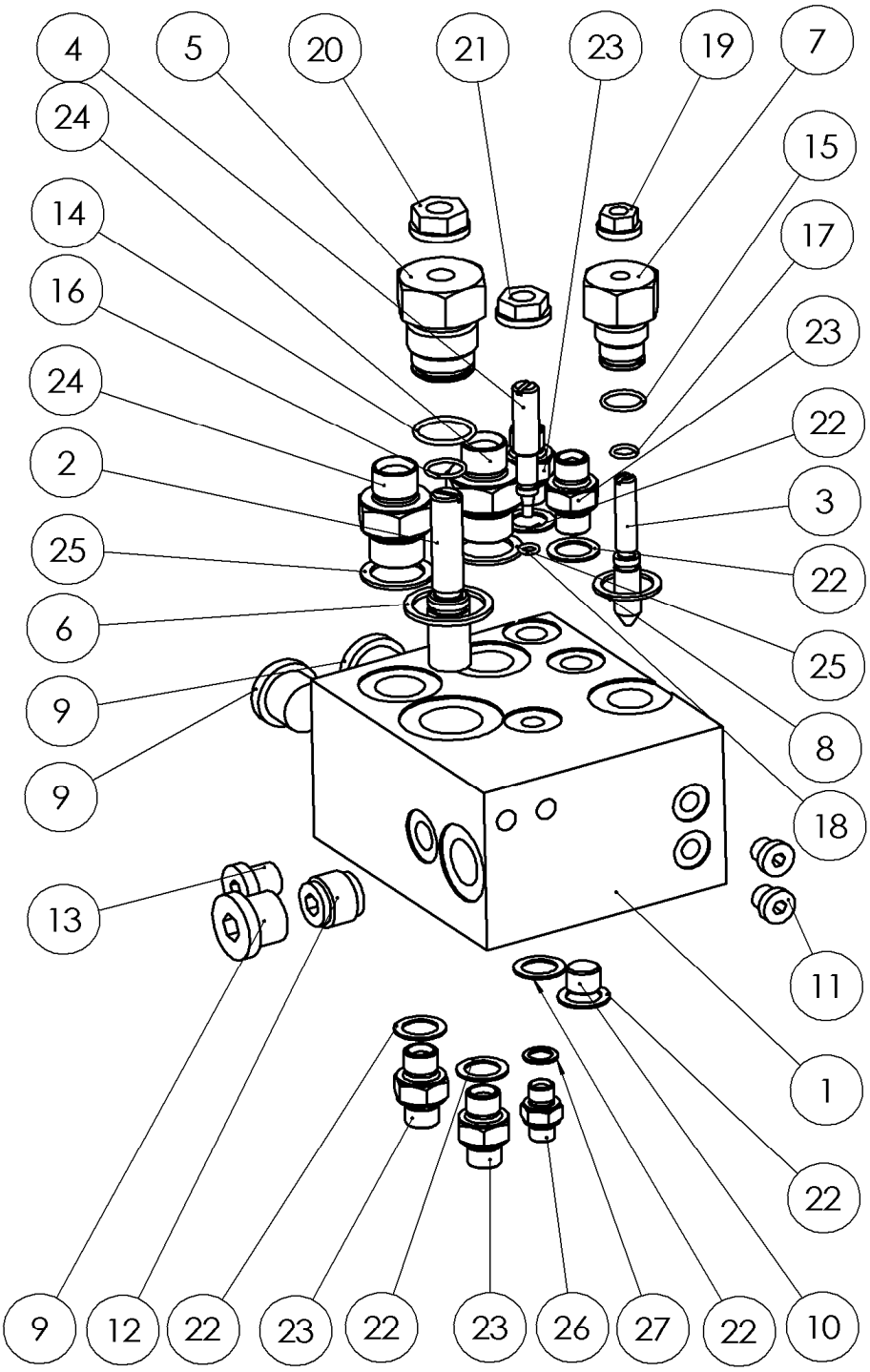
8.2 Chainsaw assembly



Part	Name	Order number	Dimensions	Nof
1	Hydraulic motor	KS HMF1100501	F11-5 BCK	1
2	Lock plate	KS 1605-61		1
3	Spacer ring	KS 1605-64	Ø56/28-18	1
4	Spacer ring	KS 1605-65	Ø36/25-2	1
5	Bearing housing	KS 1605-66	Ø85/45-16	1
6	Bushing	KS 1605-67	Ø32/16-29	1
7	Sprocket	KS 1605-68		1
8	Chainsaw chain fixture	KS1605-69	PL 25	1
9	Chain bar tensioning frame	KS 1605-70		1
10	Chainsaw bar	KS 1605TLTEVA1	7011-54	1
11	Chainsaw chain	KS 1605 TEV1	9011-54-404	1
12	Valve block	KS 1635-120		1
13	Bearing	KS 160560062RSO	6006-2RZ1-C3 RS	2
14	Tensioner	KS 1635-62		1
15	Allen screw	RKKM0602011	M6x20	5
16	Allen screw	RKKM1005011	M10x50	2
17	Allen screw	RKKM1003511	M10x35	3
18	Locking nut	RKMM10011	M10	5
19	Hexagonal nut	RKMM08012	M8	1
20	Hexagonal screw M8x100	KS1605-700	M8x100	1
21	Connector nipple	P20003316120	2003.3-16 R1/2	2
22	Threaded connector	P2035160120	2035-16R1/2	2
23	Retainer screw	RPRM08164	M8x16	1
24	Spring washer	RAL062	M6	1

Table 2: Chainsaw assembly

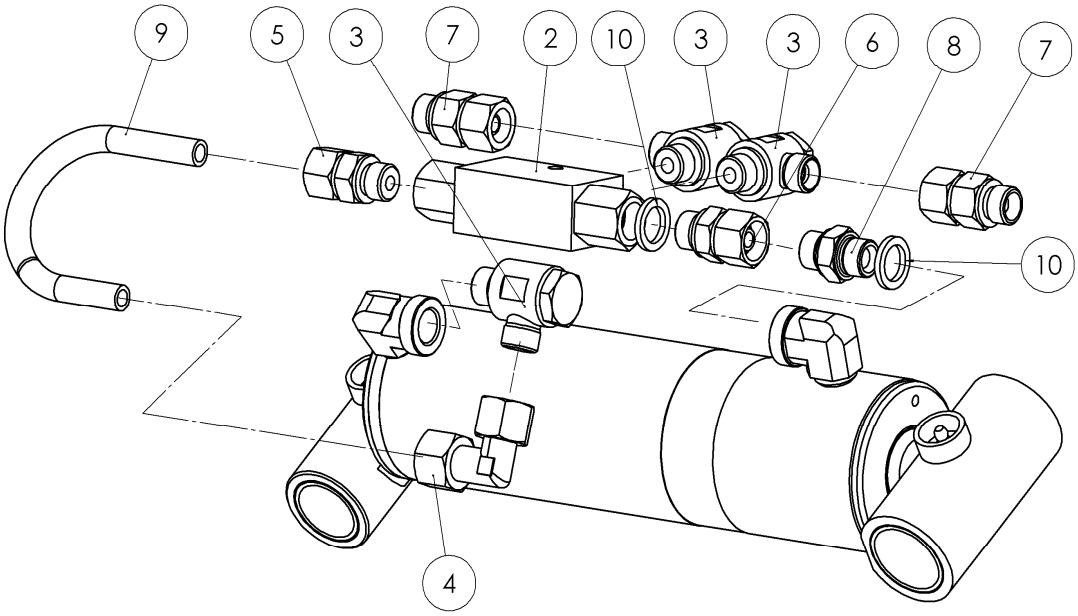
8.3 Valve block



Part	Name	Order number	Dimensions	Standard	Nof
1	Distributing valve body	KS 1635-110			1
2	Chain feed adjustment spindle	KS 1635-111			1
3	Tilt adjustment spindle	KS 1635-112			1
4	Chain lubrication adjustment spindle	KS 1635-113			1
5	Adjuster body (chain feed)	KS 1635-114			1
6	Copper packing	TKT 02800	KUT-28 28x34xx2		1
7	Adjuster body (tilt and lock)	KS 1635-115			1
8	Copper packing	TKT 02000	KUT-20 20x26x1.5		1
9	Plug	RLT 081	R1/2-ED		3
10	Plug	RLT 044	R1/4	DIN 906	1
11	Plug	RLT 021	R1/8-ED		2
12	Counter-valve	OVRC3	RC3 (G1/2)	Hawe	1
13	Plus	RLT 041	R1/4-ED		1
14	O-ring	TOR 0202201	20.2x2 NBR70		1
15	O-ring	TOR 0141161	OR 14.1x1.6 NBR 70		1
16	O-ring	TOR 0131161	OR 13.1x1.6 NBR 70		1
17	O-ring	TOR 0071161	OR 7.1x1.6 NBR 70		1
18	O-ring	TOR 0051161	OR 5.1x1.6 NBR 70		1
19	Sealing nut	RKMM08014	M8	Seal-Lok	1
20	Sealing nut	RKMM12014	M12	Seal-Lok	1
21	Sealing nut	RKMM10014	M10	Seal-Lok	1
22	Usit seal	TUR0137200	Usit-04 1/4"		6
23	Twin nipple	PBSP01401	BSP 1/4"		4
24	Twin nipple	PBSP01201	3005-08 BSP 1/2"		2
25	Usit seal	TUR0215230	Usit-08 1/2"		2
26	Twin nipple	PBSP01801	3005-02 BSP 1/8		1
27	Usit seal	TUR013200	Usit-02 1/8"		2

Table 3: Valve block

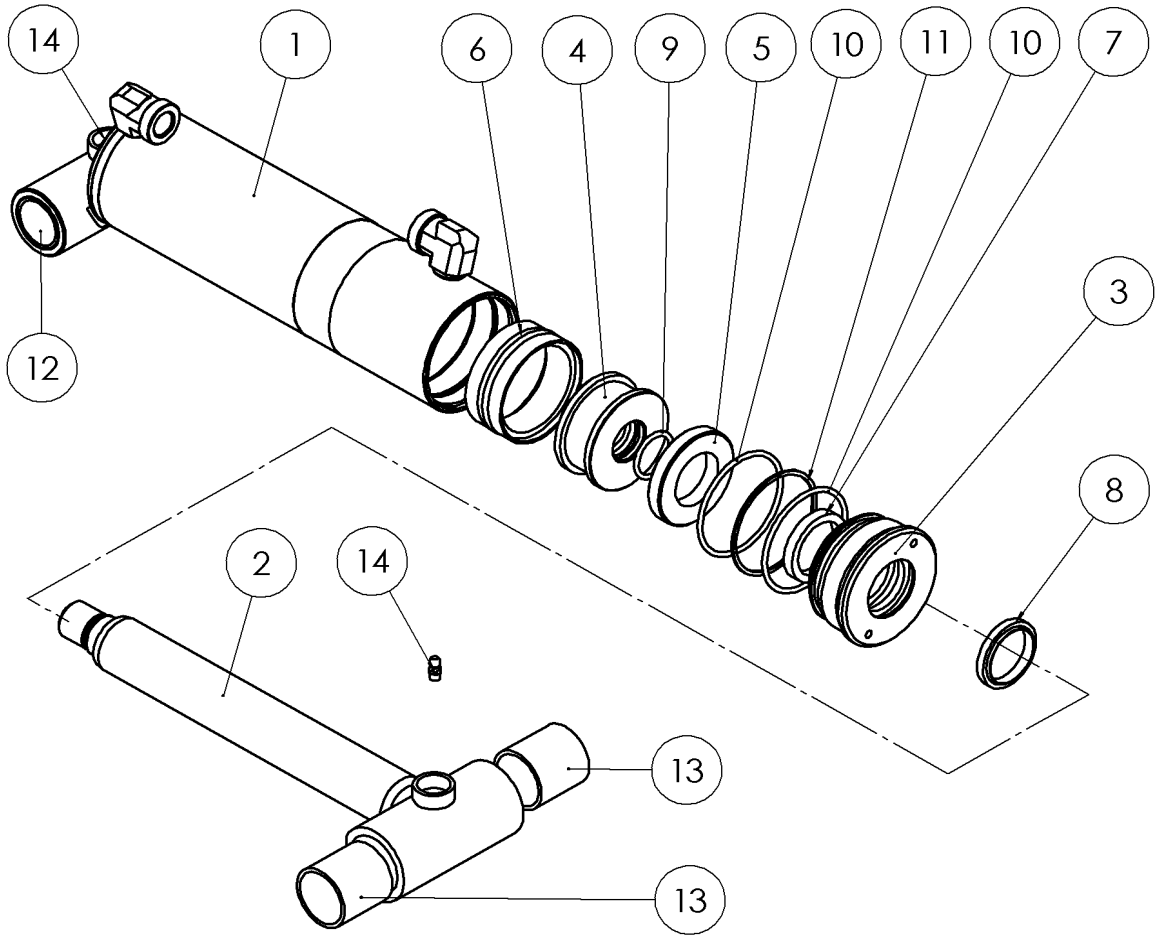
8.4 Grapple cylinder and lock valve



Part	Name	Order number	Dimensions	Nof
1	Cylinder	KR-16736A		1
2	Twin lock valve	OVVRDE015F0	VRDE-015-F	1
3	Banjo union	P101312S380	1013-12SR3/8	3
4	Adjustable elbow fitting	P604212S0	6042-12S	1
5	Direct outlet connector	P1005120S380	1005-12SR3/8	1
6	Connecting nipple	P30160380380	3016-R3/8 UK-R3/8 SK	1
7	Pipe nipple	P600512s0380	6005-12S R3/8	2
8	Twin nipple	P3005020380	3005-02 R3/8	1
9	Connecting pipe	KR 16636-13		1
10	Usit seal	TUR0172200	R3/8	2

Table 4: Grapple cylinder and lock valve

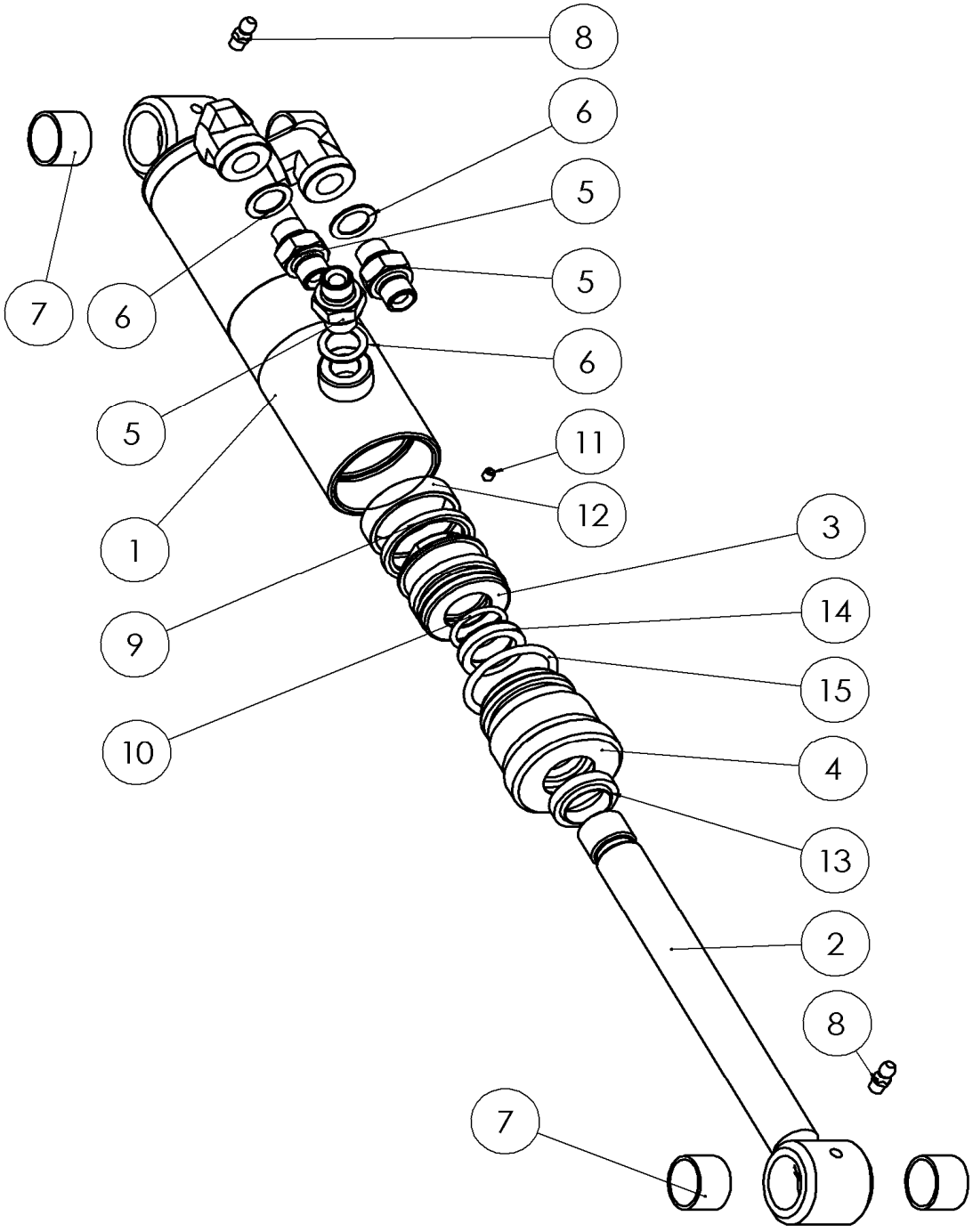
8.5 Grapple cylinder



Part	Name	Order number	Dimensions	Standard	Nof
1	Cylinder liner	KR-16736-10			1
2	Cylinder rod	KR 16636-52A			1
3	Guide	KR-16736-80			1
4	Piston	KR-16736-70			1
5	Flange	KR-16736-90			1
6	Piston seal	TMT 070320	Simko 320 70-58-14-28	Simrit	1
7	Rod seal	TVT 036100	NI300 36/46x7	Simrit	1
8	Dispenser	TVP 036120	A5 36/44-5/7	Tike	1
9	O-ring	TOR 0262301	26.2x3 NBR70		1
10	O-ring	TOR 0645301	64.5x3 NBR70		2
11	Backing ring	TTR 065131	65/70x1.3 PU		1
12	Slide bearing	NB80203030	30/34-30	WB 802	2
13	Slide bearing	NB80203540	35/39-40	WB 802	2
14	Lubrication nipple	RVNM061	M6		2

Table 5: Grapple cylinder

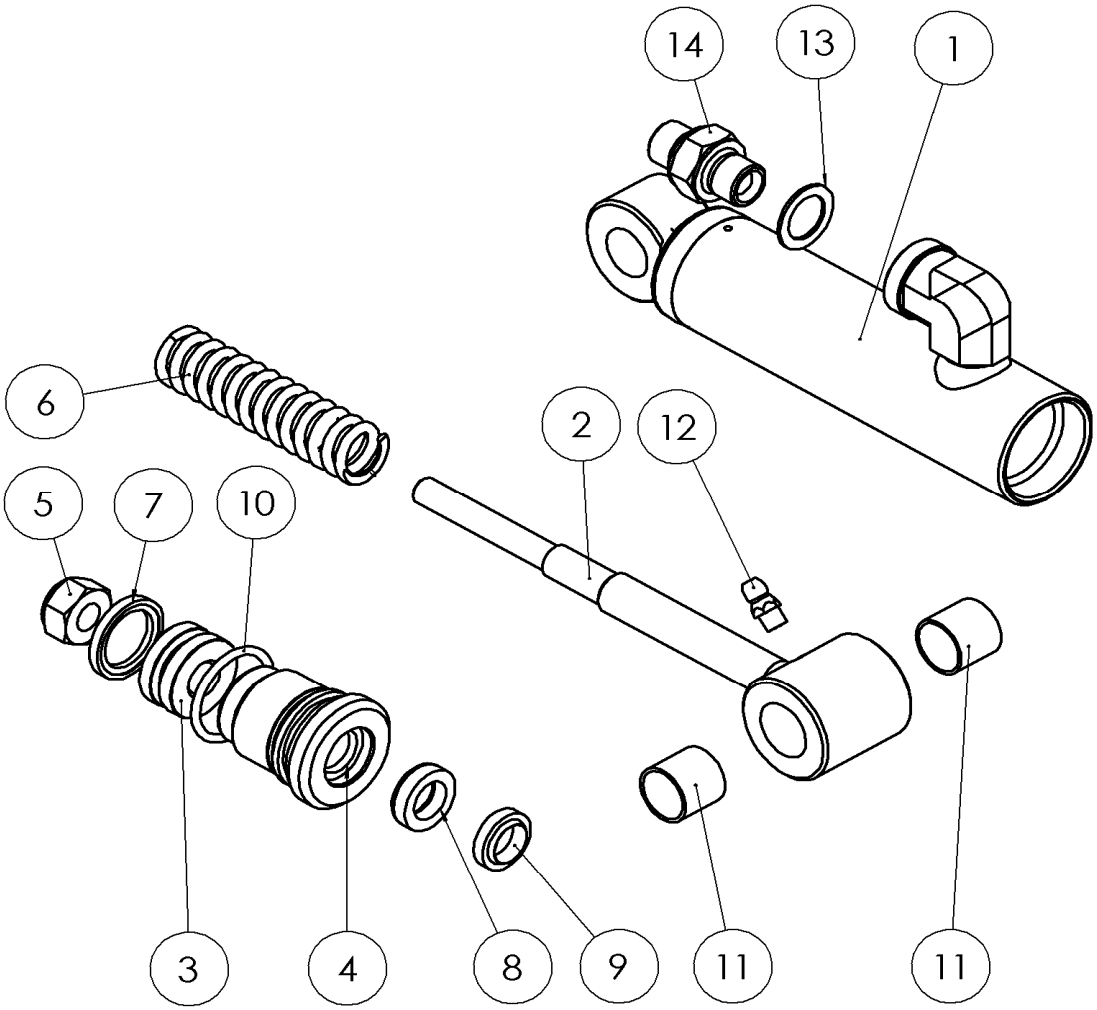
8.6 Tilt cylinder



Part	Name	Order number	Dimensions	Standard	Nof
1	Cylinder liner	KS 1640-10			1
2	Cylinder rod	KS 1640-52			1
3	Piston	B040075			1
4	Guide	KS 1640-80			1
5	Twin nipple	PBSP 01401	BSP 1/4"		3
6	Usit seal	TUR0137200	Usit-04 1/4"		3
7	Slide bearing	NB80202015	2015	WB802	4
8	Lubrication nipple	RVNM061	M6		2
9	Piston seal	TMT04010	GODA 40/32x3.5	Hunger	1
10	O-ring	TOR0202241	20.2x2.4 NBR 70		1
11	Retaining ring	RPRM05051	M5x5	DIN 914	1
12	Guide ring	TM004050	RFA 40/35x9.5	Hunger	1
13	Dispenser	TVP020120	A5 20/28-5/7		1
14	Rod seal	TVT0020200	B 20/28x6.3		1
15	O-ring	TOR0345352	34.52x3.53 NBR90		1

Table 6: Tilt cylinder

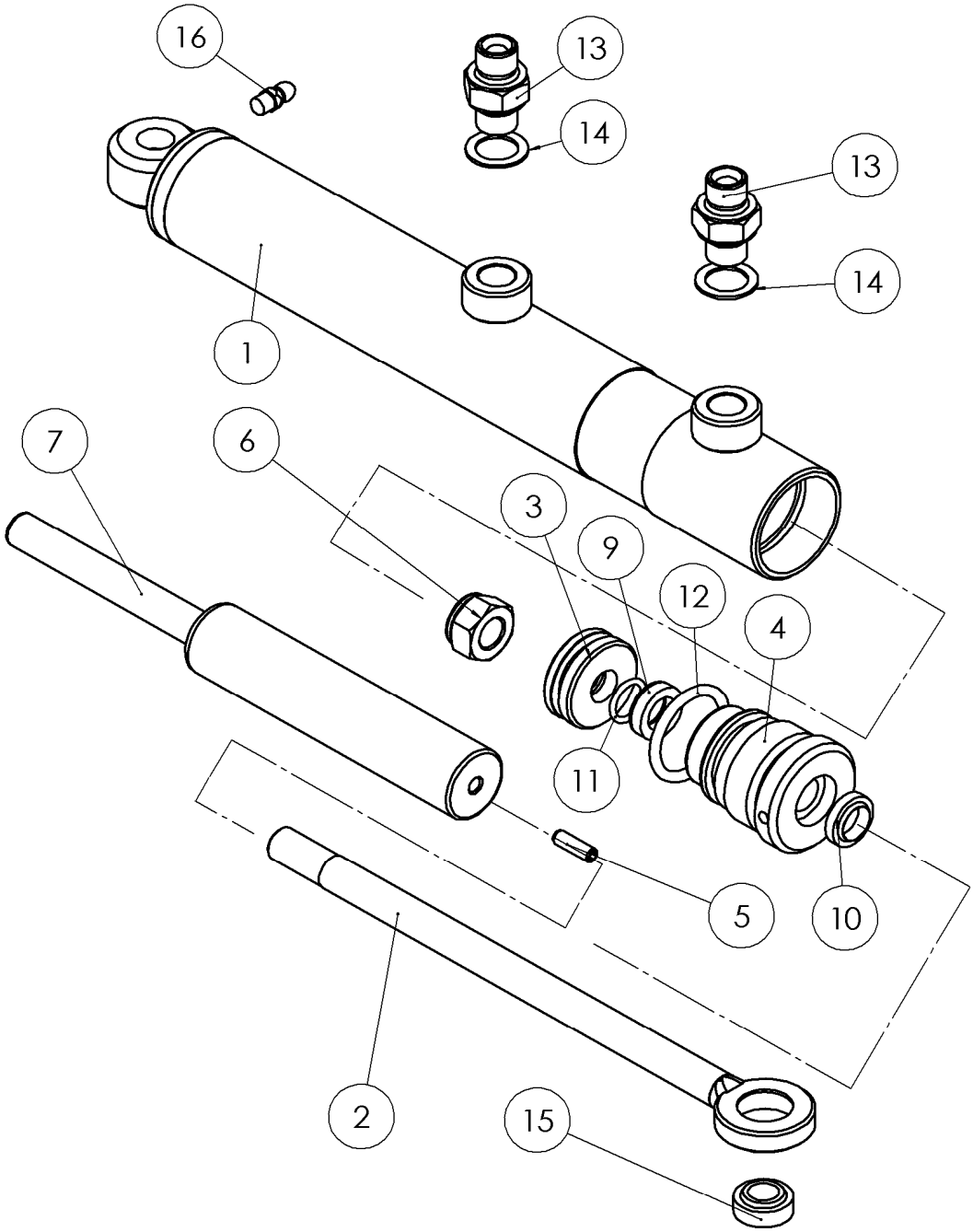
8.7 Tilt function lock cylinder



Part	Name	Order number	Dimensions	Standard	Nof
1	Cylinder	KS 1625-10			1
2	Cylinder rod	KS 1625-50			1
3	Piston	C025070	Ø30-14		1
4	Guide	C025080	Ø35-39		1
5	Locking nut	RKMM10011	M10	DIN982	1
6	Pressure spring	OPJ03512075	3.5xDi12x75 nt14.3 N:o 2715	Lesjöfors	1
7	Piston seal	TMT025200	PO 25/18x3.2		1
8	Rod seal	TVT012300	Q3 12/19-6		1
9	Wiper	TVP012210	P7 12/18-3/5		1
10	O-ring	TOR0253242	OR 25.3x2.4 NBR 90		1
11	Slide bearing	NB68101515	15/17-15	WB 802	2
12	Lubrication nipple	RVNM061	M6		1
13	Usit seal	TUR0137200	U 04-1/4		1
14	Twin nipple	PBSP01401	BSp 1/4		1

Table 7: Tilt function lock cylinder

8.8 Chainsaw feed cylinder



Part	Name	Order number	Dimensions	Standard	Nof
1	Cylinder liner	KS 1632-10			1
2	Cylinder rod	KS1632-58P			1
3	Piston	KS 1632-70	Ø30-14		1
4	Guide	KS 1632-80	Ø40-46		1
5	Retaining ring	RPRM06162	M6x16	DIN 913	1
6	Locking nut	RKMM12011	M12	DIN 982	1
7	Gas-powered spring	OJKA904018080S	90.4.0180 sin. N;o 6646		1
8	Piston seal	TMT032200	PO -55-210-320	Tike	1
9	Rod seal	TVT012300	Q3 12/19-6		1
10	Wiper	TVP012210	P7 12/18x3/5	Merkel	1
11	O-ring	TOR0120201	OR 12x2 NBR70		1
12	O-ring	TOR0265352	OR 26.57x3.53 NBR90		1
13	Twin nipple	PBsp01401	BSP 1/4"		2
14	Usit seal	TUR0137200	Usit-04 1/4"		2
15	Articulation bearing	NGE01010	GE10ES		1
16	Lubrication nipple	RVNM061	M6		1

Table 7: Tilt function lock cylinder