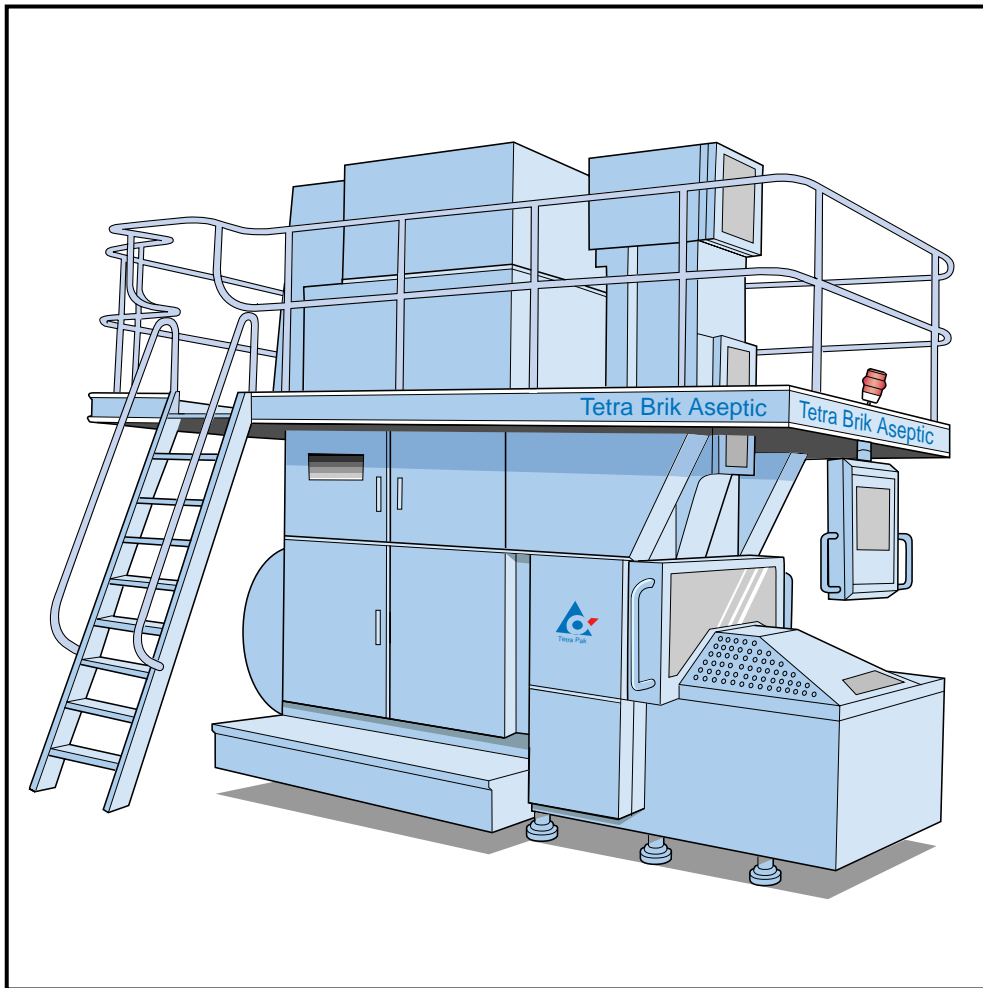


MM

Maintenance Manual

TBA/19 010V



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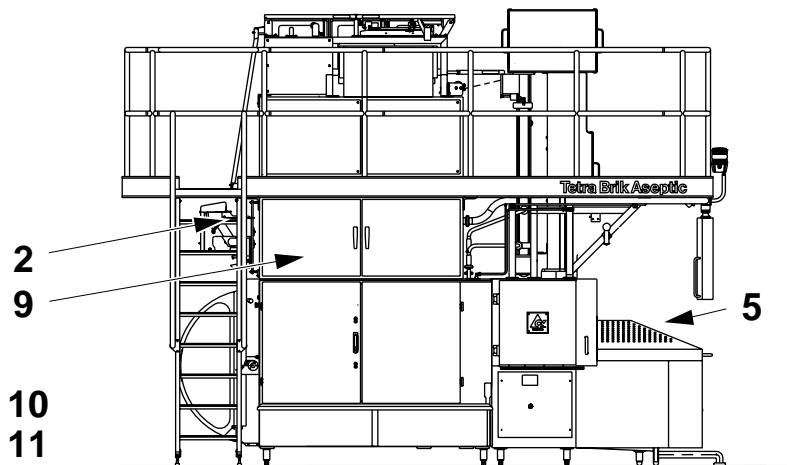
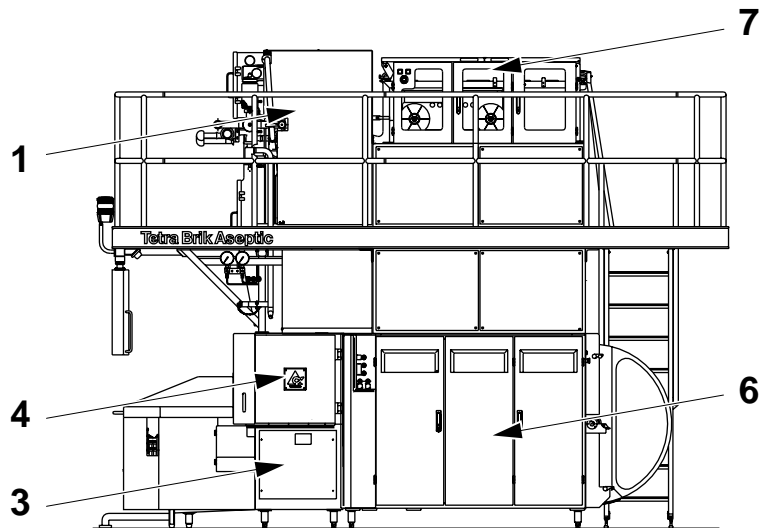
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Series No/ Machine No

Sign.

Tetra Brik Aseptic TBA/19 648160-010V



2.28207904.fro

- 1 Superstructure
- 2 Machine body
- 3 Drive unit
- 4 Jaw system
- 5 Final folder
- 6 Service unit
- 7 Strip applicator
- 8 -
- 9 Electrical equipment
- 10 General
- 11 Checklist overview

Issue 9703

Doc No. MM-82079-0104

Tetra Pak
Tetra Brik Packaging Systems

Introduction

Equipment information	2
Document information	3
How to use this manual	4
Abbreviations used in this manual	6
Machine orientation.	7

Safety precautions

Hazard information	10
General	10
Mandatory signs	11
Danger and warning signs.	12
Personnel	14
General safety precautions	15
Hygiene	15
High voltage	15
Electrical cabinet.	16
Machine safety devices	17
Emergency stop buttons	17
Doors, covers and guards	19
Chemical products	22
Personal protective equipment	22
General emergency procedures	22
Hydrogen peroxide	23
Ink	25
Equipment for lifting and moving loads	26

1 Superstructure

1-1	Superstructure - description	30
1-2	Superstructure - check bending rollers	31

2.28207904-bkTOC

Table of contents

	1-3	Superstructure - check air nozzle (LS) and hot air element (LS SS)	32
	1-4	Superstructure - measure pressures	34
	1-5	Superstructure - check pressures	36
1.1		Bath	41
	1.1-1	Bath - check suction box seal.	41
	1.1-2	Bath - check micro switches	43
1.1.1		Lower bending roller	44
	1.1.1-1	Lower bending roller - check.	44
	1.1.1-2	Lower bending roller - change bushings and shaft	46
1.1.2		Upper bending roller	48
	1.1.2-1	Upper bending roller - change bushings	48
1.1.3		Peroxide bath lid (PT19 variant)	49
	1.1.3-1	Peroxide bath lid - check suction box seals	49
1.2		Product valve	51
	1.2-1	Product valve - clean steam traps.	51
	1.2-2	Product valve - change steam filter	53
	1.2-3	Product valve - clean steam filter cartridge	54
1.2.1		AP valve	57
	1.2.1-1	AP valve - change seals and membrane.	57
	1.2.1-2	AP valve - change A- and B-cylinder seals	64
	1.2.1-3	AP valve - change C-cylinder seals	67
1.2.2		Regulating valve	68
	1.2.2-1	Regulating valve - change membranes	68
	1.2.2-2	Regulating valve - assemble.	71
	1.2.2-3	Regulating valve - set proximity switch.	74
1.3		Calender rollers	75
	1.3-1	Calender rollers - check rubber surfaces	75
	1.3-2	Calender rollers - check during operation	76
	1.3-3	Calender rollers - change bearings.	76
	1.3-4	Calender rollers - set	80
1.4		Tube forming.	82
1.4.1		Tube supports and forming rings.	82
	1.4.1-1	Tube supports and forming rings - check.	82

2.28207904.bKTOC

	1.4.1-2	Tube supports and forming rings - set.	84
1.4.2		LS overlap	87
	1.4.2-1	LS overlap - set	87
1.4.3		Upper tube support	90
	1.4.3-1	Upper tube support - overhaul.	90
1.4.4		Movable forming ring	91
	1.4.4-1	Movable forming ring - overhaul	91
1.4.5		Divided forming ring	92
	1.4.5-1	Divided forming ring - overhaul	92
1.4.6		Lower forming ring	94
	1.4.6-1	Lower forming ring - overhaul	94
	1.4.6-2	Lower forming ring - set counter roller.	96
1.4.7		Tube alignment	97
	1.4.7-1	Tube alignment - check on packages	97
1.5		Aseptic chamber	99
	1.5-1	Aseptic chamber - change sealing lip	99
	1.5-2	Aseptic chamber - check support roller.	100
	1.5-3	Aseptic chamber - measure leakage	101
1.6		Bending roller (driven)	105
	1.6-1	Bending roller (driven) - check	105
	1.6-2	Bending roller (driven) - change carbon brushes.	107
	1.6-3	Bending roller (driven) - measure speed	107
	1.6-4	Bending roller (driven) - set speed	108
	1.6-5	Bending roller (driven) - check speed	110
1.7		Air knife	111
	1.7-1	Air knife - check	111
	1.7-2	Air knife - set temperature	114
1.8		Heat exchanger	115
	1.8-1	Heat exchanger - check tightness	115
1.8.1		WEAC valve	118
	1.8.1-1	WEAC valve - overhaul.	118

Table of contents

1.9	Valve (heat exchanger)	122
1.9-1	Valve (heat exchanger) - overhaul	122
1.10	Valve (air inlet)	123
1.10-1	Valve (air inlet) - overhaul	123
1.11	Change-over valve (suction)	125
1.11-1	Change over valve (suction) - overhaul	125
1.12	Hot air element (LS SS)	127
1.12-1	Hot air element (LS SS) - check packages.	127
1.12-2	Hot air element (LS SS) - set nozzle	128
1.13	Spray system	132
1.13-1	Spray system - clean filter	132
1.13-2	Spray system - check for leaks.	133
1.14	Air nozzle (LS)	134
1.14-1	Air nozzle (LS) - set.	134
1.14-2	Air nozzle (LS) - check pressures	142
1.15	Level probe	143
1.15-1	Level probe - set.	143
1.15-2	Level probe - check filling pipe	145
1.15.1	Level regulator card	146
1.15.1-1	Level regulator card - set I/P transducer	146
1.15.1-2	Level regulator card - set	148
1.15.1-3	Level regulator card - check setting	150
1.16	Filler pipe	152
1.16-1	Filler pipe - check	152
1.16-2	Filler pipe - set	153
1.16-3	Filler pipe - check pressure roller spring force ..	156
1.17	Photocell unit	157
1.17-1	Photocell unit - check.	157
1.17-2	Photocell unit - set	158
1.18	Tube flushing device	164
1.18-1	Tube flushing device - check	164

1.19	Filling system	165
	1.19-1 Filling system - function description.....	165
	1.19-2 Filling system - check first package	166
	1.19-3 Filling system - check parameters.....	166
	1.19-4 Filling system - setting sequence	167
1.20	Crease roller	168
	1.20-1 Crease roller - change bearings.....	168
1.21	Bending roller	169
	1.21-1 Bending roller - change bearings	169

2 Machine body

	2-1 Machine body - description.....	172
2.1	Connection box	173
	2.1-1 Connection box - check sterile air pressure switch	173
2.2	Dating unit	174
2.2.1	Ink unit	174
	2.2.1-1 Ink unit - overhaul.....	174
	2.2.1-2 Ink unit - set.....	177
2.2.2	Dating unit	178
	2.2.2-1 Dating unit - set.....	178
2.3	Drop chute	185
	2.3-1 Drop chute - remove	185
	2.3-2 Drop chute - set.....	187

3 Drive

	3-1 Drive - description.....	190
3.1	Worm gear	191
	3.1-1 Worm gear - set brake gap.....	191
	3.1-2 Worm gear - change brake.....	192
	3.1-3 Worm gear - change clutch bearing.....	193
	3.1-4 Worm gear - check bearings	199

Table of contents

3.1-5	Worm gear - change bearings.	200
3.1-6	Worm gear - change V-belt.	202
3.1-7	Worm gear - change timing belt.	206
3.1- 8	Worm gear - check belt tension	207
3.1-9	Worm gear - change oil	208
3.1-10	Worm gear - change	209
3.1-11	Worm gear - set alignment template	217
3.1-12	Worm gear - set	218
3.1-13	Worm gear - check oil level	220
3.1-14	Worm gear - check clutch and brake gap	221
3.2	Arm	222
3.2-1	Arm - check timing belt rollers	222
3.3	Link system.	224
3.3-1	Link system - check cam roller condition	224
3.3-2	Link system - check arm bearings	226
3.3-3	Link system - change arm bearings	227
3.3-4	Link system - check slewing bracket bearings.	231
3.3-5	Link system - change slewing bracket bearings.	232
3.4	Hold-down device.	235
3.4-1	Hold-down device - check timing belts	235
3.4-2	Hold-down device - change timing belts	236
3.4.1	Rocker arm	239
3.4.1-1	Rocker arm - check bearing play	239
3.5	Crank	242
3.5-1	Crank - check mechanism and switch	242
3.5-2	Crank - remove.	243
3.5-3	Crank - fit	245
3.5-4	Crank - set switch.	247
3.6	Disconnection link	248
3.6-1	Disconnection link - check and lubricate.	248
3.6-2	Disconnection link - set	251
3.6-3	Disconnection link - change micro switch.	252
3.6-4	Disconnection link - set cut-out force	254

2.28207904-bkTOC

3.7	Central lubrication	255
3.7-1	Central lubrication - check oil distribution	255
3.8	Curve pack	256
3.8-1	Curve pack - change	256
3.8-2	Curve pack - set degree scale	272
3.8-3	Curve pack - set pointer	274
3.8-4	Curve pack - synchronise	275

4 Jaw system

4-1	Jaw system - description	282
4-2	Jaw system - change pressure and cutting jaws .	283
4-3	Jaw system - bleed pressure and cutting jaws . . .	288
4.1	Cutting jaw	291
4.1-1	Cutting jaw - set folding flap parallelity	291
4.1-2	Cutting jaw - overhaul	295
4.2	Design correction device	300
4.2-1	Design correction device - change brackets and link heads	300
4.2-2	Design correction device - change cylinders . . .	303
4.2-3	Design correction device - check condition	304
4.2-4	Design correction device - lubricate	306
4.3	Pressure jaw	307
4.3-1	Pressure jaw - lubricate pivot springs	307
4.3-2	Pressure jaw - overhaul	308
4.3-3	Pressure jaw - set catch pivot spring	313
4.3-4	Pressure jaw - check catches and catch clearance	314
4.4	Yoke	316
4.4-1	Yoke - check sliders	316
4.4-2	Yoke - check curve rollers	317
4.4-3	Yoke - change plungers	318
4.4-4	Yoke - overhaul	319

2.28207904-bkTOC

Table of contents

4.5	Volume curve piece	323
4.5-1	Volume curve piece - check	323
4.5-2	Volume curve piece - change spindle and nuts ..	325
4.5-3	Volume curve piece - change volume cams	329
4.6	Central lubrication	330
4.6-1	Central lubrication - check oil distribution	330
4.7	Basic jaw system setting	331
4.7-1	Yoke - set turning position	332
4.7-2	Cam and support rollers - set	335
4.7-3	Jaw gap - check	336
4.7-4	Jaw gap - set	337
4.7-5	Non-parallelity in movement - check	339
4.7-6	Stroke - check	341
4.7-7	Stroke - check during production	343
4.7-8	Stroke - set	344
4.7-9	Volume curve piece - set	346
4.7-10	Volume flap - set package weight	349
4.7-11	Cutting jaw and pressure jaw alignment - set ..	350
4.7-12	Yoke symmetry - set	352
4.7-13	Folding flap mechanism - check	355
4.7-14	Volume flap - alignment	358
4.7-15	Tube support rollers - set	360
4.7-16	Jaw over jaw - check	364
4.7-17	Jaw over jaw - set	365
4.7-18	Design correction mechanism - set	368
4.7-19	Catch lifter cams and rollers - set	370
4.8	Shock absorber	372
4.8-1	Shock absorber - overhaul	372
4.9	Volume flap	373
4.9-1	Volume flap - overhaul	373
4.9-2	Volume flap - check	374
4.10	Pressure rail	375
4.10-1	Pressure rail - overhaul	375

2.28207904-bKTOC

4.11 Knife holder 376
 4.11 -1 Knife holder - overhaul 376

5 Final folder

 5-1 Final folder - description 380
 5-2 Final folder - check oil levels 381
 5-3 Final folder - bleed pressure and pull-down device 384

5.1 Station chain 388
 5.1-1 Station chain - change 388
 5.1-2 Station chain - turn shafts 397

5.2 Drive wheel 400
 5.2-1 Drive wheel - check sprocket surface 400
 5.2-2 Drive wheel - change 400
 5.2-3 Drive wheel - overhaul 402

5.3 Tension sprocket 403
 5.3-1 Tension sprocket - check sprocket surface
 and bearing 403
 5.3-2 Tension sprocket - change 403
 5.3-3 Tension sprocket - overhaul 407

5.4 Indexing unit 408
 5.4-1 Indexing unit - change oil 408
 5.4-2 Indexing unit - check cut out torque 409
 5.4-3 Indexing unit - change 410

5.5 Pressure device 421
 5.5-1 Pressure device - overhaul hydraulics 421
 5.5-2 Pressure device - set 424

5.6 Worm gear 427
 5.6-1 Worm gear - change oil 427
 5.6-2 Worm gear - change 428

5.7 Element 430
 5.7-1 Element - set air nozzles 430

2.28207904.bktOC

Table of contents

5.7-2	Element - check connections	432
5.7-3	Element - change element units	432
5.8	Frame	433
5.8-1	Frame - change pivot frame assembly	433
5.8-2	Frame - overhaul pivot frame assembly	439
5.9	Pull-down device	449
5.9-1	Pull-down device - overhaul hydraulics	449
5.9-2	Pull-down device - set rails	451
5.9-3	Pull-down device - set blocking piece	453
5.9-4	Pull-down device - set pull-down arms	455
5.10	Guide	457
5.10-1	Guide - check rails and plates	457
5.11	Cantilever	462
5.11-1	Cantilever - change oil brushes	462
5.12	Discharger	463
5.12-1	Discharger - check carriers	463
5.12-2	Discharger - change oil	464
5.12-3	Discharger - change duplex chains	465
5.12-4	Discharger - set slider	467
5.12-5	Discharger - set overload protection	468
5.12-6	Discharger - change bearings and bushings	469
5.13	Cleaning system	483
5.13-1	Cleaning system - check rotors and nozzles	483
5.13-2	Cleaning system - set nozzles	486
5.13-3	Cleaning system - check pump	489
5.13-4	Cleaning system - change pump	489
5.13-5	Cleaning system - clean pump	490
5.14	Central lubrication	492
5.14-1	Central lubrication - check oil distribution	492
5.15	Side feeder	493
5.15-1	Side feeder - check timing belts	493
5.15-2	Side feeder - check overload protection	496

2.28207904.bKTOC

	5.15-3	Side feeder - set	497
5.16		Discharge chute	499
	5.16-1	Discharge chute - set	499
5.17		Covering panel	502
	5.17-1	Covering panel - change slider and bearings.	502
	5.17-2	Covering panel - check	503
	5.17-3	Covering panel - set slider.	504

6 Service unit

	6-1	Service unit - description.	506
6.1		Paper magazine	507
	6.1-1	Paper magazine - check bending rollers	507
	6.1-2	Paper magazine - check unreeling function	512
	6.1-3	Paper magazine - set bending roller speed	513
6.1.1		Brake.	517
	6.1.1-1	Brake - check.	517
6.1.2		Bending roller motor	518
	6.1.2-1	Bending roller motor - change carbon brushes	518
	6.1.2-2	Bending roller motor - change belt	519
6.2		Cover	520
	6.2-1	Cover - check bearing blocks	520
	6.2-2	Cover - remove	521
	6.2-3	Cover - assemble	522
	6.2-4	Cover - set photocell	524
6.3		Splicing device	526
	6.3-1	Splicing device (standard) - set	526
	6.3-2	Splicing device (option) - set.	528
6.3.1		Heating block and counter rail	530
	6.3.1-1	Heating block and counter rail - check teflon tape and cloth	530

2.28207904.bkTOC

Table of contents

6.4	Valve panel	532
6.4.1	Valve plate	532
6.4.1-1	Valve plate - check sterile air pressure.	532
6.4.1-2	Valve plate - check photocell air filters	533
6.4.1-3	Valve plate - change spray filter cartridge	533
6.4.2	Pressure regulator group	534
6.4.2-1	Pressure regulator group - check photocell air pressure	534
6.4.3	Air inlet group	535
6.4.3-1	Air inlet group - change filter insert.	535
6.4.4	Cool water valve.	536
6.4.4-1	Cool water valve - clean water filters.	536
6.4.5	Flow meter	537
6.4.5-1	Flow meter - check flows	537
6.5	Peroxide and sterile systems	538
6.5-1	Peroxide and sterile systems - check for leaks. . .	538
6.5-2	Peroxide and sterile systems - check safety lids .	540
6.5.1	Compressor unit	542
6.5.1-1	Compressor unit - check for leaks and vibrations	542
6.5.1-2	Compressor unit - change seals	543
6.5.2	Peroxide tank	546
6.5.2-1	Peroxide tank - check pump for noise and vibrations	546
6.5.2-2	Peroxide tank - change pump.	547
6.5.2-3	Peroxide tank - overhaul pump	548
6.5.3	Separator	553
6.5.3-1	Separator - check float	553
6.5.3-2	Separator - clean filter	554
6.5.4	Scrubber	556
6.5.4-1	Scrubber - delime filter	556
6.5.5	Water circulation	558
6.5.5-1	Water circulation - check pressure.	558
6.5.5-2	Water circulation - overhaul pump.	559
6.5.6	Cabinet H₂O₂	560
6.5.6-1	Cabinet H ₂ O ₂ - check transfer function.	560

2.28207904.bKTOC

6.6	Impulse transmitter	561
	6.6-1 Impulse transmitter - check valve clearance	561
	6.6-2 Impulse transmitter - change timing belt.	563
	6.6-3 Impulse transmitter - set zero position	564
6.6.1	Curve pack	566
	6.6.1-1 Curve pack - check bearings	566
6.7	Central lubrication	569
	6.7-1 Central lubrication - clean oil tank	569
	6.7-2 Central lubrication - check pressure	570
	6.7-3 Central lubrication - change pump	571
6.8	Hydraulic system	572
	6.8-1 Hydraulic system - clean oil tank	572
	6.8-2 Hydraulic system - change oil and filter	573
	6.8-3 Hydraulic system - check oil level and filter indicator.	574
	6.8-4 Hydraulic system - check pressures	575
	6.8-5 Hydraulic system - check accumulator	576
	6.8-6 Hydraulic system - delime oil cooler	577
6.9	Paper reel trolley	578
	6.9-1 Paper reel trolley - check function	578
	6.9-2 Paper reel trolley - change pump cylinder.	579
	6.9-3 Paper reel trolley - change sink valve	581
	6.9-4 Paper reel trolley - overhaul lifting cylinder	582
	6.9-5 Paper reel trolley - remove fork wheel	584
	6.9-6 Paper reel trolley - remove guide wheel	585
6.10	PT brake cassette unit	586
	6.10-1 PT brake cassette unit - set spring	586
	6.10-2 PT brake cassette unit - change damper	587
	6.10-3 PT brake cassette unit - change roll balls	588
6.10.1	Paper guide	590
	6.10.1-1 Paper guide - set	590
6.10.2	Paper guide plate	591
	6.10.2-1 Paper guide plate - change wheel and ball bearings	591

2.28207904-bkTOC

7 Strip applicator

7-1	Strip applicator - description	594
7.1	Strip applicator	595
7.1-1	Strip applicator - check rollers	595
7.1.1	Splice detector	596
7.1.1-1	Splice detector - check function	596
7.1.1-2	Splice detector - set	597
7.1.2	Pressure rollers	598
7.1.2-1	Pressure rollers - check condition and spring force	598
7.1.2-2	Pressure rollers - change	599
7.1.3	Strip guide	601
7.1.3-1	Strip guide - check guide wheels and bushings	601
7.1.3-2	Strip guide - set	604
7.1.4	Inductor	605
7.1.4-1	Inductor - check seal on ejected package	605
7.1.4-2	Inductor - set	606
7.2	Strip magazine	608
7.2.1	Mounting sheet	608
7.2.1-1	Mounting sheet - check	608
7.2.2	Hub jumbo	609
7.2.2-1	Hub jumbo - check	609
7.2.3	Splicing device	611
7.2.3-1	Splicing device - check function	611
7.2.3-2	Splicing device - check	613
7.2.3-3	Splicing device - change bracket	614
7.2.3-4	Splicing device - change knife	615
7.2.3-5	Splicing device - change ball bushing	616
7.2.3-6	Splicing device - change dowels	617
7.2.3-7	Splicing device - change cylinder	618
7.2.4	Brake arms	619
7.2.4-1	Brake arms - check function	619
7.2.4-2	Brake arms - set belt tension	620
7.2.5	Hub standard	622
7.2.5-1	Hub standard - check	622

7.3	Splicing magazine	624
	7.3-1 Splicing magazine - check.....	624
	7.3-2 Splicing magazine - set.....	627
7.4	Doors	628
7.4.1	Key safety switches	628
	7.4.1-1 Key safety switches - check function	628
7.5	Bending rollers	629
	7.5-1 Bending rollers - check rotation	629

9 Electrical equipment

	9-1 Electrical equipment - description.....	634
	9-2 PullTab position - set.....	635
9.1	Temperature regulators	636
	9.1-1 Temperature regulators - record values.....	636
	9.1-2 Temperature regulators - set	637
	9.1-3 Temperature regulator - change.....	641
	9.1-4 Temperature regulators - calibrate.....	642
	9.1-5 Calibrator (Micromite II) - set.....	645
9.1.1	Thermocouple	647
	9.1.1-1 Thermocouple - check.....	647
9.2	Air cooler	650
	9.2-1 Air cooler - check function	650
	9.2-2 Air cooler - check filters	652
9.3	PLC	653
	9.3-1 PLC - load program.....	653
	9.3-2 PLC - change program step.....	656
9.3.1	PLC power supply unit	657
	9.3.1-1 PLC power supply unit - change battery.....	657
9.4	TPIH system	658
	9.4-1 TPIH system - description.....	658
9.4.1	TPIH cables	663
	9.4.1-1 TPIH cables - check condition	663

2.28207904-bkTOC

Table of contents

9.4.2	TPIH impedance transformer	664
9.4.2-1	TPIH impedance transformer - check	664
9.4.3	TPIH generator	665
9.4.3-1	TPIH generator - change	665
9.4.4	TPIH test instrument	666
9.4.4-1	TPIH test instrument - description	666
9.4.5	TPIH power	667
9.4.5-1	TPIH power - record setting	667
9.4.5-2	TPIH power - set TS power	668
9.4.5-3	TPIH power - set SA power	669
9.4.5-4	TPIH power - set web splice power	670
9.5	Process recorder	671
9.5-1	Process recorder - set	671
9.6	DCS19	672
9.6-1	DCS19 - function description	672
9.6-2	DCS19 - basic set	676
9.6-3	DCS19 - program download	678
9.7	Level regulator relay	680
9.7-1	Level regulator relay - description	680
9.7-2	Level regulator relay - set	681
9.8	Stepper motor driver card (PT)	682
9.8-1	Stepper motor driver card (PT) - set	682
9.9	Brake card (PT)	684
9.9-1	Brake card (PT) - set	684
9.10	PT19 CS	686
9.10-1	PT19 CS - function description	686
9.10-2	PT19 CS - set TMCC control card	689
9.10-3	PT19 CS - basic set	690
9.10-4	PT19 CS - program download	691
9.11	PT19 MC	693
9.11-1	PT19 MC - description	693
9.11-2	PT19 MC - basic set	694

2.28207904.bkTOC

10 General

	10-1	General - description	698
10.1		Technical data	699
10.2		Lubricants	702
10.3		Templates and tools	705
10.4		Conversion table, degrees	712
10.5		Passivation	713
10.6		External cleaning program	716
	10.6-1	External cleaning program - diagram	716
10.7		Safety functions	717
	10.7-1	Safety functions SA variant - check	717
	10.7-2	Safety functions ASU variant - check	718
	10.7-3	Safety functions PT19 variant - check	719

11 Checklist overview

	Checklist overview - description	722
	TPMS - description	723
	Checklist overview	724

2.28207904.bkTOC

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Introduction

To ensure maximum safety, always read the *Safety precautions* section before doing any work on the equipment or making any adjustments.

Equipment information

Intended use

The purpose of this Tetra Pak equipment is to pack liquid food products.

Manufacturer

This Tetra Pak equipment has been manufactured by:

Tetra Brik Packaging Systems AB
Ruben Rausings gata
221 86 LUND
Sweden

or by:

Tetra Brik Packaging Systems S.p.A.
Via Delfini 1
411 00 MODENA
Italy

Service

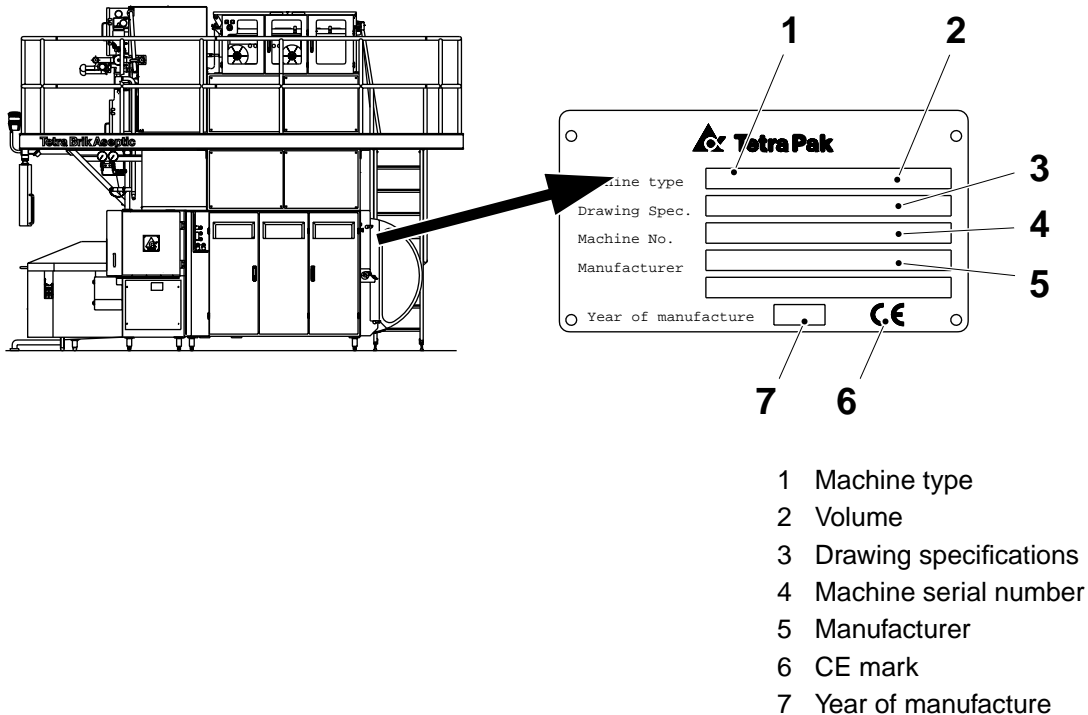
Contact the nearest Tetra Pak service station.

Identification

The figure shows an example of the equipment sign. The sign carries data needed when contacting Tetra Pak concerning this specific equipment.

CE marking

This equipment complies with the basic health and safety regulations of the European Economic Area (EEA).



Document information

Purpose of Maintenance Manual (MM)

The purpose of this Maintenance Manual is to provide the service technicians with:

- all **scheduled maintenance** procedures listed in the checklists
- information for **unscheduled maintenance** such as:
 - additional maintenance procedures
 - functional descriptions
 - system descriptions

The same **structure, codes** and **denominations** used in this MM, are used in the Spare Part Catalogue (SPC) and in the checklists.

It is important to:

- keep the manual for the life of the equipment
- pass the manual on to any subsequent holder or user of the equipment.

Design modifications

The directives in this document are in accordance with the design and construction of the equipment at the time it was delivered from the Tetra Pak production plant.

Technical publications

- Electrical Manual (EM)
- Installation Manual (IM)
- Maintenance Manual (MM)
- Operation Manual (OM)
- Spare Parts Catalogue (SPC)

Additional copies can be ordered from the nearest Tetra Pak service station.

When ordering technical publications, always quote the **document number** that can be found in the machine specification document.

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Number of pages

This document contains a total of 730 pages.

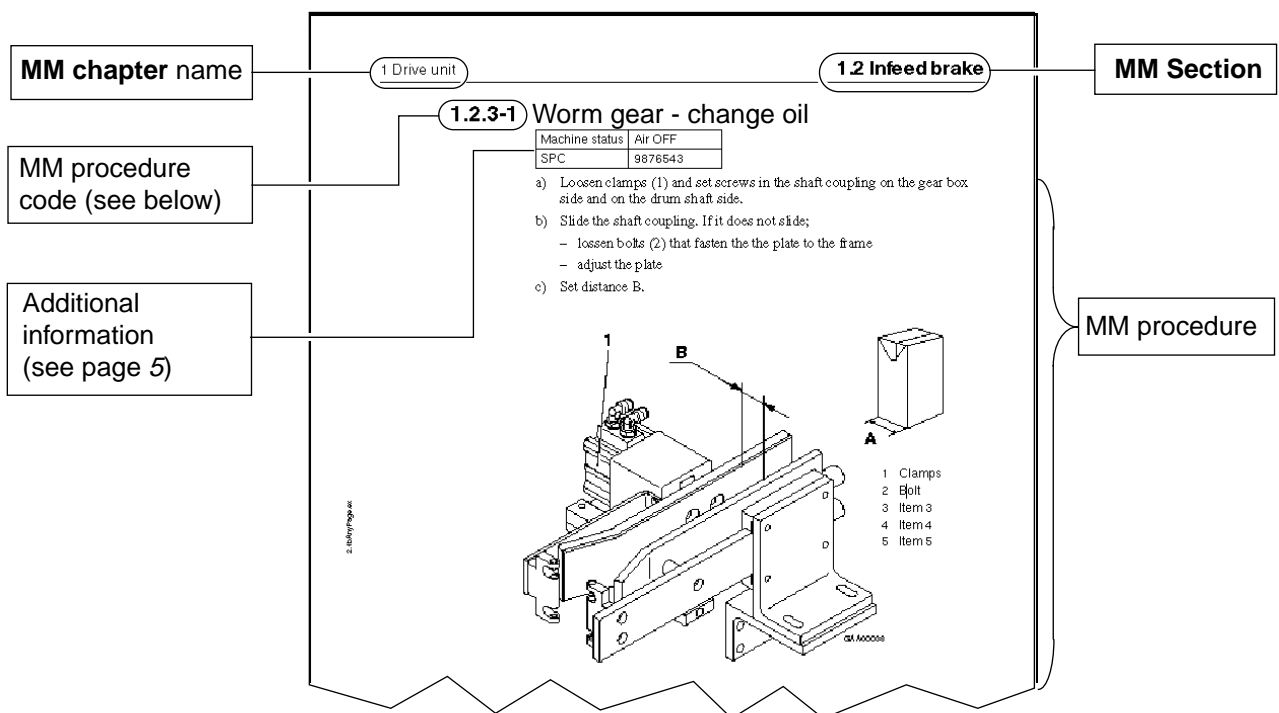
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Tetra Brik Packaging Systems

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How to use this manual

Page layout



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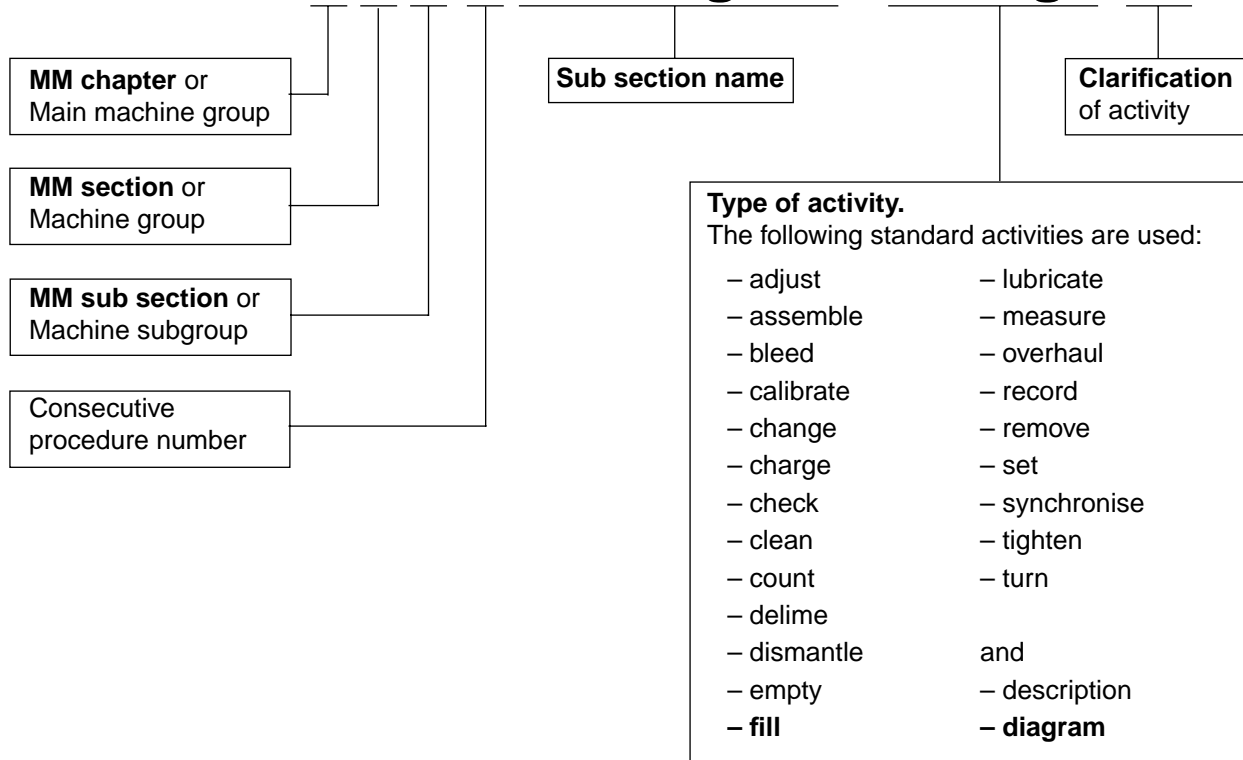
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MM procedure codes

The maintenance procedures are indicated as shown by the example below:

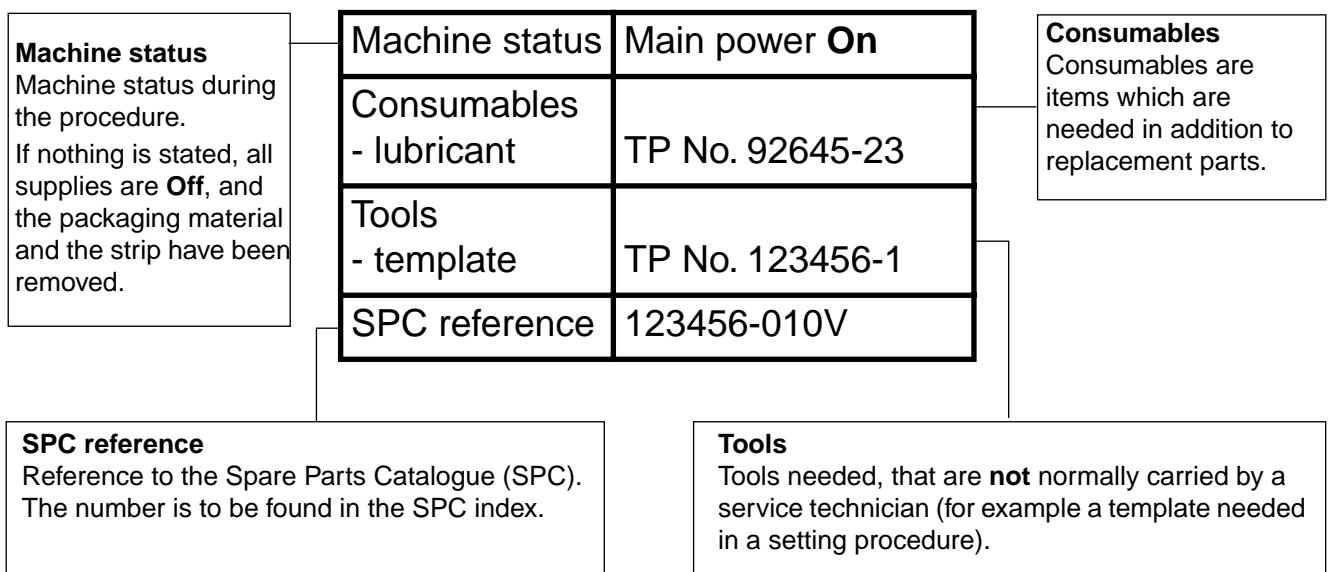
1.2.3-1 Worm gear - change oil



Additional information

The following additional information is included in each MM procedure as applicable.

1.2.3-1 Worm gear - change oil

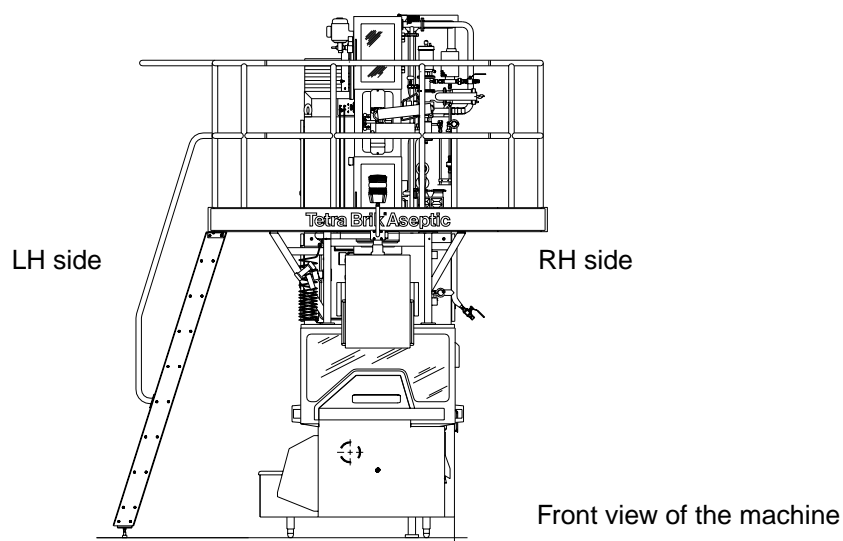


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Abbreviations used in this manual

AP	Aseptic Product
AT	(standard)
ASU	Automatic Splicing Unit
B	Baseline (package shape)
CIP	Cleaning In Place
CS	Control System
DCS	Design Control System
DMC	Digital Motion Control
EM	Electrical Manual
EN	Norme Européenne (European standard)
HF	High Frequency
IH	Induction Heating
IM	Installation Manual
LED	Light Emitting Diode
LH	Left Hand
LS	Logitudinal Seal(ing)
M	Midline (package shape)
MC	Motion Control
MM	Maintenance Manual
OM	Operation Manual
PE	Polyethylene
PC	Personal Computer
PLC	Programmable Logic Controller
PT	PullTab unit
PVC	Polyvinylchloride
RH	Right Hand
S	Slimline (package shape)
SA	Strip Applicator
SP	Spare Part
SPC	Spare Parts Catalogue
SS	Short Stop
TMCC	Tetra Pak Multi-purpose Compact Controller
TP	Tetra Pak
TPIH	Tetra Pak Induction Heating
TPMS	Tetra Pak Maintenance System
TS	Transversal Seal(ing)

Machine orientation



Note! In the beginning of each section, there is an overview of the main group described. For more detailed information, see also the SPC.

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Safety precautions

To ensure maximum safety, always read this section carefully before doing any work on the equipment or making any adjustments.

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Hazard information

General



Failure to observe information marked "DANGER!" **puts your life in danger.**



Failure to observe information marked "WARNING!" can result in **personal injury and/or serious damage to or destruction of equipment.**

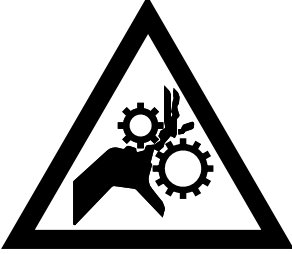

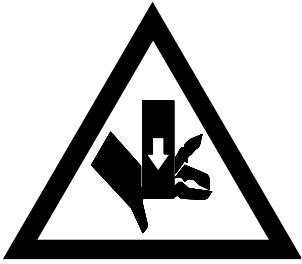


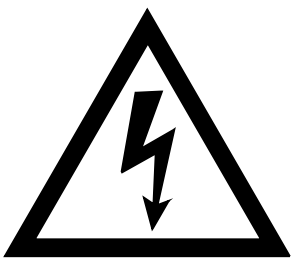
Caution! Failure to observe information marked "Caution!" can result in **damage to equipment.**

Mandatory signs

 <p>Wear eye protection</p>	 <p>Wear hearing protection</p>
 <p>Wear head protection</p>	 <p>Wear protective gloves</p>
 <p>Disinfect hands/gloves</p>	

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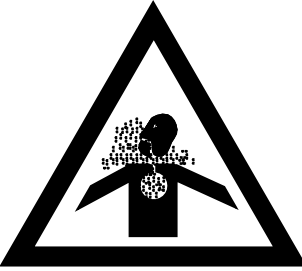

Danger and warning signs

 <p>Risk of entanglement!</p>	 <p>Risk of corrosion!</p>
 <p>Risk of crushing!</p>	 <p>Risk of cutting/amputation!</p>
 <p>Risk of burns!</p>	 <p>Risk of electrocution!</p>

(Cont'd)

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(Cont'd)

 <p>Risk of crushing!</p>	 <p>Risk of intoxication!</p>
 <p>Risk of falling!</p>	

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Personnel

Only skilled or instructed persons are allowed to work on the equipment.

The manufacturer declines all responsibility for injury or damage if the instructions in this manual are not followed.

Personnel are responsible for:

- the equipment and the work area around the equipment
- all personnel in the vicinity of the equipment
- making sure that all safety devices are fully operational

Personnel must regard all electrical equipment as live. Before carrying out maintenance or repair work, switch the equipment off at the mains power and padlock the switch.

Electricians should be certified according to local regulations and have experience of similar types of installations, proven skills in reading and working from drawings and cable lists, and knowledge of local safety regulations regarding power and automation. Work with the electrical equipment must be performed only by skilled or instructed technicians. According to EN 60204.3,55 a skilled person is:

- *An individual with technical knowledge or sufficient experience to enable that individual to avoid hazards which electricity can create.*



General safety precautions

Wear hearing protection while the equipment is running.

Hygiene

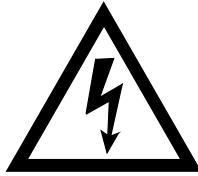
It is important to keep hands and/or gloves clean.

Disinfect hands and/or gloves before touching the packaging material, the strip(s) or any other equipment part that may come into contact with the product.

Clean the platforms, the ladder and the area around the equipment.

To avoid production faults, it is important that the packaging material and the strip(s) never touch the floor, the platform or the area around the equipment.

High voltage



Work with parts marked with this symbol must be performed by **skilled or instructed** persons **only**.

Make sure that the mains power is disconnected before starting any work on electrical equipment marked with this symbol.

In case of accident, call for medical attention immediately.

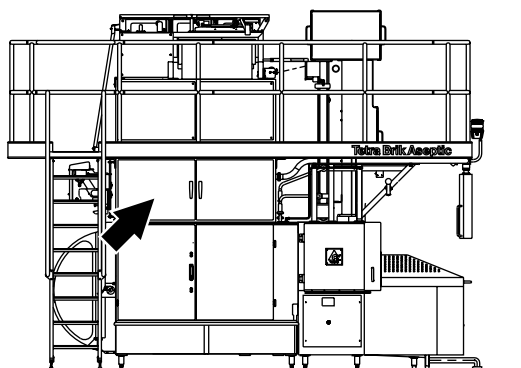
Electrical cabinet



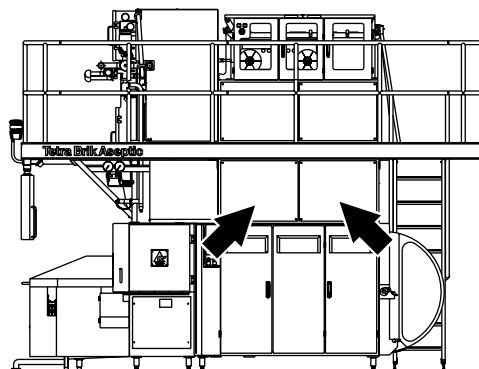
There is high voltage in the electrical cabinet (up to 400 V).

Work inside the electrical cabinet must be performed by skilled or instructed persons only.

Electrical cabinet doors locked with screws may be opened only by skilled or instructed persons.



LH side



RH side

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Machine safety devices

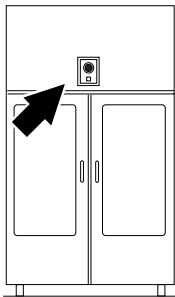
Emergency stop buttons

Learn the position of the **Emergency stop** buttons in order to stop the equipment immediately in case of danger to people or damage to the equipment.

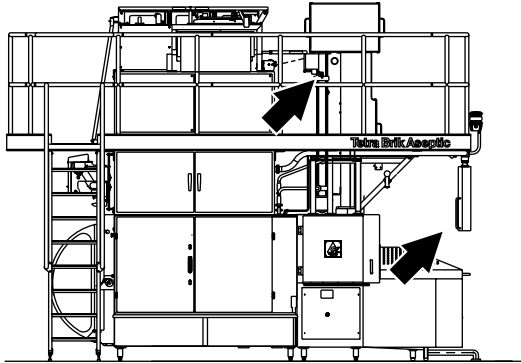
The **Emergency stop** buttons do not switch off the power at the mains power switch.

Pushing the **Emergency stop** buttons will reset the equipment program to **Zero** position and deactivate all pneumatic cylinders.

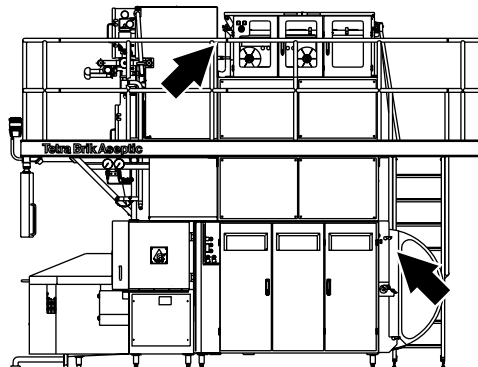
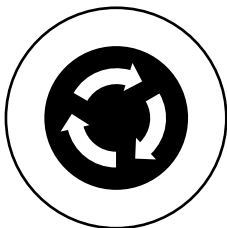
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ASU variant



LH side SA variant

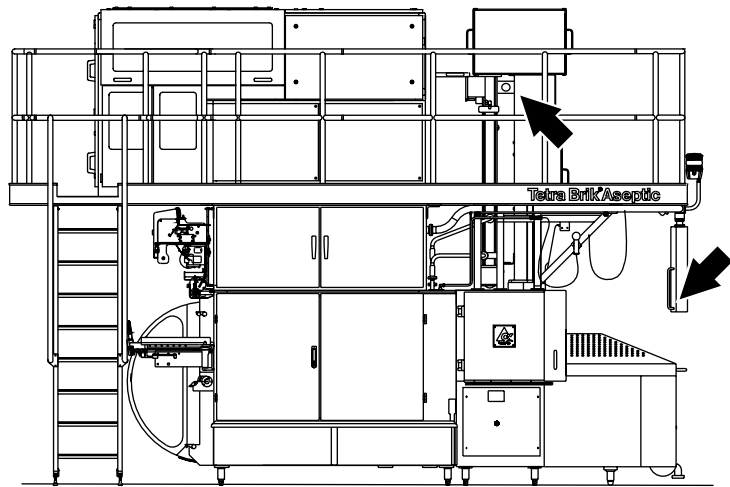
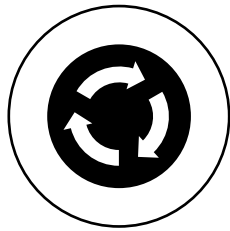


RH side SA variant

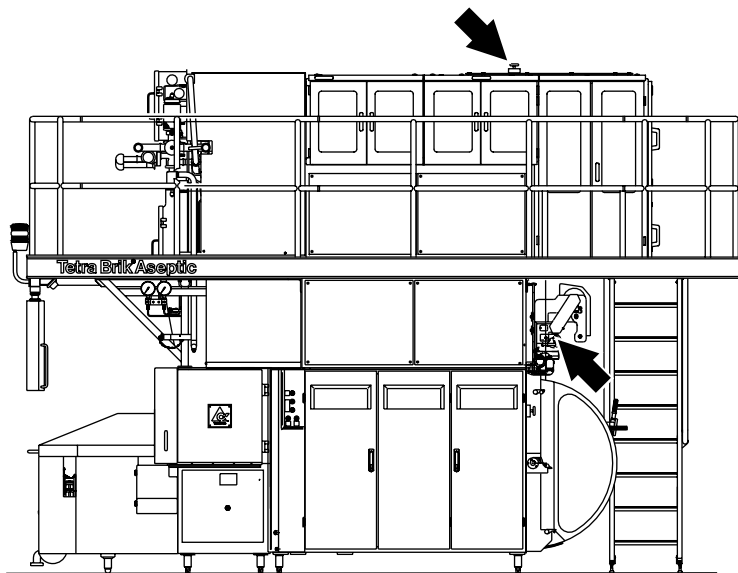
(Cont'd)

Safety precautions

(Cont'd)



LH side PT variant



RH side PT variant

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Doors, covers and guards



Make sure that all doors, covers and guards are in place and functioning.

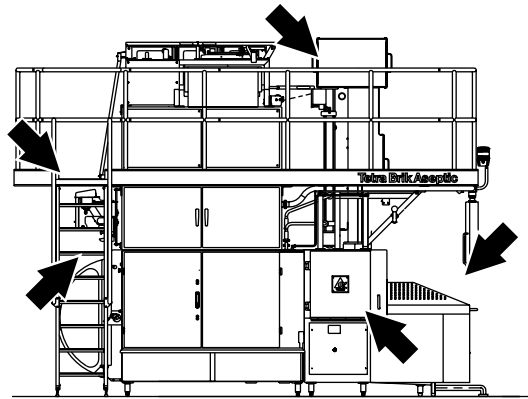
Never remove covers or guards while the equipment is operating.

Certain doors, covers and guards are fitted with safety switches. These switches are part of the safety system and must **never** be bridged, by-passed or otherwise made non-operational.

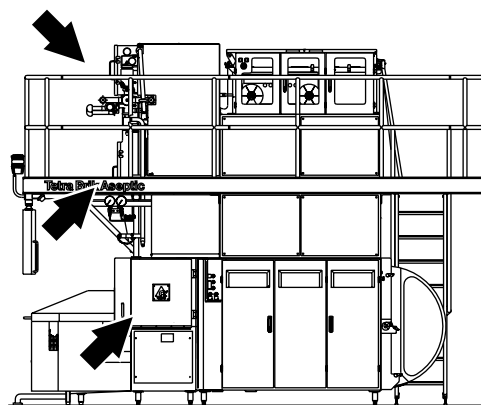
Never stop the equipment by opening a door or cover with a safety switch.

The equipment may perform a reciprocating movement during the first few seconds after a stop. Some equipment parts may also be hot.

In case of accident, call for medical attention.



LH side SA variant



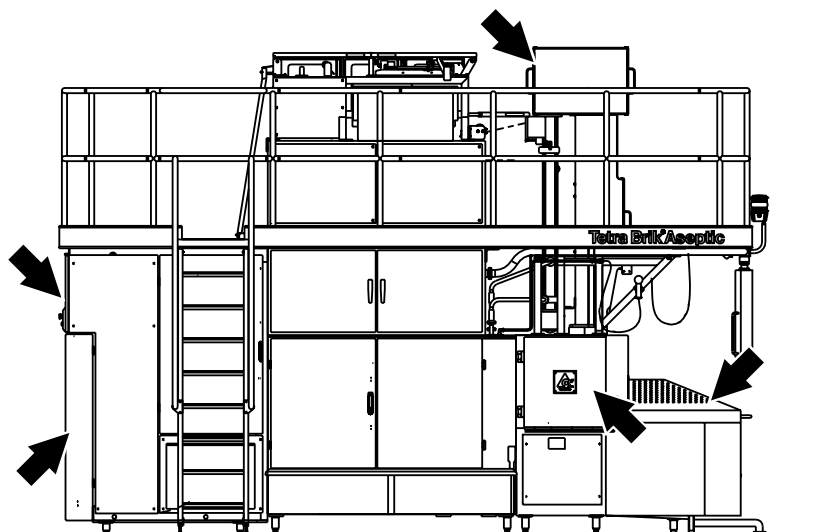
RH side SA variant

(Cont'd)

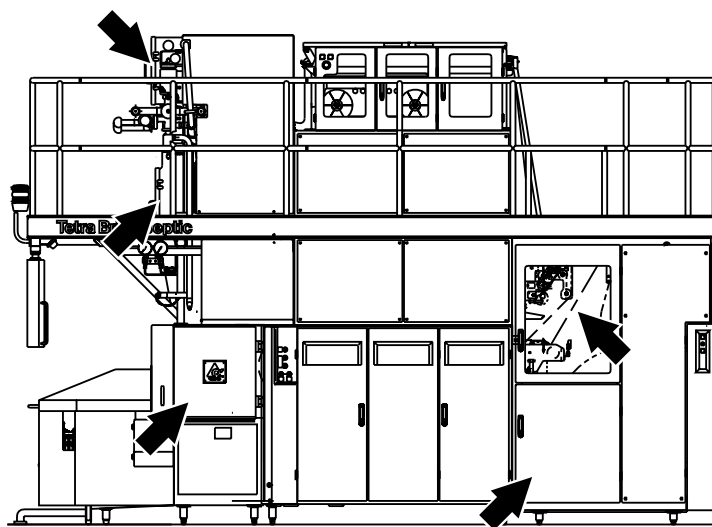
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Safety precautions

(Cont'd)



LH side ASU variant

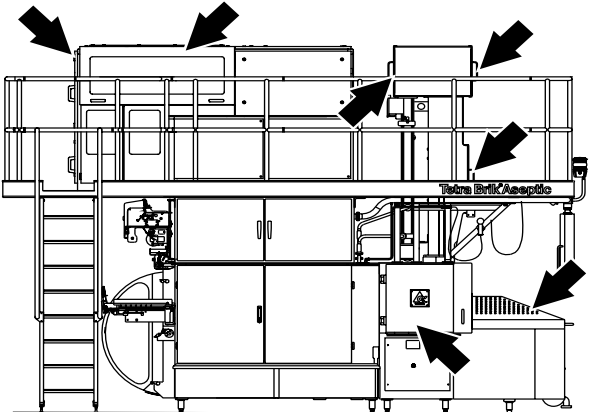


RH side ASU variant

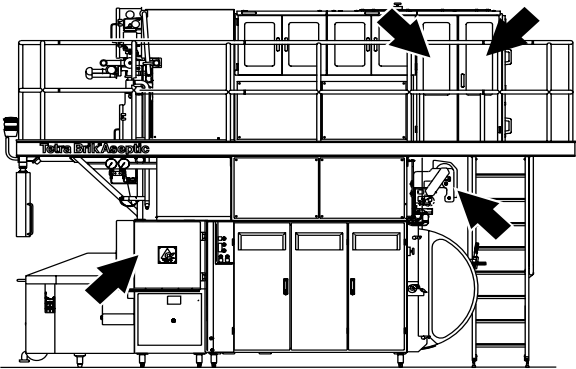
(Cont'd)

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(Cont'd)



LH side PT variant



RH side PT variant

2.28207904.sp

Chemical products



Risk of personal injury!

Certain chemical products are toxic and/or inflammable. Carefully follow the instructions on the container label.

Follow the supplier's instructions for handling and disposal of the chemical products.

Personal protective equipment

- **Safety goggles**, TP No. 779130-102
- **Apron**, TP No. 90303-5
- **Shoes** made of PVC, PE plastic or rubber
- **Protective gloves** made of neoprene, TP No. 90303-4

Before starting work with any chemical products, make sure that:

- the showers work
- a portable, TP No. 90303-6, or wall-mounted eyewash device is available at or near each machine site
- there are additional washing facilities

(Cont'd)

(Cont'd)



General emergency procedures

If you accidentally **swallow** chemical products, drink large amounts of lukewarm water.

If you get splashes or vapour from chemical products in your **eyes**, wash your eyes thoroughly with lukewarm water for 15 minutes (keeping eyelids wide apart).

If chemical products come into contact with **skin** or **clothes**:

- rinse immediately with plenty of water
- if skin burns appear, call for medical attention immediately
- thoroughly wash clothes before wearing them again

If you experience irritation or pain due to having **inhaled** chemical products vapour:

- leave the affected area and get some fresh air
- if the symptoms get worse, call for medical attention

Hydrogen peroxide

The liquid used for sterilising the packaging material consist of 35% hydrogen peroxide (H₂O₂).

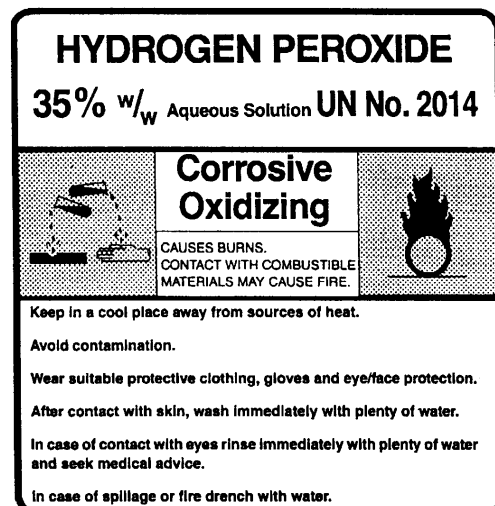


Hydrogen peroxide in liquid and gas form can cause irritation and injury if it comes into contact with the skin, mucous membranes, the eyes or clothes. Carefully follow the instructions on the can label.

Hydrogen peroxide can HYDROGEN PEROXIDE:

- 35% w/w Aqueous Solution UN No. 2014
- Corrosive
- Oxidizing
- Causes burns. Contact with combustible materials may cause fire
- Keep in a cool place away from sources of heat
- Avoid contamination
- Wear suitable protective clothing, gloves, and eye/face protection
- After contact with skin, wash immediately with plenty of water and call for medical attention
- In case of contact with eyes, rinse immediately with plenty of water and call for medical attention
- In case of spillage or fire, drench with water

Reference: TP document No. M 1751.80



Example of can label

(Cont'd)

(Cont'd)

Storage of hydrogen peroxide

Make sure that the area or room used for storage is:

- cool, clean and well ventilated
- shielded from direct sunlight
- free from combustible materials

Hydrogen peroxide must be stored only in its **original container** as delivered by the suppliers.

Keep the container upright and closed with a **proper ventilation cap** which allows oxygen to escape.

Pumps and other equipment used for hydrogen peroxide must be used **for this purpose only**.

Never put used hydrogen peroxide back into storage.

Disposal of hydrogen peroxide

Hydrogen peroxide should be sent for destruction by waste disposal specialists.



Risk of explosion!

Do not pour surplus hydrogen peroxide back into its original container. Hydrogen peroxide may decompose. In case of accident, call for medical attention immediately.

In some countries it is permitted to dilute hydrogen peroxide with water to a concentration below 1% and to dispose of it in the normal waste water drain. Hydrogen peroxide with a concentration below 1% is considered harmless.



WARNING!

Ink

Risk of personal injury!

Ink is inflammable and can be harmful if it comes into contact with the eyes or skin. Carefully follow the instructions on the container label.

Ink container

- INFLAMMABLE
- Avoid direct contact with the product
- Use gloves and goggles
- Care for good ventilation
- Propylene glycol mono methyl ether >30%
- Ethanol 1-5%
- **SHAKE BEFORE USE**



**BLACK MARKFLEX
MF 7011
INFLAMMABLE**

Avoid direct contact with
the product

Use gloves and goggles
Care for good ventilation

Propylene glycol mono
methyl ether >30%
Ethanol 1 - 5%

Manufacturer:
G-man AB
tel. 0410-59200
Trelleborg
SWEDEN

TP No. 90299-72

SHAKE BEFORE USE

Equipment for lifting and moving loads



Make sure that the capacity of the lifting equipment is adequate and that the equipment itself is in good working order.

If lifting tackle has to be joined to make up the necessary lengths, make sure that the joins are secure and have the same lifting capacity as the rest of the tackle.

Always engage the safety clip on lifting hooks to prevent the tackle from slipping off.

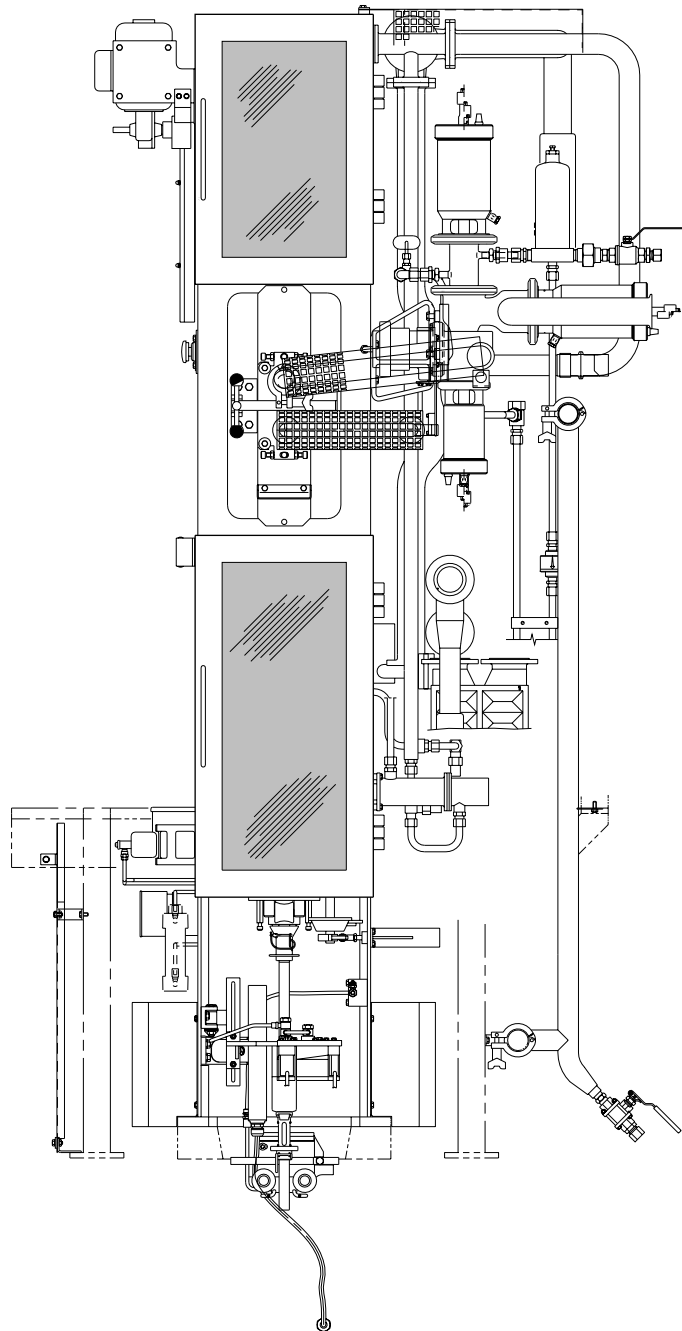
Use ropes or poles to steady and manoeuvre loads. Do **not** use hands or feet.

Make sure that the route and the destination are free from obstacles before moving a suspended load. It must be possible to lower the load to the floor quickly and safely in an emergency.

When depositing loads, keep the lifting equipment in place until the stability of the load has been checked.

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1 Superstructure

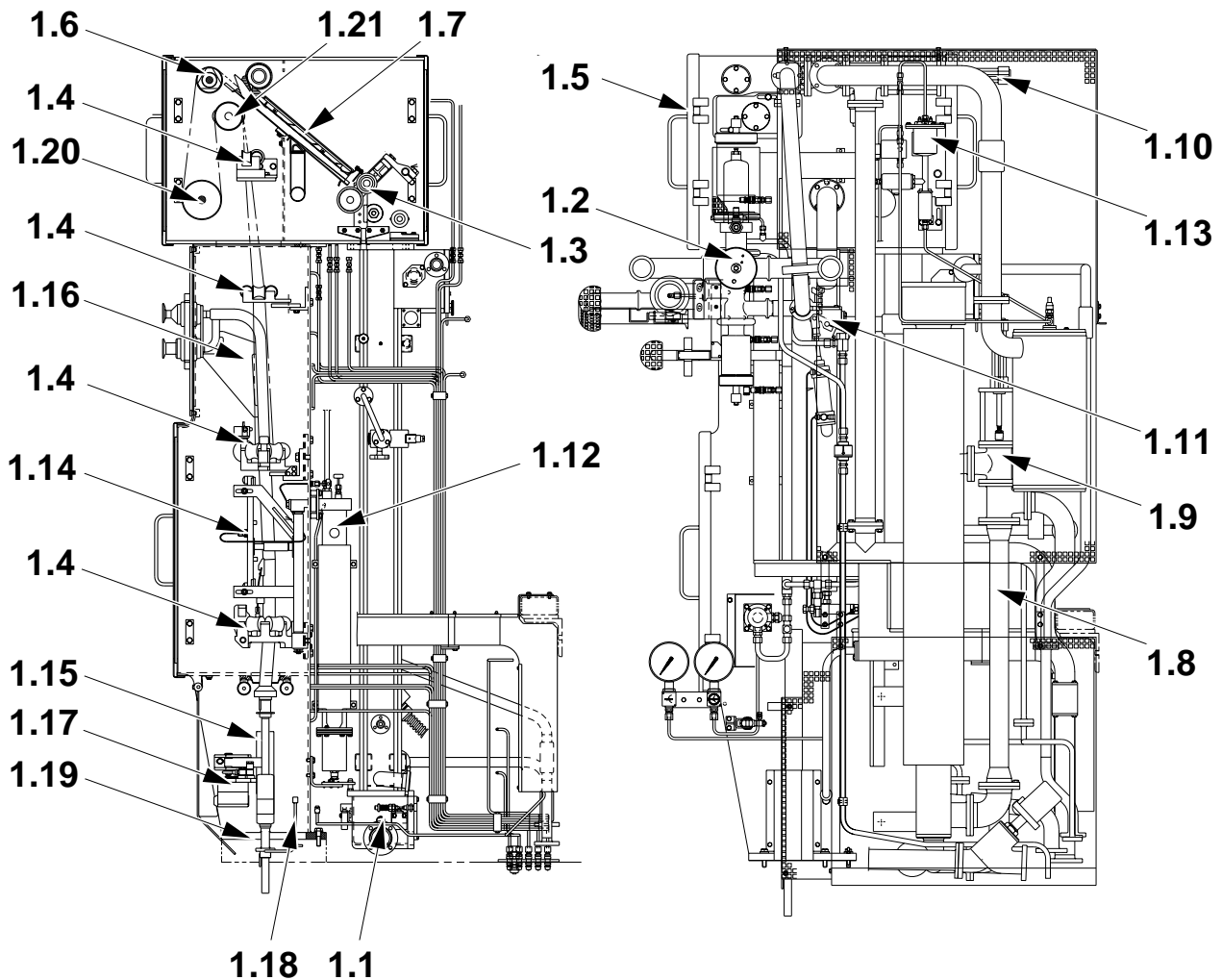


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1 Superstructure

1-1 Superstructure - description

SPC reference 648111-110V



1.1	Bath	1.12	Hot air element
1.2	Product valve	1.13	Spray system
1.3	Calender rollers	1.14	Air nozzle (LS)
1.4	Tube forming	1.15	Level probe
1.5	Aseptic chamber	1.16	Filler tube
1.6	Bending roller (driven)	1.17	Photocell unit
1.7	Air knife	1.18	Tube flushing
1.8	Heat exchanger	1.19	Filling system
1.9	Valve (heat exchanger)	1.20	Crease roller
1.10	Valve (air inlet)	1.21	Bending roller
1.11	Change over valve (suction)		

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1-2 Superstructure - check bending rollers

SPC reference	256014-070V 272004-040V 751088-030V
---------------	-------------------------------------------



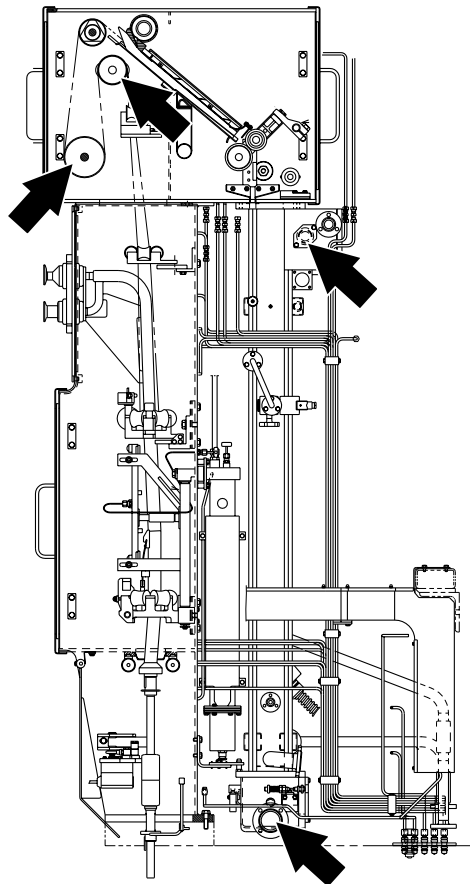
Hydrogen peroxide!
Follow the *Safety precautions*.

Check that the bending rollers in the superstructure rotate freely and that the radial play is not excessive.

Make sure that the running surfaces of the rollers are not worn or damaged.

Change the bending roller bearings and/or bushings if there is any sign of excessive play, see:

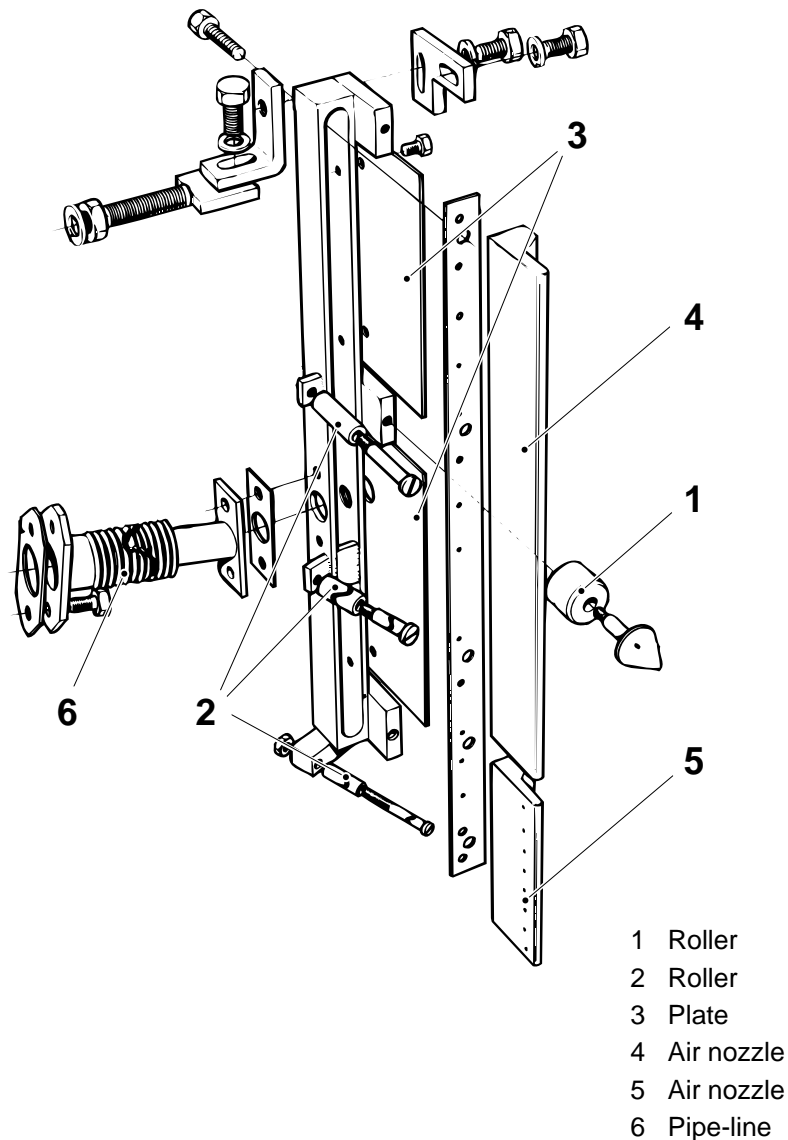
- 1.1.1-2 Lower bending roller - change bushings and shaft
- 1.1.2-1 Upper bending roller - change bushings
- 1.20-1 Crease roller - change bearings
- 1.21-1 Bending roller - change bearings



1-3 Superstructure - check air nozzle (LS) and hot air element (LS SS)

SPC reference	469501-040V 256095-060V
---------------	----------------------------

- a) Check that the rollers (1) and (2) rotate smoothly.
- b) Remove the plates (3) and make sure that the air holes of the LS nozzles (4) and (5) are not clogged, and that the nozzles are clean and without defects. Clean as required.
- c) Make sure that the pipe-line (6) is not damaged.

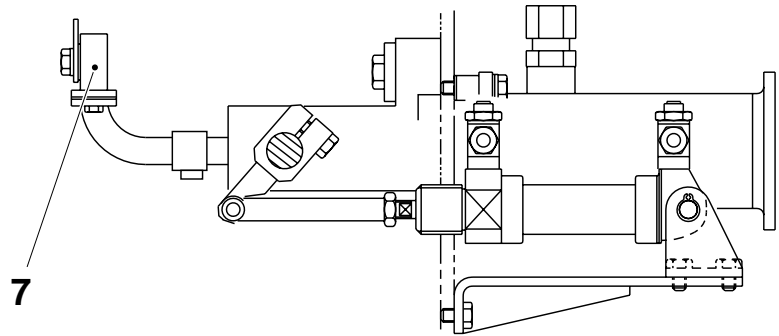


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- d) Make sure that the air holes of the nozzle (7) on the hot air element are not clogged, and that the nozzle is clean and without defects. Clean as required.



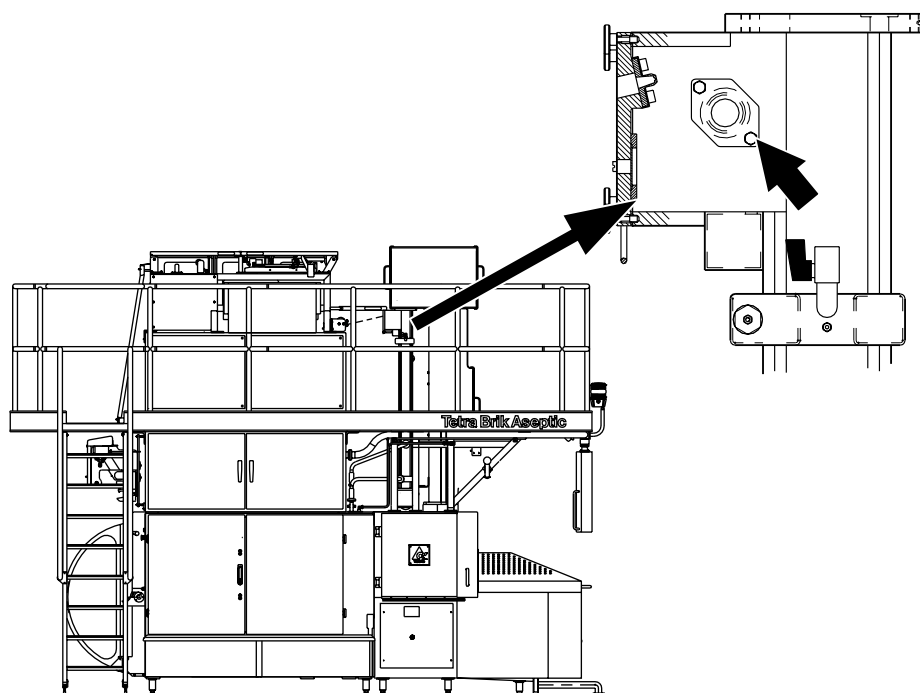
7 Nozzle

1-4 Superstructure - measure pressures

Machine status	Short stop
Tools - pressure gauge - hose connection	TP No. 90243-137
SPC reference	256014-070V 272021-070V

Bath - measure underpressure

- Unscrew the screw and fit a hose connection in its place.
- Connect the pressure gauge to the hose. Step up the machine to step **Production**.
- Measure the underpressure and record the measured value.
- Perform a **Short stop** and refit the screw.



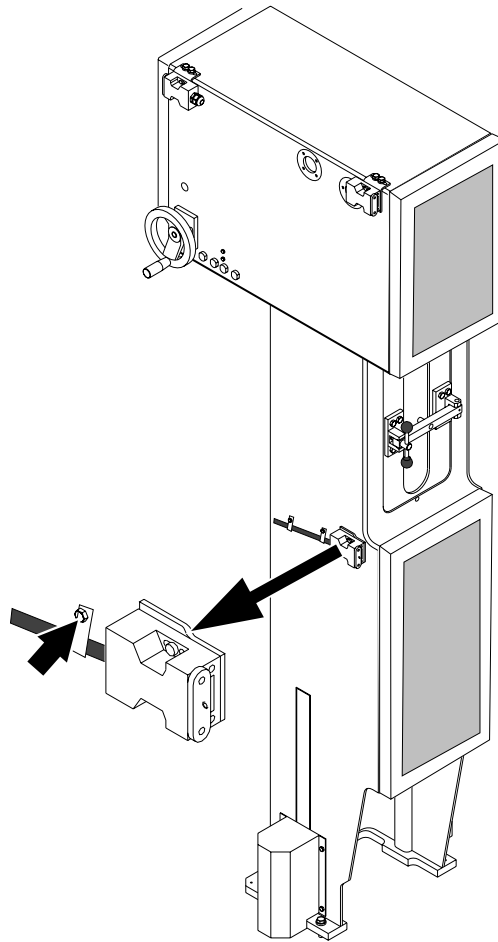
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(Cont'd)

(Cont'd)

Aseptic chamber - measure overpressure

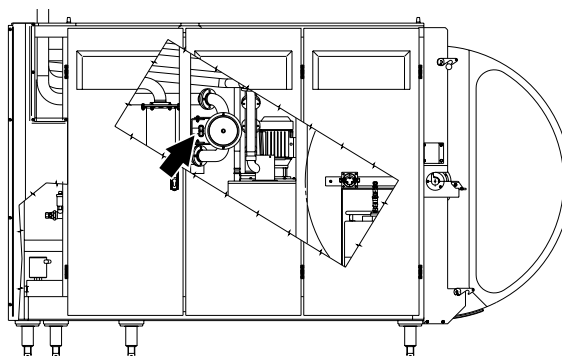
- a) Unscrew the screw in the aseptic chamber and fit a hose connection in its place.
- b) Connect the pressure gauge to the hose connection and step up the machine to step **Production**.
- c) Measure the overpressure and record the measured value.
- d) Stop the machine and refit the screw.



1-5 Superstructure - check pressures

Machine status	Short stop
Tools - pressure gauge - hose connection - leak finding equipment	TP No. 90243-137 2 pcs TP No. 533014-010V
SPC reference	256014-070V 272021-070V

Note! If the machine is connected for 60 Hz, first set the compressor air pressure to 0.3 bar by means of the regulating screw at the 60 Hz by-pass (arrow).

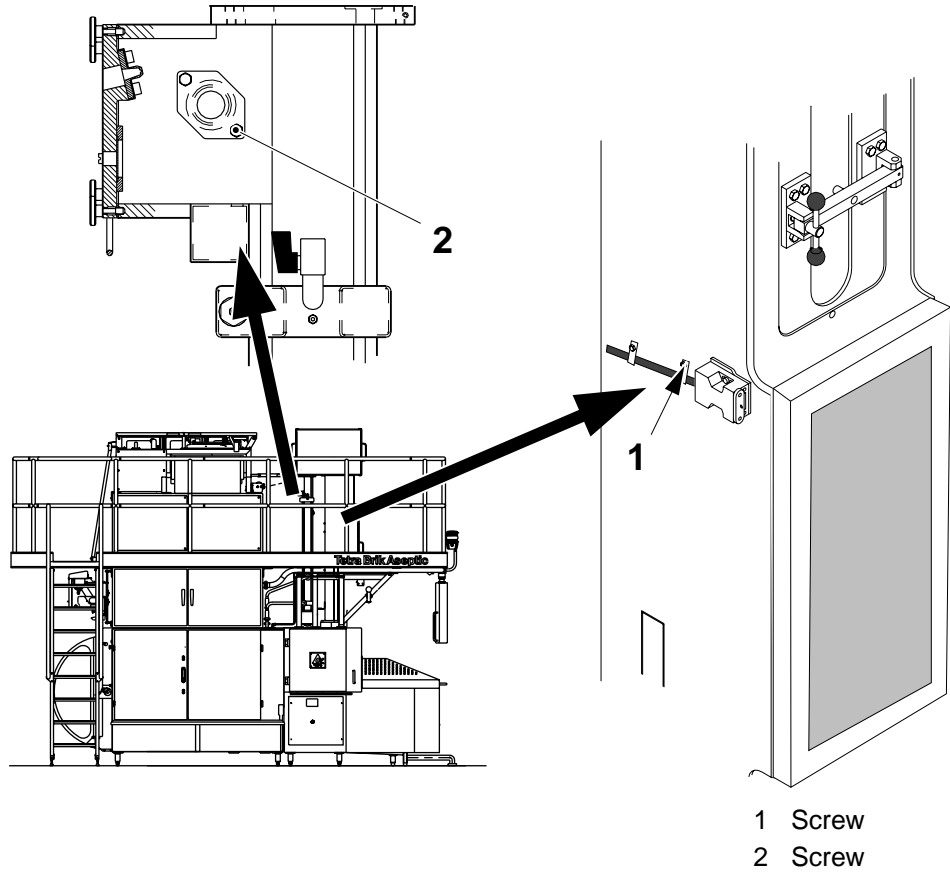


a) Measure the leakages, see *1.5-3 Aseptic chamber - measure leakage*.

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(Cont'd)

- b) Unscrew the screw (1) on the aseptic chamber and the screw (2) in the bath. Fit hose connections in their places.



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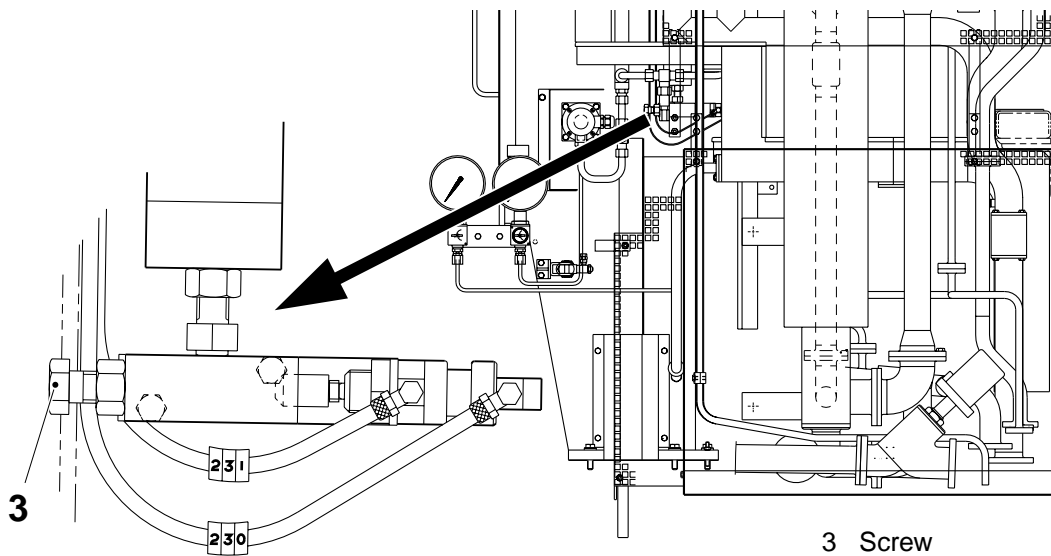
1 Superstructure

(Cont'd)

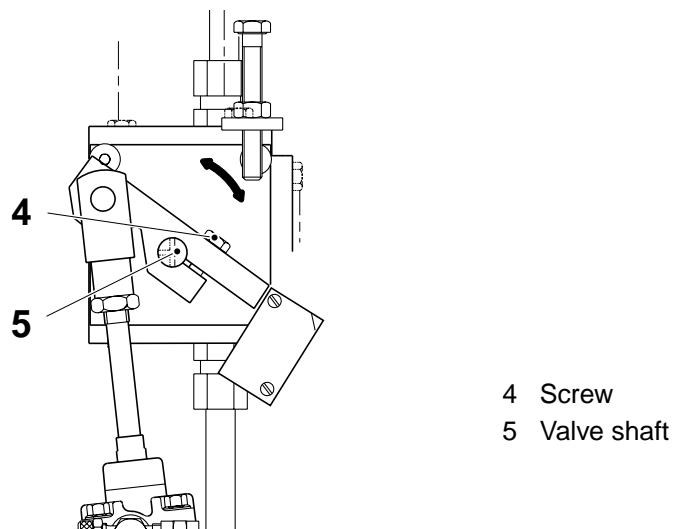
- c) Connect pressure gauges to the hoses and check that
 - the **overpressure** in the aseptic chamber is 20 - 30 mmWC
 - the **underpressure** in the bath is 1 - 5 mmWC

Note! Decreasing the overpressure in the aseptic chamber reduces the pressure in the bath.

- d) If required, set:
 - the **overpressure** by means of the screw (3) on the valve. **Screw in** to decrease the overpressure



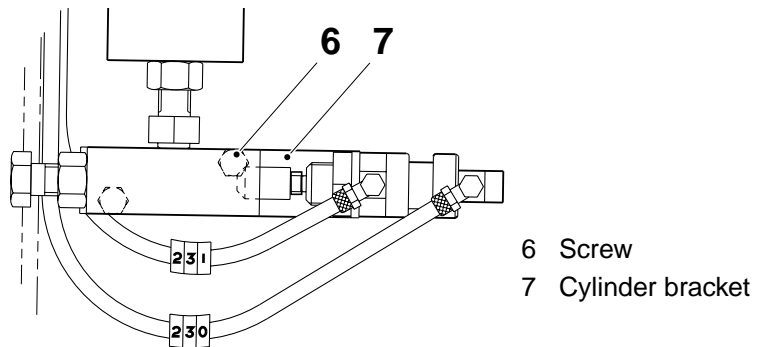
- the **underpressure** by loosening the screw (4) on the change over valve, and turning the valve shaft (5).
Turn the valve shaft **clockwise** to decrease the underpressure.



(Cont'd)

(Cont'd)

- e) Repeat until both pressures are within the limits.
- f) Perform a **Short stop** and set
 - the **overpressure** in the aseptic chamber to 5 - 40 mmWC
 - the **underpressure** in the bath to 1 - 40 mmWCTo set, loosen the screws (6) and shift the cylinder bracket (7).
- g) If it is not possible to obtain the correct pressures, change the seals of chains in the bath as follows.



(Cont'd)

(Cont'd)

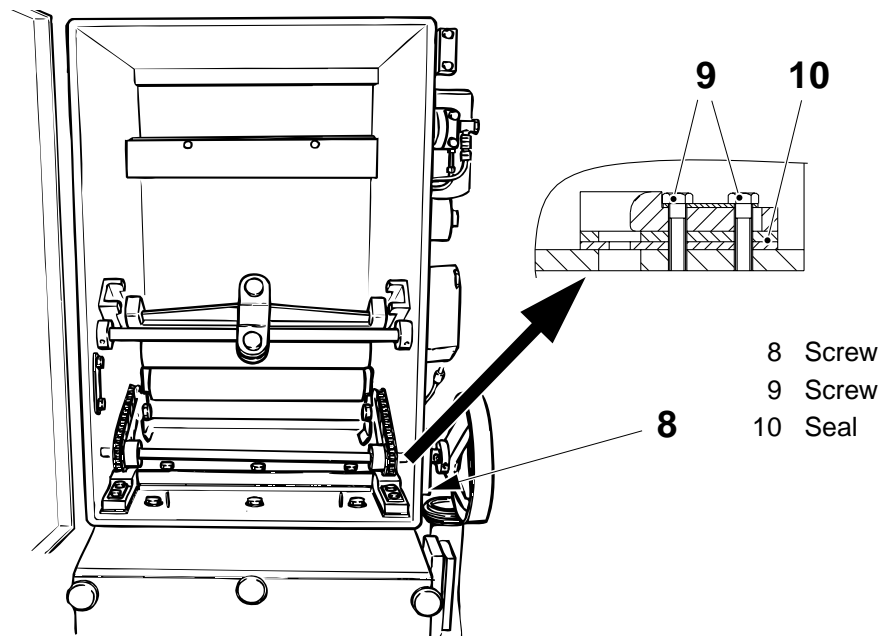
Change chain seals



Hydrogen peroxide!

Follow the *Safety precautions*.

- a) Step down to **Zero** position.
- b) Make sure that the chain carrier is in its upper position. Slacken the peroxide bath chains by loosening the screws (8) on both sides and shifting the chain crank.
- c) Tie up the chain ends so that they **cannot drop** down into the bath. Carefully remove the carrier and take the chains apart.
- d) Unscrew the screws (9) and change the seals (10).
- e) Assemble in the reverse order and tighten the chains.



1.1 Bath

SPC reference	256014-070V
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1.1-1 Bath - check suction box seal

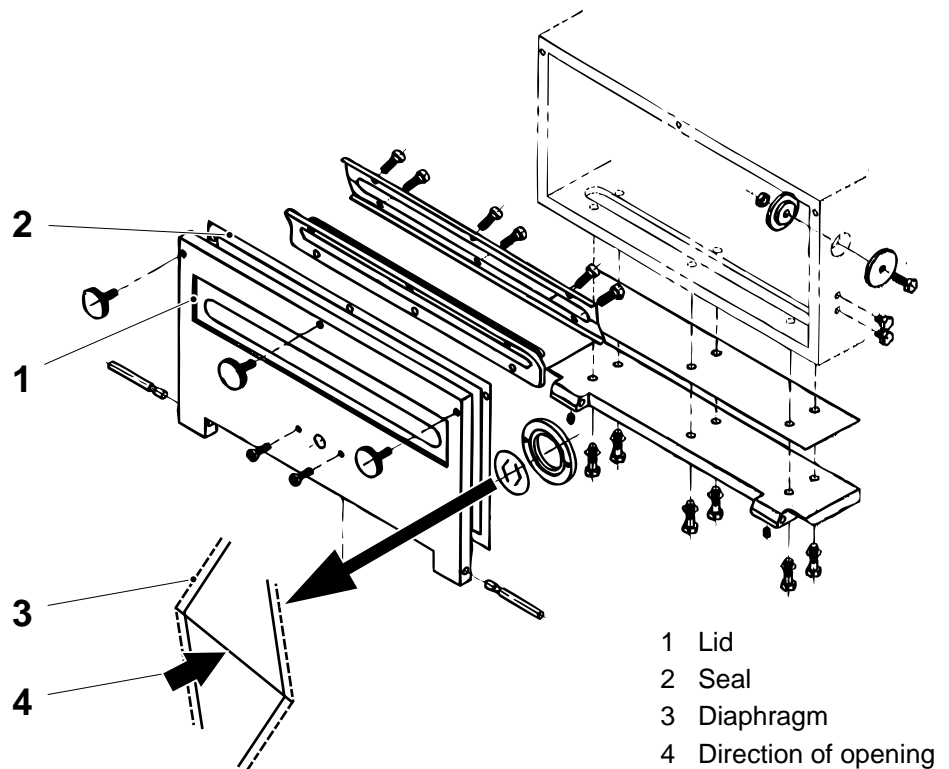
Consumables - adhesive	TP No. 90153-23
SPC reference	256014-070V



Hydrogen peroxide!
Follow the *Safety precautions*.

- Open the lid (1). Check that the seal (2) is not worn or damaged. If required, change the seal. Fit the new one with adhesive.
- Check that the diaphragm (3) is not worn and/or damaged. Change as required.

Note! The slits in the diaphragm are angled. Fit the diaphragm with the direction of opening (4) as illustrated. It must revert to **closed position** after actuation **from the outside**.



(Cont'd)

(Cont'd)

- c) Insert a piece of packaging material of the correct width through the seal (5). Make sure that the seal closes tight and that the bevelled edges are not worn. If required, unscrew the screws (6) and change the seal.

Note! For machines equipped with PullTab unit, the seal is fitted on the outside of the lid.

- d) Assemble in the reverse order.
- e) Check the underpressure in the bath, see *1.5-2 Aseptic chamber - check overpressure*.

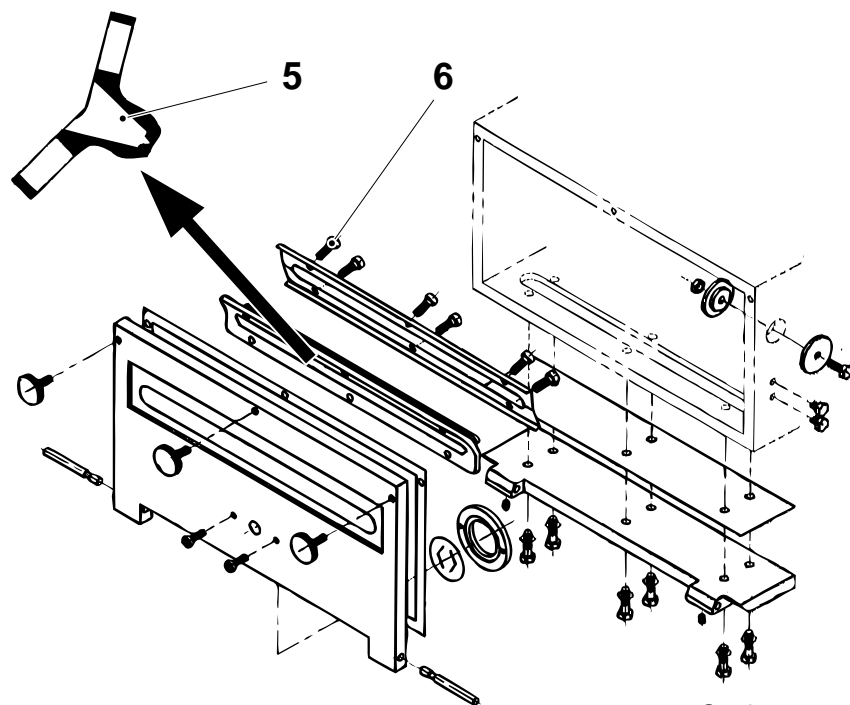


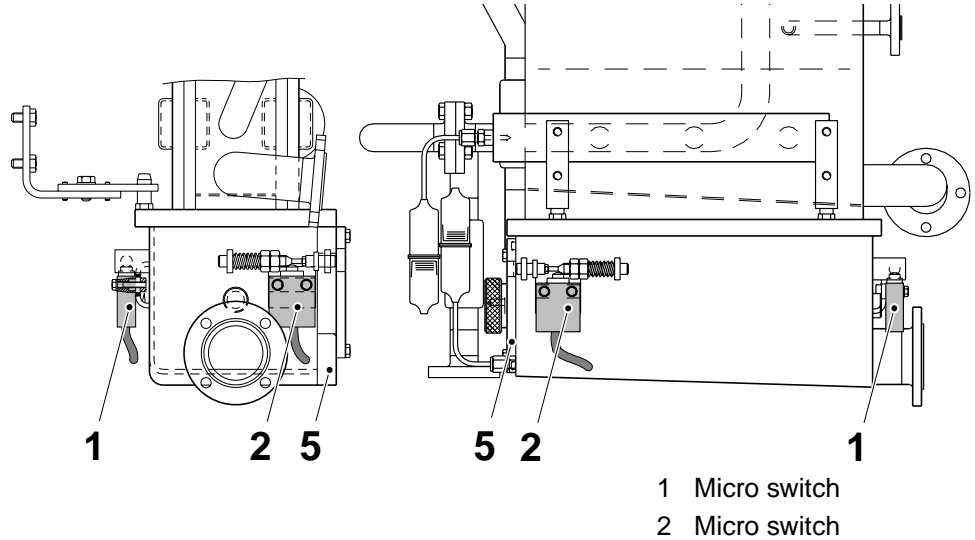
Fig. shows variant for SA machines

5 Seal
6 Screw

1.1-2 Bath - check micro switches

SPC reference	256014-070V
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Check that the micro switch (1) for the side cover of the bath and the micro switch (2) for the front cover are clean and without defects.



If required, unscrew the screws (6) and change the micro switches.

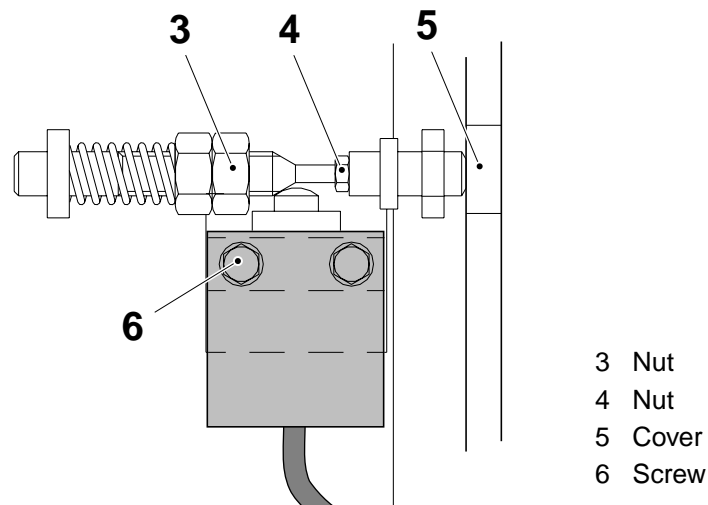
Setting

Machine status	Power On
----------------	----------

The micro switches are to be set so that an alarm is

- **activated** as soon as the cover (5) is **not** tightened in its correct position
- **not** activated when the cover is in the correct position

If required, set by means of the nuts (3) and (4).



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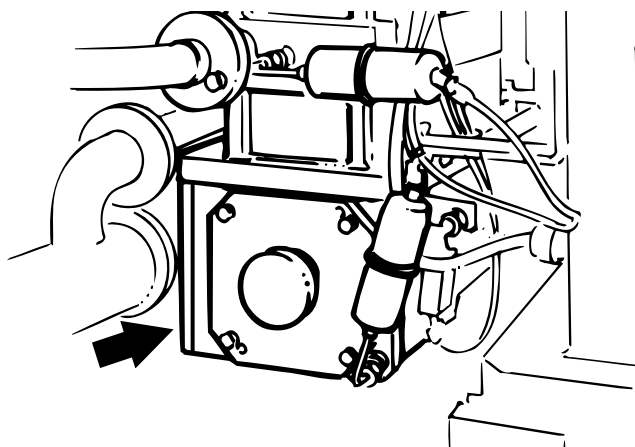
1.1.1 Lower bending roller

1.1.1-1 Lower bending roller - check

SPC reference	256014-070V
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**Hydrogen peroxide!**Follow the *Safety precautions*.

- Unscrew the screws and remove the front cover of the bath.

*(Cont'd)*

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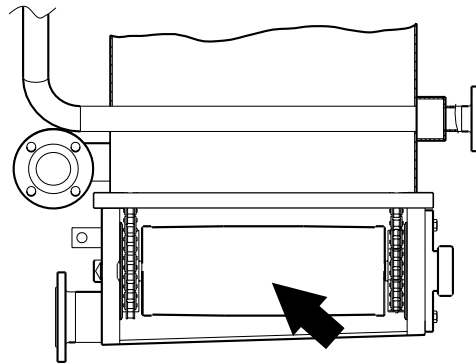


(Cont'd)

Risk of explosion!

Make sure that no oil or dirt comes into contact with parts in the bath.

- b) Make sure that the lower bending roller is clean and free from defects. Make sure that it rotates freely. Change the bearings in the roller as required, see *1.1.1-2 Lower bending roller - change bushings and shaft*.
- c) Remove any strip residues from the bottom of the bath.
- d) Make sure that the O-ring of the cover is without defects. Change as required.



- e) Refit the cover.
- f) Make sure that the proximity switch of the peroxide bath cover is activated when the cover has been fitted, see also *1.1-2 Bath - check micro switches*.

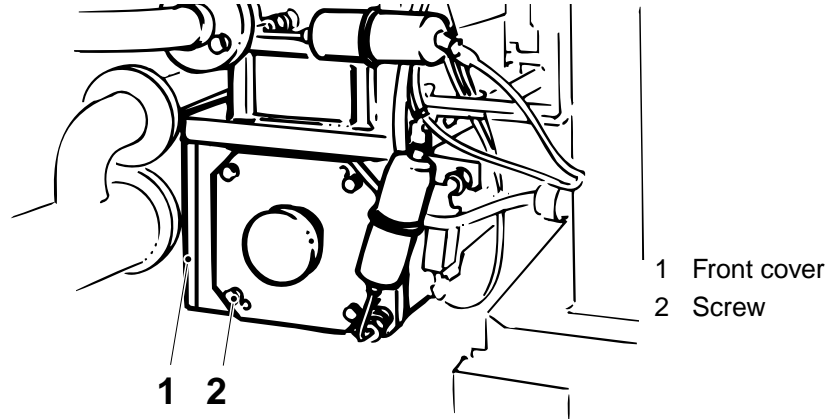
1.1.1-2 Lower bending roller - change bushings and shaft

SPC reference 256014-070V



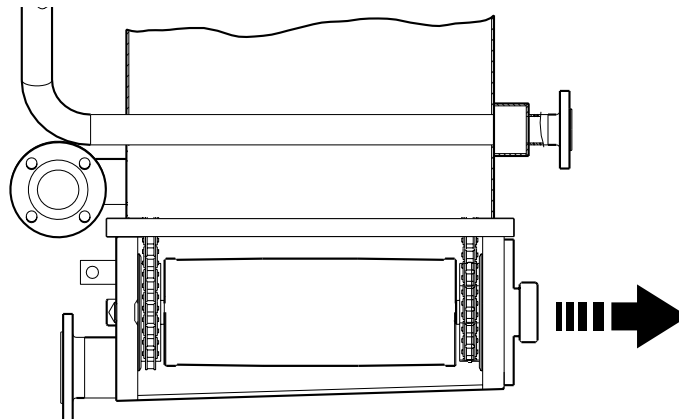
Hydrogen peroxide!
Follow the *Safety precautions*.

- a) Unscrew the screws and remove the front cover (1). Undo the screws (2).



Risk of explosion!
Make sure that no oil or dirt comes into contact with parts in the bath.

- b) Lift off the chains, pull out the lid together with the roller and the sprockets.



(Cont'd)

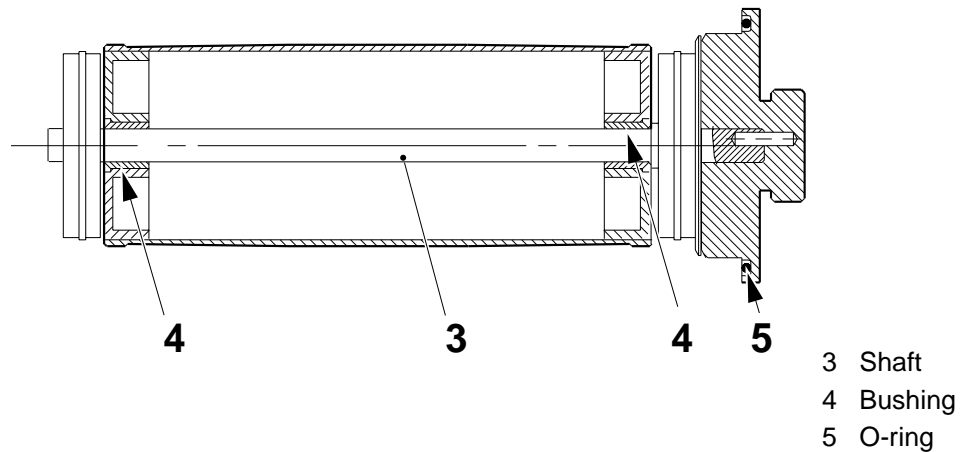
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(Cont'd)

- c) Change the shaft (3) and the bushings (4). Make sure that the O-ring (5) is intact. Change as required.
- d) Assemble in the reverse order.

Note! Make sure to fit the covers properly.

- e) Set the micro switches. Follow the procedure in *1.1-2 Bath - check micro switches*.



1.1.2 Upper bending roller

1.1.2-1 Upper bending roller - change bushings

SPC reference	256014-070V
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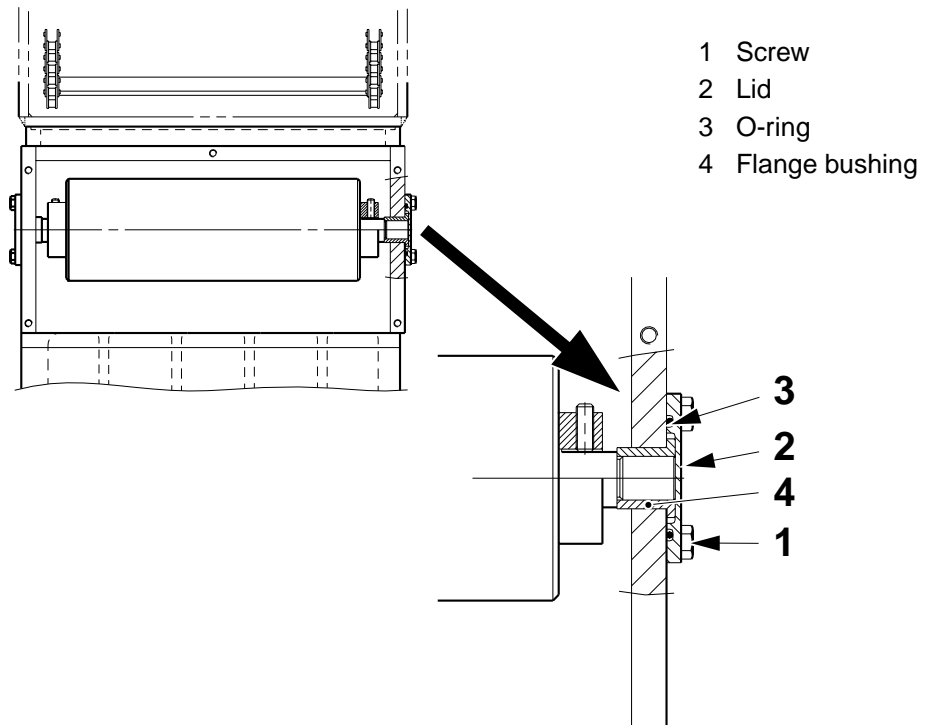
**Hydrogen peroxide!**Follow the *Safety precautions*.

- a) Open the lid of the suction box.
- b) Unscrew the screws (1) and remove the lids (2) and the O-rings (3).
- c) Change the flange bushings (4).

**Risk of explosion!**

Make sure that no oil or dirt comes into contact with parts in the bath.

- d) Assemble in the reverse order.



1.1.3 Peroxide bath lid (PT19 variant)

1.1.3-1 Peroxide bath lid - check suction box seals

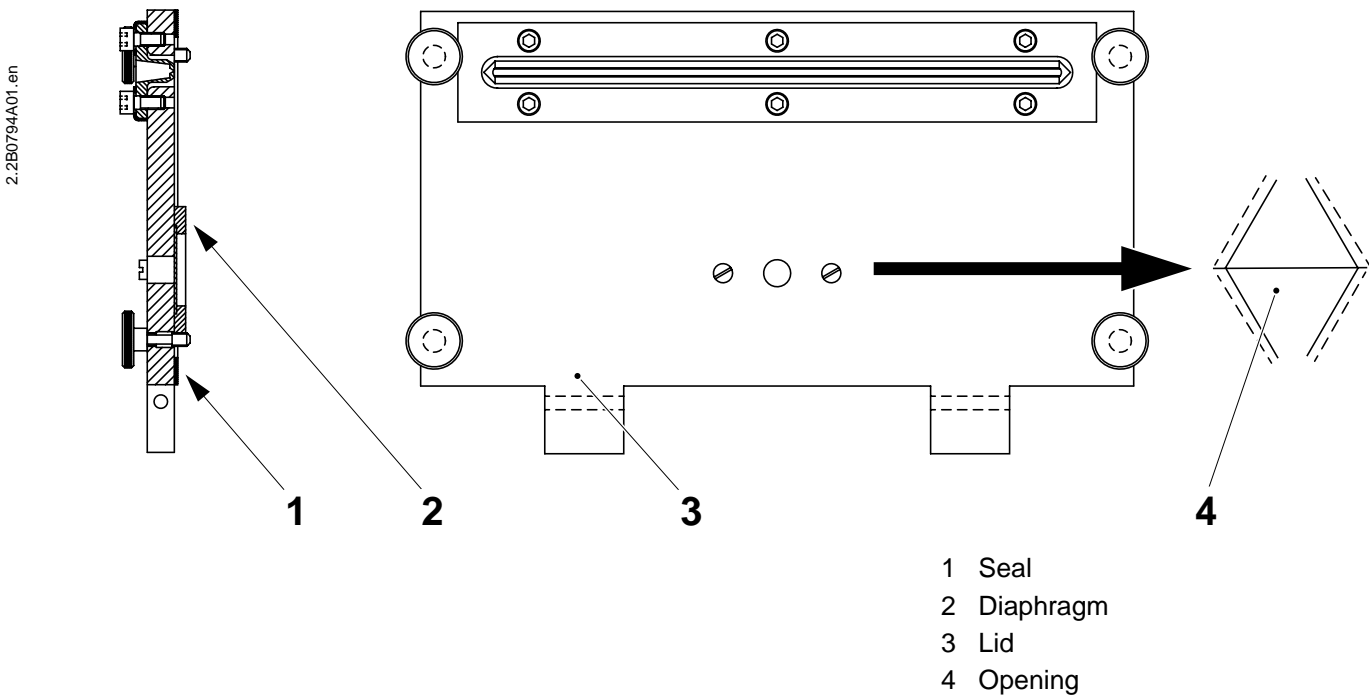
Consumable - adhesive	TP No. 90153-23
SPC reference	582432-010V



Hydrogen peroxide!
Follow the *Safety precautions*.

- a) Remove the lid (3). Check that the seal (1) is not damaged or worn. Change as required. Fit the new seal with adhesive.
- b) Check that the diaphragm (2) is not worn and/or damaged. Change as required.

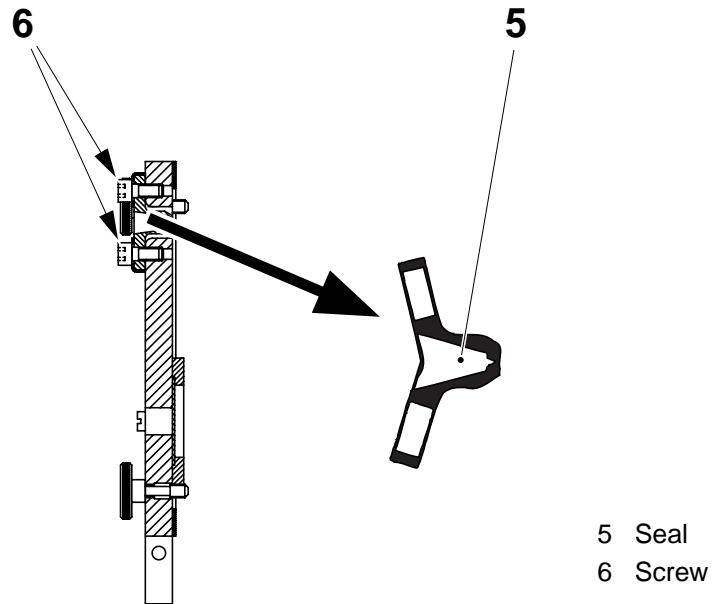
Note! The slits in the diaphragm are angled. Fit the diaphragm with the direction of the opening (4) as illustrated. It must revert to **closed position** after actuation from the outside.



(Cont'd)

(Cont'd)

- c) Insert a piece of packaging material of the correct width through the seal (5). Make sure that the seal closes tight and that the bevelled edges are not worn. If required, unscrew the screws (6) and change the seal.
- d) Assemble in the reverse order.
- e) Check the underpressure in the bath, *1-4 Superstructure - measure pressures*.



1.2 Product valve

SPC reference	272560-070V
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1.2-1 Product valve - clean steam traps

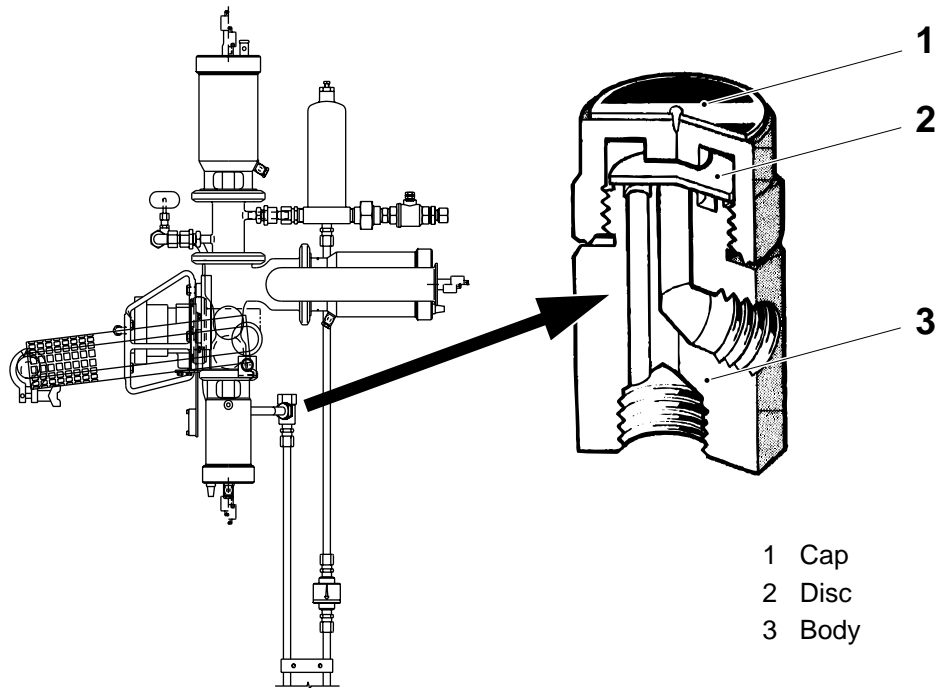
Consumable - lubricant	TP No. 90296-57
SPC reference	272560-070V



Risk of personal injury!

Make sure that the steam and the compressed air have been turned off. Make sure that there is **no product, steam or cleaning liquid** in the line. In case of accident call for medical attention.

- Remove the cap (1). Remove the disc (2) and clean it.
- Fit the disc with the **grooved side** facing the body (3).
- Apply a thin layer of lubricant to the threads of the cap and fit it.

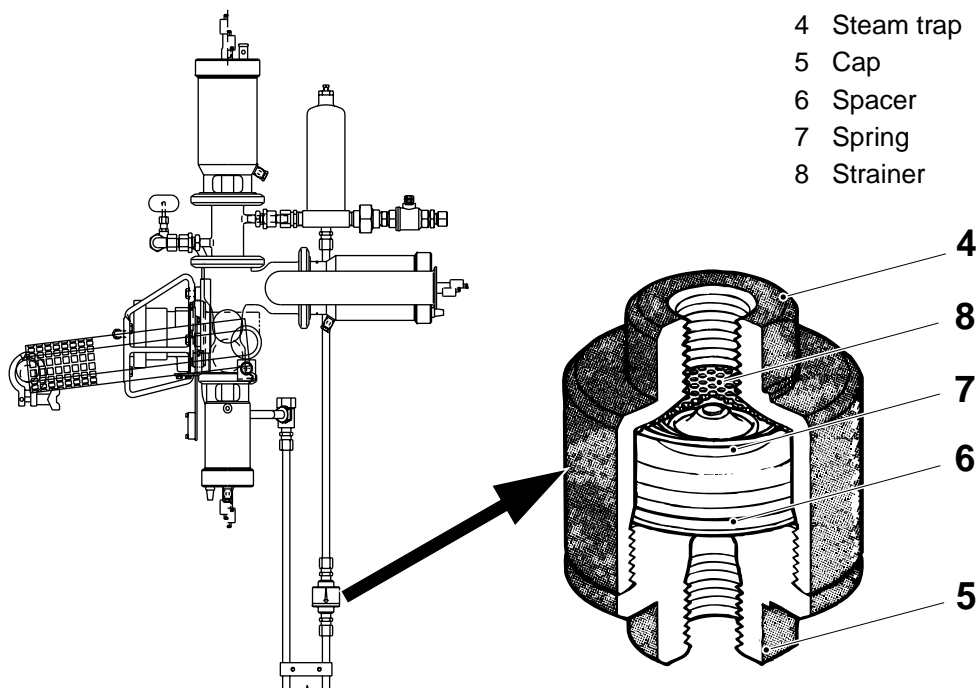


1 Cap
2 Disc
3 Body

(Cont'd)

(Cont'd)

- d) Remove the steam trap (4) from the line. Unscrew the cap (5).
- e) Remove the spacer (6), the spring (7) and the strainer (8). Clean the parts.
- f) Assemble in the reverse order.



1.2-2 Product valve - change steam filter

SPC reference	272560-070V
---------------	-------------



Risk of personal injury!

Make sure that the steam and the compressed air have been turned off. Make sure that there is **no product, steam or cleaning liquid** in the line. In case of accident call for medical attention.

Close the system inlet valve and slowly open the vent and drain the valve to release the pressure.

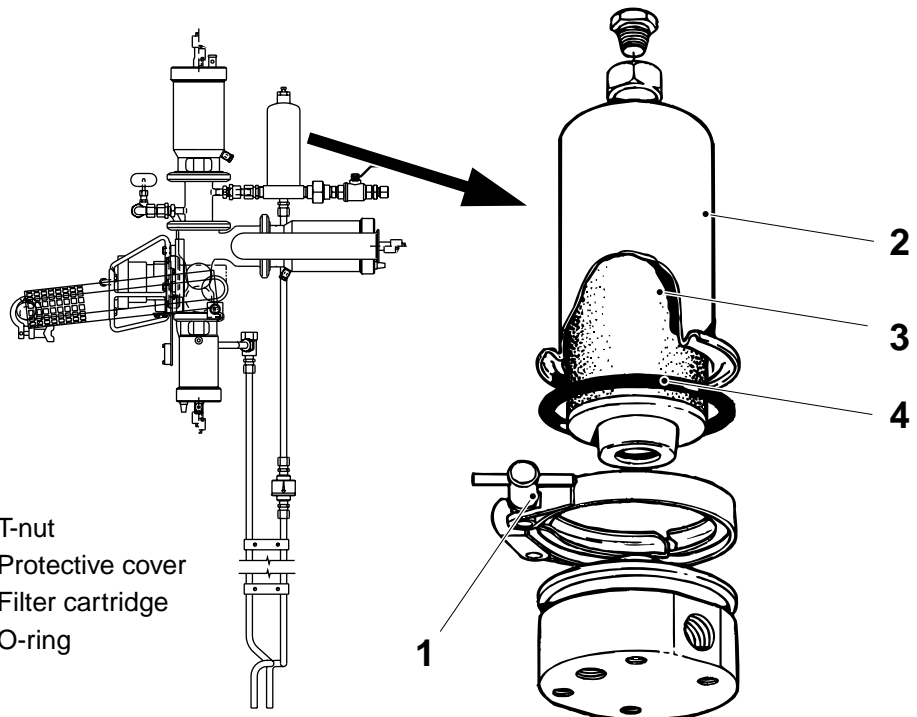


Risk of personal injury!

Hot surfaces. Wear protective gloves.

- Unscrew the T-nut (1) and remove the protective cover (2). Clean the inside of the cover.
- Remove the filter cartridge (3) and clean it with water and detergent. Rinse with water and dry.
- Change the O-ring (4).
- Change the filter cartridge, and assemble in the reverse order.

Note! Do not tighten the T-nut too hard. Finger tight only.

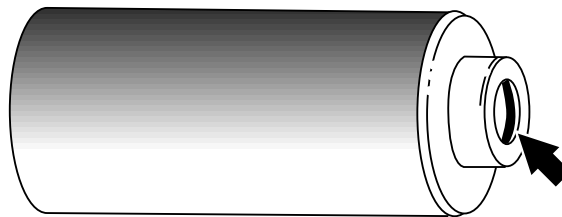


- T-nut
- Protective cover
- Filter cartridge
- O-ring

1.2-3 Product valve - clean steam filter cartridge

Tools - tank - filter - coalecher element - termometer - pressure gauge - air tight end piece	50 litres Pall Profile 10µm Pall SU range
Consumable - nitric acid - O-ring	14 - 15% (w/w) TP No. 90227-339
SPC reference	272560-070V

Remove the O-ring (arrow) from the filter cartridge.



General information

- a) To obtain optimum performance of the filter cartridge:
 - clean the filter cartridge thoroughly (or return to Pall for cleaning and testing) before reusing
 - label and store used cartridge **after** removing the O-ring
- b) Water used during the cleaning should be deionized **and** filtered.
- c) For rinsing, use a 50 litre tank, designed to avoid “dead spaces”. Incoming water (renewal rate 5 l/min) must be filtered with Pall Profile 10µm.
- d) The contents of the tank should be agitated by means of compressed air, filtered through a Coalecher element from the Pall SU-range.

(Cont'd)

(Cont'd)

Cleaning with nitric acid



Chemical products!

Cleaning compound. Follow the *Safety precautions*.

- Note!** If the cartridge is highly contaminated or if the recommended temperature cannot be used, contact **Pall Scientific & Laboratory Services** for advice.
- Immerse the filter cartridge in 14 - 15% (w/w) nitric acid at 60 - 70°C for 10 - 20 minutes.
 - Rinse the cartridge in water for **at least** 10 minutes.
 - Empty the tank and refill with water. The pH level of the tank contents should now be 6 - 8.
 - Rinse the cartridges again for at least two hours, or until the pH level of the tank contents is the same as that of the incoming water.
 - Flush the cartridges in reverse direction with water.
If the water emerging from the cartridge is discoloured or contains visible contaminants, repeat items *a)* - *b)* in the cleaning procedure.

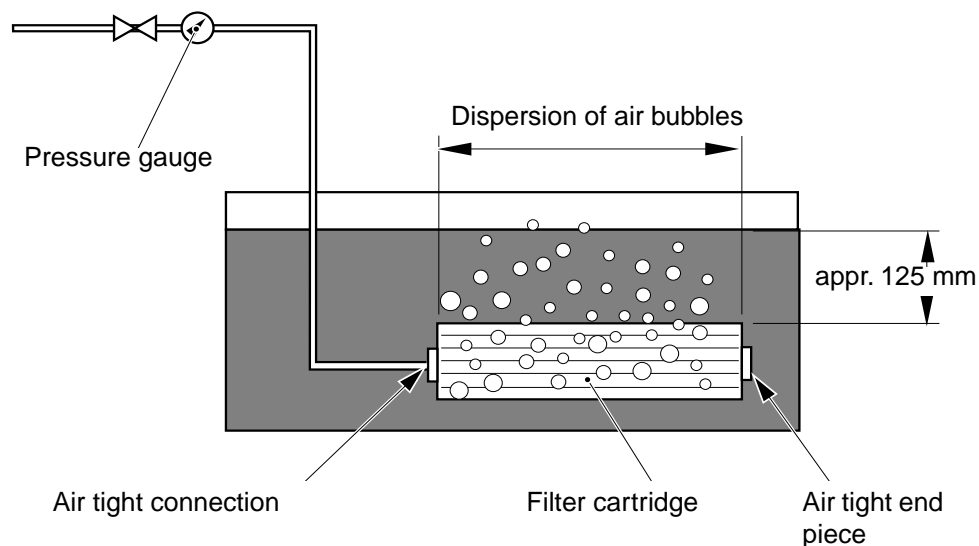
Reverse bubble point testing

- Note!** Perform these steps **immediately** after the cleaning procedure.
- Thoroughly soak and wet the filter cartridge in water.
 - Fit the air tight end piece on one end of the filter cartridge.
 - Seal the other end of the cartridge to a compressed air line. The pressure should be in the range of 0 - 13 kPa.

(Cont'd)

(Cont'd)

- d) Submerge the filter cartridge in water. The filter should be kept approx. 125 mm below the surface.



- e) Gradually increase the air pressure while rotating the cartridge slowly, until air bubbles can be seen emerging from it. Record the air pressure at this point.
- f) Carefully inspect the filter cartridge to ensure that the air bubbles emerge at a similar rate from the entire cartridge. If not, contact **Pall Scientific & Laboratory Services** for advice.
- g) Lower the pressure to half the recorded pressure. If air bubbles emerge from an isolated area of the cartridge at this pressure, contact **Pall Scientific & Laboratory Services** for advice.

Drying procedure

Dry the filter at 105 - 120 °C for 1 - 2 hours to constant weight.

After drying, visually check the filter cartridge for damage and/or corrosion. Change the cartridge as required.

Before fitting the filter cartridge, fit a new O-ring.

1.2.1 AP valve

1.2.1-1 AP valve - change seals and membrane

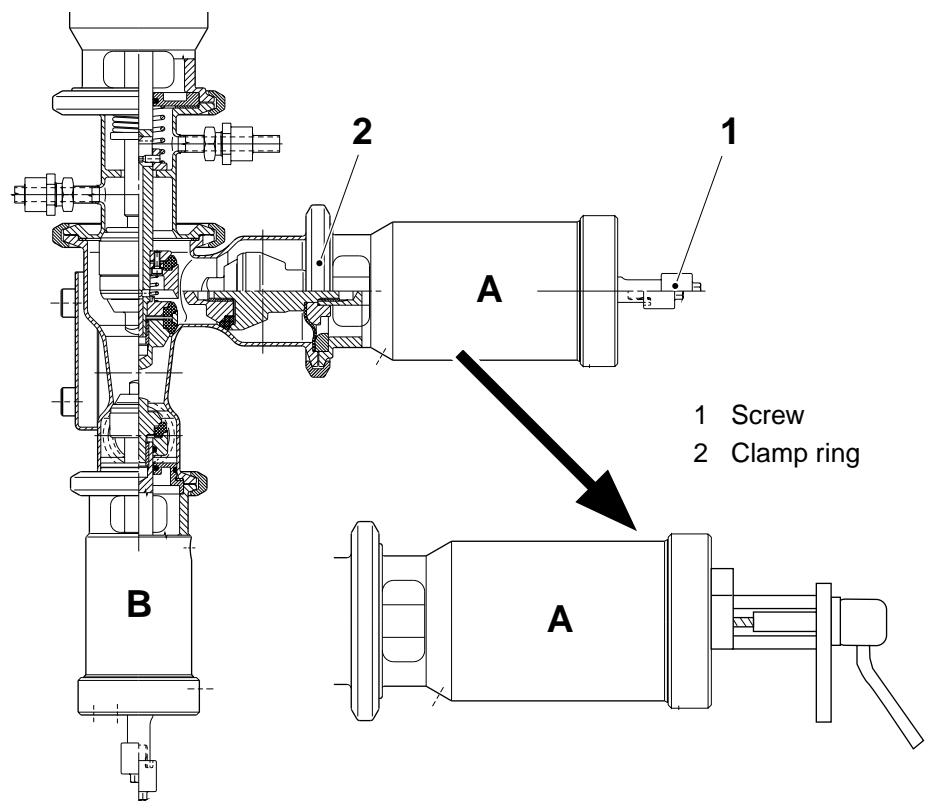
Tools	
- torque wrench	min 55 Nm
- tool	TP No. 449969-101
Consumable	
- silicon grease	code L
SPC reference	576434-010V

**Risk of personal injury!**

Make sure that the steam and the compressed air have been turned off. Make sure that there is **no product, steam or cleaning liquid** in the line. In case of accident call for medical attention.

A-cylinder (product)

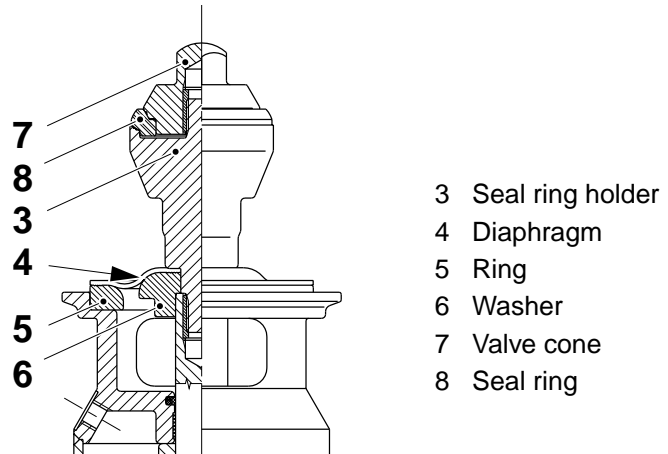
- a) Remove the air connection to the cylinder, and unscrew the screw (1).
- b) Compress the cylinder spring by means of the tool.
Remove clamp ring (2) and the cylinder



(Cont'd)

(Cont'd)

- c) Unscrew the seal ring holder (3). Remove the diaphragm (4), the ring (5) and the washer (6). Change the diaphragm.
- d) Unscrew the valve cone (7).
- e) Change the seal ring (8) and refit the valve cone.

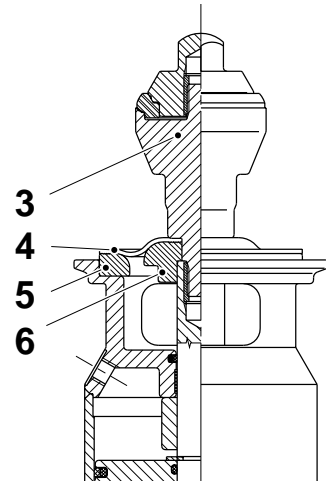


- f) Slowly torque the valve cone to 50 ± 1 Nm.
- g) Wait for 10 - 20 s and then tighten once more with the same torque. Repeat several times.

(Cont'd)

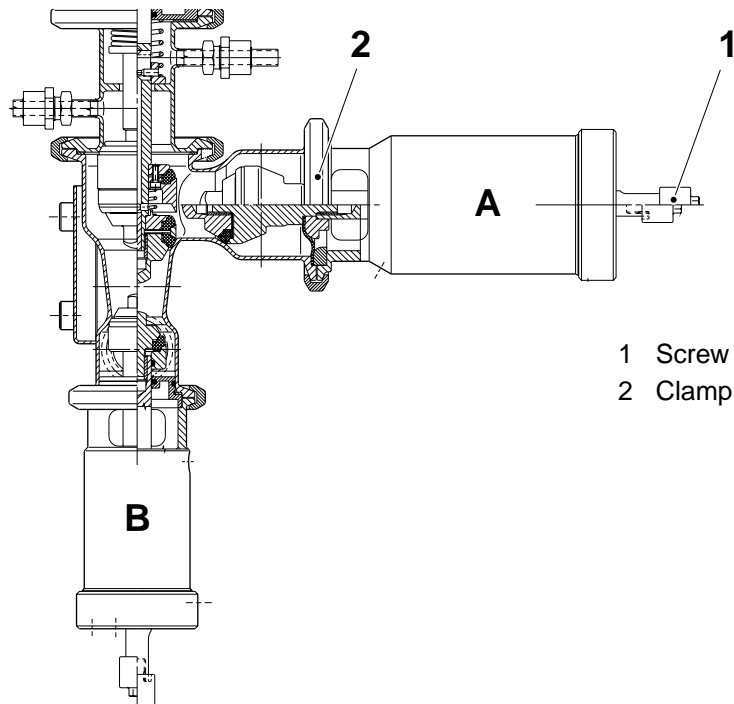
(Cont'd)

- h) Fit the ring (5) and the washer (6) in the cylinder housing with the grooves facing upwards.
- i) Fit the new diaphragm (4); the bulge is to be facing upwards.
- j) Lubricate the threads of the piston rod with silicone grease and refit the complete seal ring holder (3) on the piston rod.



- 3 Seal ring holder
- 4 Diaphragm
- 5 Ring
- 6 Washer

- k) Slowly torque the seal ring holder to 50 ± 1 Nm.
- l) Wait for 10 - 20 s and then tighten once more with the same torque. Repeat several times.
- m) Fit the cylinder and tighten the clamp ring (2). Remove the tool.
- n) Fit the screw (1) and the air connection.



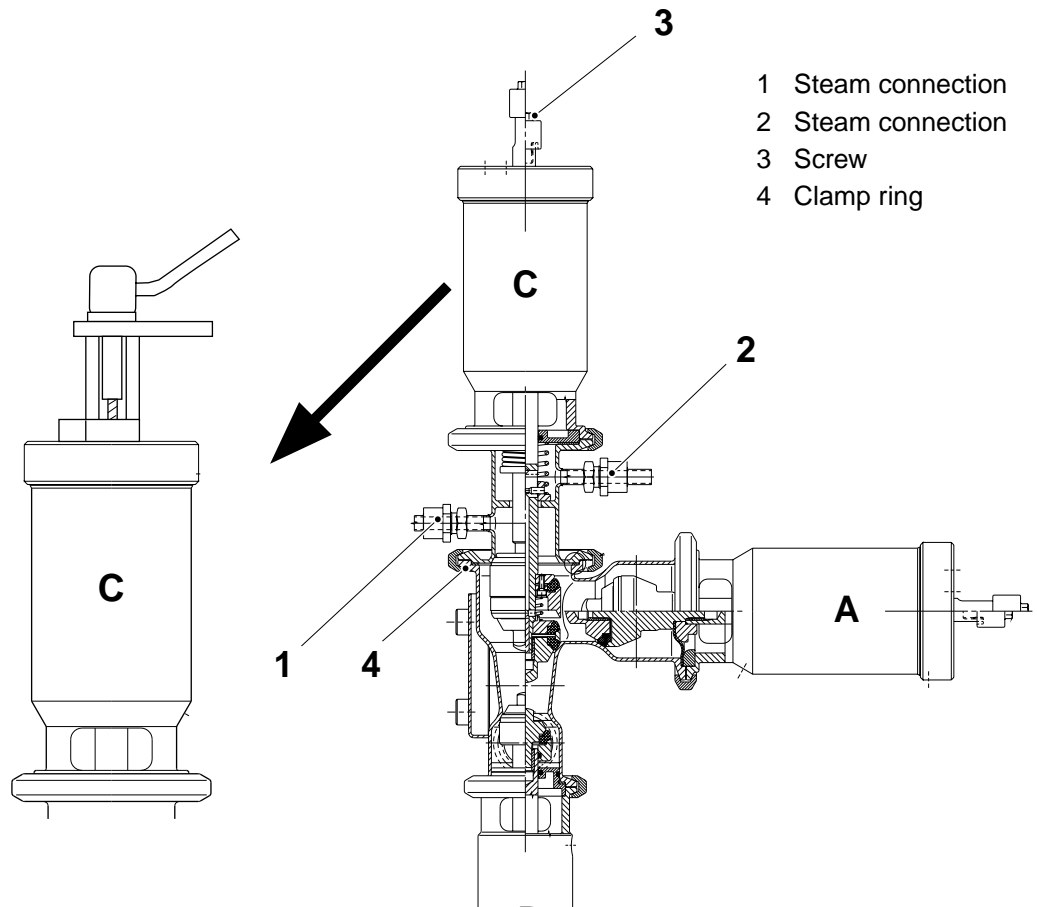
- 1 Screw
- 2 Clamp ring

(Cont'd)

(Cont'd)

C-cylinder (steam)

- a) Unscrew the steam connections (1) and (2).
- b) Remove the air connection to the cylinder and the screw (3).
- c) Compress the cylinder spring with the aid of the tool. Remove the clamp ring (4) and remove the cylinder.

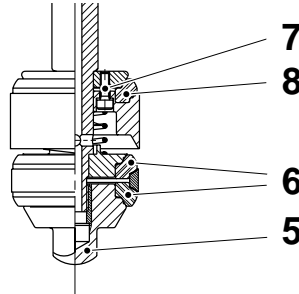


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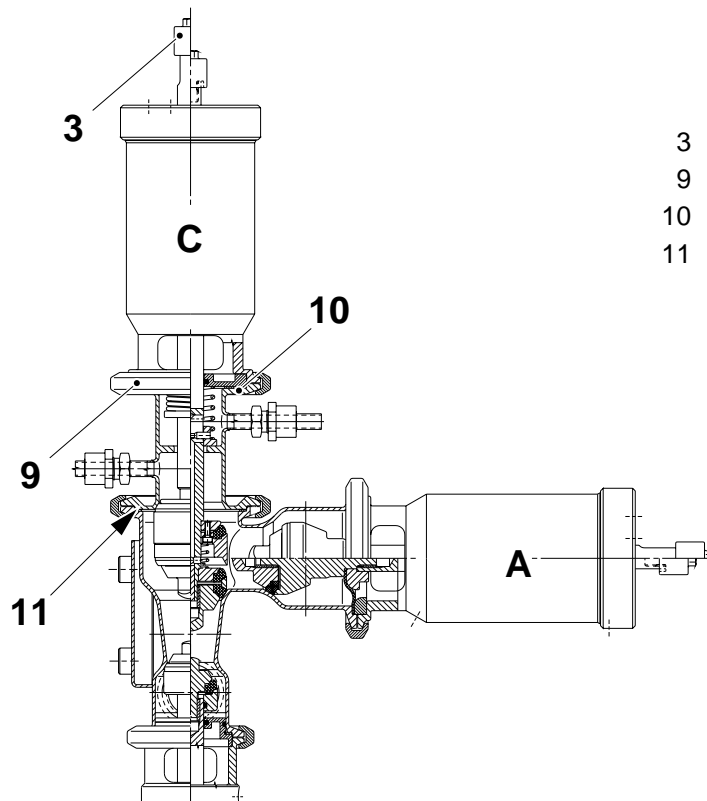
(Cont'd)

- d) Unscrew the valve cone (5) and remove the seal rings (6) and the holder.
- e) Change the seal rings.
- f) Unscrew the four screws (7) in the holder and change the seal ring (8).



- 5 Valve cone
- 6 Seal ring
- 7 Screw
- 8 Seal ring

- g) Remove the clamp ring (9) and take off the cylinder housing.
- h) Change the gasket (10) and fit the cylinder housing and the clamp ring.
- i) Assemble the valve cone in the reverse order. Slowly torque the valve cone to 50 ± 1 Nm.
- j) Change the gasket (11) and fit the cylinder with the clamp ring.
- k) Remove the tool and fit the screw (3) and the air connection.



- 3 Screw
- 9 Clamp ring
- 10 Gasket
- 11 Gasket

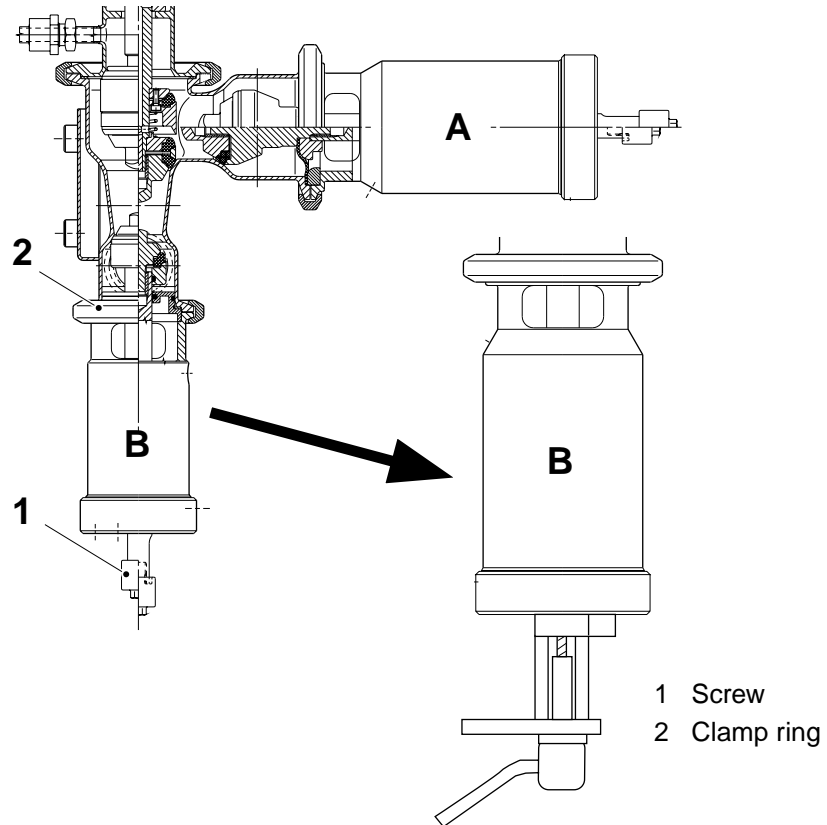
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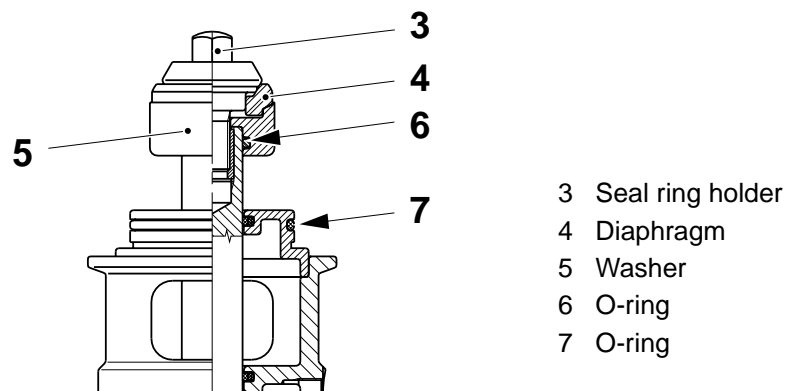
(Cont'd)

B-cylinder

- a) Remove the air connection and the proximity switch. Unscrew the screw (1) on the cylinder.
- b) Compress the cylinder spring with the aid of the tool. Remove the clamp ring (2) and the cylinder.



- c) Unscrew the valve cone (3) and change the seal ring (4).
- d) Remove the washer (5) and change the O-rings (6) and (7).

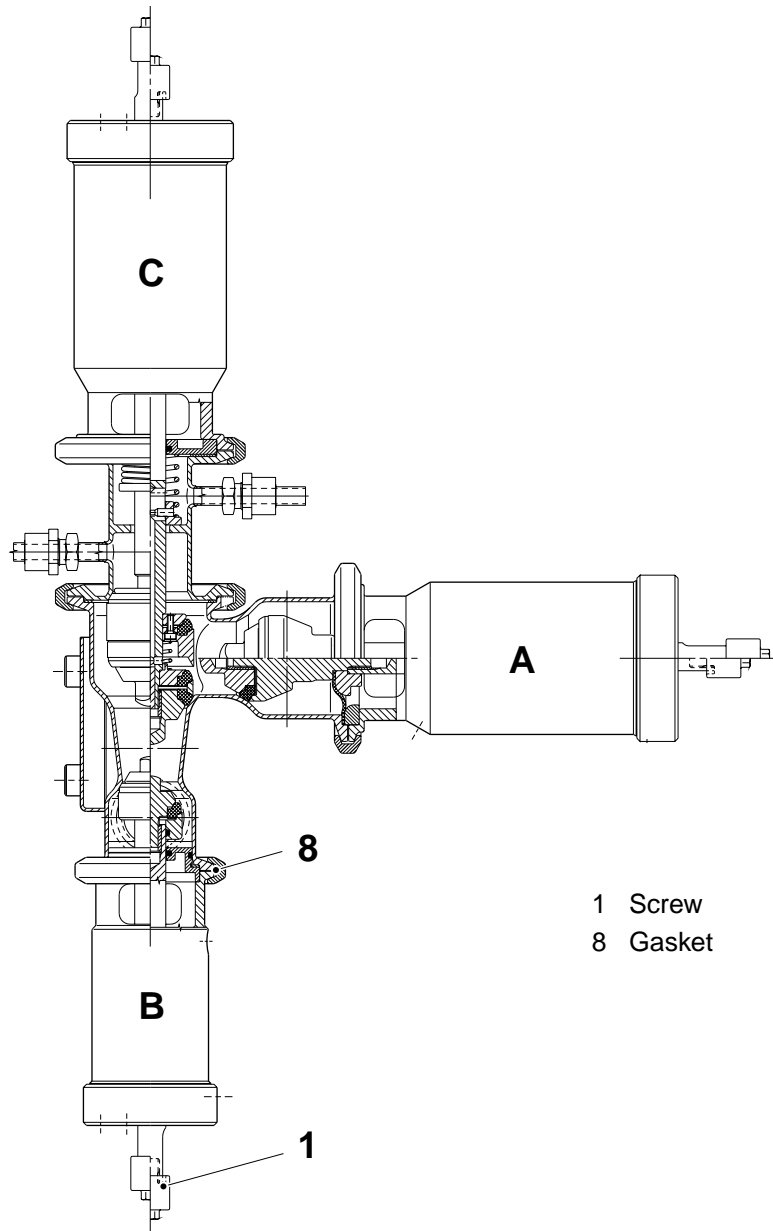


(Cont'd)

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(Cont'd)

- e) Change the gasket (8) and fit the cylinder with the clamp ring. Remove the tool and fit the screw (1).



- f) Change the seal rings on the steam connections and connect the steam lines.

1.2.1-2 AP valve - change A- and B-cylinder seals

Tools - torque wrench - tool	55 Nm TP No. 449969-101
Consumable - silicon grease	code L
SPC reference	576436-010V 576438-010V



Risk of personal injury!

Make sure that the steam and the compressed air have been turned off before starting work. Make sure that there is **no product, steam or cleaning liquid** in the line. In case of accident, call for medical attention immediately.

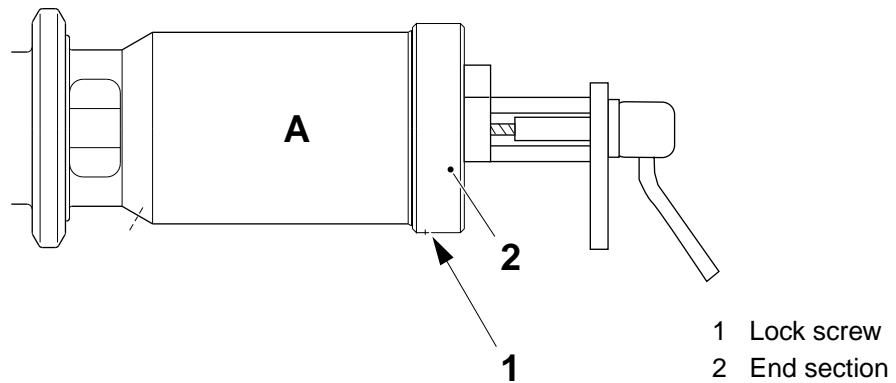


Risk of personal injury!

Compressed springs! Take care when removing/assembling components.

A-cylinder (product)

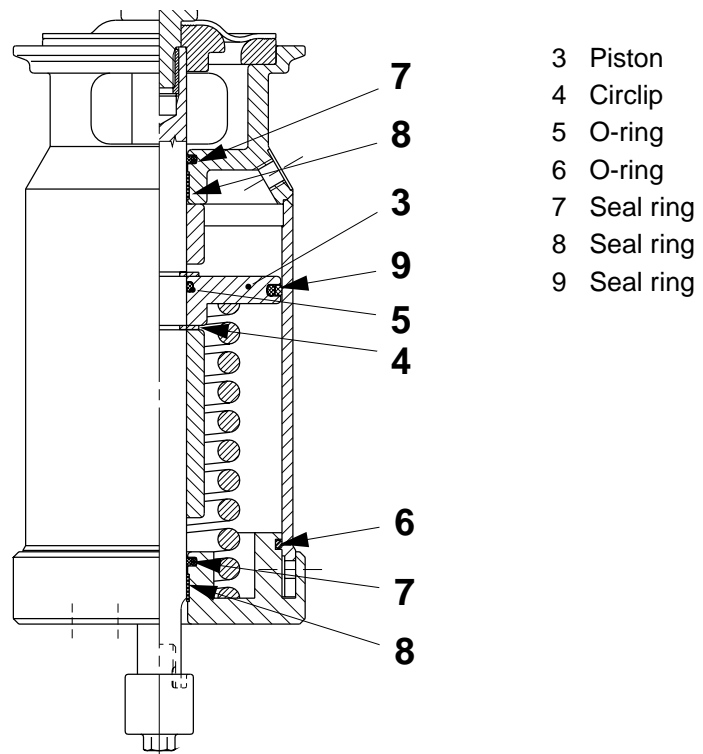
- Remove the seal ring holder following the procedure in *1.2.1-1 AP valve - change seals and membrane*.
- Remove the lock screw (1). Turn the end section (2) counter clockwise.



(Cont'd)

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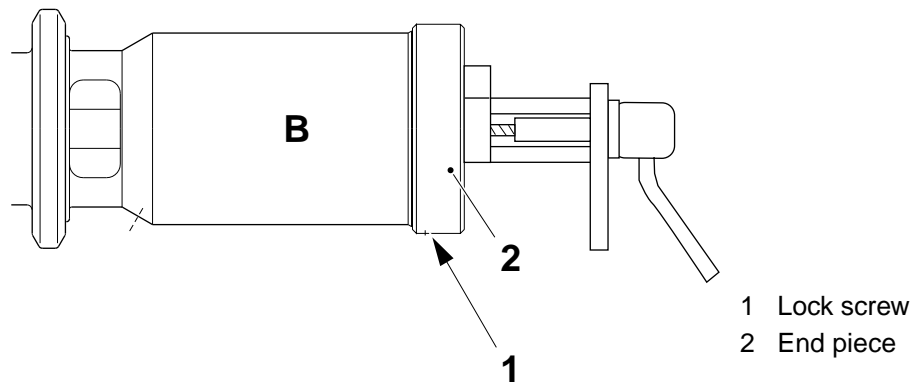
- c) Unscrew the tool and remove the end section, the spring and the piston rod with the piston (3).
- d) Remove the circlip (4) and the piston. Change the O-rings (5) and (6). Change the seal rings (7), (8) and (9).
- e) Lubricate the threads of the piston rod with silicon grease.
- f) Assemble in the reverse order.



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B-cylinder

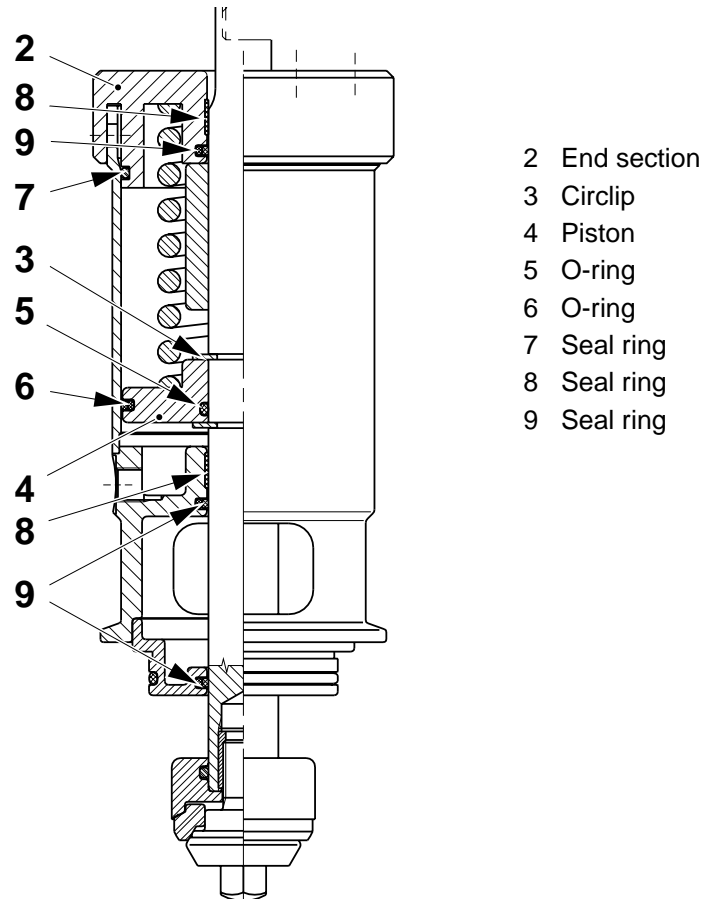
- a) Remove the seal ring holder following the procedure in 1.2.1-1 AP valve - change seals and membrane.
- b) Remove the lock screw (1) and turn the end section (2) counter clockwise.



(Cont'd)

(Cont'd)

- c) Unscrew the tool and remove the end section (2), the spring and the piston rod together with the piston.
- d) Remove the circlip (3) and the piston (4).
- e) Change the O-rings (5) and (6), and the seal rings (7), (8) and (9).
- f) Lubricate the threads of the piston rod with silicon grease.
- g) Assemble in the reverse order.

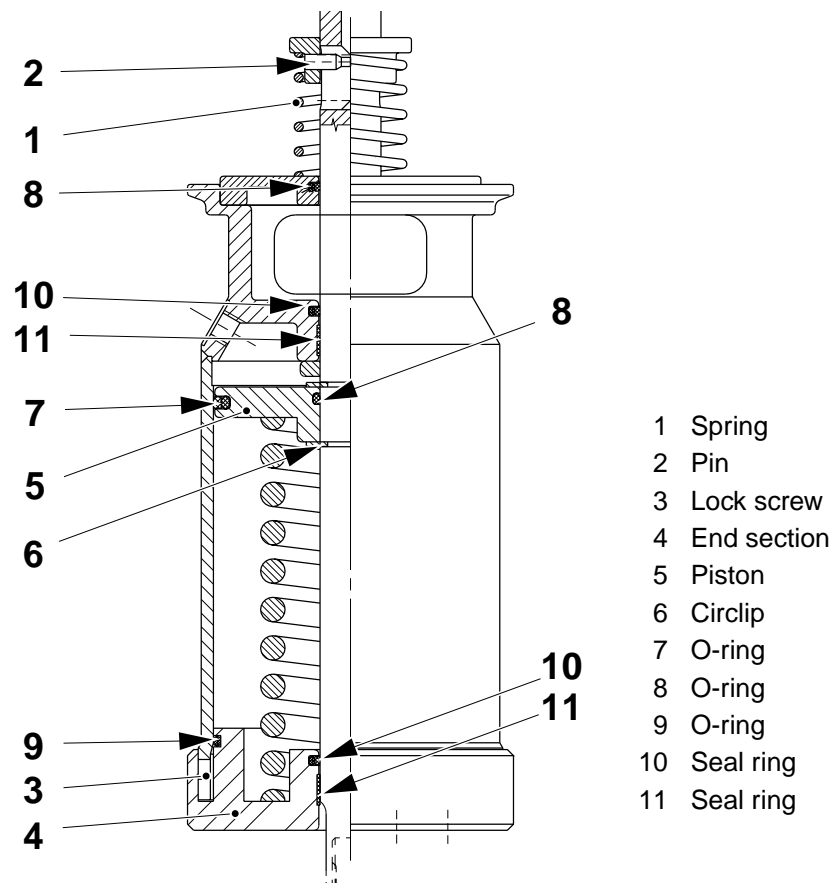


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1.2.1-3 AP valve - change C-cylinder seals

Tools - torque wrench - tool	55 Nm TP No. 449969-101
Consumable - silicone grease	code L
SPC reference	576434-010V

- a) Remove the seal ring holder following the procedure in *1.2.1-1 AP valve - change seals and membrane*.
- b) Compress the spring (1) and remove the pin (2), the ring and the spring.
- c) Unscrew the lock screw (3) and turn the end section (4) counter clockwise.
- d) Unscrew the tool and remove the end section, the spring and the piston rod with the piston (5).
- e) Remove the circlip (6) and the piston.
- f) Change the O-rings (7), (8) and (9) and the seal rings (10) and (11).
- g) Lubricate the threads of the piston rod with silicon grease.
- h) Assemble in the reverse order.

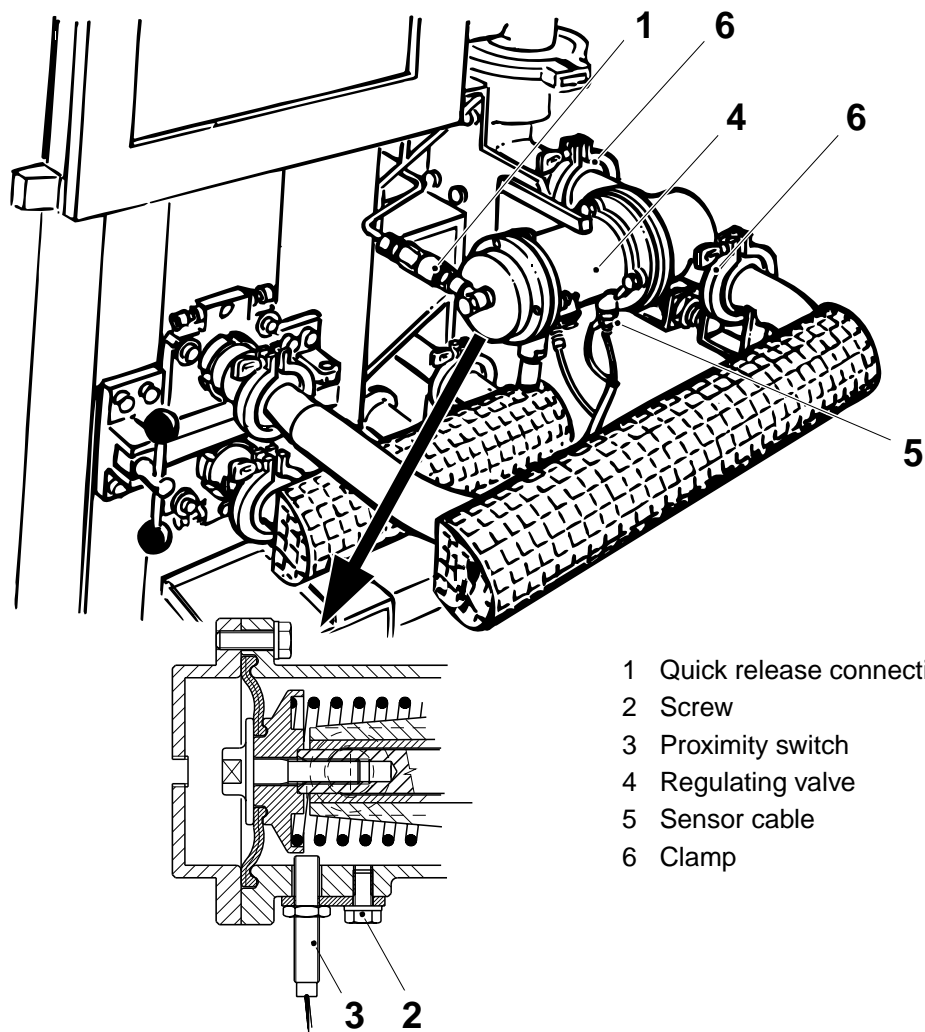


1.2.2 Regulating valve

1.2.2-1 Regulating valve - change membranes

SPC reference	927205-010V
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- a) Remove the quick-release connection (1).
- b) Unscrew the screw (2) and remove the proximity switch (3) from the regulating valve (4).
- c) Remove the sensor cable (5) from the regulating valve.
- d) Remove the clamps (6) and the regulating valve.

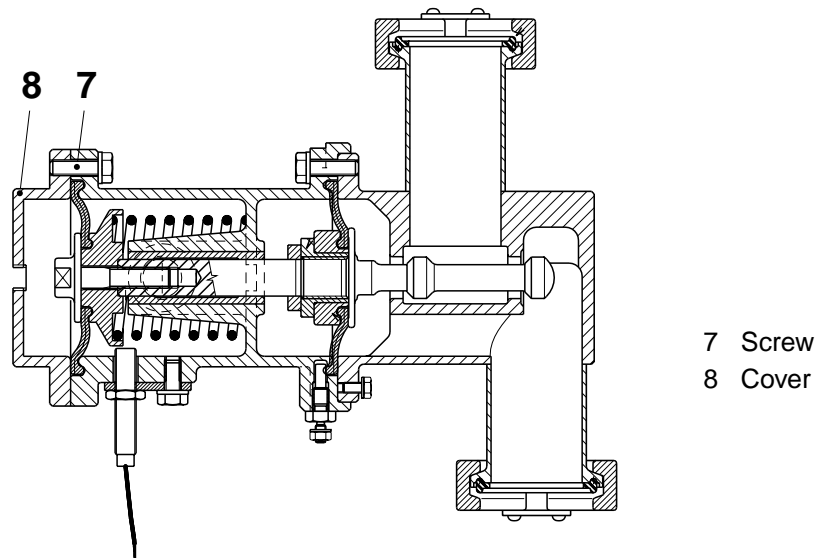


- 1 Quick release connection
- 2 Screw
- 3 Proximity switch
- 4 Regulating valve
- 5 Sensor cable
- 6 Clamp

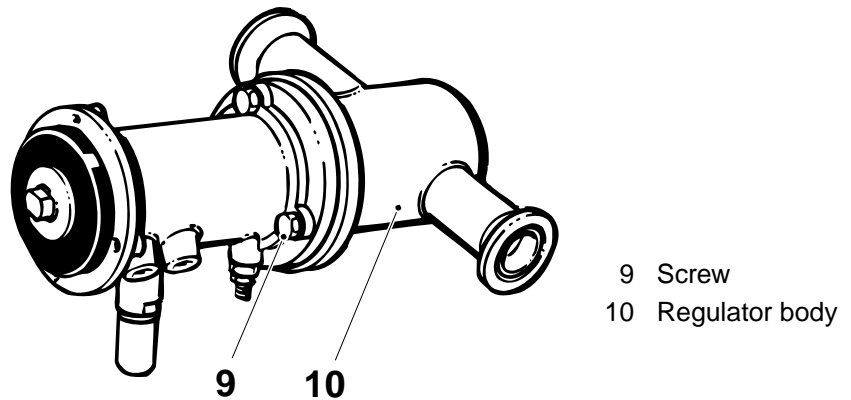
(Cont'd)

(Cont'd)

- e) Unscrew the screws (7) and remove the cover (8) from the regulating valve.



- f) Unscrew the screws (9) in small steps and in sequence, and **carefully** remove the regulator body (10) from the central body.



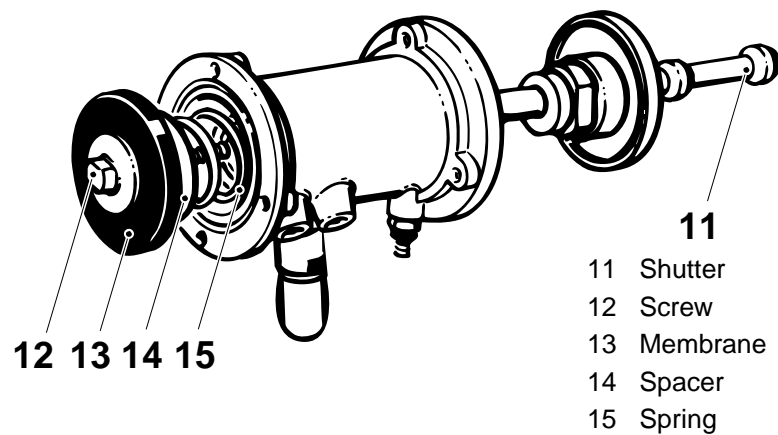
(Cont'd)

(Cont'd)**Risk of personal injury!**

Compressed springs! Take care when removing/assembling components.

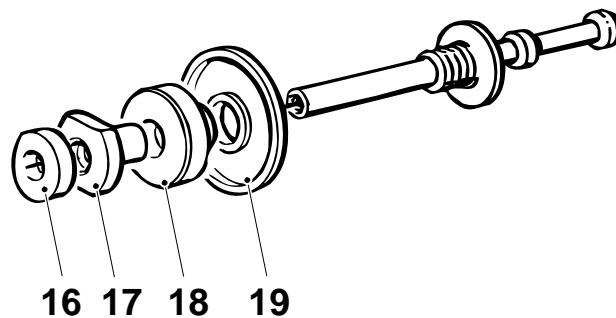
Caution! Take care **not to damage** the shutter!

- g) Remove the shutter (11) by locking the screw (12) and turning the shutter.
- h) Remove the membrane (13), the spacer (14), the spring (15) and pull out the shutter.



- 11 Shutter
- 12 Screw
- 13 Membrane
- 14 Spacer
- 15 Spring

- i) Remove the shock absorber (16). Unscrew the ferrule (17) and remove the spacer (18) and the membrane (19).



- 16 Shock absorber
- 17 Ferrule
- 18 Spacer
- 19 Membrane

- j) Change the membranes and assemble in the order described in *1.2.2-2 Regulating valve - assemble*.

1.2.2-2 Regulating valve - assemble

SPC reference	927205-010V
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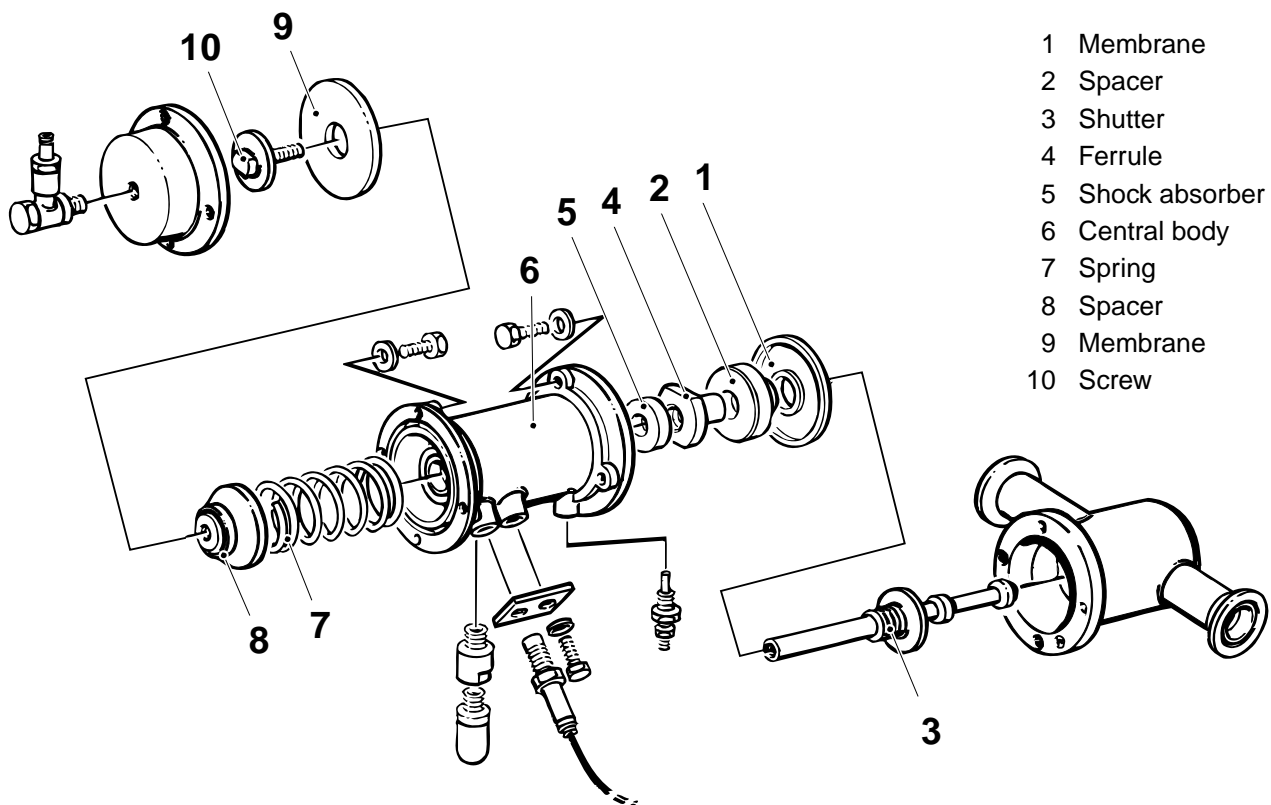
Caution! Make sure that all parts are **clean and dry**. **Do not** lubricate.

Caution! Make sure **not to damage** the membrane and make sure that the membrane is turned in the **correct direction**.

- a) Put the membrane (1) and the spacer (2) on the shutter (3) and fit the ferrule (4). Tighten until the ferrule reaches its stop position.
- b) Fit the shock absorber (5) on the shutter and insert the shutter in the central body (6).

Caution! Make sure that the membrane is turned in the **correct direction** and be careful **not to bend** the shutter.

- c) Fit the spring (7), the spacer (8), the membrane (9) by means of the screw (10).

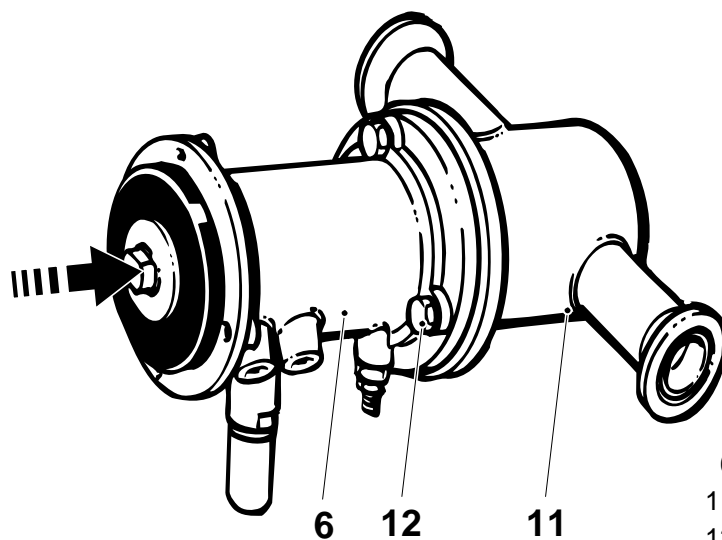


- 1 Membrane
- 2 Spacer
- 3 Shutter
- 4 Ferrule
- 5 Shock absorber
- 6 Central body
- 7 Spring
- 8 Spacer
- 9 Membrane
- 10 Screw

(Cont'd)

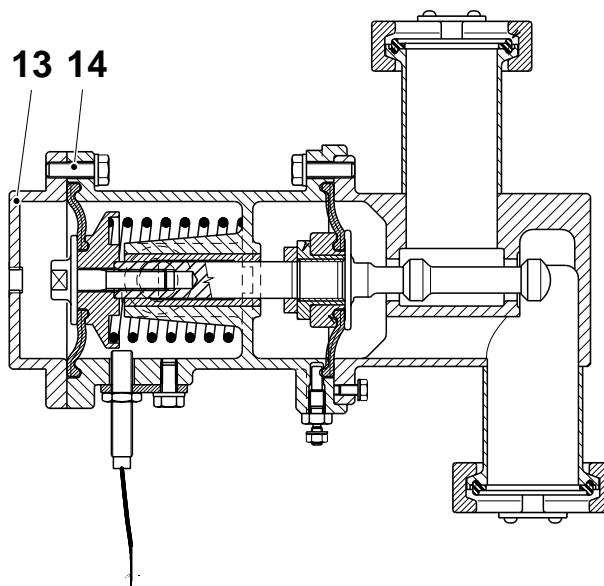
(Cont'd)

- d) Fit the regulator body (11) to the central body (6). Tighten the screws (12) crosswise in small steps.
- e) Check, by pushing the screw (arrow), that **the shutter moves smoothly**.
- f) If not, change the shutter.



- 6 Central body
- 11 Regulator body
- 12 Screw

- g) Fit the cover (13) to the central body. Tighten the screws (14) crosswise.

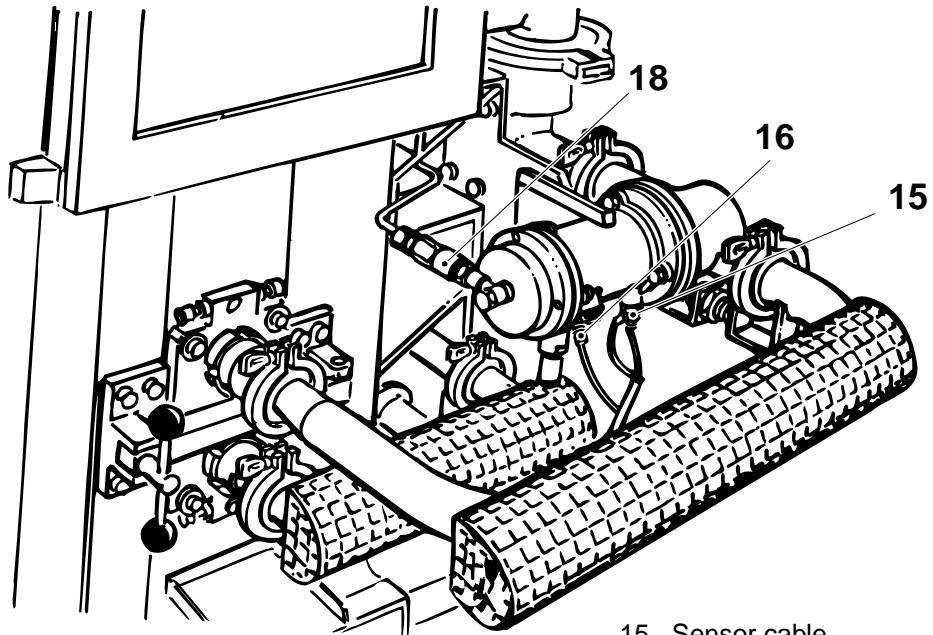


- 13 Cover
- 14 Screw

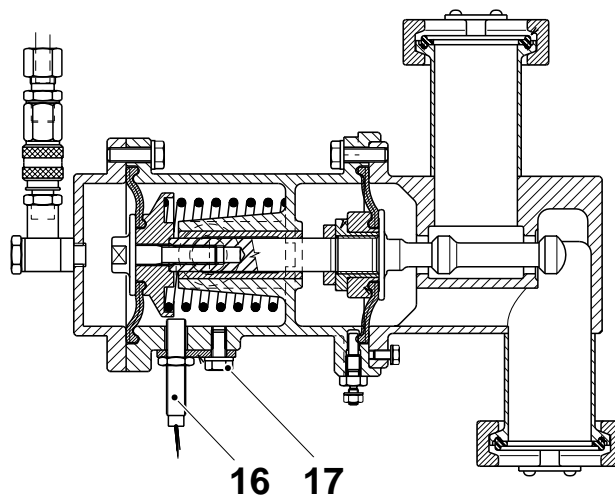
(Cont'd)

(Cont'd)

- h) Put the regulating valve in place and tighten the connections.
- i) Connect the sensor cable (15).
- j) Fit the proximity switch (16) by means of the screw (17).
- k) Connect the quick release connection (18).
- l) Make sure that the regulating valve is fitted horizontally.
Set the proximity switch, see *1.2.2-3 Regulating valve - set proximity switch*.



- 15 Sensor cable
- 16 Proximity switch
- 17 Screw
- 18 Quick-release connection

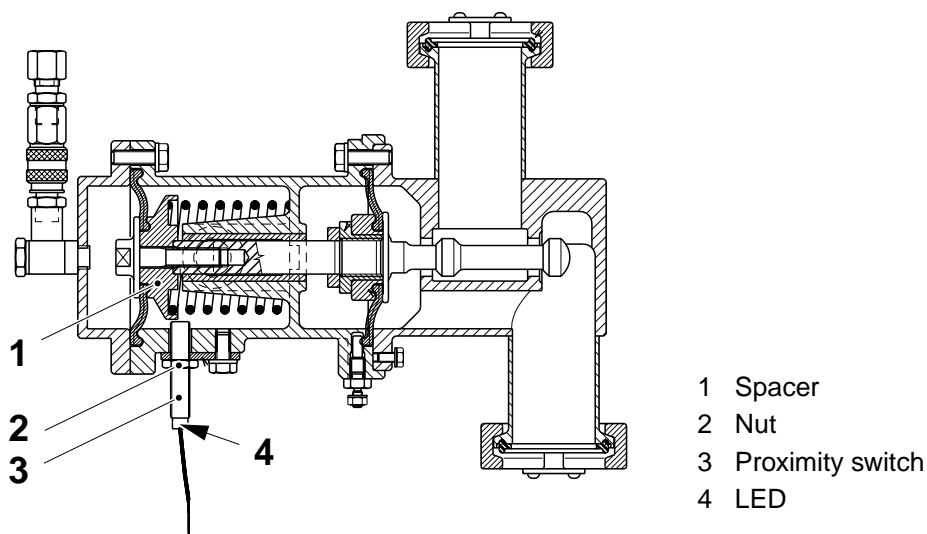


16 17

1.2.2-3 Regulating valve - set proximity switch

Machine status	Preheating II
SPC reference	927105-010V

- a) Screw in the proximity switch (3) until it just touches the spacer (1), no further.
- b) Loosen the switch one half turn and tighten the nut (2).
- c) Step down the machine to step **Preheating I**.
- d) Step up the machine to step **Preheating II** again and make sure that the LED (4) lights up.



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1.3 Calender rollers

SPC reference	272024-040V
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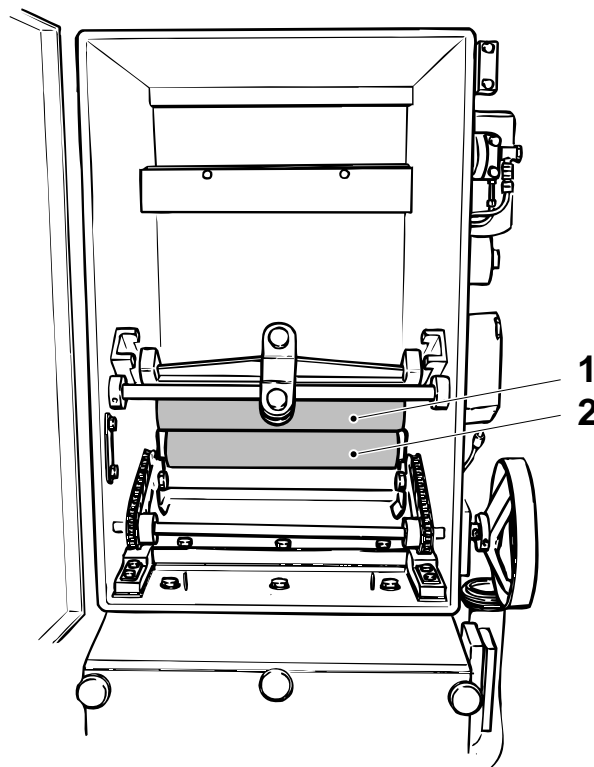
1.3-1 Calender rollers - check rubber surfaces

SPC reference	272024-040V
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Hydrogen peroxide!
Follow the *Safety precautions*.

- Check that the rubber surface of the fixed calender roller (2) and the movable calender roller (1) are not damaged or worn.
- Make sure that the rollers rotate freely. If required, change the bushings, see *1.3-3 Calender rollers - change bearings*.



- 1 Movable calender roller
- 2 Fixed calender roller

1.3-2 Calender rollers - check during operation

Machine status	Production
SPC reference	272024-040V

Check that there are no drops of hydrogen peroxide on the packaging material, that is no visible peroxide passes the calender rollers.

If required, change the calender rollers. Follow the procedure in 1.3-3 *Calender rollers - change bearings*.

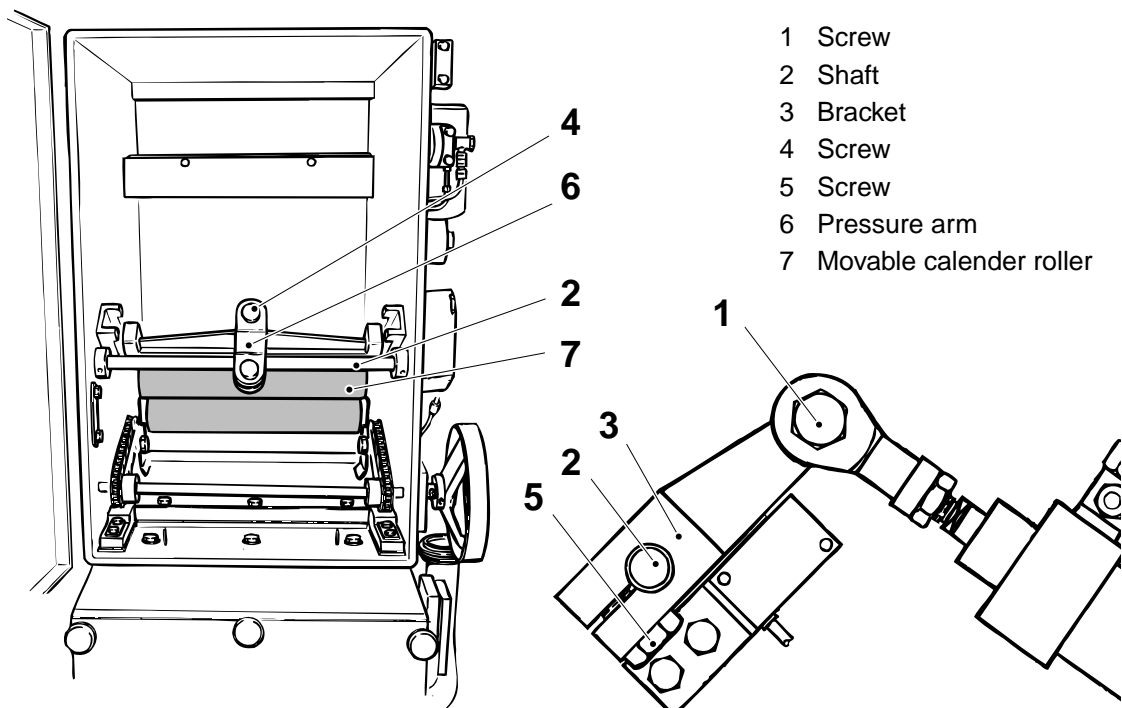
1.3-3 Calender rollers - change bearings

Consumable - PTFE grease	code N
SPC reference	272024-010V



Hydrogen peroxide!
Follow the *Safety precautions*.

- a) Unscrew the screw (1).
- b) Mark the position of the shaft (2) in relation to the bracket (3).
- c) Unscrew the screw (4). Loosen the screw (5) and rotate the pressure arm (6) upwards.
- d) Pull out the movable calender roller (7).



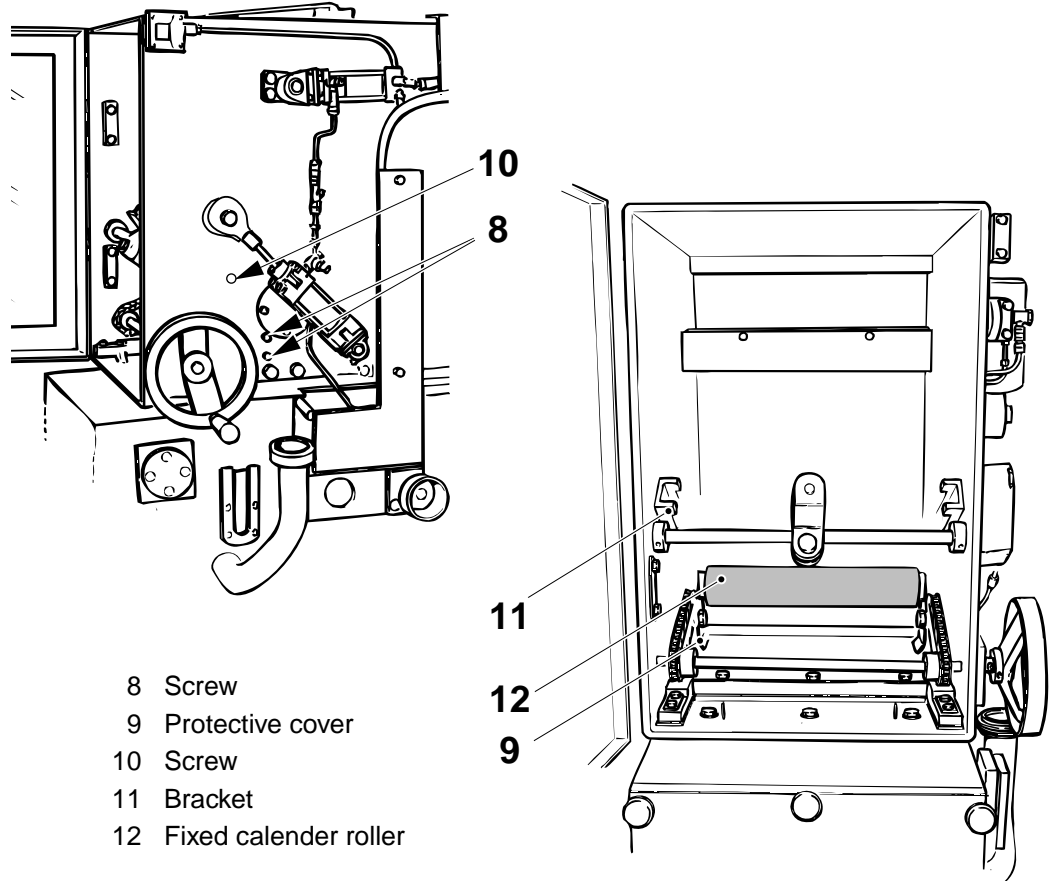
- 1 Screw
- 2 Shaft
- 3 Bracket
- 4 Screw
- 5 Screw
- 6 Pressure arm
- 7 Movable calender roller

(Cont'd)

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(Cont'd)

- e) Unscrew the two screws (8) and remove the protective cover (9).
- f) Unscrew the screws (10), one on each side, and remove the brackets (11).
- g) Pull out the calender roller (12). It may be necessary to push the air knife out of the way to make it easier to pull out the roller.



- 8 Screw
- 9 Protective cover
- 10 Screw
- 11 Bracket
- 12 Fixed calender roller

(Cont'd)

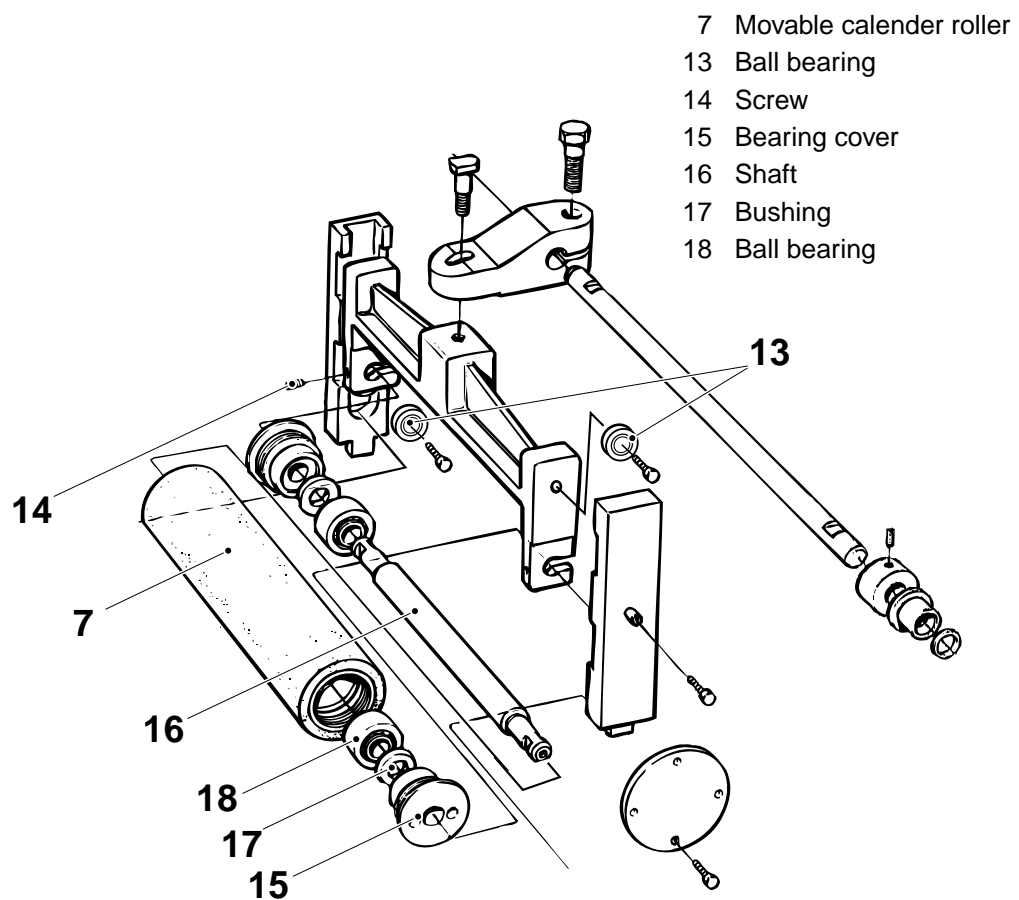
(Cont'd)

- h) Unscrew the screws in the axle ends and change the four bearings (13) for the guide console. Grease the bearings with silicon grease.

Movable calender roller

- a) Loosen the screws (14) and remove the movable calender roller. Remove the bearing covers (15) and pull out the shaft (16).
- b) Remove the bushings (17) and the ball bearings (18) from the movable calender roller.
- c) Change the bearings. Grease the bearings with silicon grease.
- d) Assemble in the reverse order.

Caution! Only **finger tighten** the screws (14).



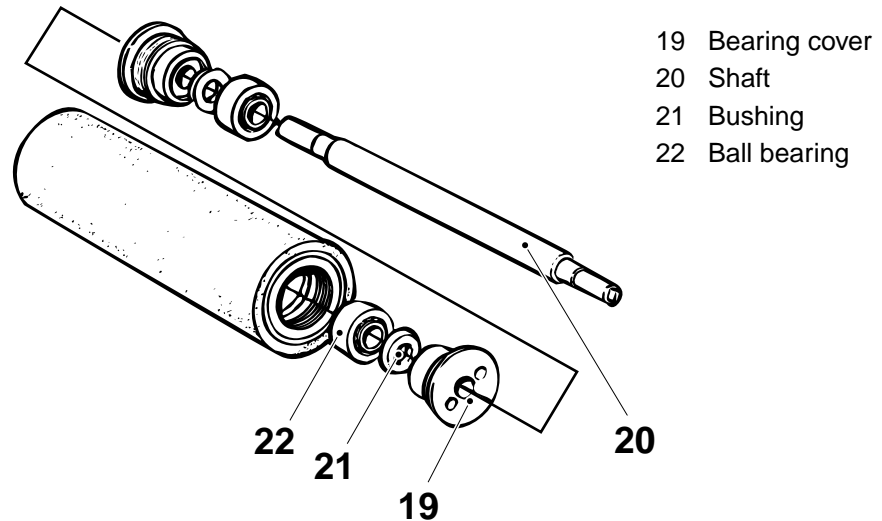
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(Cont'd)

(Cont'd)

Fixed calender roller

- a) Remove the bearing covers (19) and pull out the shaft (20).
- b) Remove the bushings (21) and the ball bearings (22) from the fixed calender roller.
- c) Change the bearings. Grease the bearings with silicon grease.



- d) Assemble in the reverse order.

Note! Make sure that the **bearing covers** are fitted correctly and that the **shaft** is positioned according to the mark previously made. Also make sure that the **bracket** is placed correctly.

- e) Make sure that the cylinder piston **does not** reach its inner position before the movable calender roller reaches its bottom position.
- f) Set the calender rollers, see *1.3-4 Calender rollers - set*.

1.3-4 Calender rollers - set

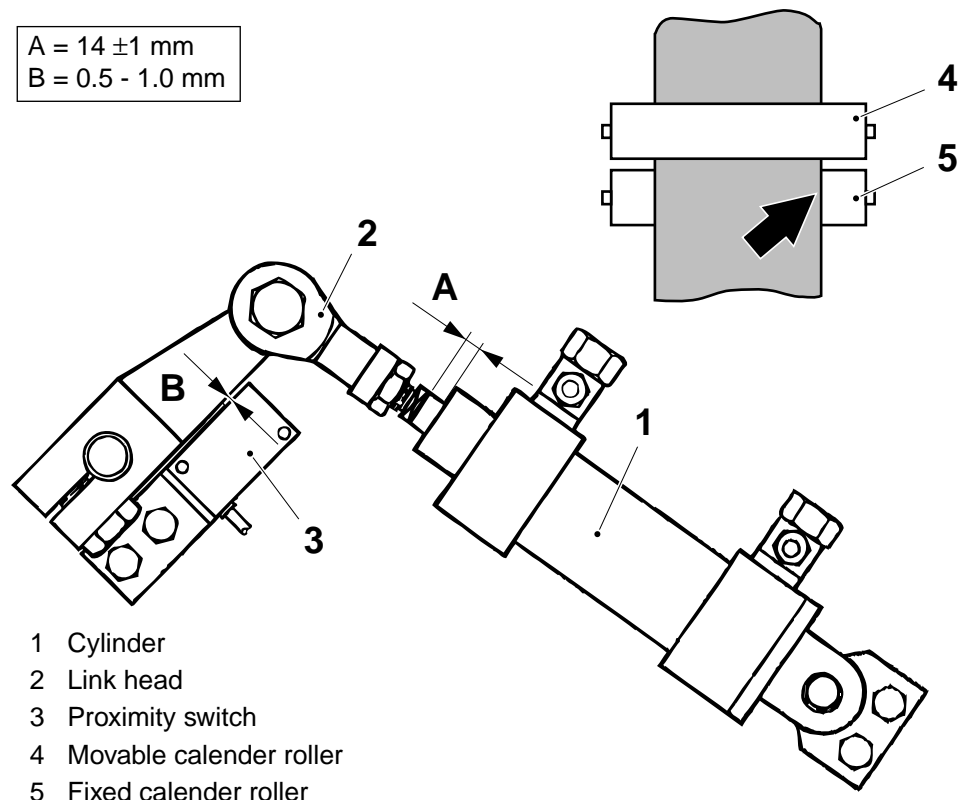
Machine status	Preheating I
SPC reference	272024-040V

**Hydrogen peroxide!**

Follow the *Safety precautions*.

- Set the cylinder (1) so that it does not reach its end position, distance A, when the rollers are pressed against each other. If required, adjust on the link head (2).
- Set the proximity switch (3), distance B.
- Turn off the calender roller air pressure.
- Raise the movable calender roller (4) so that it does **not** touch the packaging material.
- Select fast inching and inch the machine for about one minute.
- Stop the machine and, without moving the packaging material web, mark the position of the web edge on the fixed calender roller (5) (arrow).

A = 14 ± 1 mm
B = 0.5 - 1.0 mm

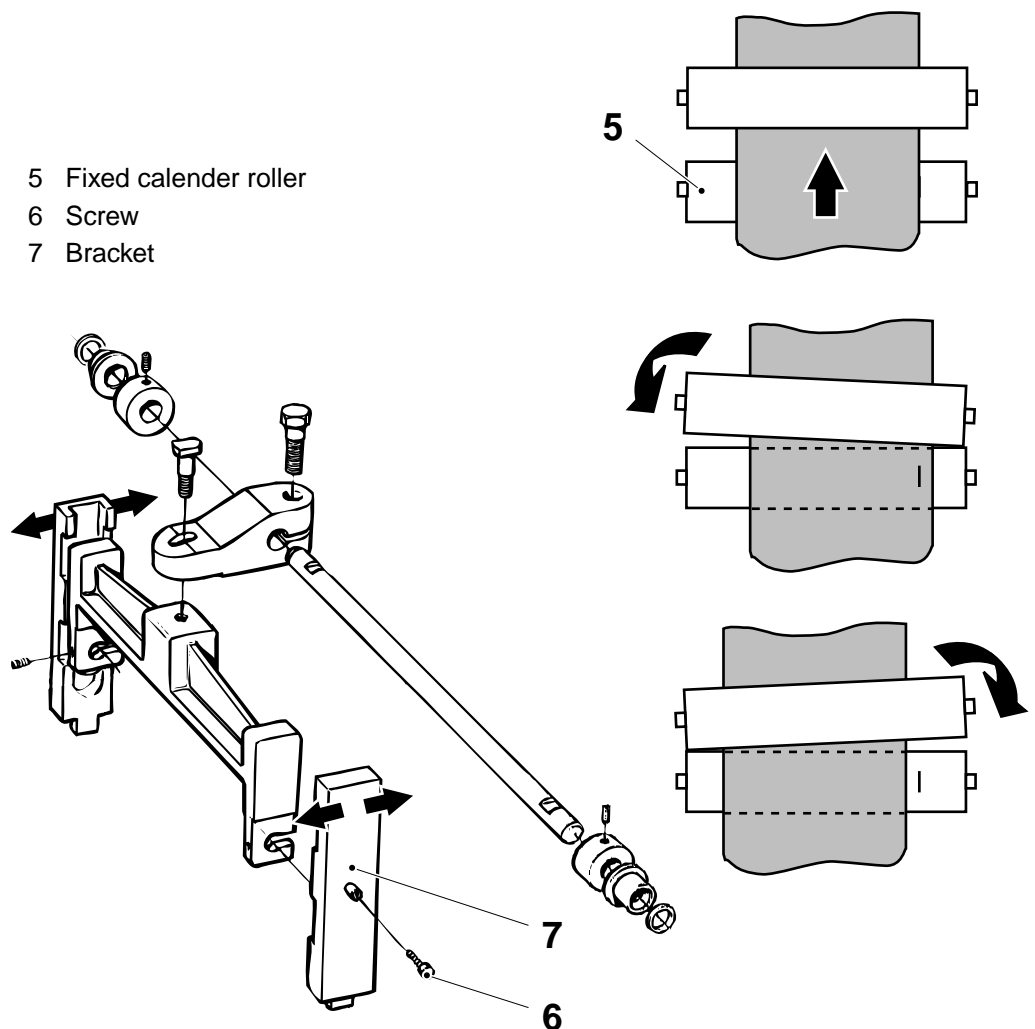


- Cylinder
- Link head
- Proximity switch
- Movable calender roller
- Fixed calender roller

(Cont'd)

(Cont'd)

- g) Set the correct calender roller air pressure, see *10.1 Technical data*.
- h) Select fast inching again and inch the machine for about one minute.
- i) Stop the machine and check that the edge of the packaging material is in line with the mark on the roller (5).
- j) If required, loosen the screws (6) on the outside of the aseptic chamber and correct the position of the movable calender roller by shifting the brackets (7). Tighten the screws.
- k) Inch the machine again and recheck.
- l) If required, repeat items *h) - k)* until the correct setting has been obtained.



1.4 Tube forming

SPC reference	441304-030V 441307-030V 441486-040V 456309-050V
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1.4.1 Tube supports and forming rings

1.4.1-1 Tube supports and forming rings - check

Machine status	Production
SPC reference	441304-030V 441307-030V 441486-040V 456309-050V

- Step down to **Zero** position.
- Check that all rollers are undamaged and clean.
- While the machine is **warm**, check that the play A between the rollers (1) does not exceed 0.3 mm. Change worn bushings (3) and axles/shafts (4) as required, see *1.4.3-1 Upper tube support - overhaul*, *1.4.4-1 Movable forming ring - overhaul*, *1.4.5-1 Divided forming ring - overhaul* and *1.4.6-1 Lower forming ring - overhaul*.

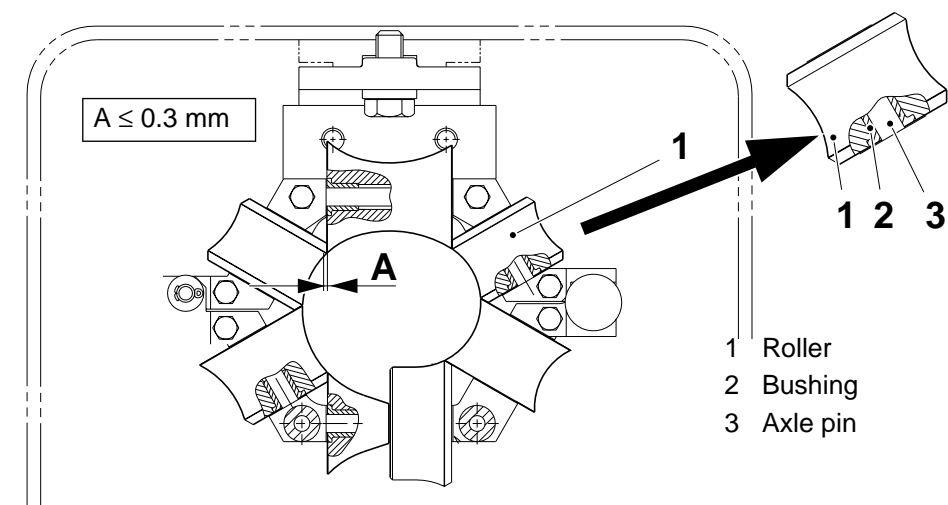


Fig. shows the Divided forming ring

(Cont'd)

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Note! The play between the rollers is to be the same all the way around and the passage between the rollers should be smooth. Adjust by means of shimming washers (2).

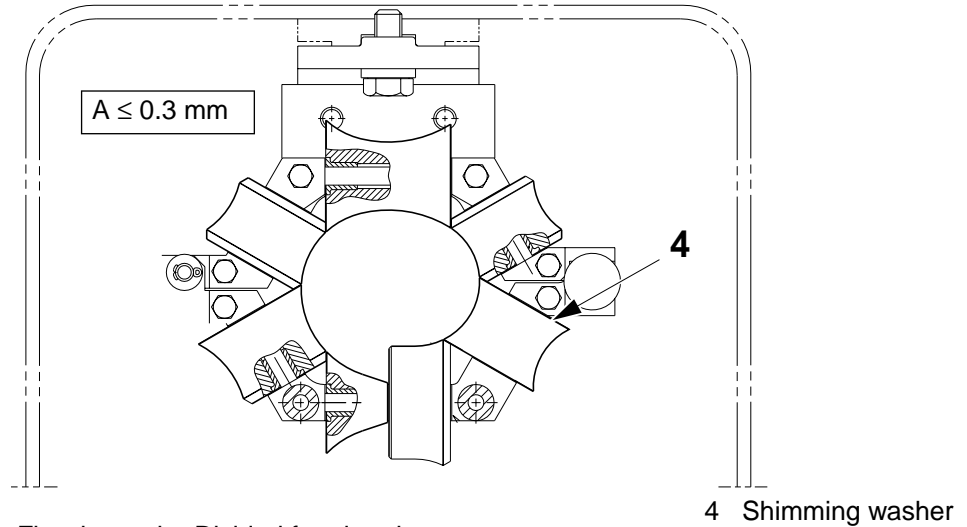


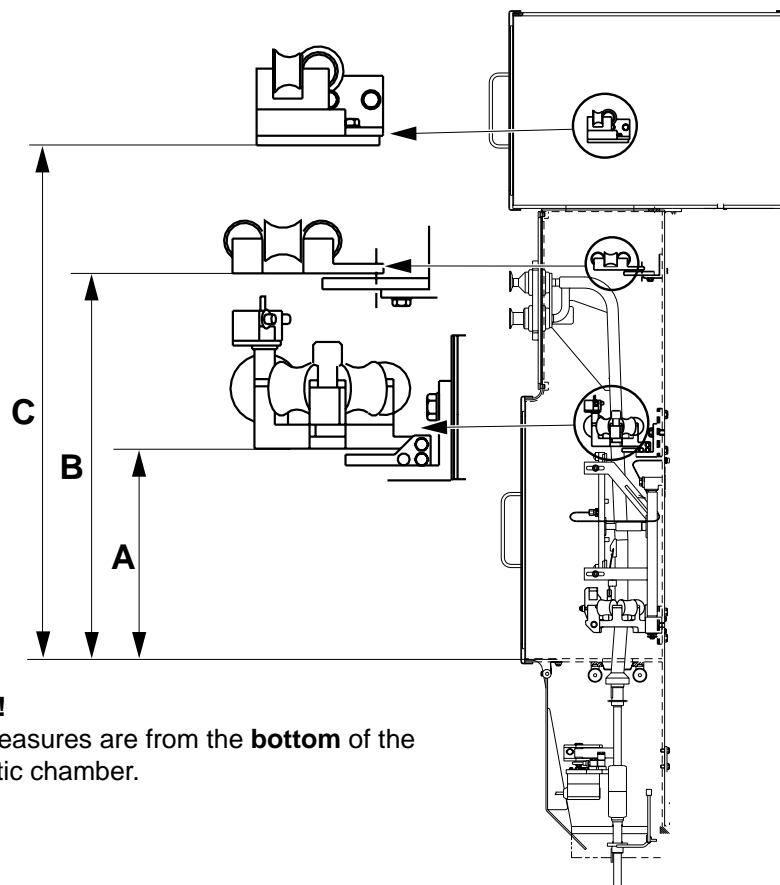
Fig. shows the Divided forming ring

d) While the machine is still **warm**, make sure that all rollers rotate freely. Adjust the play as required.

1.4.1-2 Tube supports and forming rings - set

a) Set the position of the forming rings, see table below.

Package	A ±1.0 (mm)	B ±1.0 (mm)	C ±1.0 (mm)
100 B	540	962	1336
125 S	540	962	1336
160 S	541	977	1283
180 B	532	956	1292
200 B	532	956	1292
200 M	541	977	1283
200 S	541	977	1283
236 B	532	956	1292
250 B	532	956	1292
250 S	541	977	1283
284 B	532	956	1292
300 S	532	956	1292
330 S	532	956	1292



Note!
All measures are from the **bottom** of the aseptic chamber.

(Cont'd)

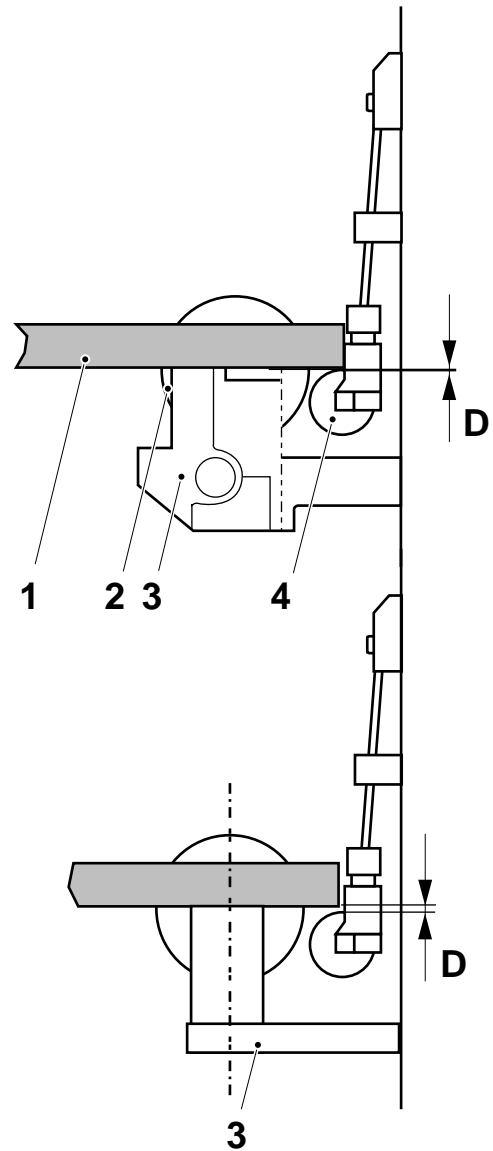
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(Cont'd)

- b) Turn the counter roller (2) to operation position and apply a ruler (1), slide callipers, or a similar tool.
- c) Set the height of the lower forming ring, distance D, see table.

- 1 Slide callipers
- 2 Counter roller
- 3 Lower forming ring
- 4 Pressure roller

Package	D ±0.5 (mm)
100 B	1
125 S	1
160 S	1
180 B	0
200 B	0
200 M	1
200 S	1
236 B	0
250 B	0
250 S	1
284 B	0
300 S	0
330 S	0



Alternative design

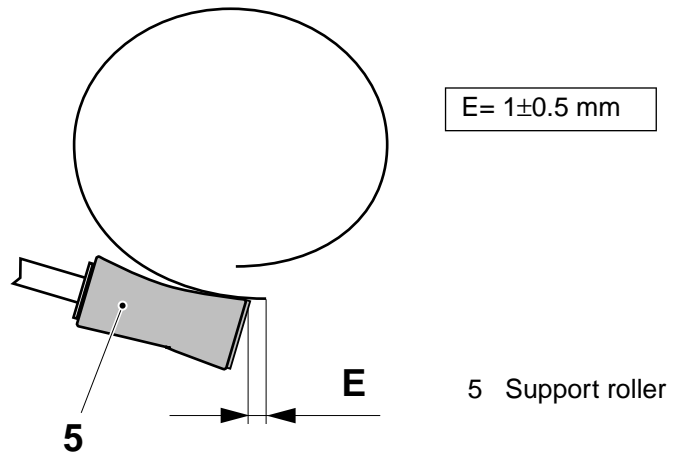
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Support roller, lower forming ring

- a) Make sure that the packaging material is threaded and well straightened.
- b) Set distance E between the support roller and the edge of the packaging material tube.
- c) During operation, check that the support roller (5) does not guide the packaging material tube or affects the overlap.



1.4.2 LS overlap

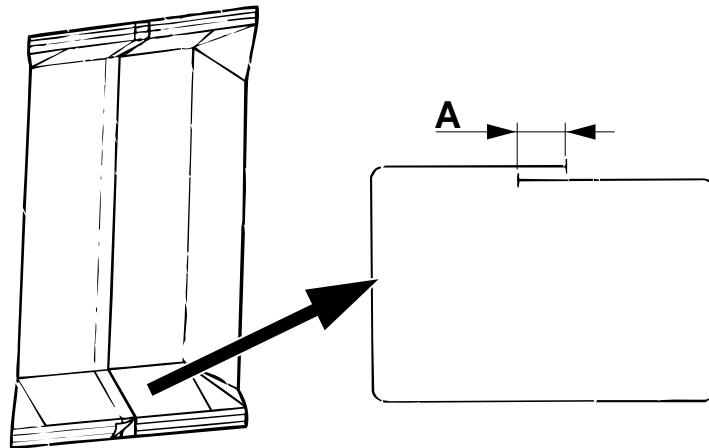
1.4.2-1 LS overlap - set

Machine status	Production
SPC reference	456309-050V

Pick out two packages and measure the LS overlap A.

Set the LS overlap, see table, by changing rollers in the lower forming ring.

Package	Overlap A (mm)
100 B	3.5 - 4.5
125 S	3.5 - 4.5
160 S	3.5 - 4.5
180 B	7.0 - 9.0
200 B	7.0 - 9.0
200 M	5.0 - 7.0
200 S	3.5 - 4.5
236 B	7.0 - 9.0
250 B	7.0 - 9.0
250 S	5.0 - 7.0
284 B	7.0 - 9.0
300 S	6.0 - 8.0
330 S	5.0 - 7.0



(Cont'd)

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Note! The values listed in the table below apply to the **nominal** packaging material width. If the packaging material width varies, the overlap has to be increased or decreased correspondingly.

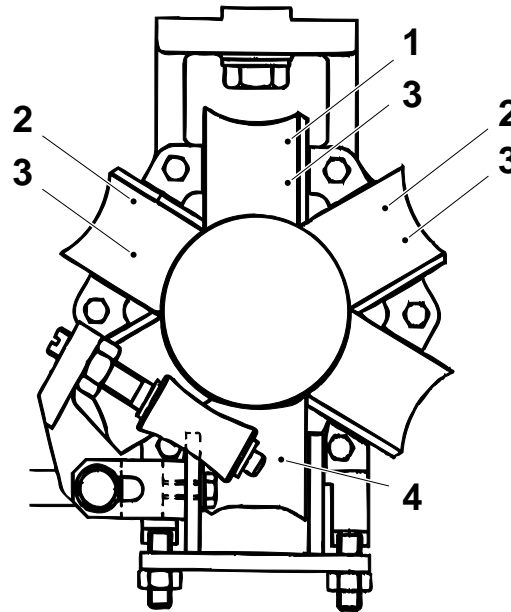
Package	Width (mm)	Overlap (mm)	Regular roller, TP No.	Minus trim. roller, TP No.	Plus trim. roller, TP No.
100 B	162	4	752153	752467	752466
125 S	162	4	752153	752467	752466
160 S	174	4	752138	752465	752464
180 B	214	8	751502	752463	752462
200 B	214	8	751502	752463	752462
200 M	188	6	574346	574447	574446
200 S	174	4	752138	752465	752464
236 B	174	8	751502	752463	752462
250 B	214	8	751502	752463	752462
250 S	188	6	574346	574447	574446
284 B	214	8	751502	752463	752462
300 S	214	8	751502	752463	752462
330 S	212	6	751502	752463	752462

(Cont'd)

(Cont'd)

Caution! Trimming rollers must always be fitted **symmetrically** relative the pressure roller (4). Plus and minus trimming rollers must **never** be fitted at the same time in the forming ring.

- Change max. three regular rollers in the lower forming ring with minus trimming rollers to **increase** the LS overlap A.
- Change max. three regular rollers with plus trimming rollers to **decrease** the LS overlap A.



- 1 Where to put one trimming roller
- 2 Where to put two trimming rollers
- 3 Where to put three trimming rollers
- 4 Pressure roller

Check that the rollers rotate freely, see also *1.4.1-1 Tube supports and forming rings - check*.

1.4.3 Upper tube support

1.4.3-1 Upper tube support - overhaul

SPC reference	441307-030V
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Note! Note the position of the lock plates and the washers before removal.

- a) Unscrew the screws (1) and remove the lock plates (2).
- b) Remove the forming roller (3) and the washers. Change the flange bushings and the axle.
- c) Unscrew the screws (4) and remove the lock plates (5).
- d) Remove the rollers (6) and the washers. Change the flange bushings and the axles.

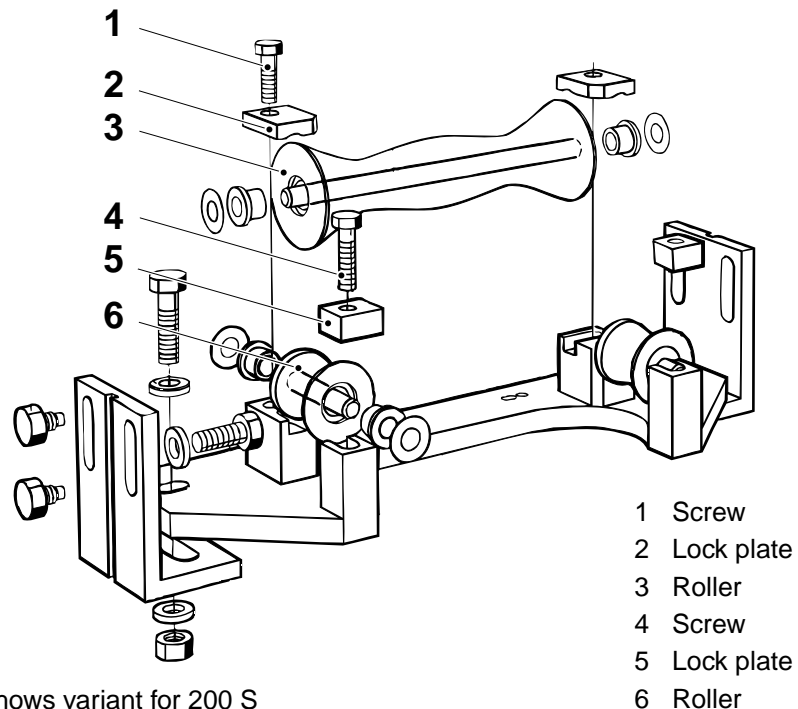


Fig. shows variant for 200 S

Note! In case the rollers are damaged or worn, change them before assembly.

- e) Assemble in the reverse order.
- f) Check that the play between the rollers does not exceed 0.3 mm and that the passage between the rollers is smooth.
- g) When the machine is **warm**, make sure that the rollers rotate freely. Adjust the play as required.

1.4.4 Movable forming ring

1.4.4-1 Movable forming ring - overhaul

SPC reference	441304-030V
---------------	-------------

Note! Note the position of the lock plates and the washers before removal.

- a) Unscrew the screws (1) and remove the lock plates.
Remove the roller (2).
- b) Change the flange bushings and the axle.
- c) Unscrew the screws (3) and remove the lock plates. Remove the rollers (4) and the rollers (5).
- d) Change the flange bushings and the axles in the rollers.

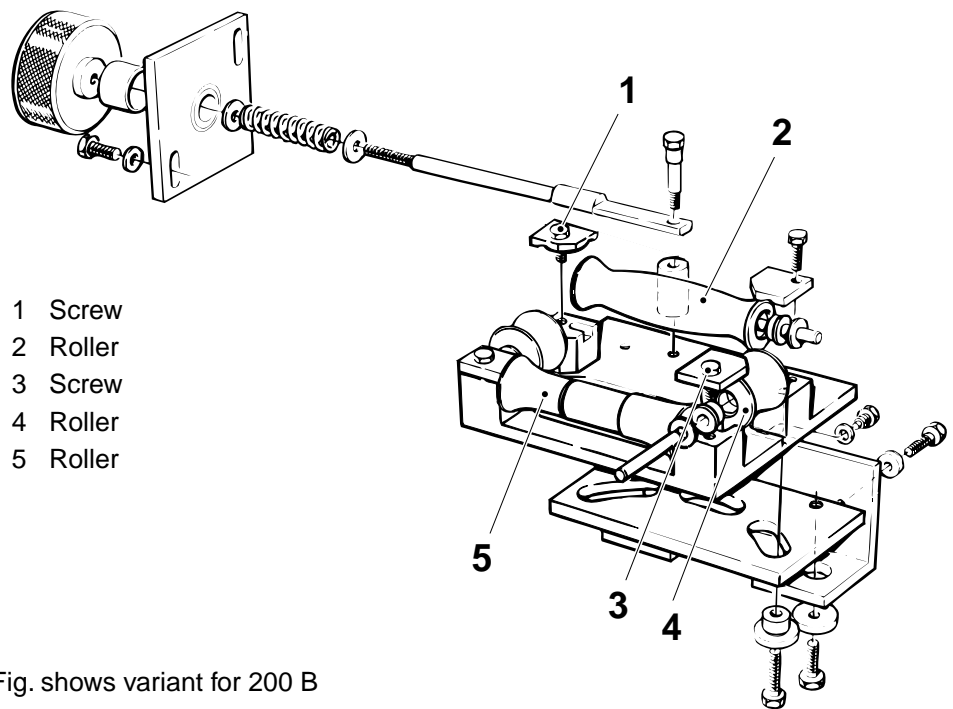


Fig. shows variant for 200 B

Note! In case the rollers are damaged or worn, change them before assembly.

- e) Assemble in the reverse order.
- f) Check that the play between the rollers does not exceed 0.3 mm and that the passage between the rollers is smooth.
- g) When the machine is **warm**, make sure that the rollers rotate freely. Adjust the play as required.

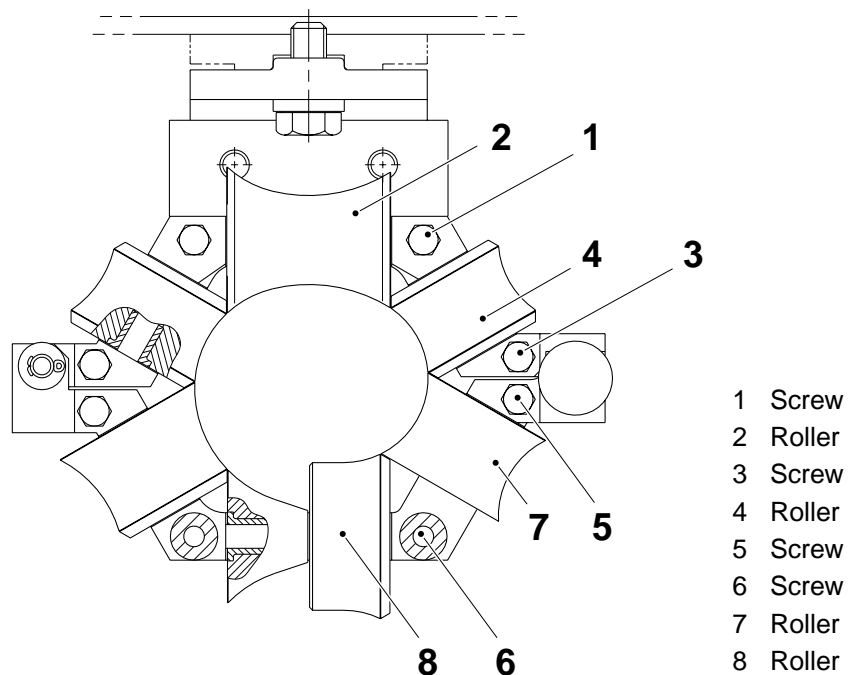
1.4.5 Divided forming ring

1.4.5-1 Divided forming ring - overhaul

SPC reference	441386-040V
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Note! Note the position of the lock plates and the washers before removal.

- a) Unscrew the screws (1) and remove the lock plates.
- b) Remove the roller (2) and the washers. Change the bushings and the axle.
- c) Unscrew the screws (3) and remove the lock plates.
- d) Remove the rollers (4) and the washers. Change the bushings and the axles.
- e) Unscrew the screws (5) and (6) and remove the lock plates.
- f) Remove the two rollers (7), the roller (8) and the washers. Change the flange bushings and the axles.



(Cont'd)

(Cont'd)

Note! In case the rollers are damaged or worn, change them before assembly.

- g) Assemble in the reverse order.
- h) Check that the play between the rollers does not exceed 0.3 mm and that the passage between the rollers is smooth.
- i) When the machine is **warm**, make sure that the rollers rotate freely. Adjust the play as required.

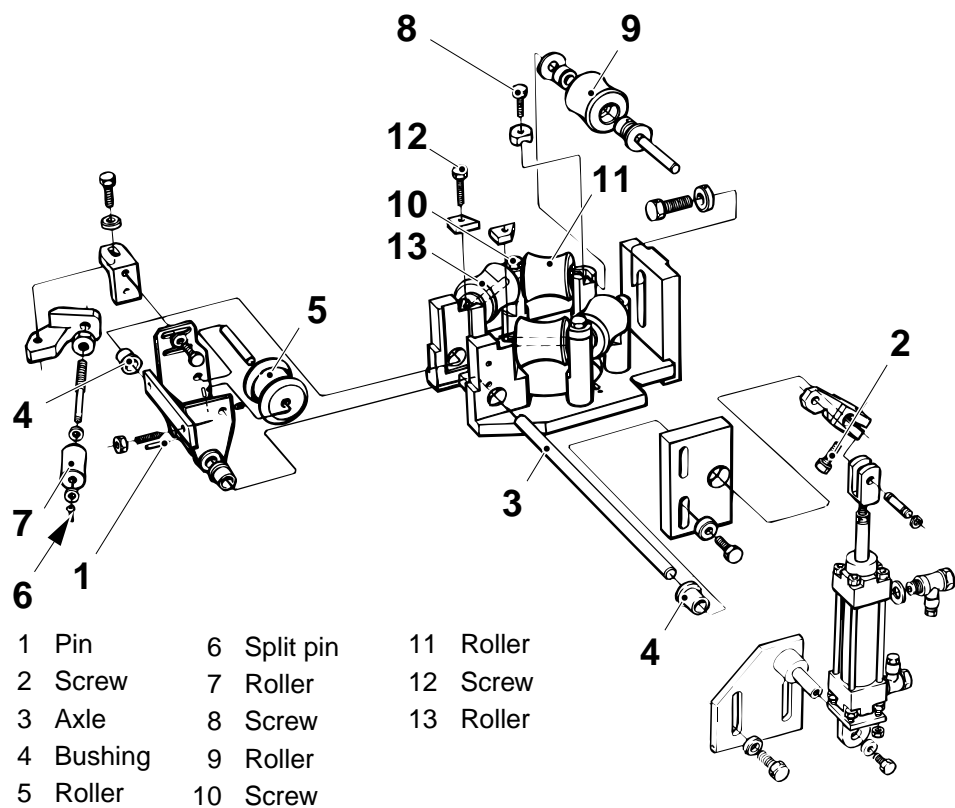
1.4.6 Lower forming ring

1.4.6-1 Lower forming ring - overhaul

SPC reference	456309-050V
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Note! Note the position of the lock plates and the washers before removal.

- a) Tap out the pin (1). Loosen the screw (2) and pull out the axle (3). Change the bushings (4).
- b) Remove the counter roller (5). Change the axle as required.
- c) Remove the split pin (6) and change the roller (7).
- d) Unscrew the screws (8) and remove the lock plates.
- e) Remove the two rollers (9). Change the bushings and the axles.
- f) Unscrew the screws (10) and remove the lock plates.
- g) Remove the two rollers (11). Change the bushings and the shafts.
- h) Unscrew the screws (12) and remove the lock plates.
- i) Remove the two rollers (13). Change the bushings and the shafts.



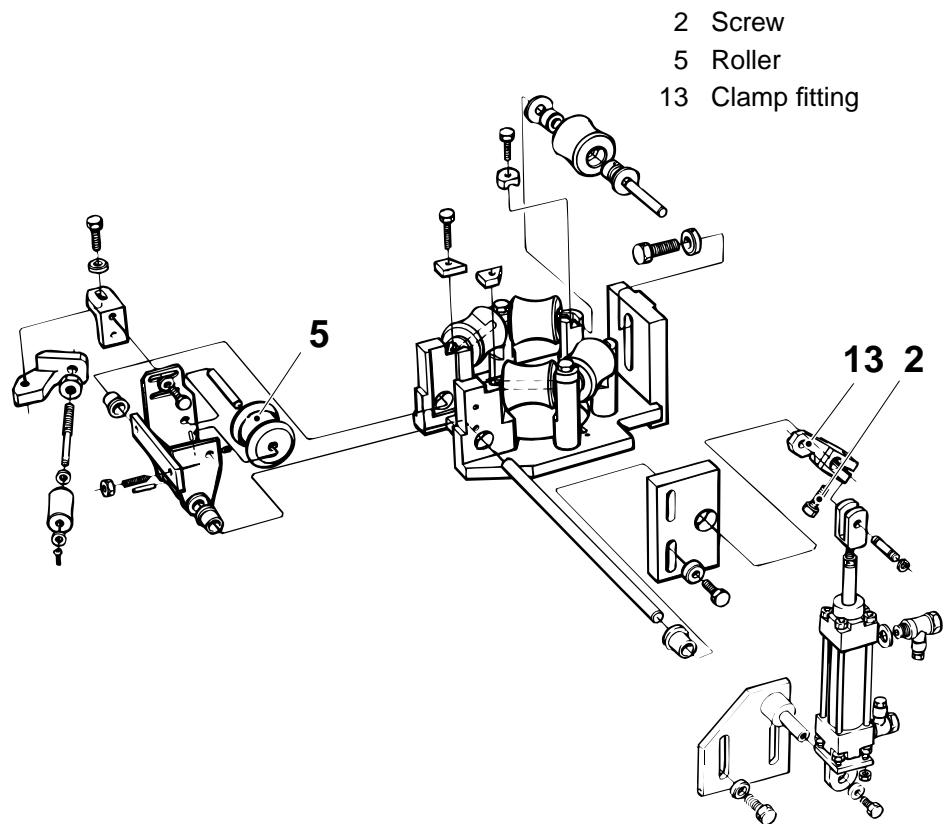
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Note! In case the rollers are damaged or worn, change them before assembly.

- j) Assemble in the reverse order.
- k) Check that the play between the rollers does not exceed 0.3 mm and that the passage between the rollers is smooth.
- l) When the machine is **warm**, make sure that the rollers rotate freely. Adjust the play as required.

Note! The cylinder shall be fully out and the roller (5) in its upper position when tightening the screw (2). Make sure that the clamp fitting (13) moves clear of the bracket.

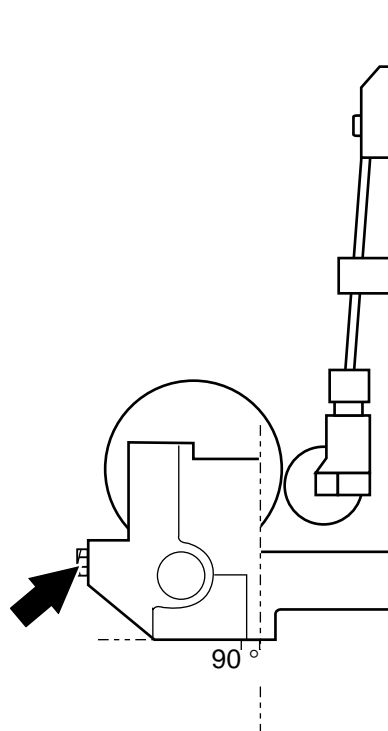


1.4.6-2 Lower forming ring - set counter roller

SPC reference	456309-050V
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- a) Move up the counter roller so that it touches the pressure roller.
- b) Make sure that the counter roller bracket is in vertical position.
- c) If required, set by means of the stop screws.

Note! Make sure that the passage between the rollers is smooth.



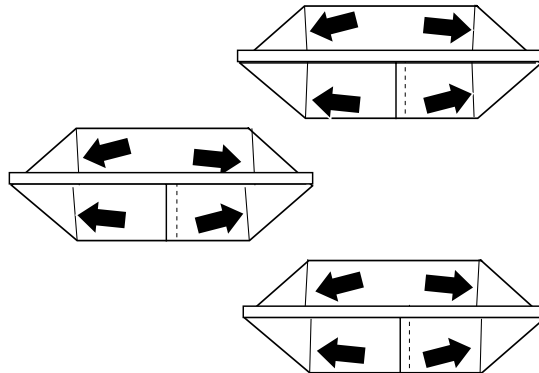
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1.4.7 Tube alignment

1.4.7-1 Tube alignment - check on packages

Machine status	Production
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- a) Pick out two packages and check that the crease lines on the packages are opposite one another or displaced symmetrically.



Note!

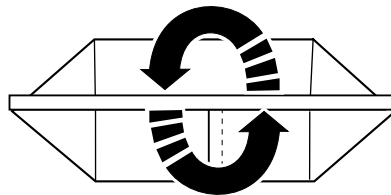
The pictures show the top of the package with the flaps unfolded.

- b) If required, set the tube alignment as follows.

Position the web, SA machines

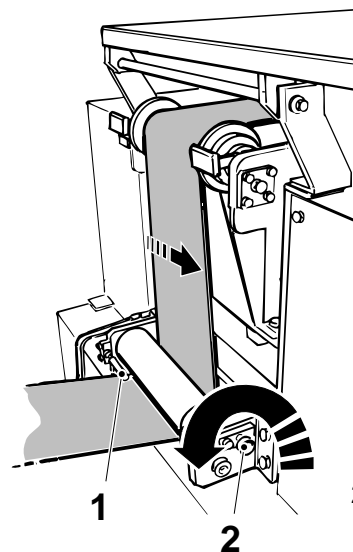
Note! Machines equipped with PullTab unit, see below.

- a) Make a **Short stop**. Remove the web cover.
- b) Turn the knob (2) on the SA. The marks on the pointer (1) indicate how much the packaging material web is adjusted. Turning the knob counter-clockwise moves the web as illustrated.
- c) Pick out new packages and check the crease position.



Note!

The picture shows the top of the package with the flaps unfolded.



- 1 Pointer
- 2 Knob

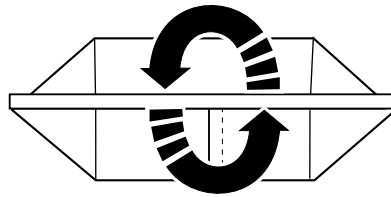
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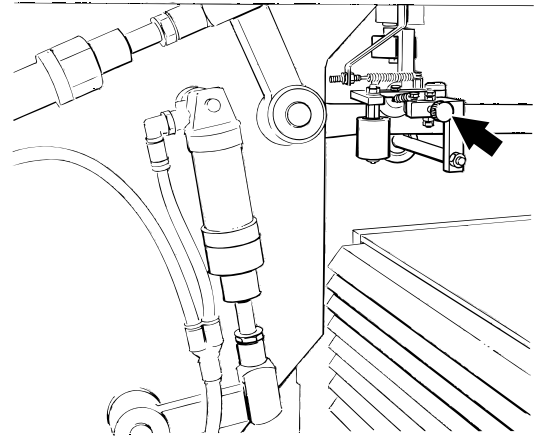
Position the web, PullTab machines

- a) Make a **Short stop**. Open the PullTab unit cover.
- b) Turn the knob on the paper guide.
Turning the knob counter-clockwise moves the web as illustrated.
- c) Pick out new packages and check the crease position.



Note!

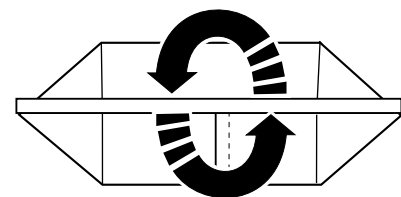
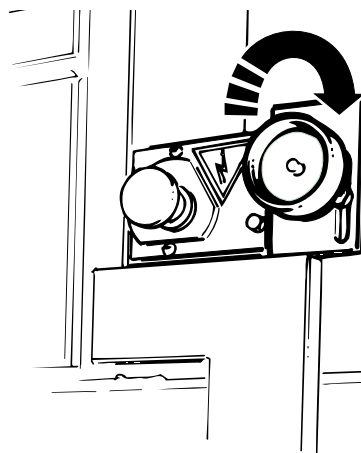
The picture shows the top of the package with the flaps unfolded.



If this adjustment is not sufficient, proceed as follows:

Turn the tube

- a) Turn the knob on the superstructure.
- b) Turning the knob clockwise, moves the tube as illustrated.
- c) Pick out new packages and check the crease position.



Note!

The picture shows the top of the package with the flaps unfolded.

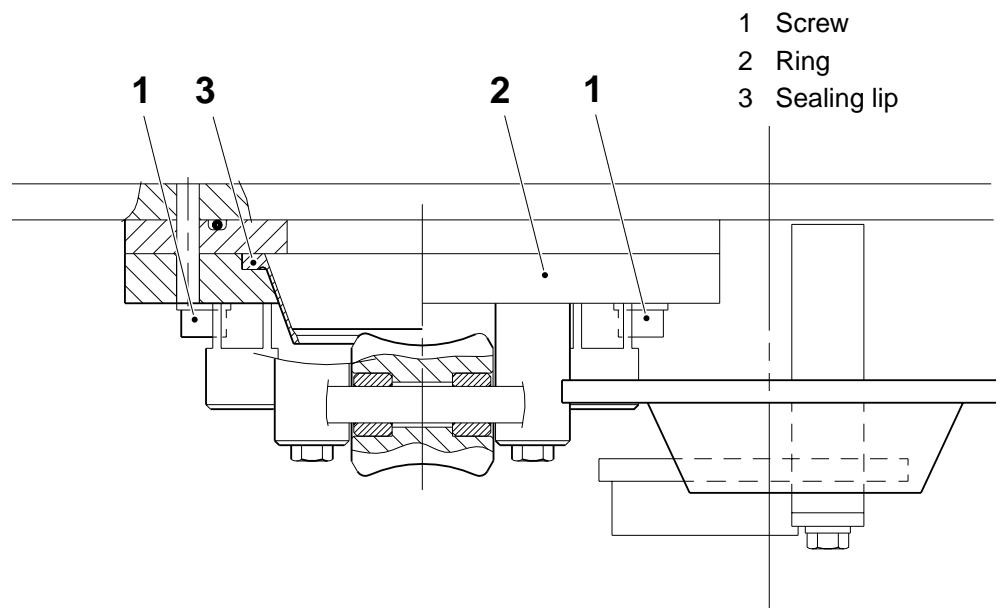
1.5 Aseptic chamber

SPC reference	272021-070V
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1.5-1 Aseptic chamber - change sealing lip

SPC reference	272021-070V
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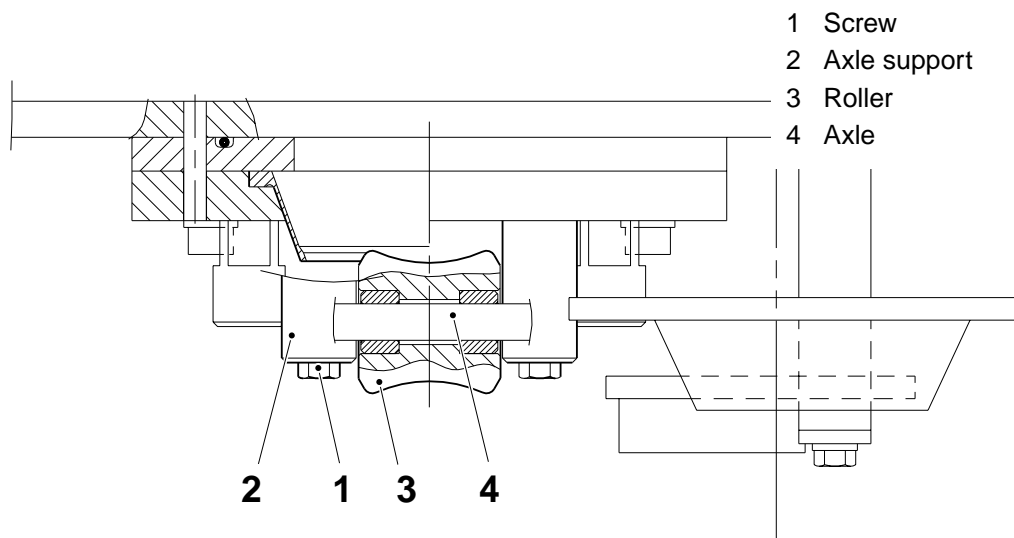
- a) Unscrew the screws (1) and remove the ring (2).
- b) Change the sealing lip (3).
- c) Assemble in the reverse order.



1.5-2 Aseptic chamber - check support roller

SPC reference	272021-070V
---------------	-------------

- Check that the rollers (3) are not damaged and that their running surfaces are not worn. Make sure that the rollers rotate smoothly.
- If the rollers are damaged or do not rotate smoothly, unscrew the screws (1) and remove the axle support (2) and the roller (3).
- Change the washers, the bearings, the axles (4) and/or the rollers.
- Assemble in the reverse order.

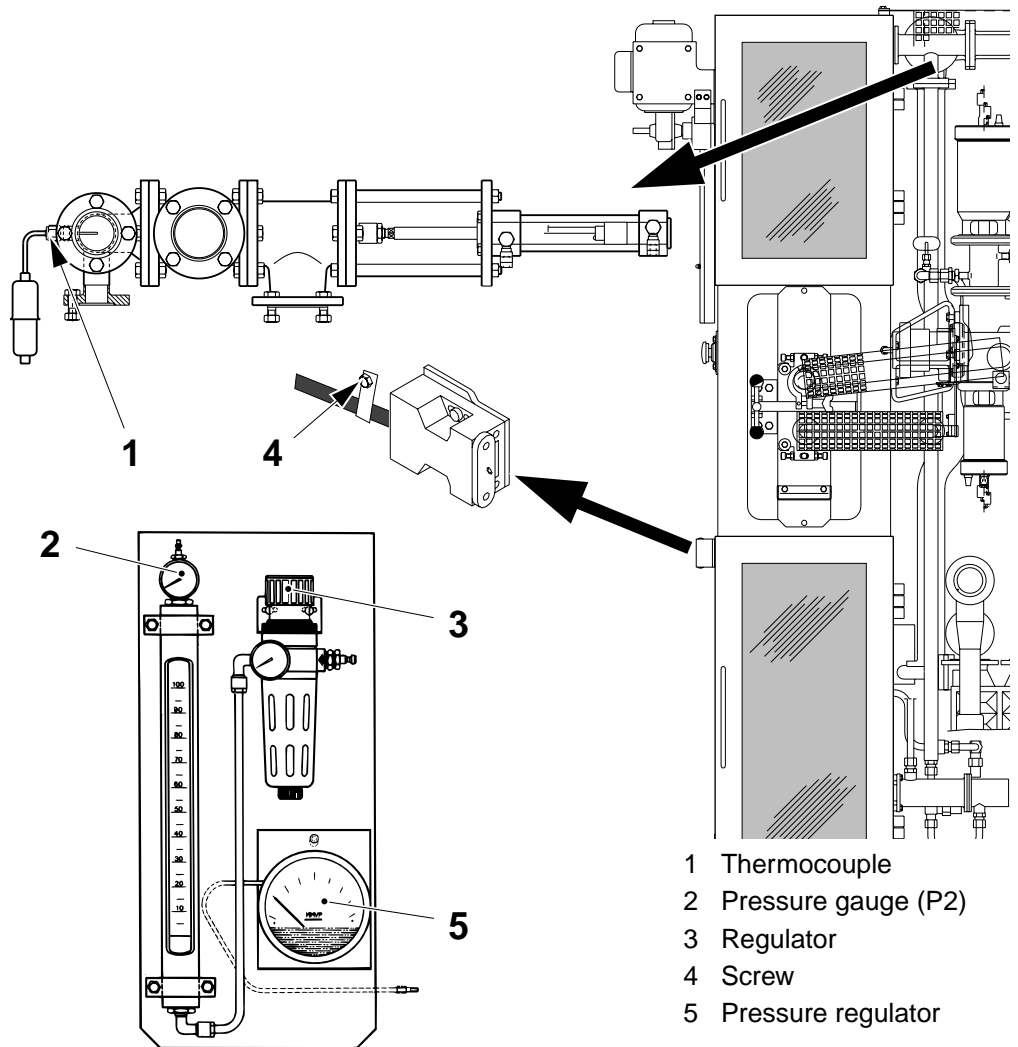


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1.5-3 Aseptic chamber - measure leakage

Machine status	Production
Tools - test equipment	TP No. 533014-101
Consumable - adhesive tape	
SPC reference	272021-070V

- a) Perform a **Short stop and** step down the machine to **Zero** position.
- b) Undo the thermocouple (1) at the air knife. Connect the hose from the pressure gauge (2) to it.
- c) Connect a compressed air line to the regulator (3). Unscrew the screw (4) in the aseptic chamber and fit a hose connection in its place. Connect the hose to the pressure gauge (5).

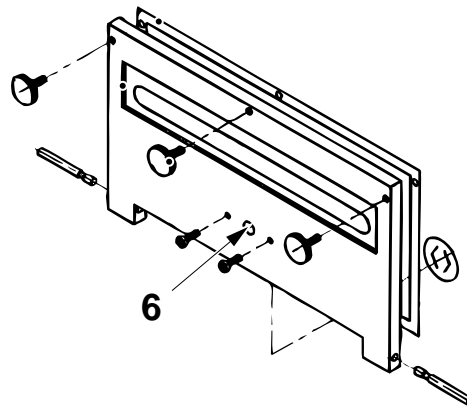


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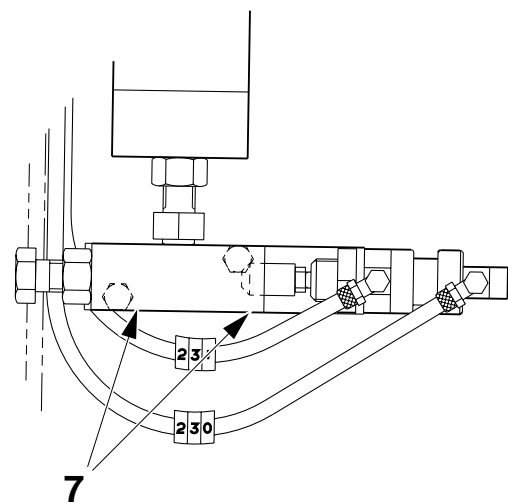
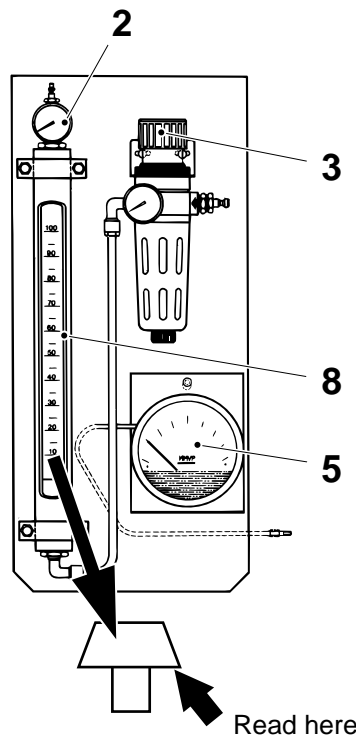
(Cont'd)

- d) Seal the membrane valve (6) of the bath with adhesive tape.



6 Membrane valve

- e) Seal the holes (7) of the valve with adhesive tape.
 f) Slowly open the regulator (3) until the pressure gauge (5) indicates **20 mmWC**.
 g) Read the flow on the flow meter (8) and the pressure on the pressure gauge (2).



- 2 Pressure gauge (P2)
- 3 Regulator
- 5 Pressure gauge
- 7 Hole
- 8 Flow meter

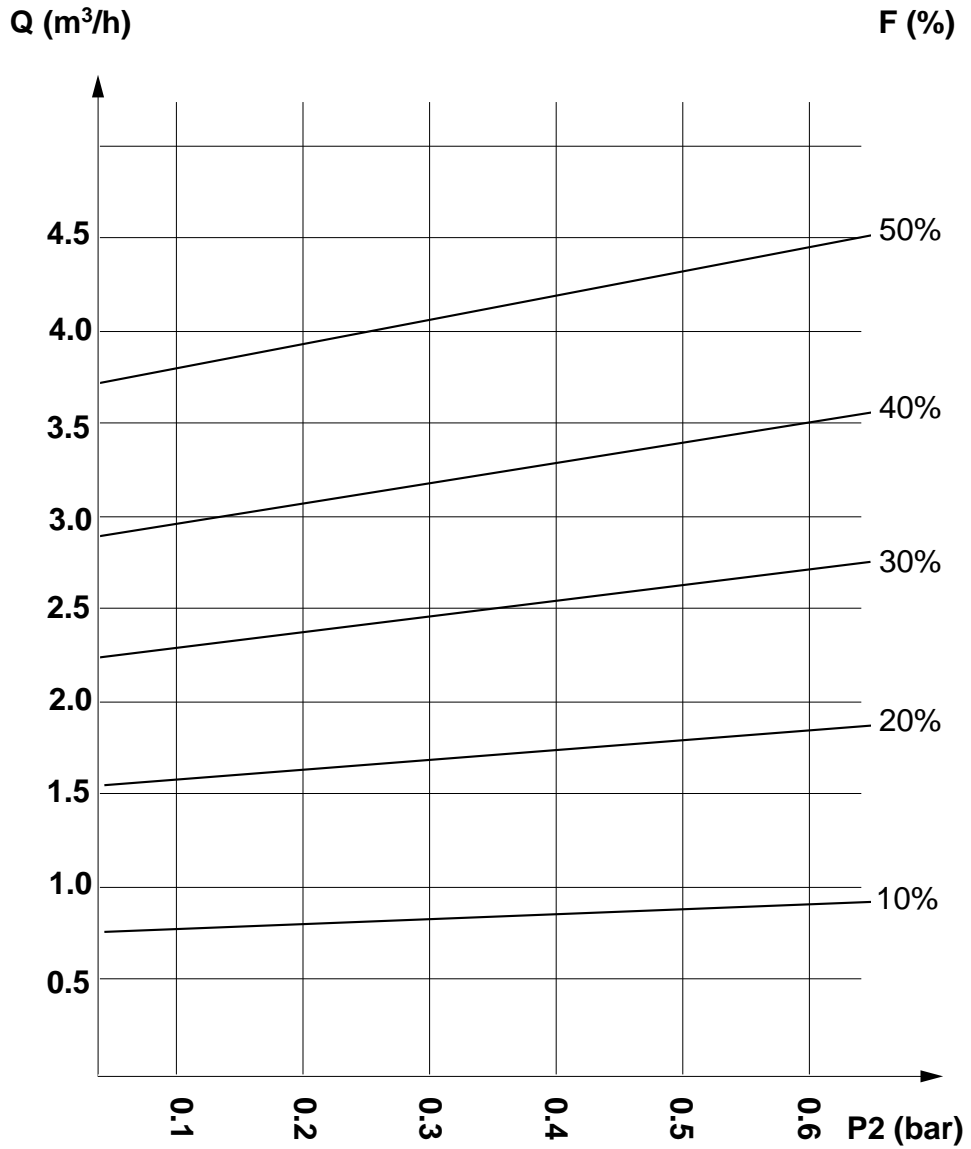
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(Cont'd)

h) Enter these values in the diagram and read the leakage quantity (Q).

Note! The leakage quantity Q is to be 2.0 - 2.5 m³/h



(Cont'd)

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(Cont'd)



Hydrogen peroxide!

Follow the *Safety precautions*.

If the leakage quantity is excessive, check the tightness at the following points:

- the safety valve in the hydrogen peroxide tank
- the lead-in of the driven bending roller shaft
- the shaft lead-in and the bearing cover of the crease roller
- the door seals of the aseptic chamber doors
- the chain seals in the bath and the suction box seal

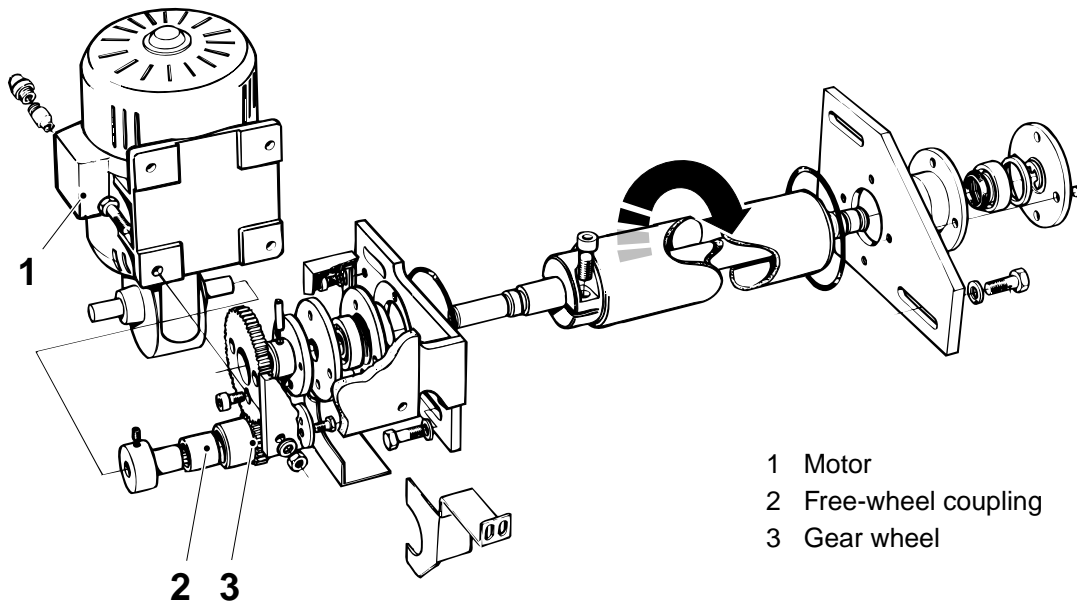
1.6 Bending roller (driven)

SPC reference	272028-070V
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1.6-1 Bending roller (driven) - check

Consumables - silicone grease	code L
SPC reference	272028-070V

- To check the free-wheel coupling, take a hold of the roller and turn it in its normal working direction. Try to turn it in the other direction. It should not be possible without turning also the motor.
- Make sure that there is no excessive play in the gear wheels.
- If required, change the free-wheel coupling and/or the gear wheel.
- Remove the motor with the hub (1), the free wheel coupling (2) and the gear wheel (3). Change the gear wheel and the free-wheel coupling.



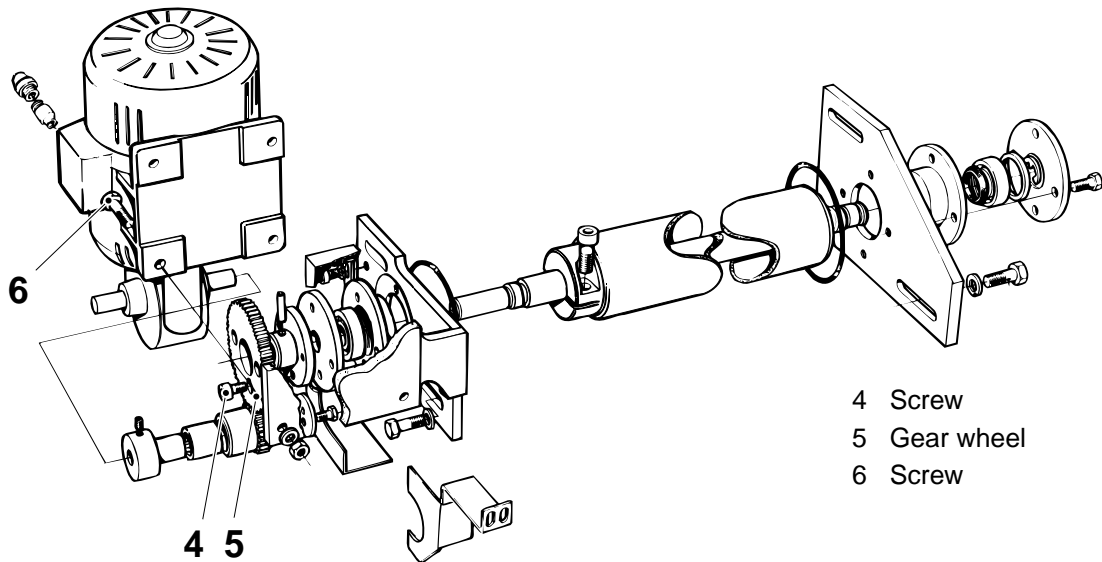
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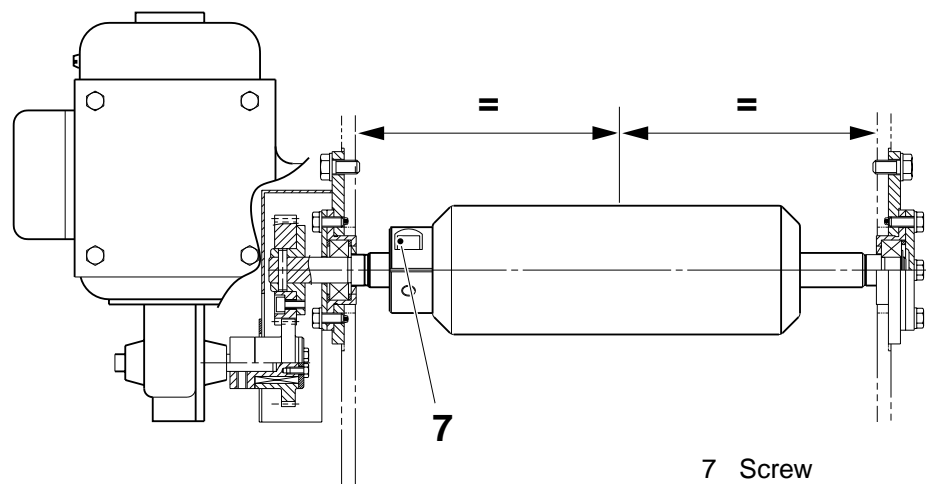
- e) Unscrew the three screws (4) and remove the gear wheel (5). Change the gear wheel.

Note! Lubricate the free-wheel hub, the gear wheels with silicone grease, code L, see 10.2 *Lubricants*.

- f) Assemble in the reverse order and set the gear play by loosening the screws (6) and shifting the motor up or down.



- g) Check that the driven bending roller is centered within 1.0 mm. If required, loosen the screw (7) and shift the roller sideways.

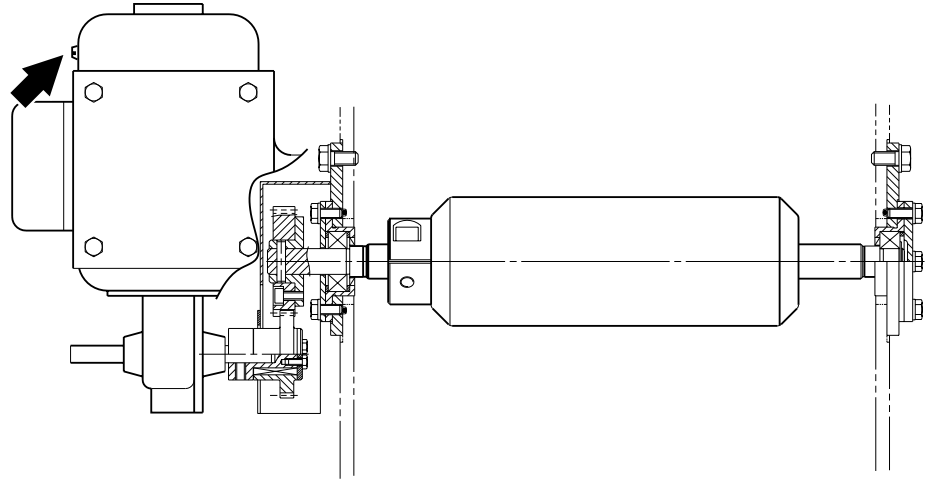


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1.6-2 Bending roller (driven) - change carbon brushes

SPC reference	272028-070V
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Unscrew the carbon brushes and change them.



1.6-3 Bending roller (driven) - measure speed

Machine status	Production
Tools - tachometer	TP No. 90243-105
SPC reference	272028-070V

Measure the speed of the driven bending roller during five minutes.

Record the min. speed and the max. speed.

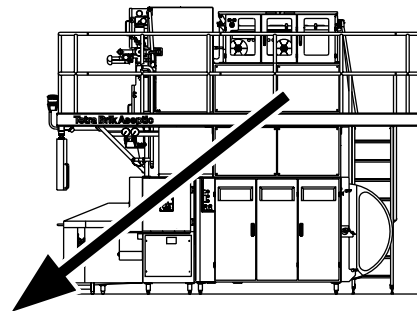
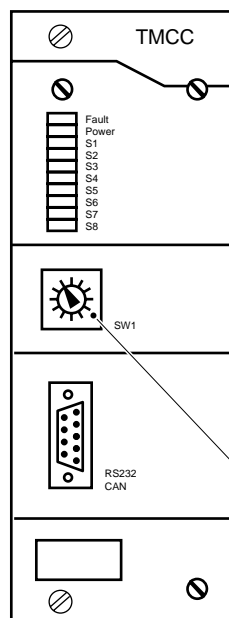
1.6-4 Bending roller (driven) - set speed

Machine status	Preheating I
Tools - tachometer -AT compatible PC	TP No. 90243-105
SPC reference	272028-070V

- a) Make sure that all safety covers and doors are closed.
- b) Push **Alarm reset**.
- c) Connect wires 1 and 4 on **A119** and start the bending roller by activating contactor K19.

Note! If you are equipped with a terminal PC force **On** output Q12 and Q83 to start the bending roller.

- d) Set the multi switch (arrow) to position **1**.



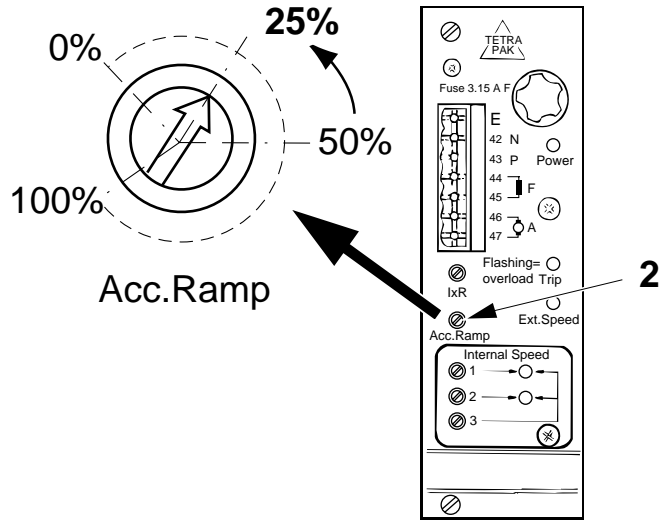
1 Multi switch

(Cont'd)

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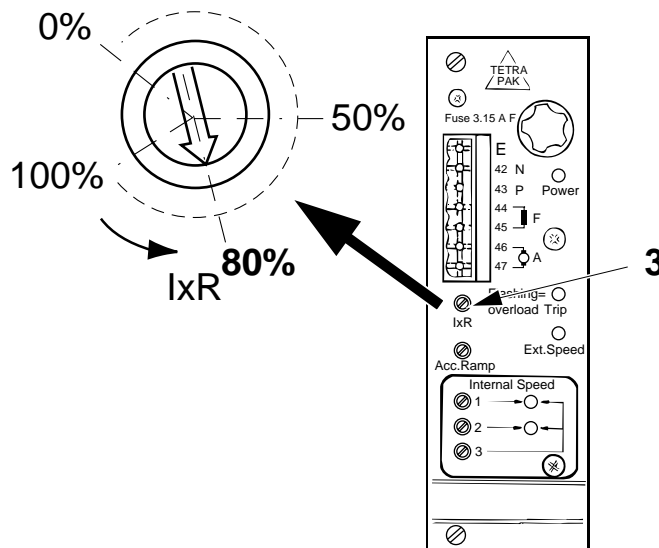
(Cont'd)

- e) Turn the potentiometer (2) on card A001 fully counter-clockwise. Then turn it clockwise approx. of the 25% (Fig.2).



2 Potentiometer

- f) Turn the potentiometer (3) on card A001 fully clockwise. Then turn it counter-clockwise approx. of the 20%.



3 Potentiometer

(Cont'd)

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- g) Measure the **min. speed** (100 rpm) of the driven bending roller by means of a tachometer.
 - If the min. speed is too **high**, set the multi switch to position **2**. The speed decreases with approx. 1 rpm/s.
 - If the min. speed is too **low**, set the multi switch to position **3**. The speed increases with approx. 1 rpm/s.
- h) Set the multi switch in position **1** and recheck the min. speed. Repeat item g) until the speed is correct.
- i) Set the multi switch to position **4**.
- j) Measure the **max. speed** (135 rpm) by means of a tachometer.
 - If the max. speed is too **high**, set the multi switch to position **5**. The speed decreases with approx. 1 rpm/s.
 - If the max. speed is too **low**, set the multi switch to position **6**. The speed increases with approx. 1 rpm/s.
- k) Set the multi switch in position **4** and recheck the max. speed. Repeat item j) until the speed is correct.
- l) Set the multi-switch to position **7** (storing the set values). When all the LEDs on the front panel have flashed at least once, set the multi switch to position **8**.
- m) Deactivate the contactor, disconnect the wires and turn **Off** the mains power.

Caution! If you follow the procedure described in the note on page 108 remember to remove the force **On** on Q12 and Q83 before continue to work on the machine.

1.6-5 Bending roller (driven) - check speed

Machine status	Production
Tools - tachometer	TP No. 90243-105
SPC reference	272028-070V

Check the speed of the driven bending roller during five minutes.

The speed is to be between 100 - 135 rpm. If required, set the speed of the driven bending roller, see *1.6-4 Bending roller (driven) - set speed*.

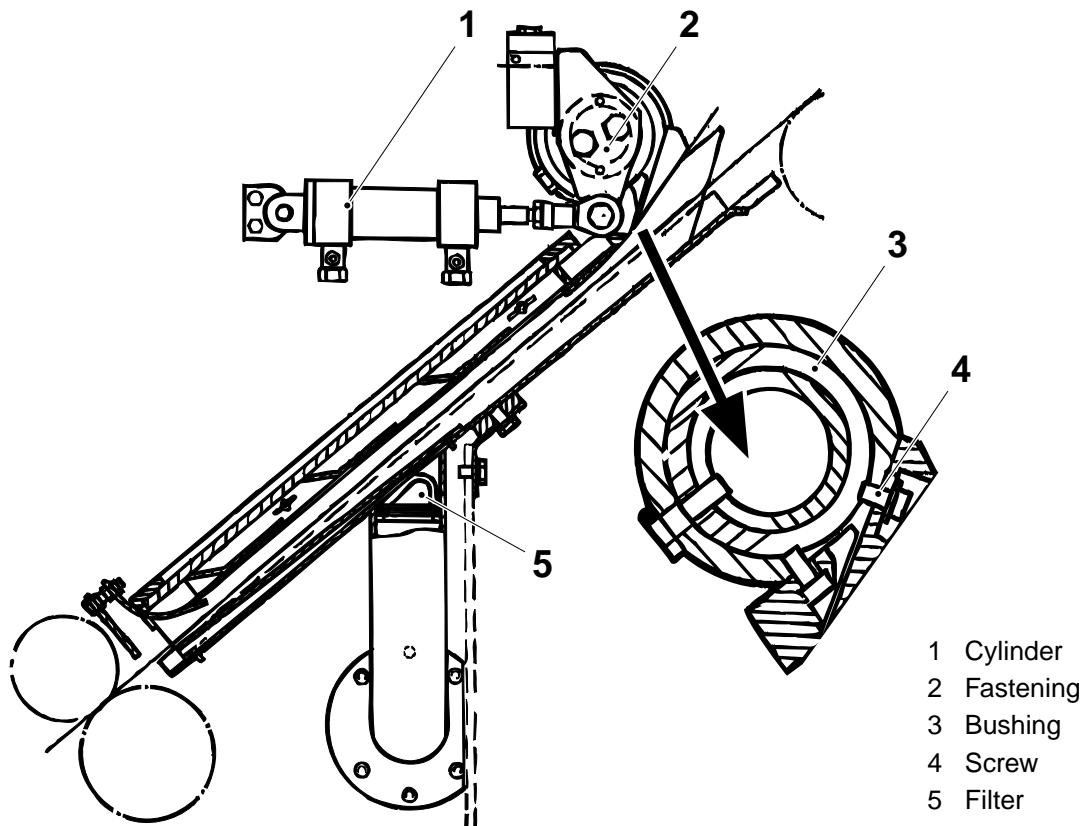
1.7 Air knife

SPC reference	272025-030V
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1.7-1 Air knife - check

SPC reference	272025-030V
---------------	-------------

- a) Make sure that the cylinder (1) moves smoothly.
- b) Check the following details for wear and/or damage.
 - the fastening (2)
 - the bushings (3); make sure that there is no excessive play
 - the filter (5); make sure that it is clean
- c) Change as required.
- d) Tighten the screws (4).
- e) Check and, if required, set as follows:



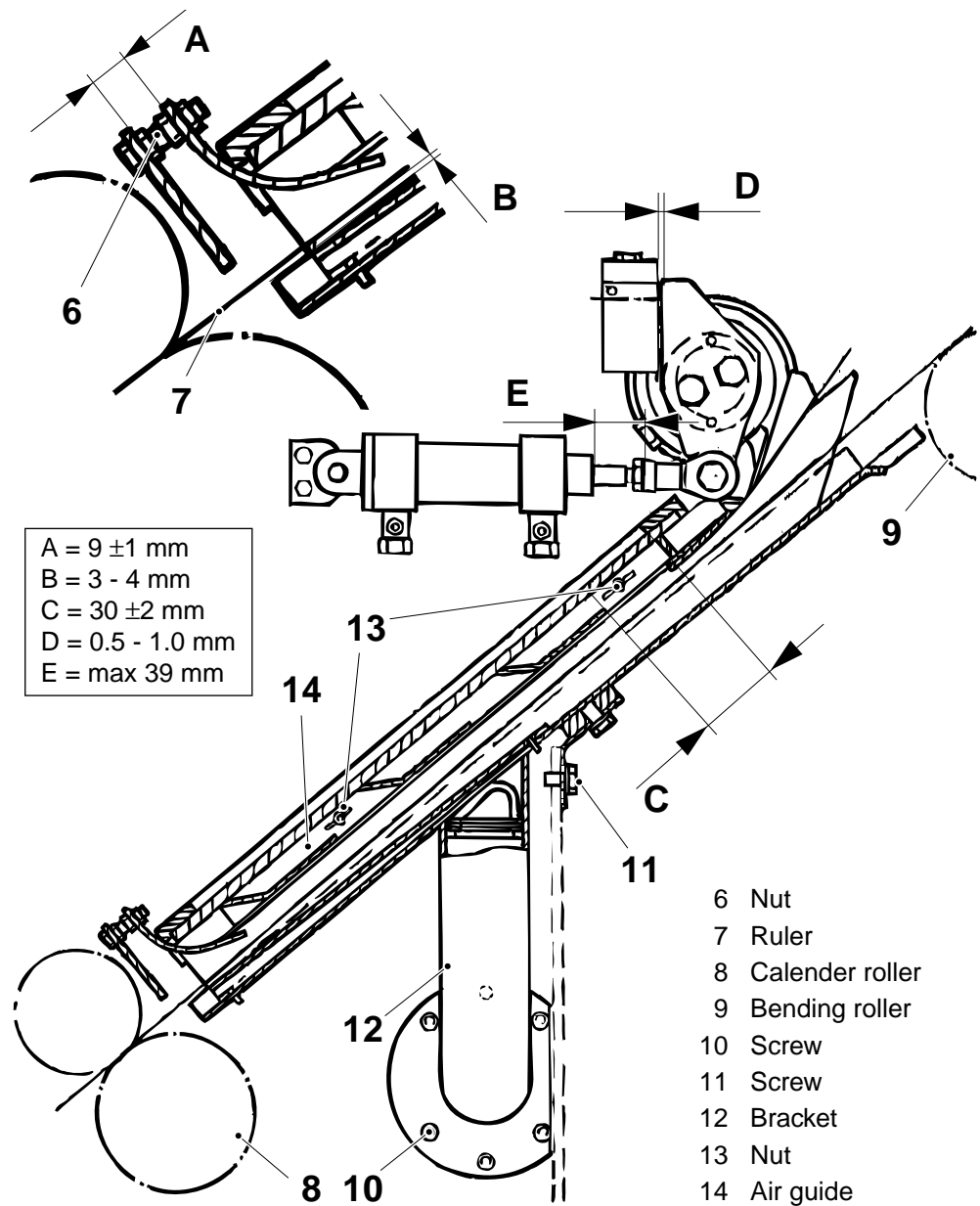
- 1 Cylinder
- 2 Fastening
- 3 Bushing
- 4 Screw
- 5 Filter

(Cont'd)

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Basic setting

- a) Set distance A by means of the nuts (6).
- b) Place a ruler (7) between the calender roller (8) and the bending roller (9). Set distance B by loosening the screws (10) and (11), and shifting the bracket (12).
- c) Set distance C by loosening the nuts (13) and shifting the air guide (14).
- d) Set distance D between the proximity switch and the plate.
- e) Set distance E so that the cylinder does not move fully home when the air knife is in working position.

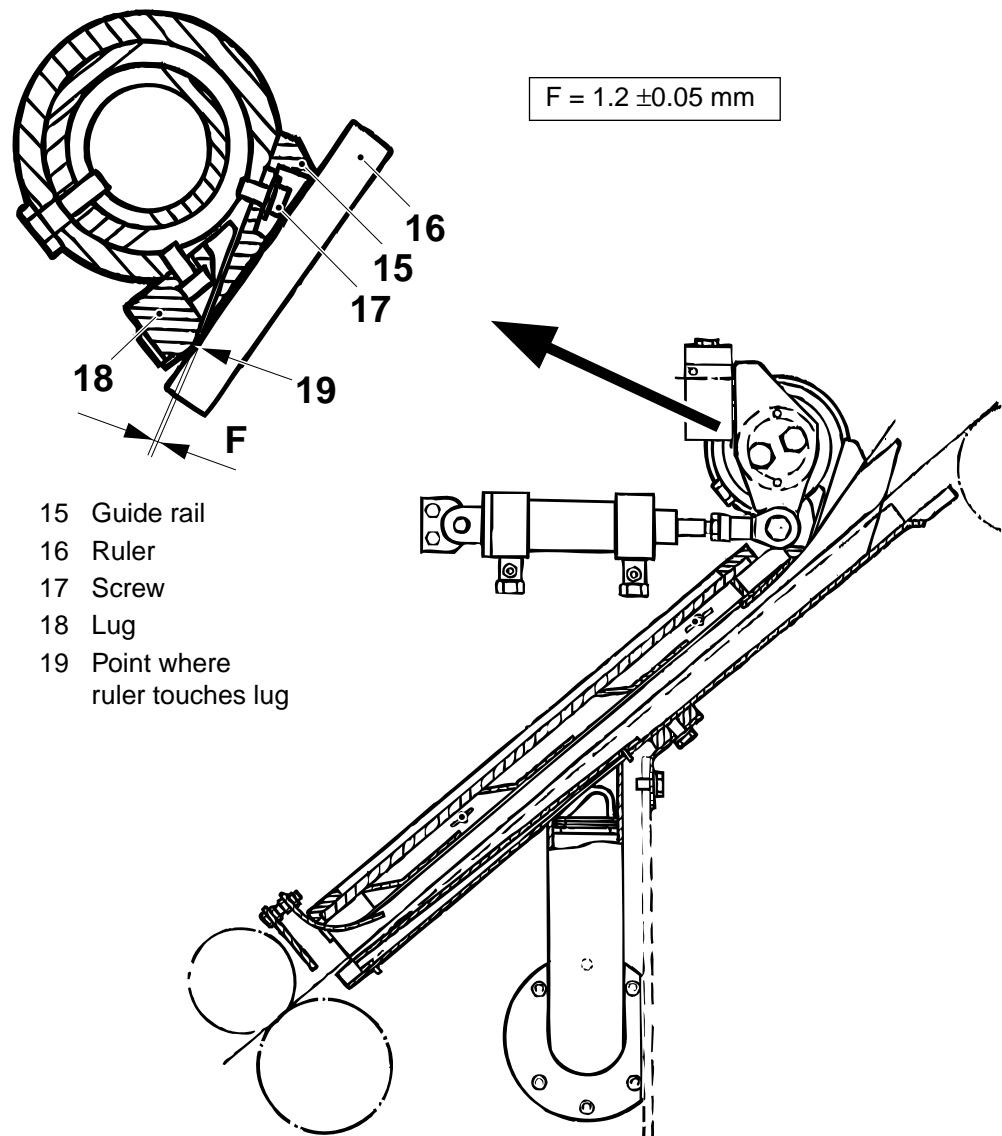


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*(Cont'd)***Valid for 100 B, 125 S, 160 S, 200 M, 200 S and 330 S**

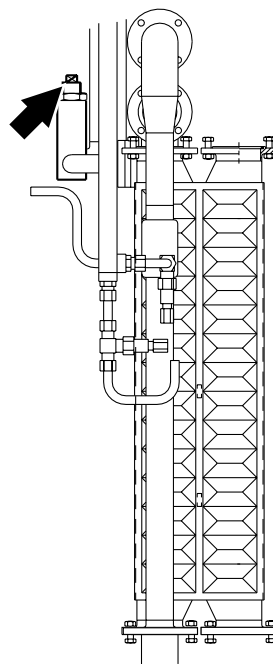
- f) Set distance F along the hole width of the bending roller. Adjust by putting shims under the guide rail (15).
- g) Place a ruler (16) on the guide rail. Loosen the screws (17) and shift the guide rail so that the ruler touches the lug (18) at the point (19). Tighten the screws.



1.7-2 Air knife - set temperature

Machine status	Production
SPC reference	272025-030V

- With the machine in step **Production**, let it run for approx. 15 minutes.
- Set the air knife temperature, see *10.1 Technical data*, by means of the by-pass throttle (arrow).
- Read the air knife temperature on the temperature regulator.



1.8 Heat exchanger

SPC reference	456976-060V
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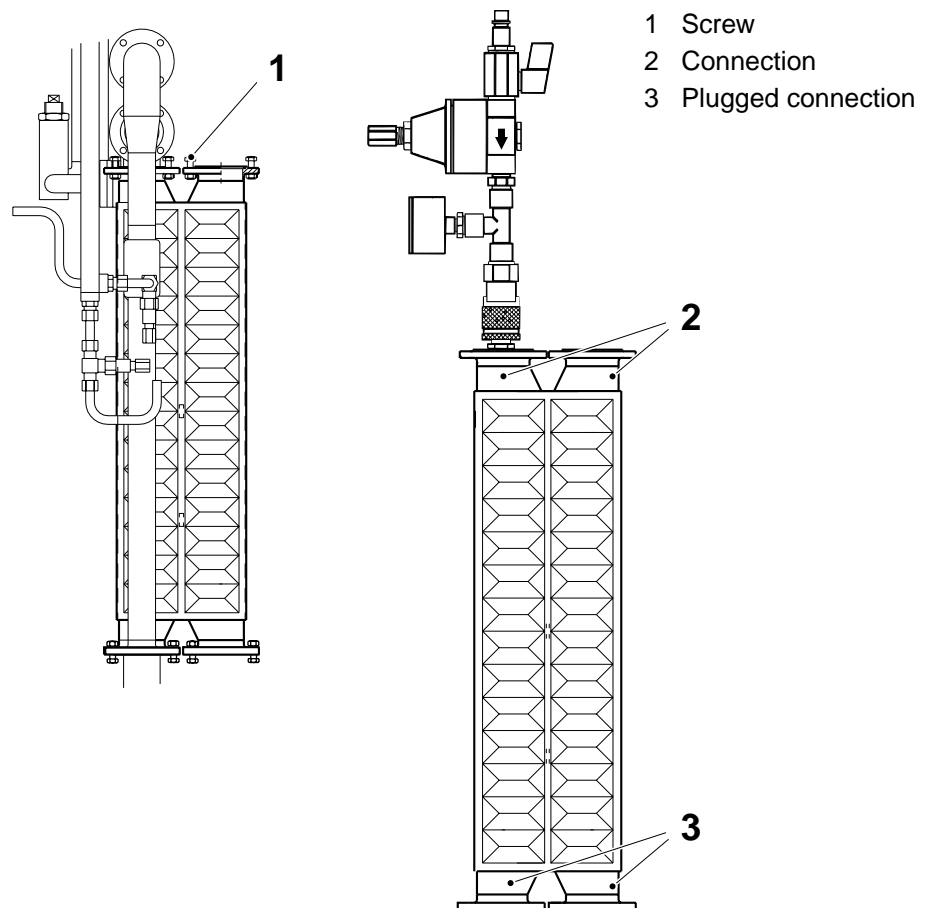
1.8-1 Heat exchanger - check tightness

Tools	
- flange	TP No. 979952
- flange	TP No. 979951
- hydrostatic test equipment	TP No. 565536
SPC reference	456976-060V

Unscrew the screws (1) and remove the heat exchanger from the machine.

Check the tightness as follows:

- a) Plug one of the connections (3) by means of blank-off flange TP No. 979952.
- b) Connect the hydrostatic test equipment with flange TP No. 979951, to the connection (2), **diagonally placed** to the plugged connection (3).

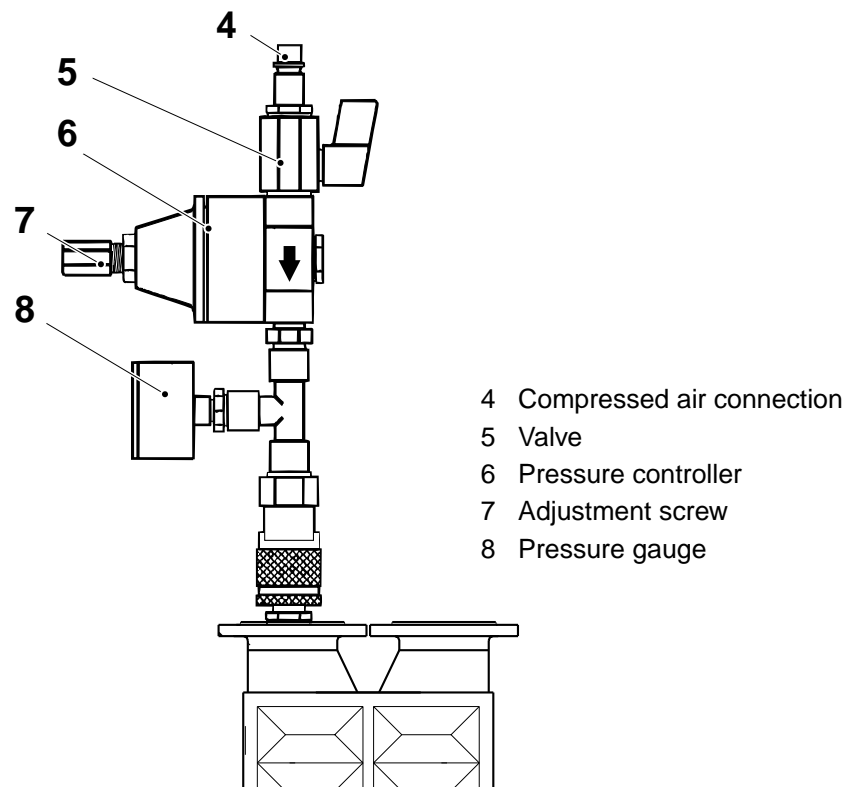


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Note! Make sure that the equipment is connected in the correct direction - the flow is to run **from** the valve (5) **towards (arrow direction)** the pressure gauge (8).

- Caution!** Before turning on compressed air, turn the adjustment screw (7) **counter-clockwise** until the spring load is released, and **close** the valve (5).
- c) Connect compressed air to the connection (4).
 - d) Submerge the whole heat exchanger in water. Make sure **not** to drench the pressure controller (6). Let all air bubbles disappear.
 - e) Open the valve (5). Adjust the pressure to **50 kPa (0.5 bar)**, indicated on the pressure gauge (8), by means of the adjustment screw (7). Air bubbles will immediately show any leaking points in the heat exchanger.
 - f) Repeat the procedure with the other side.
 - g) If leakage is suspected, change the heat exchanger.



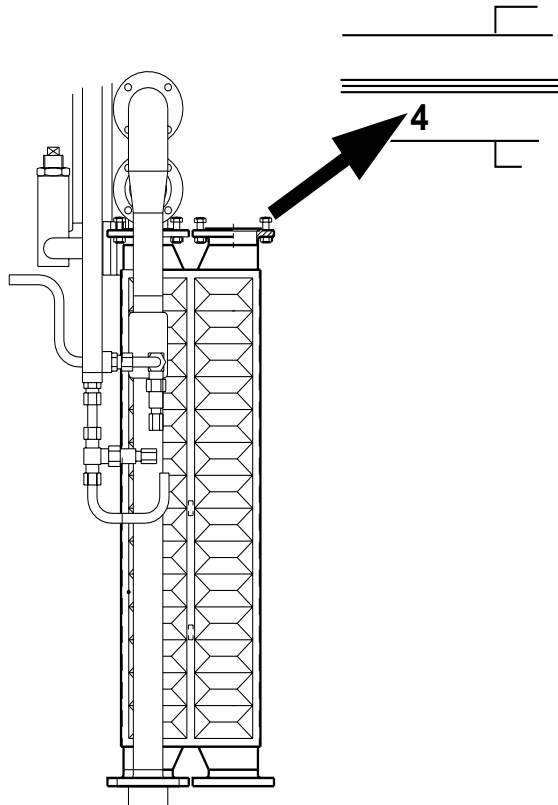
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Change the joint gaskets.

Fit the heat exchanger on the machine with the flange with **number 4** positioned as illustrated.



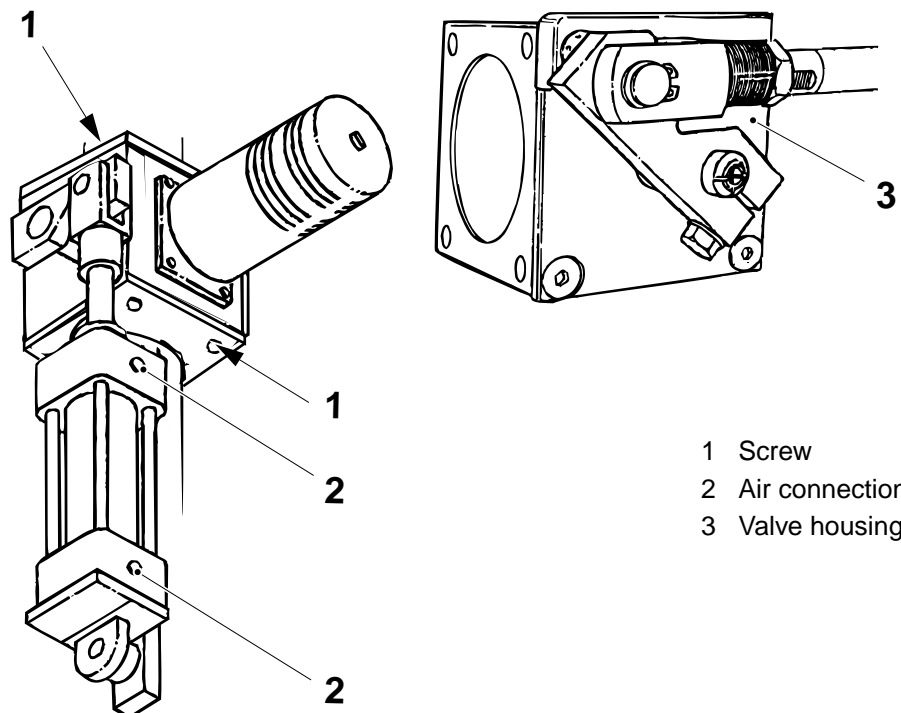
1.8.1 WEAC valve

1.8.1-1 WEAC valve - overhaul

SPC reference	476859-030V
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Valve

- a) Unscrew the screws (1).
- b) Remove the air connections (2) from the cylinder and remove the WEAC valve from the machine.
- c) Remove the valve housing (3).



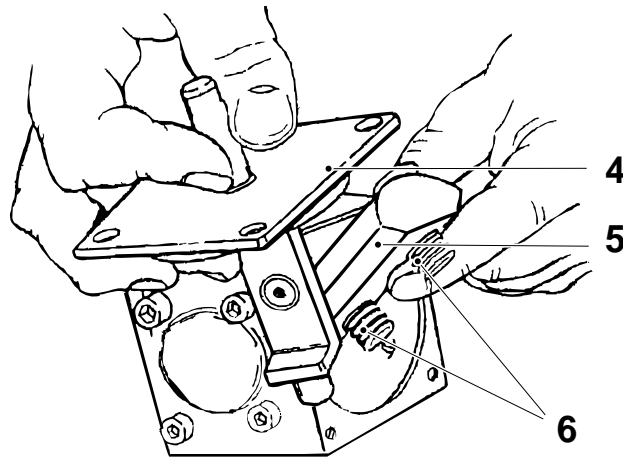
- 1 Screw
2 Air connection
3 Valve housing

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- d) Unscrew the four screws and remove the bearing cover (4) together with the slide piece (5) and the springs (6).



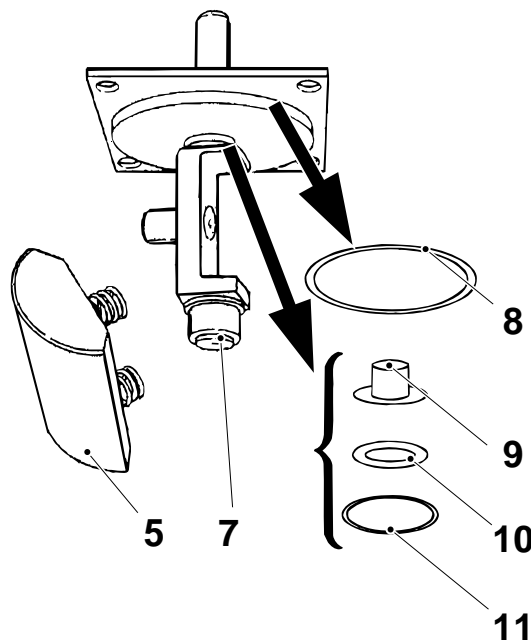
- 4 Bearing cover
- 5 Slide piece
- 6 Spring

- e) Check the following details for wear and/or damage:

- the bushings (7) and (9)
- the O-rings (8) and (11)
- the slide piece (5)
- the inside of the valve housing

Change as required.

- f) Assemble the valve in the reverse order.



- 7 Slide piece
- 7 Bushing
- 8 O-ring
- 9 Bushing
- 10 Washer
- 11 O-ring

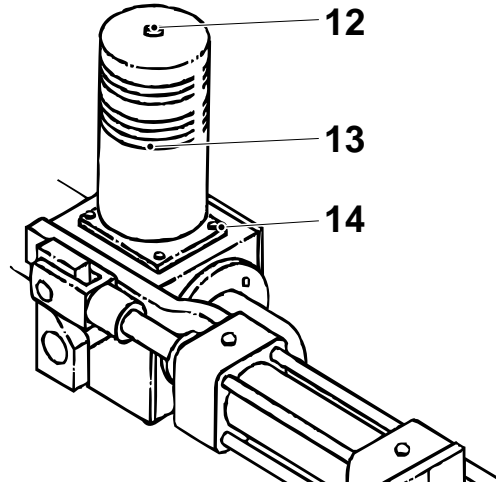
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Filter

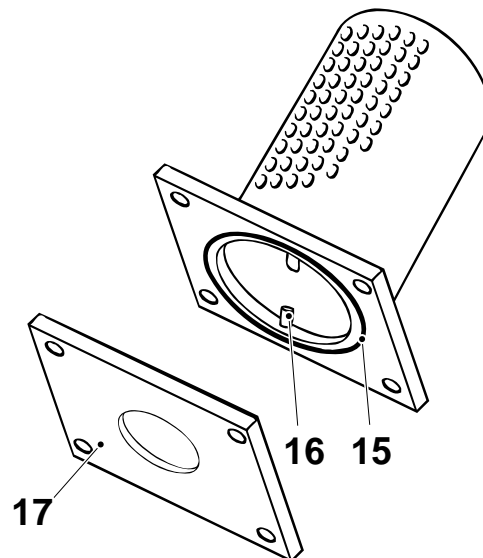
- a) Unscrew the screw (12) and remove the filter cover (13). Unscrew the four screws (14).



- 12 Screw
- 13 Filter cover
- 14 Screw

- b) Undo the two screws (16) and remove the filter net, the ring, and the washer (17) (alternative design).
- c) Make sure that the filter net is not clogged; change the filter net as required. When changing the filter net, also change the O-ring (15).
- d) Assemble in the reverse order.

Note! Make sure that the cylinder piston moves freely.



- 15 O-ring
- 16 Screw
- 17 Washer (alt. design)

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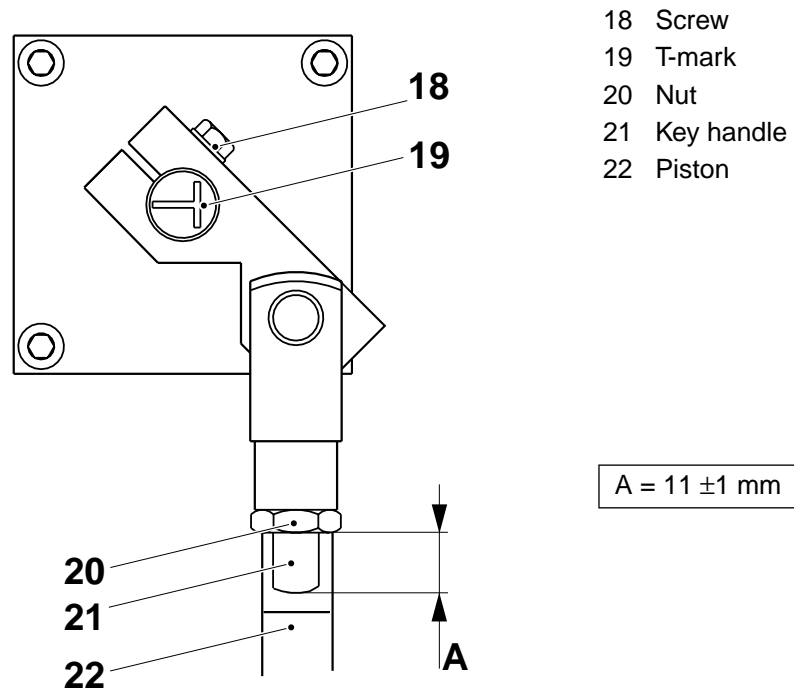
- e) Refit the WEAC valve on the machine.
- f) Open for compressed air and make sure that the air cylinder connections do not leak.

Note! The adjustment screws of the cylinder end position damping must be **fully open**.

- g) Set the position of the valve as follows.

Setting

- a) Make sure that the piston (22) is in its inner position.
- b) Set the cylinder stroke by loosening the nut (20) and turning the piston. Set distance A between the nut and the key handle (21) on the piston rod.
- c) Set the T-mark (19) in the position illustrated and tighten the screw (18).



1.9 Valve (heat exchanger)

SPC reference	271169-050V
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1.9-1 Valve (heat exchanger) - overhaul

Consumable - silicon grease	code L
SPC reference	271169-050V

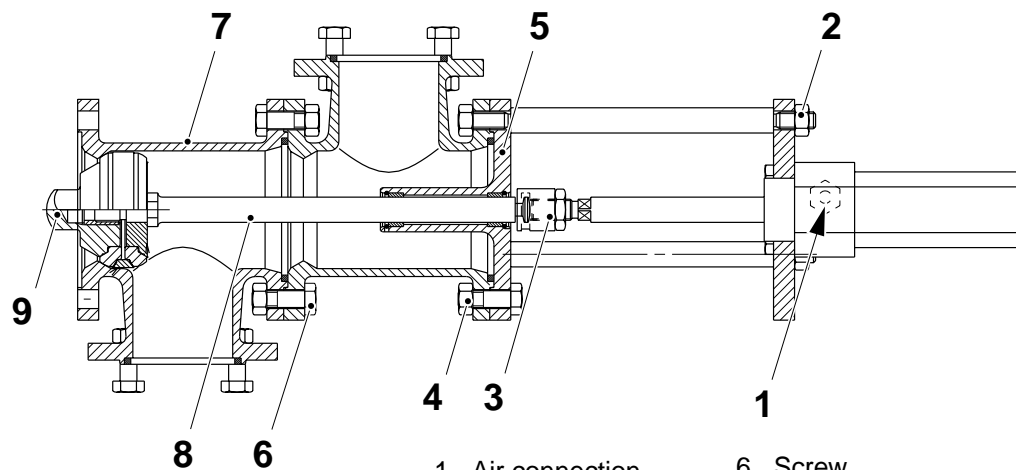
- a) Disconnect the air connections (1) to the cylinder.
- b) Unscrew the screws to the pipe unions and remove the valve from the machine.
- c) Unscrew the screws (2) and remove the pendulum bracket (3) from the shaft. Make sure that the cylinder piston moves smoothly. Change the cylinder as required.
- d) Unscrew the screws (4) and remove the spindle guide (5). Change the bushing in the spindle guide.
- e) Unscrew the screws (6) and remove the T-pipe (7). Pull out the shaft (8).
- f) Unscrew the valve cone (9) and, change the two seal rings.



Chemical products!

Lubricant. Follow the *Safety precautions*.

- g) Change all O-rings; fit the new O-rings with silicon grease.
- h) Assemble in the reverse order.



- | | |
|--------------------|--------------|
| 1 Air connection | 6 Screw |
| 2 Screw | 7 T-pipe |
| 3 Pendulum bracket | 8 Shaft |
| 4 Screw | 9 Valve cone |
| 5 Spindle guide | |

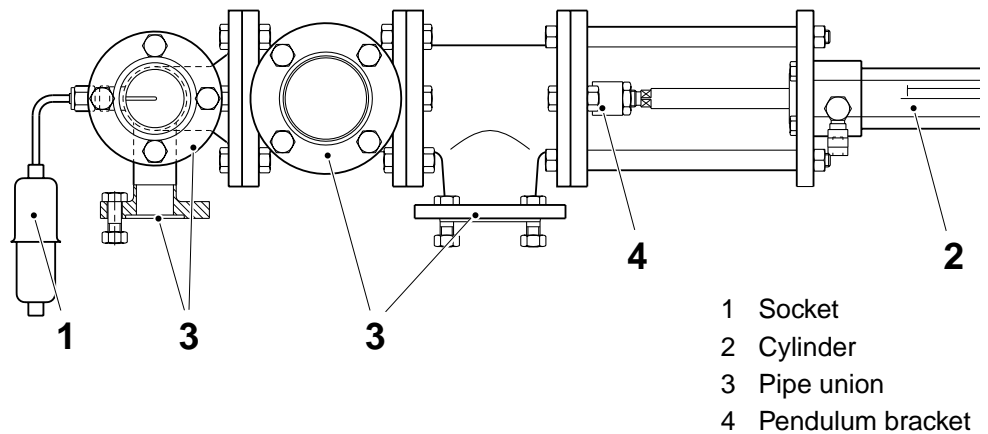
1.10 Valve (air inlet)

SPC reference	272337-050V
---------------	-------------

1.10-1 Valve (air inlet) - overhaul

Consumable - silicon grease	code L
SPC reference	272337-050V

- Undo the socket (1) and disconnect the air connections to the cylinder (2). Make sure that the cylinder moves smoothly.
- Unscrew the screws to the pipe unions (3) and remove the valve from the machine.
- Remove the pendulum bracket (4) from the shaft.



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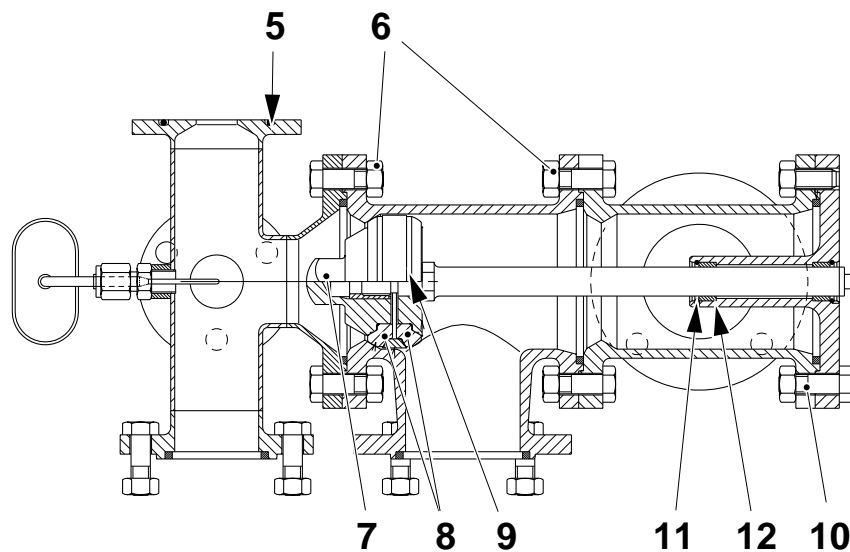
- d) Unscrew the screws (6) and take the valve apart.
- e) Unscrew the nut (7) and change the two seal rings (8) and the ring (9).
- f) Unscrew the screws (10) and remove the spindle guide. Change the rings (11) and the bearings (12).



Chemical products!

Lubricant. Follow the *Safety precautions*.

- g) Assemble in the reverse order and fit the new gaskets and the O-rings with silicon grease.



- 5 O-ring
- 6 Screw
- 7 Nut
- 8 Seal ring
- 9 Ring
- 10 Screw
- 11 O-ring
- 12 Bearing

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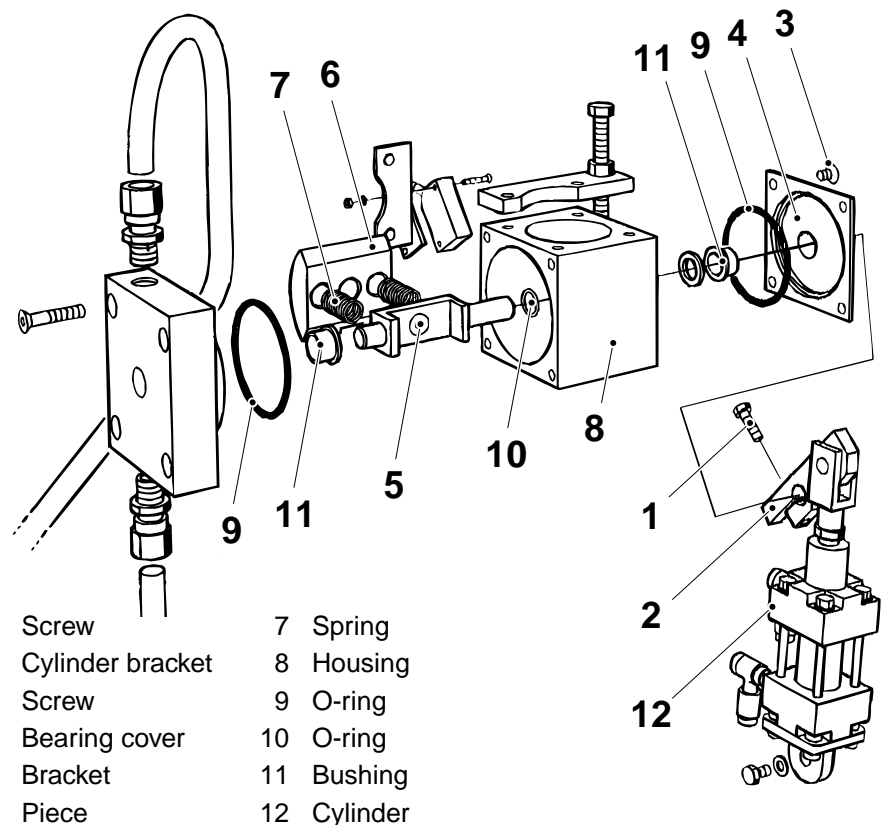
1.11 Change-over valve (suction)

SPC reference	256084-060V
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1.11-1 Change over valve (suction) - overhaul

SPC reference	256084-060V
---------------	-------------

- Loosen the screw (1) and swing the cylinder bracket (2) aside.
- Unscrew the screws (3) and remove the bearing cover (4).
- Pull out the bracket (5), the block (6) and the springs (7).
- Check the following details for wear and/or damages:
 - the inside of the housing (8)
 - the three O-rings (9) and (10)
 - the bushings (11)
 - the cylinder (12); make sure that it moves smoothly
- Change as required.

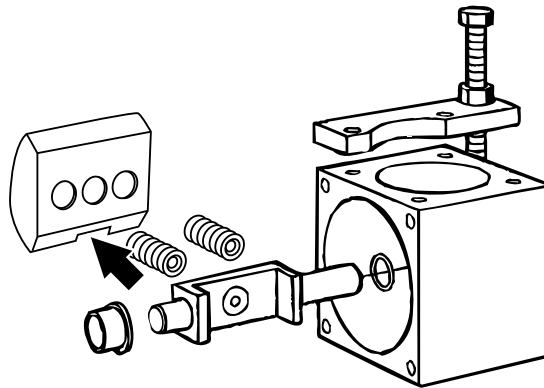


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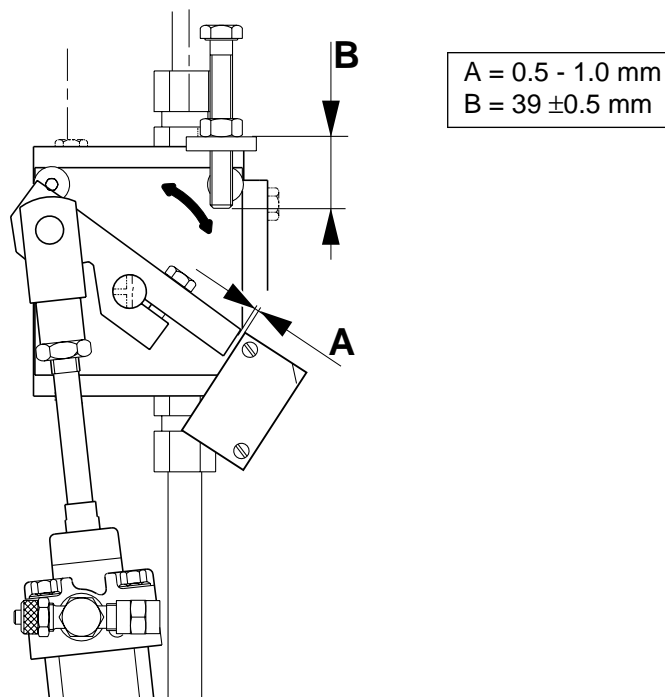
Note! Make sure to place the block with the slot facing **downwards** (arrow).

- f) Assemble in the reverse order.
- g) Open for compressed air and make sure that there air cylinder connections do not leak.
- h) Set the position of the valve as follows.



Setting

- a) Set distances A and B.
- b) Set the pressure in the aseptic chamber and the bath, see I-5 *Superstructure - check pressures*



2.2E0794A11.en

1.12 Hot air element (LS SS)

SPC reference	256095-060V
---------------	-------------

1.12-1 Hot air element (LS SS) - check packages

Machine status	Production
SPC reference	256095-060V

- a) Make a **Short stop**.
- b) Step up the machine in step **Production** again.
- c) Pick out the packages that are discarded. Take the packages and check that the LS strip is properly sealed.

If there is no sealing at all, check the element.

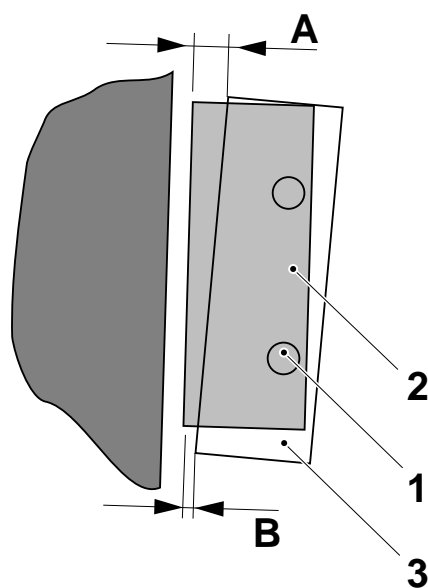
If the sealing is not satisfactory, check;

- the LS SS air pressure, see *10.1 Technical data*.
- the setting of the nozzle and the cylinder movement, see *1.12-2 Hot air element (LS SS) - set nozzle*.

1.12-2 Hot air element (LS SS) - set nozzle

Machine status	Preheating I
SPC reference	256095-060V

- Inch the machine until the packaging material is well straightened all the way down to the jaws.
- Loosen the screws (1) and set distances A and B from the heat shield (2) to the short stop nozzle (3).
- Simulate the short stop movement manually by actuating pneumatic valve **Y20** on the valve panel.



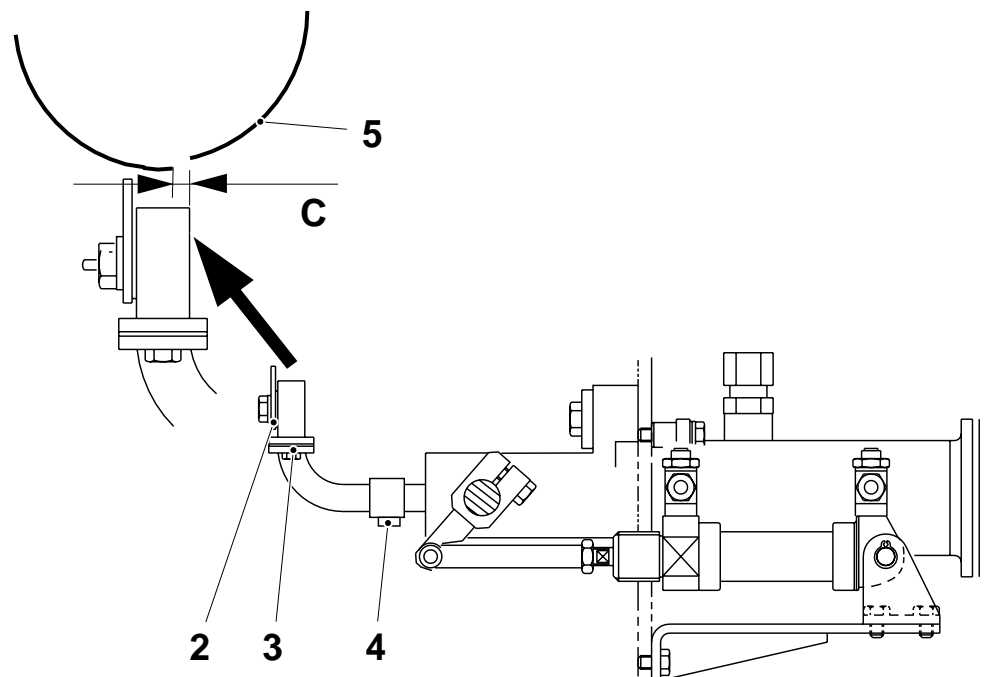
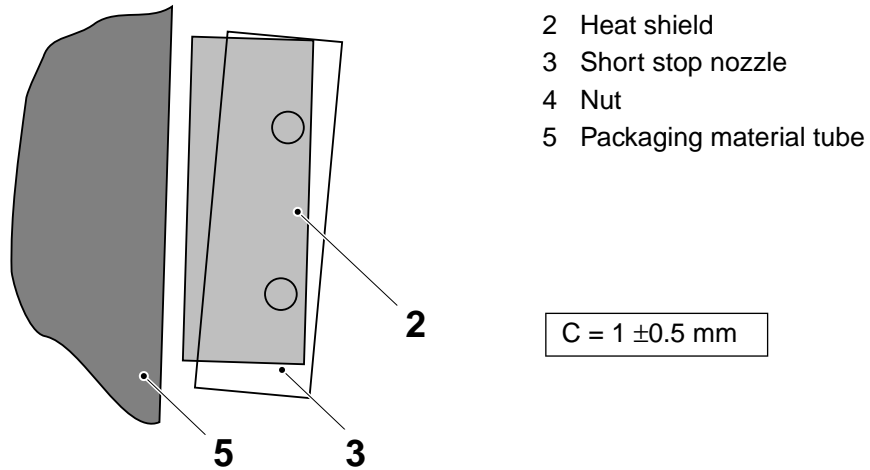
A = 8 ± 0.5 mm
B = 3 ± 0.5 mm

- 1 Screw
- 2 Heat shield
- 3 Short stop nozzle

(Cont'd)

(Cont'd)

- d) Loosen the screw (4) and shift the short stop nozzle until the edge of the heat shield (2) is in line with the packaging material tube (5). At the same time, set the corner of the short stop nozzle (3) so that it protrudes distance C beyond the edge of the packaging material.

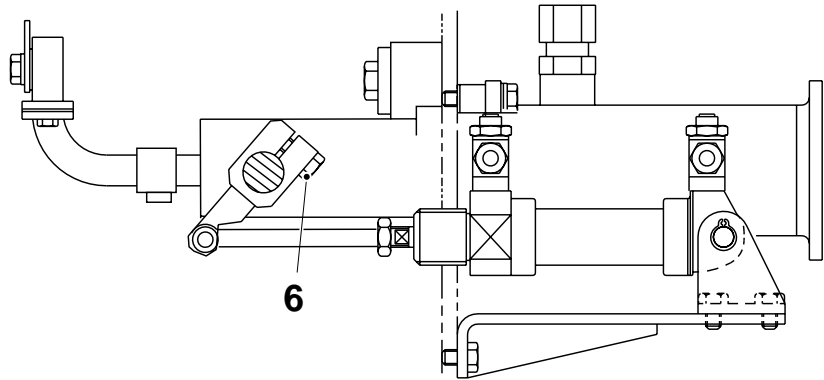


- e) Set the distance between the LS nozzle and the short stop nozzle, see *1.14-1 Air nozzle (LS) - set.*

(Cont'd)

(Cont'd)

- f) With the machine in step **Production**, make a **Short stop** and check that the nozzle moves without fouling the pressure roller and the LS nozzle. If required, adjust on the cylinder throttles.
- g) Step up the machine in step **Production** again.
- h) Pick out the packages that are discarded. Take the packages and check that the LS strip is properly sealed.
- i) The heating can be altered by adjusting the clamp union (6).



6 Clamp union



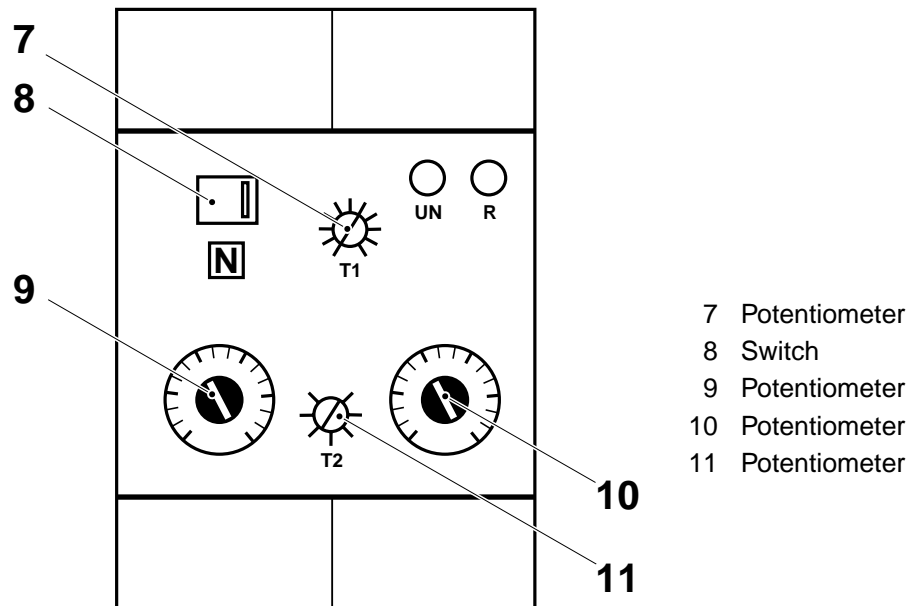
- j) The heating of the short stop nozzle can also be altered by reconnecting transformer T3 in the electrical cabinet.

Caution! This **must only** be done by a qualified electrician.

(Cont'd)

(Cont'd)**Current relay setting**

- a) Make sure that the switch (8) is in position **N**.
- b) Turn the potentiometer (7) and (9) fully counter-clockwise.
- a) Turn the potentiometer (11) to **0.1**.
- a) Step up the machine to **Preheating II**.
- b) Turn the potentiometer (10) to **0.40** (the **red LED** must be **OFF**).
The machine drop down to **0** position.
- c) Turn the potentiometer (10) to **0.10**.



- 7 Potentiometer
- 8 Switch
- 9 Potentiometer
- 10 Potentiometer
- 11 Potentiometer

1.13 Spray system

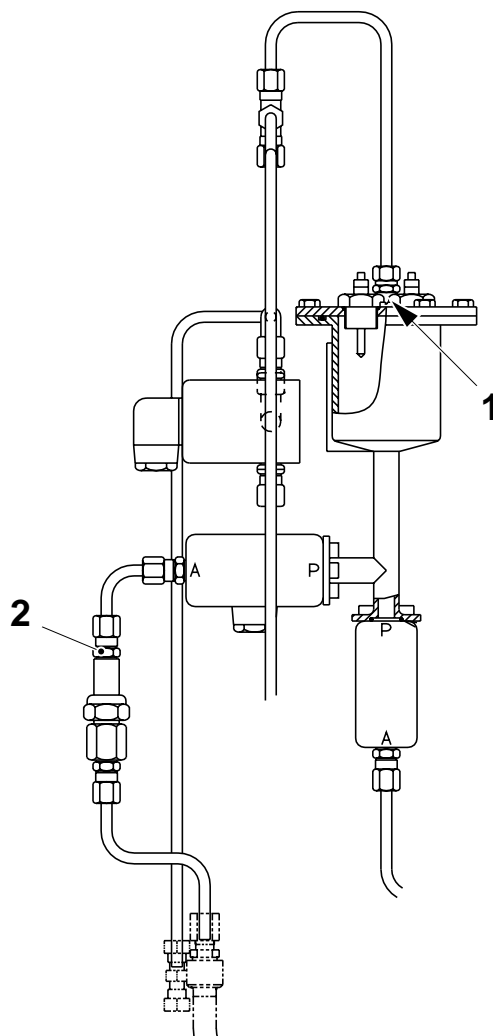
SPC reference 272623-060V

1.13-1 Spray system - clean filter

SPC reference 272623-060V

**Hydrogen peroxide!**Follow the *Safety precautions*.

- Unscrew the peroxide pipes and remove the filters (1) and (2).
- Clean the filters with compressed air or, if they are clogged, replace them.
- Assemble and tighten all connections properly.



- 1 Filter
2 Filter

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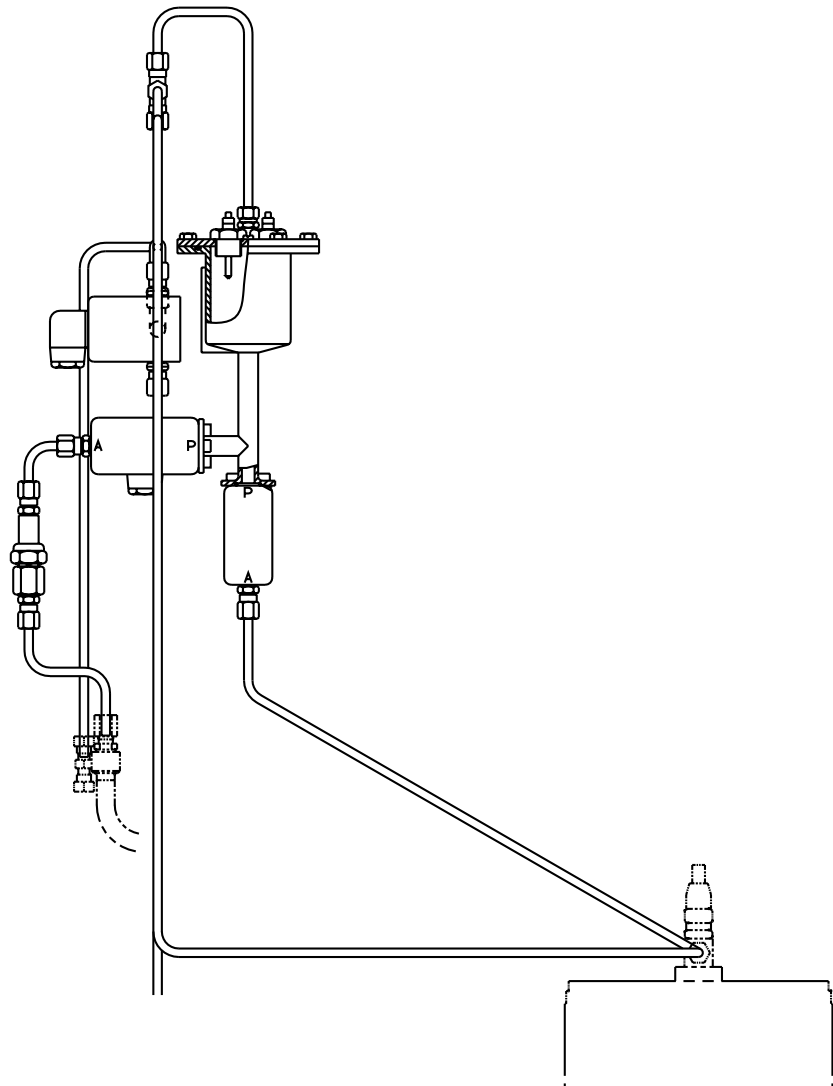
1.13-2 Spray system - check for leaks

Machine status	Spraying
SPC reference	272623-060V



Hydrogen peroxide!
Follow the *Safety precautions*.

Check all pipe connections in the spray system for leaks.
Make sure that all connections are properly tightened.



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1.14 Air nozzle (LS)

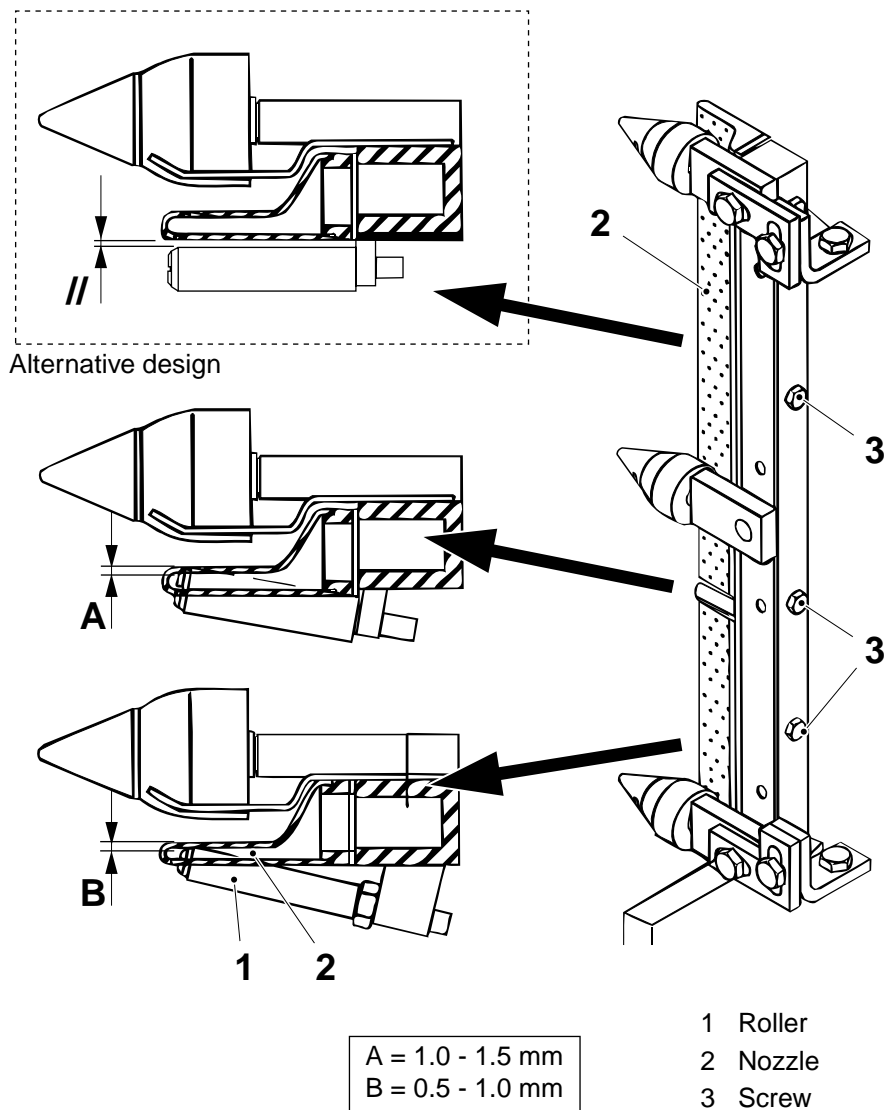
SPC reference	469501-040V
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1.14-1 Air nozzle (LS) - set

Tools - see table	
SPC reference	469501-040V

Basic setting

- Remove the cover plates from the LS nozzle.
- Set the rollers (1) as illustrated. To adjust, loosen the screws (3) and shift the nozzles (2).

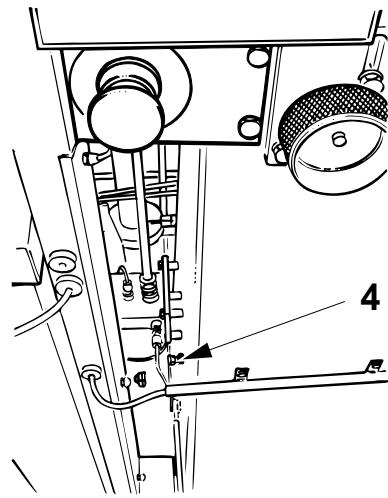


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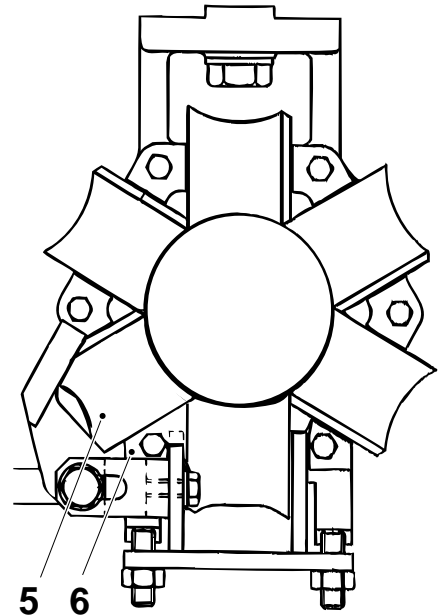
(Cont'd)

(Cont'd)

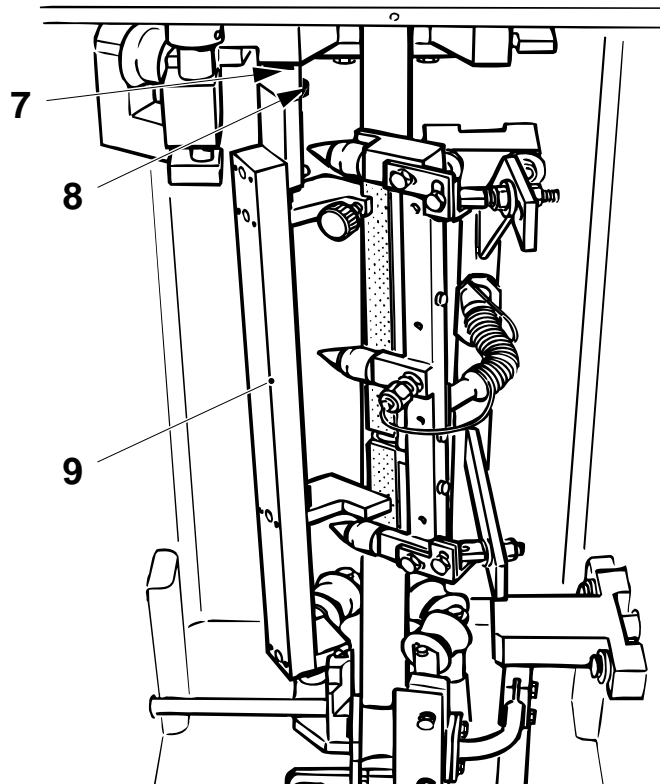
- c) Loosen the stop screw (4).
- d) Remove the lock plates (6) and the roller (5) in the lower forming ring.



- 4 Screw
- 5 Roller
- 6 Lock plate



- e) Put the lower pin of the template (9), in the place of the roller in the forming ring. Fit the spacer (7) and secure the template, see table, with the screw (8).



Package	Template, TP No.
100 B	76133-101
125 S	76133-101
160 S	76606-101
180 B	76595-101
200 B	76595-101
200 M	590222-101
200 S	76606-101
236 B	76595-101
250 B	76595-101
250 S	590222-101
284 B	76595-101
300 S	76595-101
330 S	76595-101

- 7 Spacer
- 8 Screw
- 9 Template

(Cont'd)

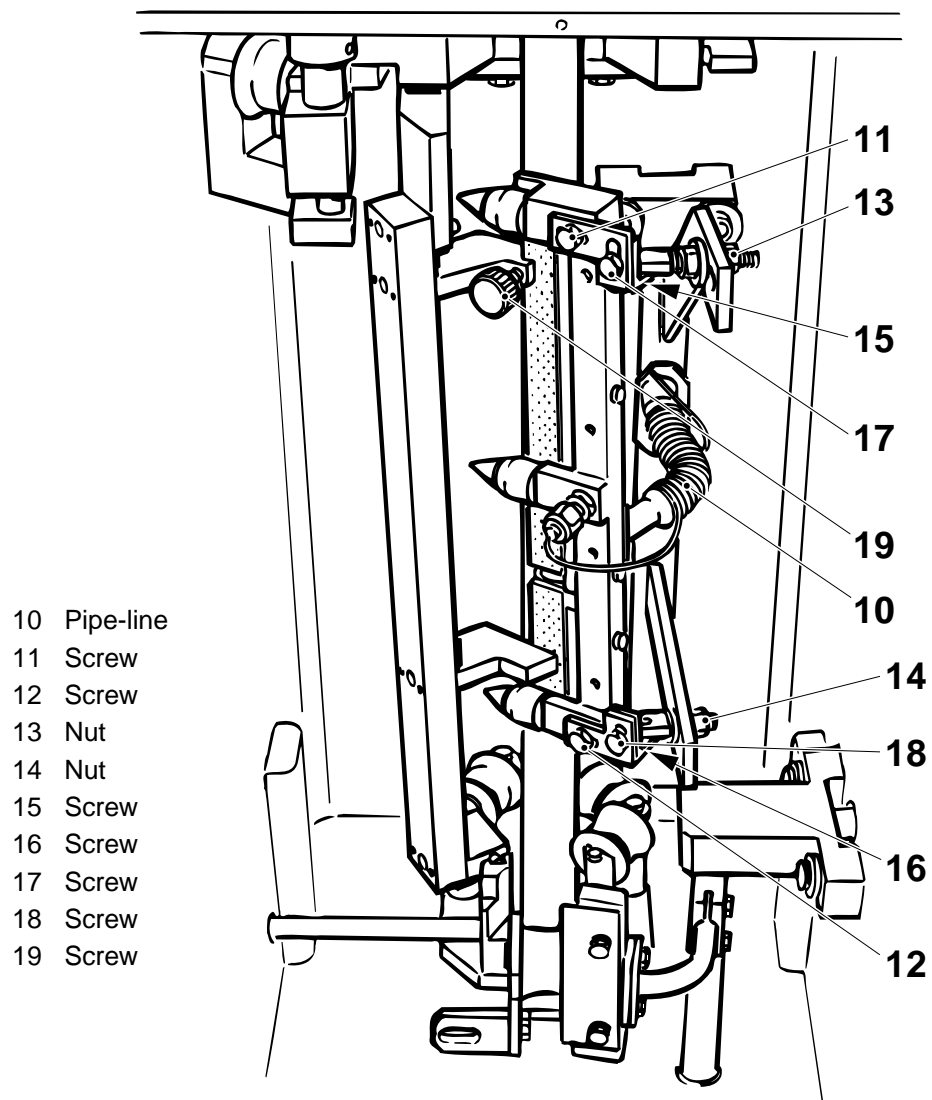
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(Cont'd)

- f) Disconnect the pipe-line (10).
- g) Loosen the screws (11) and (12), the nuts (13) and (14), the screws (15), (16), (17) and (18).

Note! Make sure that the nozzle is not “forced” towards the template; it shall only touch.

- h) Shift the LS nozzle against the contact surfaces of the template. It may be necessary to adjust the cylinder stroke.
- i) Tighten the screw (19).

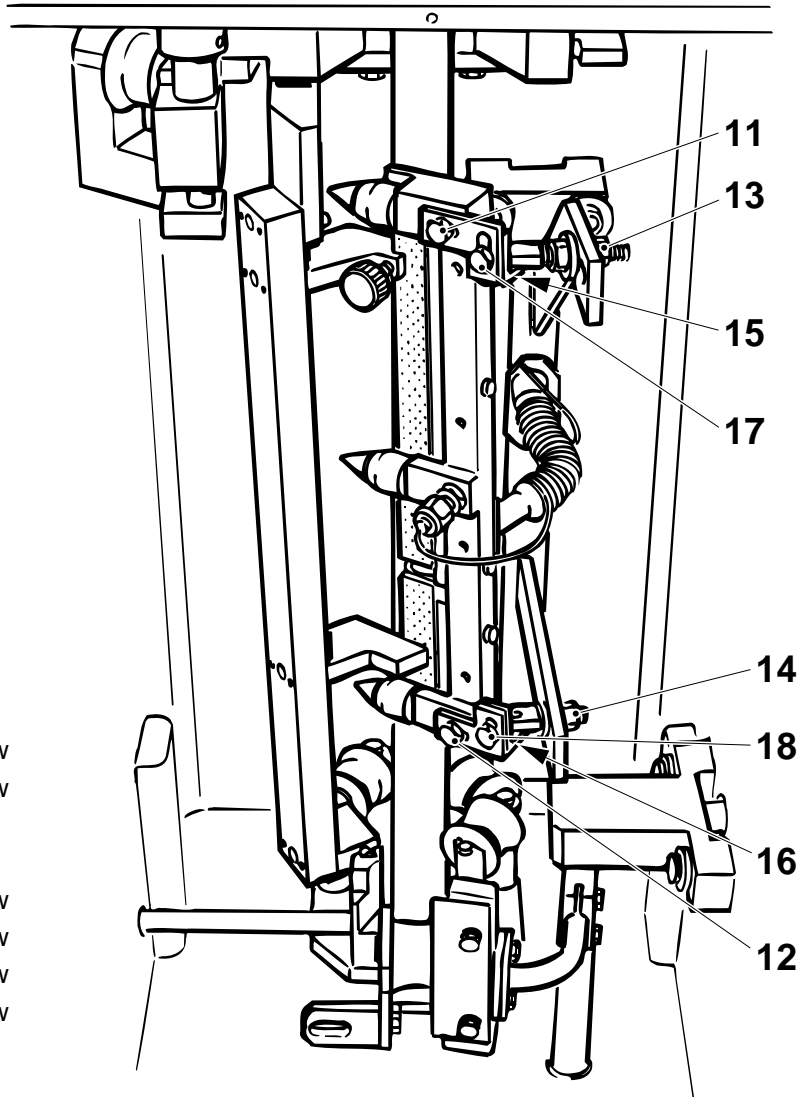


(Cont'd)

(Cont'd)

- j) Tighten the screws (11) and (12). Make sure that there is space for final adjustment (the screws must not be in any end position in the oblong holes).
- k) Tighten the nut (14) and the screws (16) and (18).
- l) Tighten the nut (13) and the screws (15) and (17).

Note! Make sure that the nozzle is not “forced” towards the template; it shall only touch.



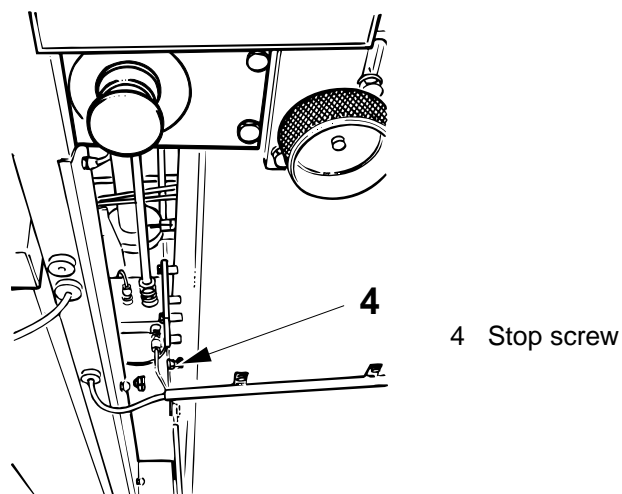
- 11 Screw
- 12 Screw
- 13 Nut
- 14 Nut
- 15 Screw
- 16 Screw
- 17 Screw
- 18 Screw

(Cont'd)

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(Cont'd)

- m) Set the stop screw (4) so that it touches the contact point on the LS nozzle. Make sure to have space for adjustments in both directions.



- n) Remove the template.
o) Swing out the LS nozzle and make sure that it can move freely. Swing it back.
p) Fit back the pipe line on the nozzle.

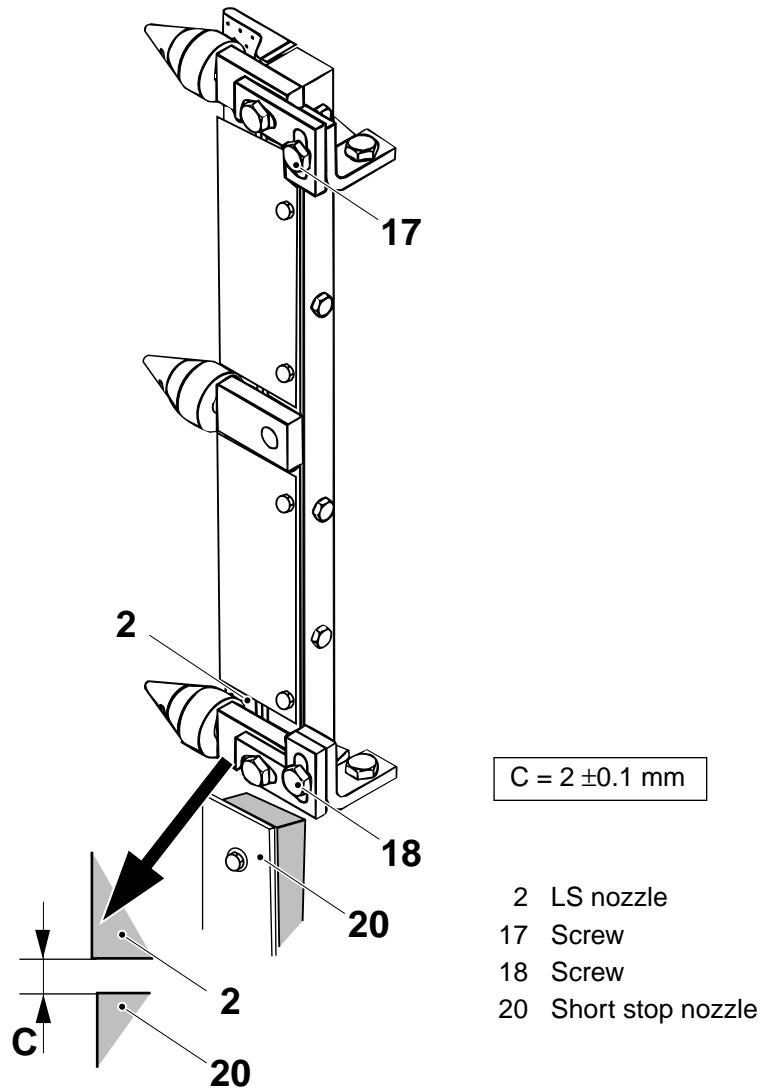
Note! Make sure that the gasket is correctly positioned.

- q) Fit back the roller in the forming ring and the cover plates of the LS nozzle.

(Cont'd)

(Cont'd)

- r) Remove the lower roller of the LS nozzle and set distance C between the LS nozzle (2) and the short stop nozzle (20), when the machine is **cold**. To adjust, loosen the screws (17) and (18) and shift the nozzle up or down.
- s) Fit back the lower roller.

*(Cont'd)*

(Cont'd)

Final setting

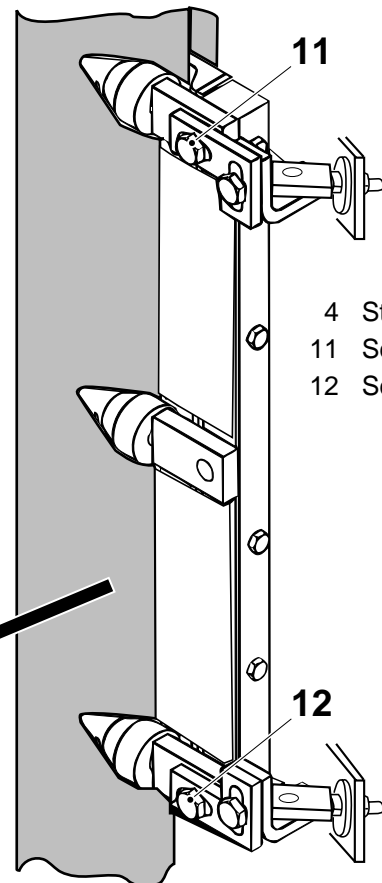
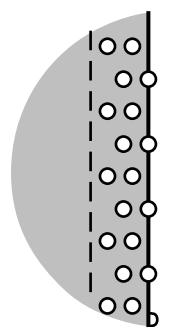
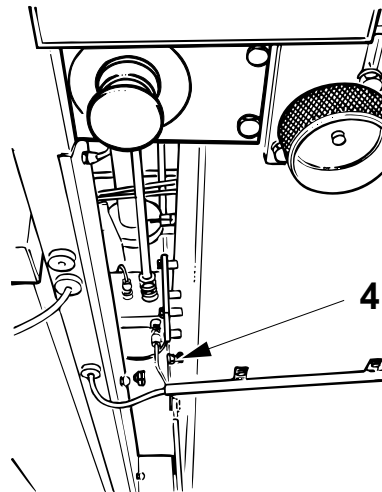
Machine status	Production
	Service switch On

Do not touch hot surfaces without wearing protective gloves.

Keep clear of moving parts. In case of accident, call for medical attention immediately.

Verify the following:

- The rows of holes on the nozzle are to be parallel with the edge of the packaging material. If required, stop the machine and adjust by loosening the screws (11) and (12) and shifting the nozzle.
- The inner row of holes (for 100 B, 125 S, 160 S and 200 S, the second row of holes) is to be aligned directly underneath the edge of the packaging material. If required, adjust by means of the stop screw (4).



- 4 Stop screw
- 11 Screw
- 12 Screw

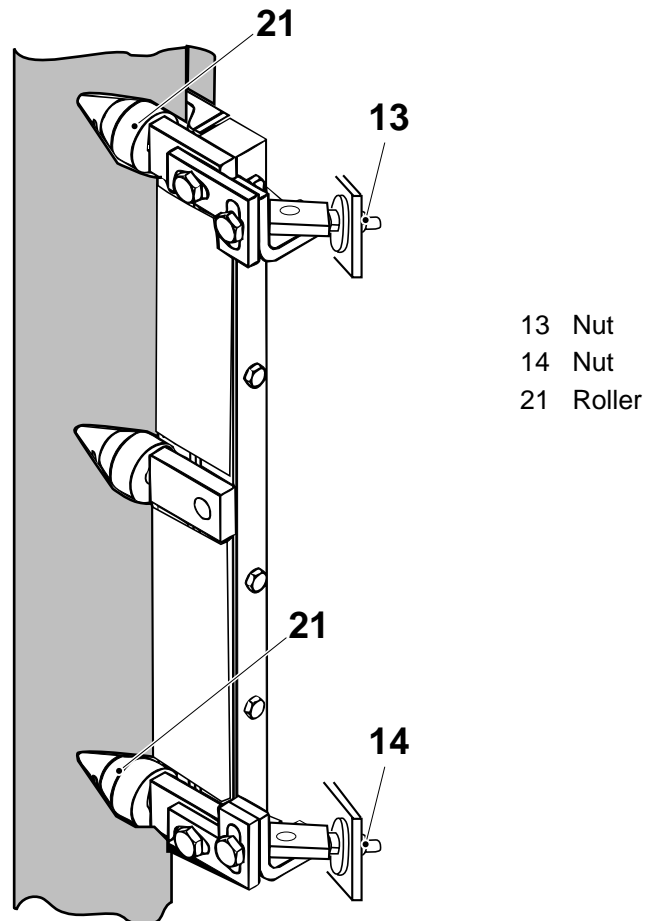
(Cont'd)

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- The upper and the lower rollers (21) are to lightly touch the packaging material. If required, stop the machine and adjust by loosening the nuts (13) and (14) and shifting the bracket.

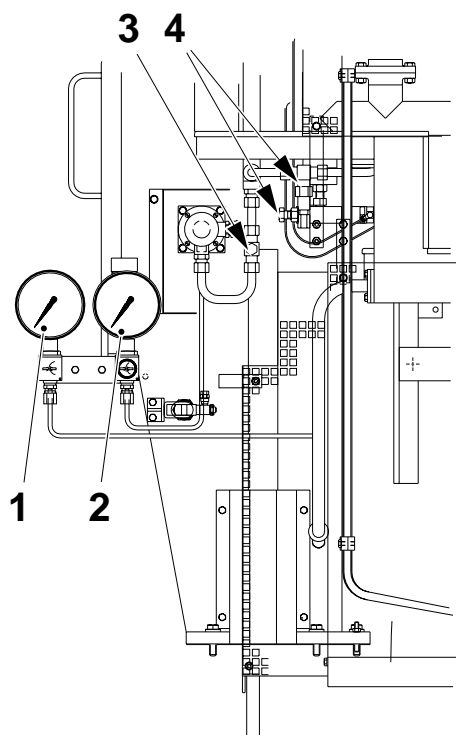
After adjustment, run the machine and recheck.



1.14-2 Air nozzle (LS) - check pressures

Machine status	Production
SPC reference	469501-040V 577834-010V

- a) On the pressure gauges, check the LS pressure (1) and the LS short stop pressure (2).
- b) Correct values, see *10.1 Technical data*.
- c) If required, adjust the LS short stop pressure on the adjustment screw (3) and the LS pressure on the adjustment screw (4).



- 1 Pressure gauge, LS
- 2 Pressure gauge, LS short stop
- 3 Adjustment screw, LS short stop
- 4 Adjustment screw, LS

1.15 Level probe

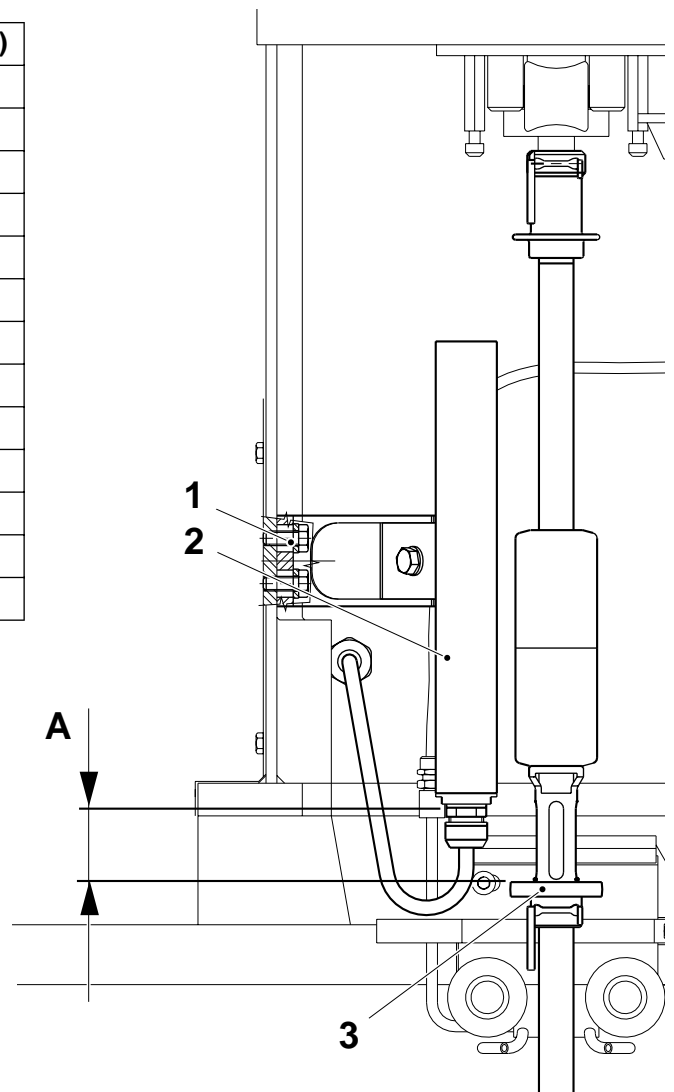
SPC reference	925991-010V
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1.15-1 Level probe - set

Tools - spirit level	TP No. 90243-165
SPC reference	925991-010V

- a) Apply a spirit level to the level detector (2).
- b) Loosen the screws (1) and set the level detector in level, that is it should be vertical in all directions. At the same time, set distance A between the level detector and the pressure flange (3), see table below.

Package	A ±1 (mm)
100 B	75.0
125 S	75.0
160 S	45.5
180 B	45.0
200 B	45.0
200 M	50.0
200 S	45.5
236 B	53.5
250 B	36.0
250 S	50.0
284 B	53.5
300 S	53.5
330 S	53.5



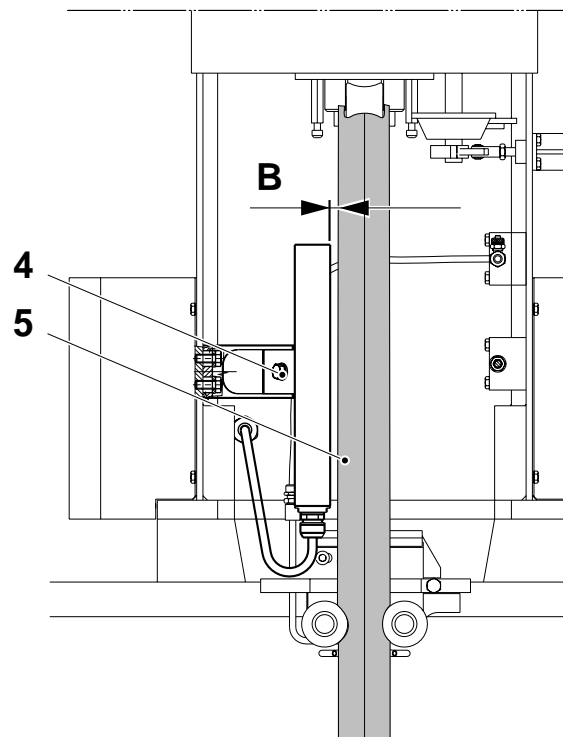
- 1 Screw
- 2 Level detector
- 3 Pressure flange

(Cont'd)

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(Cont'd)

- c) Pull down the packaging material and step up the machine to step **Tube sealing**.
- d) Set distance B between the level detector and the packaging material tube (5), see table below. Adjust by means of the screw (4).



Package	B ±1 (mm)
100 B	7
125 S	7
160 S	5
180 B	9
200 B	9
200 M	3
200 S	5
236 B	9
250 B	9
250 S	3
284 B	9
300 S	9
330 S	9

- 4 Screw
5 Packaging material tube

Function check

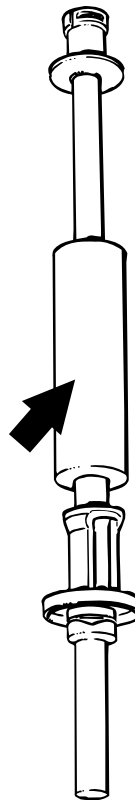
- a) Connect a voltmeter to the terminal connections 5 and 6 (analog inputs) on the back plane at the back of the level regulator card.
- b) Cut up a small hole in the packaging material tube, just above the pressure flange, so that it is possible to reach the lower filling pipe.
- c) Lift up the floater and let it drop down to its lower position. Check that the voltmeter shows approximately 0.6.
- d) Repeat the check (lifting and dropping the floater) and, at the same time, move the pressure flange backwards, forwards and in sideways directions. The voltmeter should still show approximately 0.6.
- e) Verify the setting by moving the floater up and down and check that the movement is indicated on the level indicator on the level regulator card.

Note! Only **one LED** is to remain on when the floater is in its lowest position.

1.15-2 Level probe - check filling pipe

SPC reference	929591-010V
---------------	-------------

- Remove the lower filling pipe from the machine.
- Make sure that there are no cracks in the float.
- Make sure that no liquid has leaked into it by weighing it. Nominal weight, see table below.
- Check that the locking fingers are not worn and/or damaged.
- Change as required.



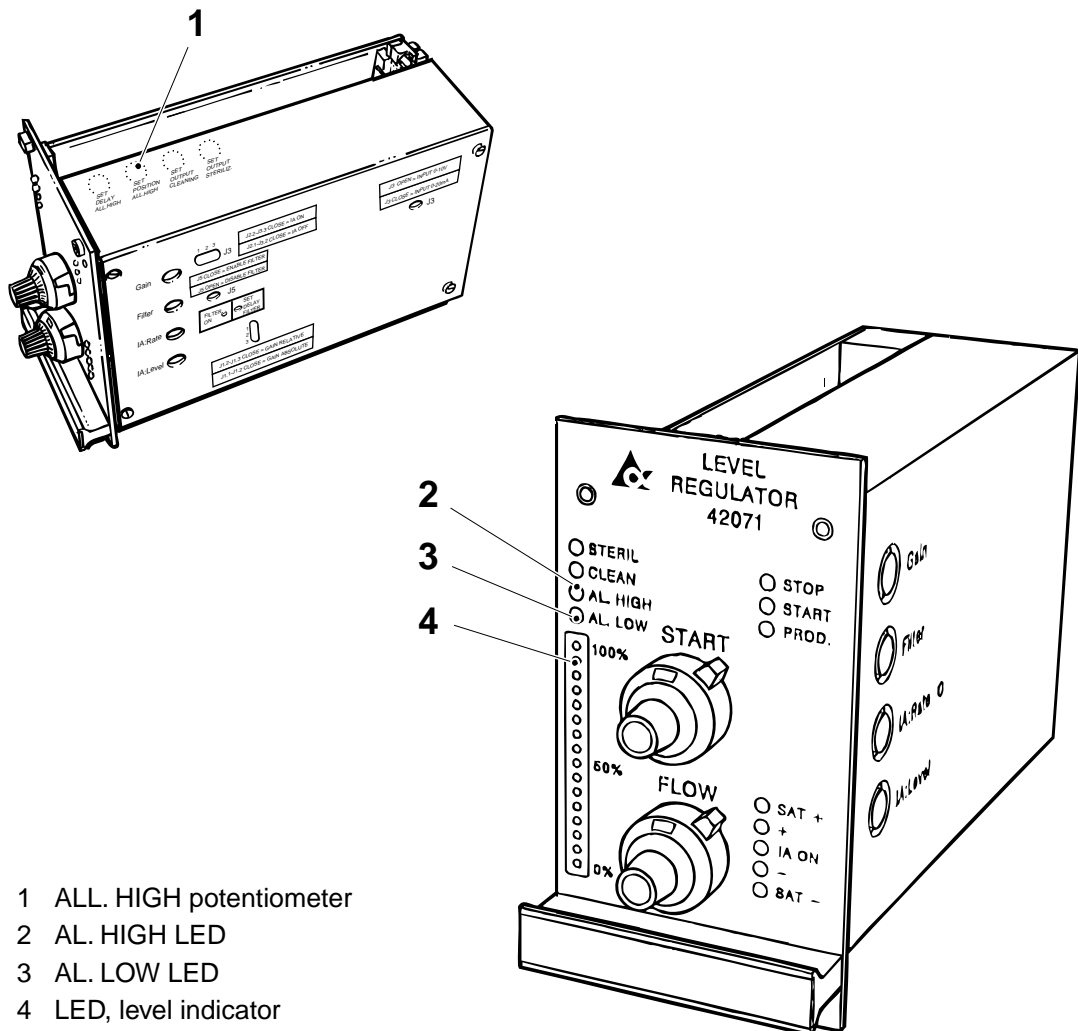
Package	Max weight (g)
100 B	137
125 S	137
160 S	137
180 B	208
200 B	208
200 M	137
200 S	137
236 B	208
250 B	208
250 S	137
284 B	208
300 S	208
330 S	208

1.15.1 Level regulator card

1.15.1-1 Level regulator card - set I/P transducer

Machine status	Power On Air On
----------------	--------------------

- a) Remove the lower filling pipe. Make sure that the LED (3) is on.
- b) Fit back the lower filling pipe and rise the floater until the LED (4) (second from the top) **and** the AL.HIGH LED (2) light up. If this does not happen, turn the ALL HIGH potentiometer (1) until the LED (2) just lights up.
- c) Lower the floater. Repeat item b) to check the setting.
- d) Step up the machine to step **Preheating I**.



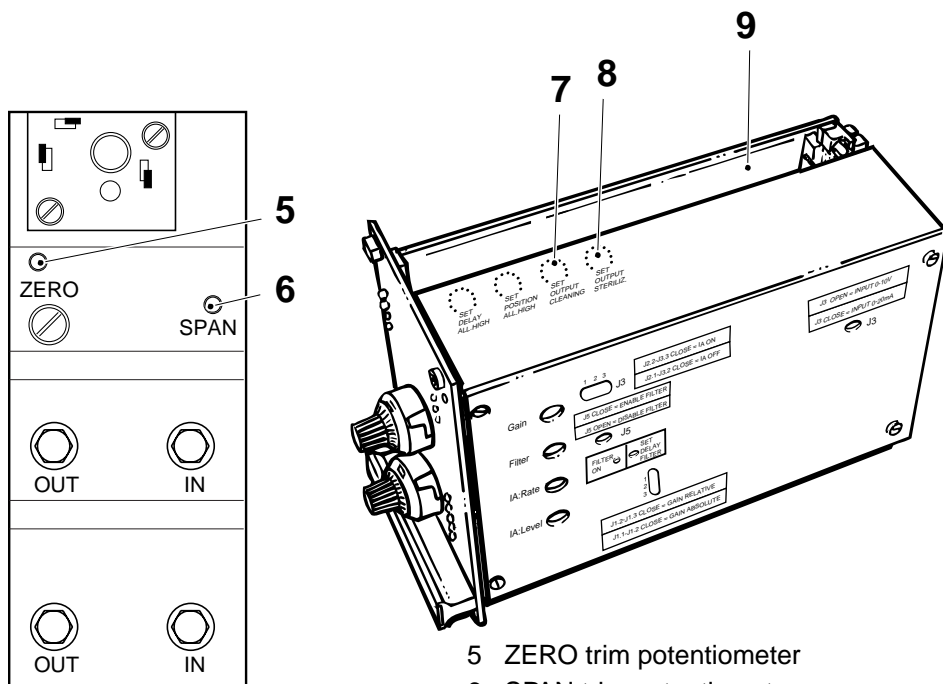
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Caution! Be careful not to damage the potentiometer with the screw driver.

- e) Set the pressure for the regulating valve to 0.1 bar by means of the ZERO trim potentiometer (5). Read the pressure on the pressure gauge on the valve panel.
- f) Step up the machine to step **Preheating II**.
- g) Connect a voltmeter between pin 8 and pin 25 (analogue outputs) on the back plane card (9). Check that the voltage is 4.7 V. If not, adjust by means of the OUTPUT STERILIZ. potentiometer (8).
- h) Check the pressure to the regulating valve. The pressure should be 2.0 bar. If required, adjust by means of the SPAN trim potentiometer (6).
- i) Step up the machine in step **CIP**.
- j) Set the pressure for the regulating valve to 3.5 bar by means of the OUTPUT CLEANING potentiometer (7).



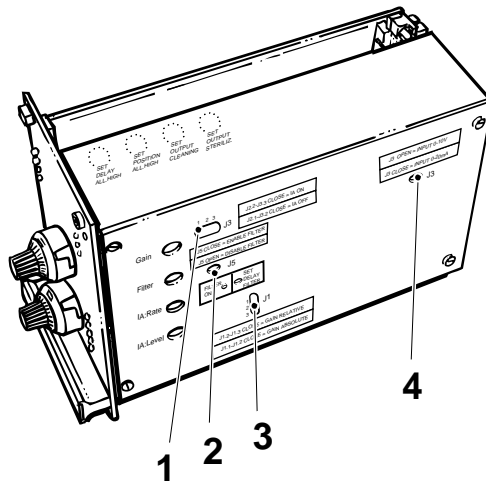
- 5 ZERO trim potentiometer
- 6 SPAN trim potentiometer
- 7 OUTPUT CLEANING potentiometer
- 8 OUTPUT STERILIZ. potentiometer
- 9 Back plane card

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1.15.1-2 Level regulator card - set

a) Set the four jumpers according to the table:

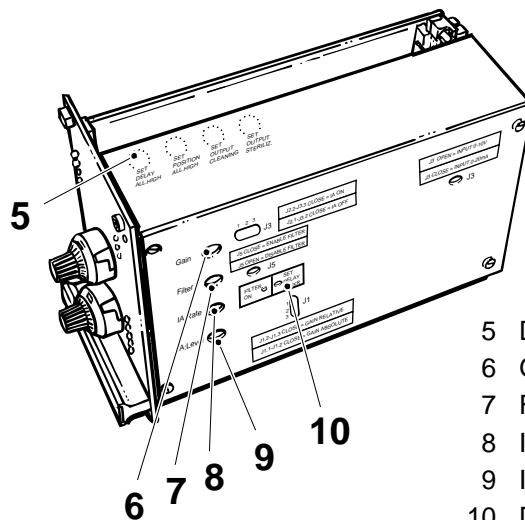
Jumper	Position
J2 (1)	IA On (J2.2-J2.3 close)
J5 (2)	CLOSE (ENABLE FILTER)
J1 (3)	GAIN RELATIVE (J1.2-J1.3 close)
J3 (4)	CLOSE (INPUT 0 - 20 mA)



- 1 J2 IA jumper (Integral Action)
- 2 J5 FILTER jumper
- 3 J1 GAIN jumper
- 4 J3 INPUT jumper

b) Set the potentiometers according to the table:

Potentiometer	Position
DELAY ALL.HIGH (5)	middle position
Gain (6)	50
Filter (7)	50
IA:Rate (8)	20
IA:Level (9)	40
DELAY FILTER (10)	fully clockwise



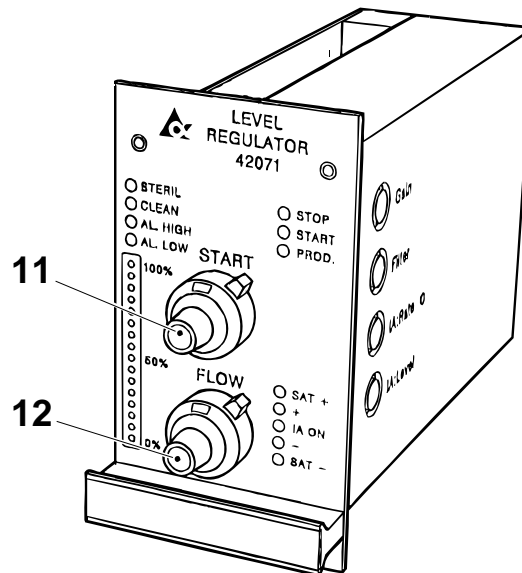
- 5 DELAY ALL.HIGH potentiometer
- 6 Gain potentiometer
- 7 Filter potentiometer
- 8 IA:Rate potentiometer
- 9 IA:Level potentiometer
- 10 DELAY FILTER potentiometer

(Cont'd)

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(Cont'd)

- c) Basic set the start flow by turning the START potentiometer (11) to 1.30.
- d) Basic set the production flow by turning the FLOW potentiometer (12) to 1.0.



- 11 START potentiometer
- 12 FLOW potentiometer

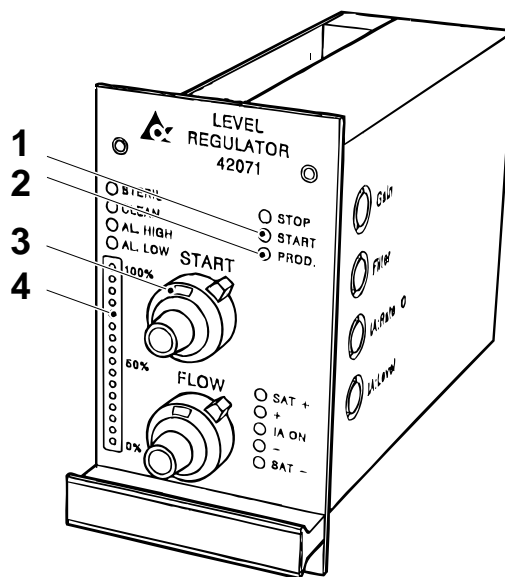
1.15.1-3 Level regulator card - check setting

Machine status	Ready for production
----------------	----------------------

- a) Step up the program. When the machine is in step **Filling**, the START LED (1) lights up. After 6 - 8 packages the PROD. LED (2) lights up and the level indicator (4) indicates a level rise.

Caution! **Adjust carefully!** Small changes on the START potentiometer affects the start flow considerably.

- b) If not, stop the machine in **Normal stop**, increase the start flow by means of the START potentiometer (3) and start again.



- 1 START LED
2 PROD. LED
3 START potentiometer
4 Level indicator

- c) Pick out the first packages discharged from the final folder and check-weigh them.
d) If required, adjust by means of the START potentiometer to obtain correct weight. Repeat from item a).

(Cont'd)

(Cont'd)

Note! Too low start flow will cause either loss of design correction or not fully filled packages. Too high flow will cause overfilling.

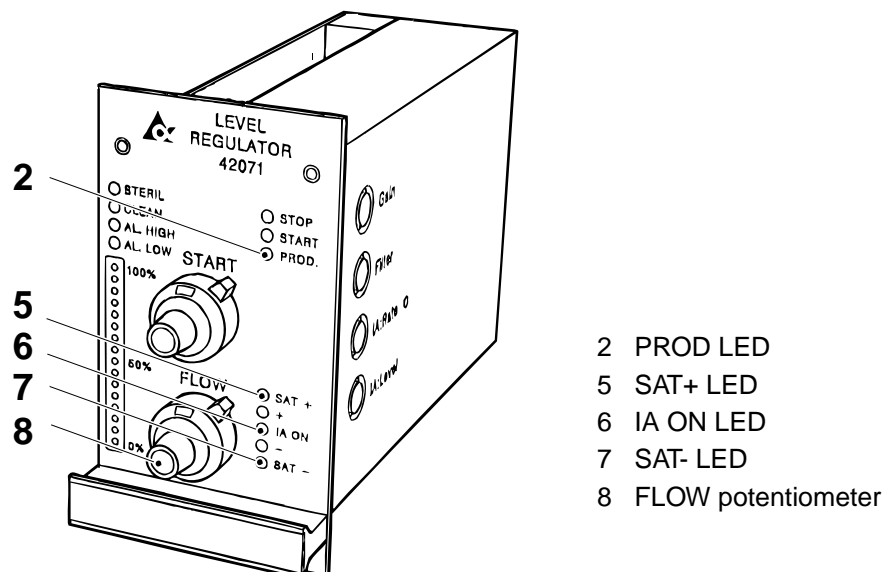
- e) When the machine is in step **Production**, the PROD. LED (2) lights up.
- f) Check the IA compensation. If it reaches the limits of the range, one of the LEDs (5) or (7) lights up. If this happens, adjust by means of the FLOW potentiometer (8).

Caution! **Adjust carefully!** Small changes on the FLOW potentiometer affects the production flow considerably.

- g) Increase the flow if the SAT+ LED (5) is on, decrease it if the SAT- LED (7) is on. The correct setting is obtained **only** if the IA ON LED (6) is on.

Note! The value on the FLOW potentiometer is **always** lower than the START value.

- h) When correct setting is obtained, the level indicator indicate a level of 30 - 50%.



- 2 PROD LED
- 5 SAT+ LED
- 6 IA ON LED
- 7 SAT- LED
- 8 FLOW potentiometer

1.16 Filler pipe

SPC reference	469091-040V
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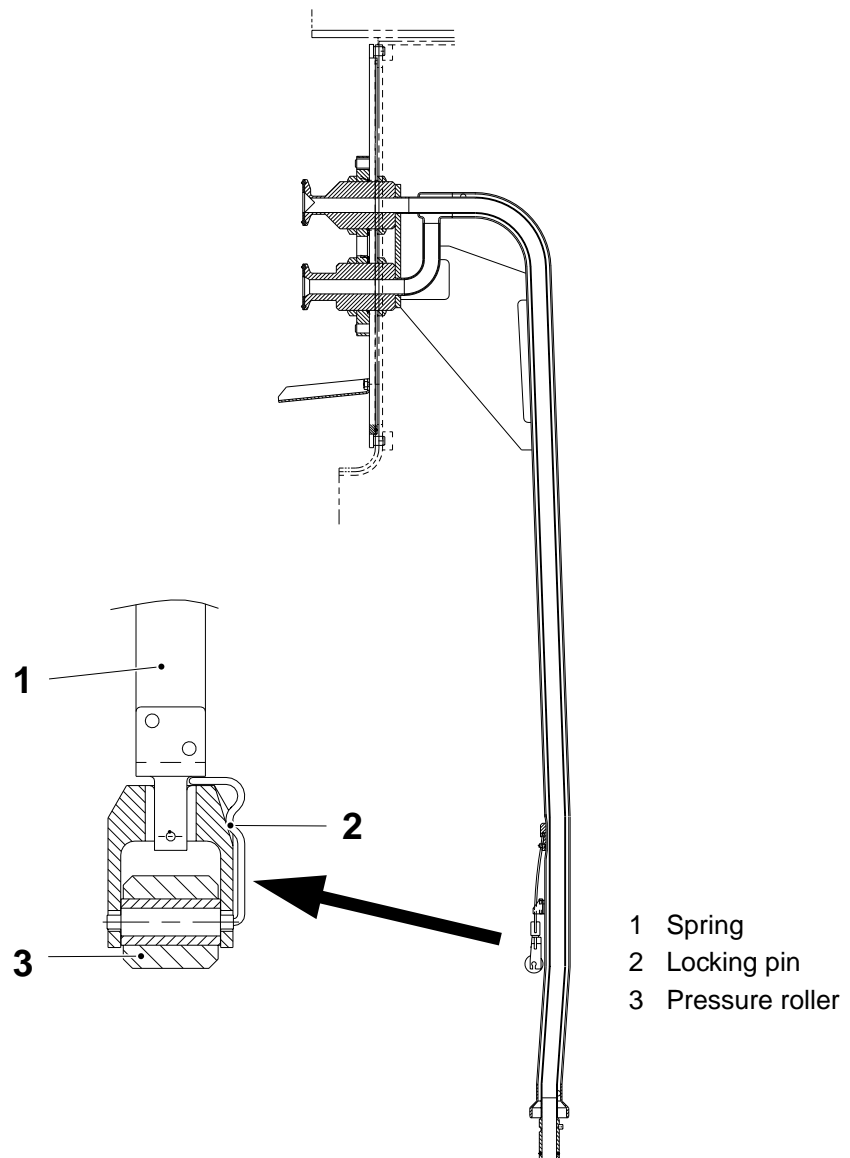
1.16-1 Filler pipe - check

SPC reference	464091-040V
---------------	-------------

Check the following details for wear and/or damage:

- the spring (1)
- the locking pin (2)
- the pressure roller (3); make sure that the roller rotates freely. The play must not exceed 0.5 mm

Change as required.

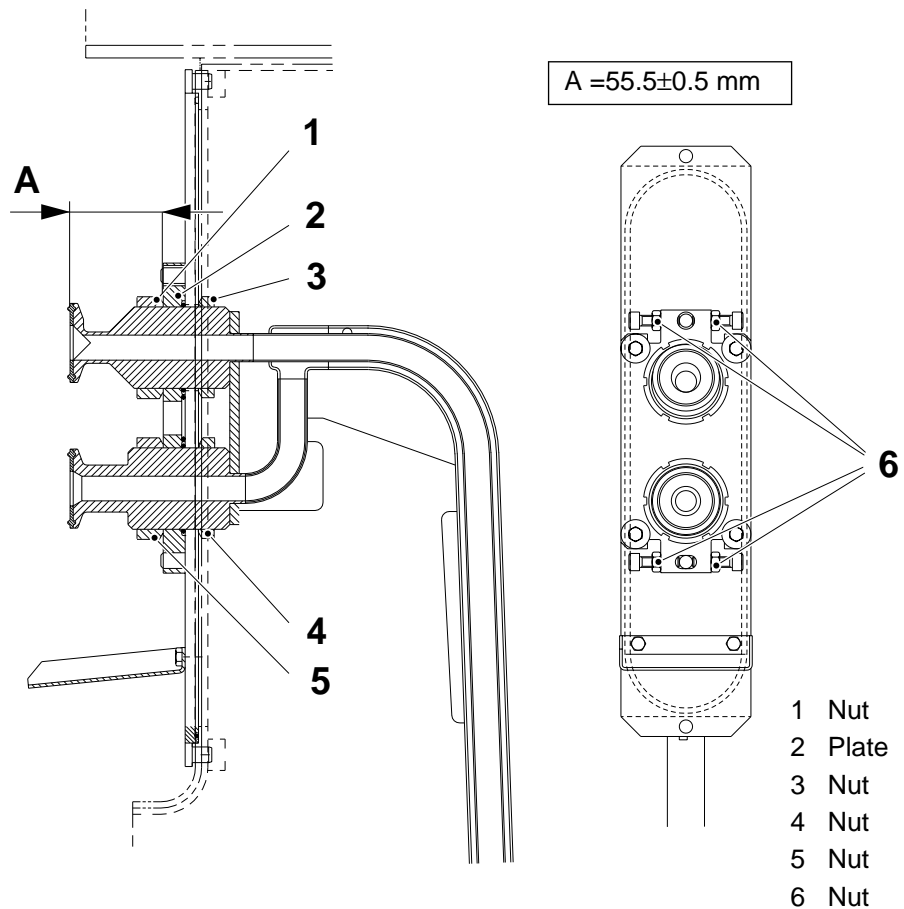


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1.16-2 Filler pipe - set

Tools - template	see table page 153
SPC reference	469091-040V

- a) Remove the filler pipe from the machine.
- b) Make sure that the nuts (1), (3), (4) and (5) are turned with the bevelled sides towards each other.
- c) Hand tighten the nuts (3) and (4) towards the plate.
- d) Adjust on the nuts (6), so that the pin is in the middle of the oblong hole.

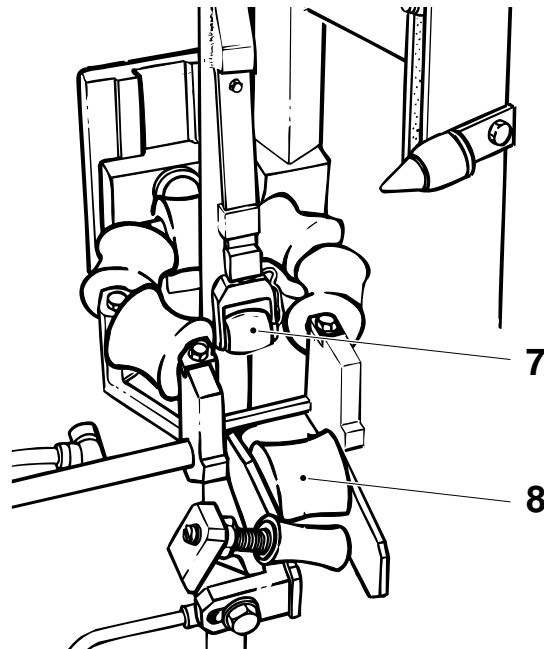


- e) Set distance A (basic setting) between the plate (2) and the flange. Tighten the nuts.
- f) Fit the filler pipe again.

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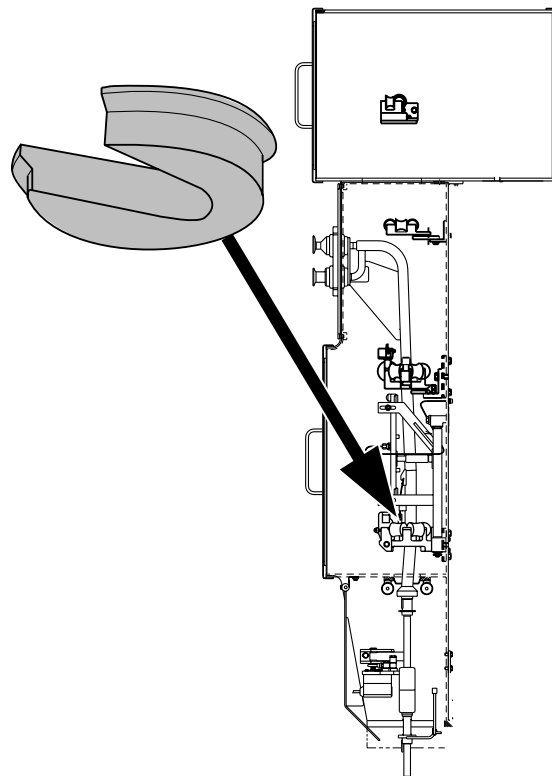
- g) Insert double packaging material between the pressure roller (7) and the counter roller (8).



7 Pressure roller
8 Counter roller

- h) Move up the counter roller to operation position.
- i) Place the template, see table, in the **lower** forming ring.

Package	Template, TP No.
100 B	76187
125 S	76187
160 S	76188
180 B	76398
200 B	76398
200 M	574453
200 S	76188
236 B	76398
250 B	76398
250 S	574453
284 B	76398
300 S	76398
330 S	76398



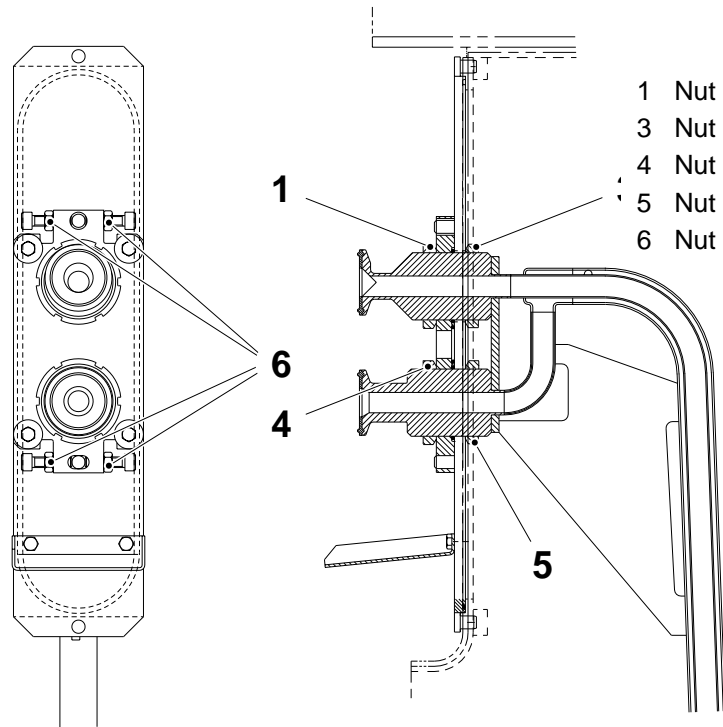
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(Cont'd)

Caution! Take care not to tighten the nuts so that the filler pipe is being bent.

- j) Adjust by means of the nuts (4) and (5) until the filler pipe is centered in the template. It must not be touching the template at any point.
- k) Adjust sideways by means of the nuts (6).
- l) Tighten the nuts (1), (3), (4) and (5) properly. Check distance A and the centering.



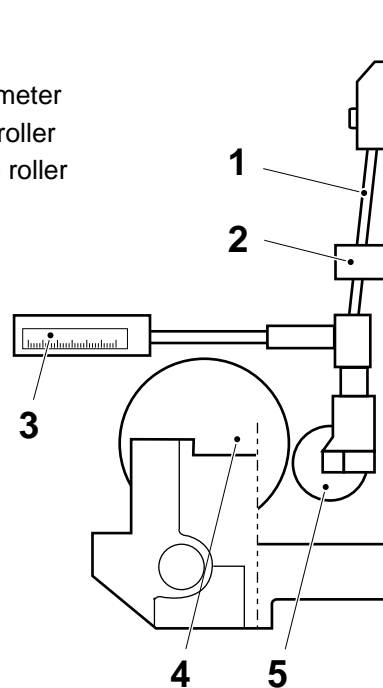
- m) Check the height of the counter roller, see *1.4.1-1 Tube supports and forming rings - check*.

1.16-3 Filler pipe - check pressure roller spring force

Machine status	Air On Power On
Tools - dynamometer	TP No. 74767-102
SPC reference	

- a) Activate valve Y26 for the counter roller.
- b) Put a piece of packaging material (folded double) between the pressure roller and the counter roller (4).
- c) Measure the spring force by pushing with the dynamometer (3) against the fork head until the pressure roller (5) just eases off.
- d) Check the spring force, see table.
- e) The spring must not touch the cover (2). If required, bend the spring.
- f) Deactivate valve Y26, turn off the mains power and close for compressed air.

- 1 Spring
- 2 Cover
- 3 Dynamometer
- 4 Counter roller
- 5 Pressure roller



Package	Spring force, N
100 B	30 - 40
125 S	30 - 40
160 S	30 - 40
180 B	40 - 50
200 B	40 - 50
200 M	40 - 50
200 S	30 - 40
236 B	40 - 50
250 B	40 - 50
250 S	40 - 50
284 B	40 - 50
300 S	40 - 50
330 S	40 - 50

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1.17 Photocell unit

SPC reference	491976-020V
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1.17-1 Photocell unit - check

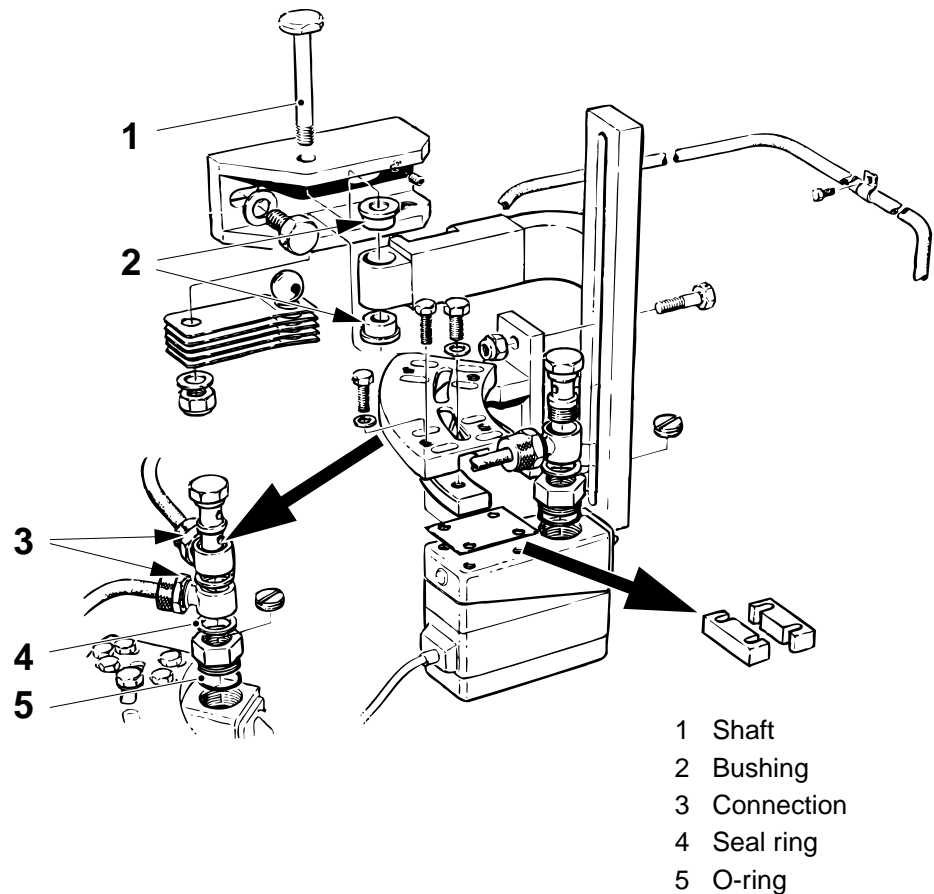
Consumable - soapy water	
SPC reference	491976-020V

Check the following details for wear and/or damage:

- the shaft (1)
- the bushings (2)

Change as required.

With air on, check with soapy water, that there is no air leakage in the connections (3). Change the seal ring (4) and/or the O-ring (5) as required.

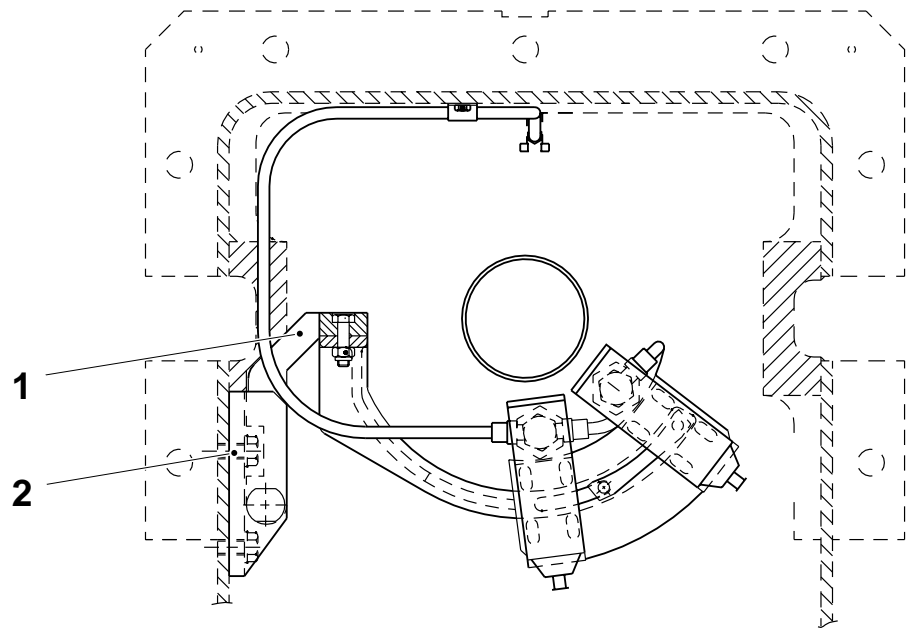


1.17-2 Photocell unit - set

Machine status	Air On Power On
SPC reference	491976-020V

Vertical position

- Set the bracket (1) in production position.
- Set the limit screw (2) so that it bears against the bracket (1) and eliminates any play.
- Crank the machine to 0°.



- 1 Bracket
- 2 Limit screw

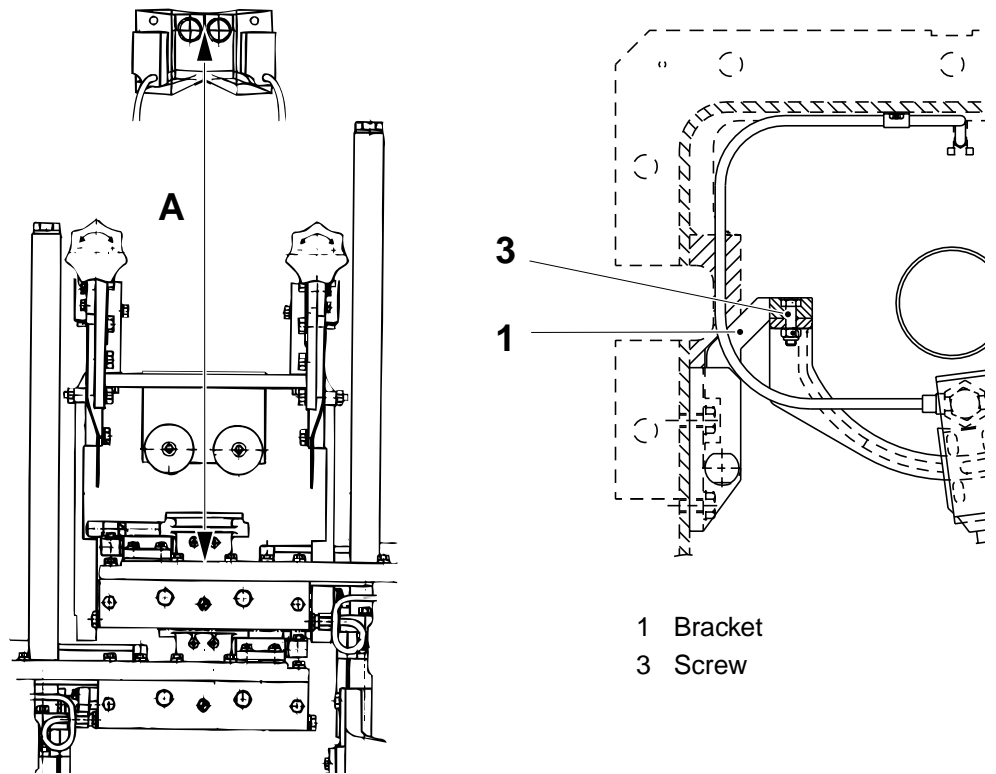
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d) Loosen the screws (3) and set distance A between the carrier and the photocell focal point, see table.

Package	Gap A (mm)
100 B	505
125 S	460
160 S	506
180 B	-
200 B	489
200 M	578
200 S	447
236 B	552
250 B	415
250 S	480
284 B	455
300 S	455
330 S	512

Note! Push the bracket (1) against the wall when tightening the screws after adjustments, in order to ensure that the play always work in the same direction.



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Sensitivity

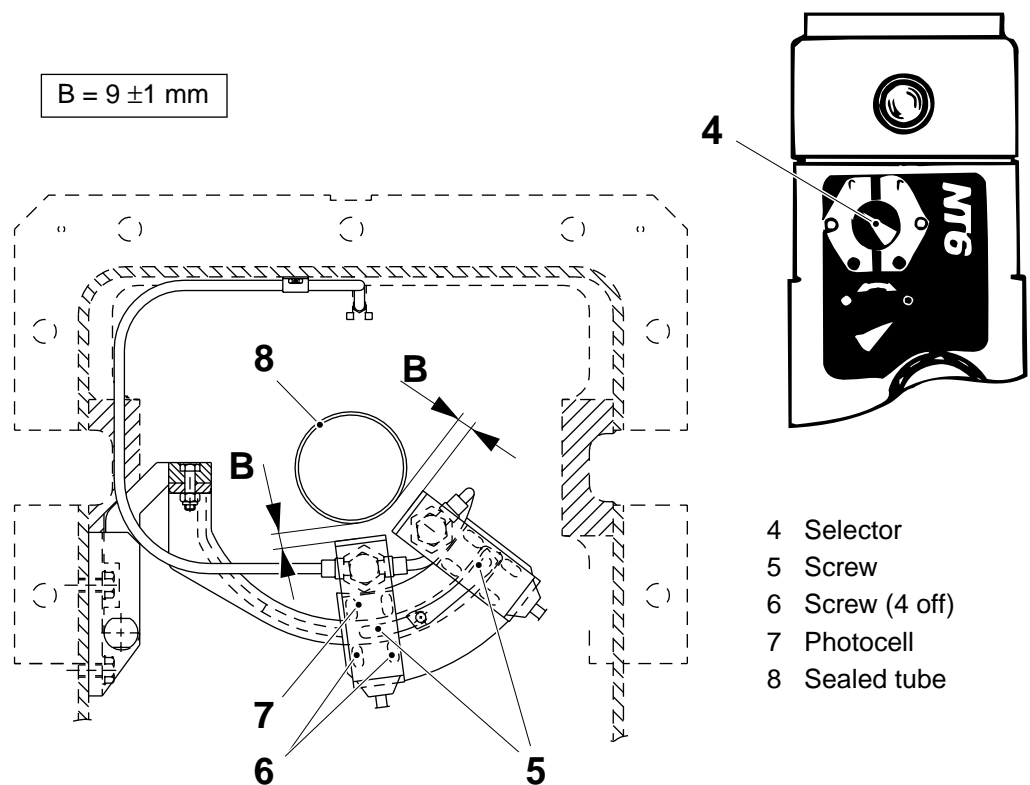
Each photocell is equipped with two separate light sources.

Select light source with the selector (4).

Always use the LH side light source first. When this does not work anymore, change over to the RH light source.

Note! Whenever there has been a change of light source, the photocell sensitivity has to be reset.

- a) Insert packaging material all the way down to the jaws. Inch until a sealed tube is obtained.
- b) Loosen the screws (6) and set distance B between the photocell (7) and the sealed tube (8).
- c) Set the photocells so that the light spots are centered on the photocell trigger marks on the packaging material tube. Adjust by means of the screws (5).

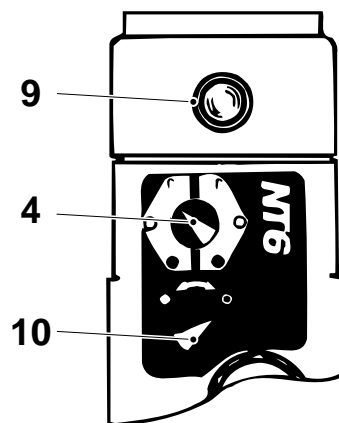


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- d) Remove the cover over the adjustment knobs. Set the light source selector (4) to position O.
- e) Crank forward until a section of white packaging material is in front of the photocell.
- f) Turn the selector switch to position J.
- g) Attach a piece of black tape along the edge of a sheet of white paper and stick this paper around the packaging material tube. Move up the black tape in front of the photocells.
- h) Check whether the LED (9) on the photocell is on or off. If it is off, turn the setting knob counter-clockwise until the LED lights up.
- i) Thereafter, follow one of the two following alternatives.
 - Alternative 1
Only packaging material with white background for the photocell mark is being used, turn the setting knob (10) clockwise until the LED just goes out.
 - Alternative 2
When packaging material with both white and unbleached background for the photocell mark is being used, turn the setting knob (10) clockwise until the LED just goes out and then turn it back (counter-clockwise) one turn.
- j) Turn the light source selector (4) to position ●.
- k) Fit the photocell covers.



- 4 Selector
- 9 LED
- 10 Setting knob

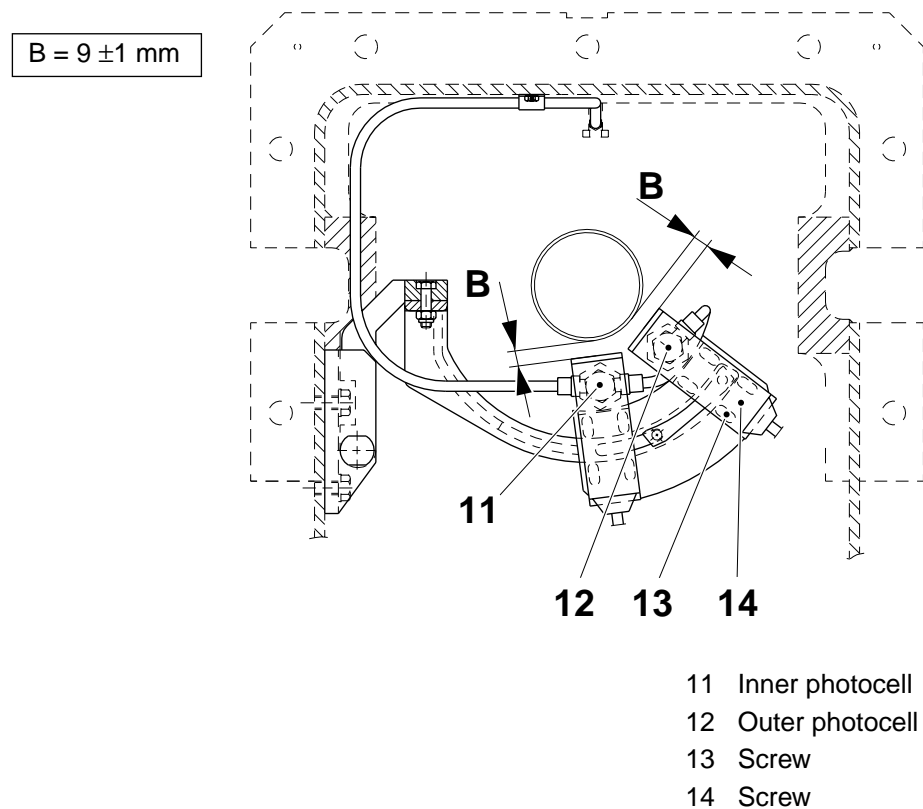
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Levelling

- Put black tape very accurately along the edge of a sheet of white paper. Attach the paper around the packaging material tube so that the black tape matches exactly.
- Move the paper slowly upwards/downwards so that the photocell light spots pass across the horizontal borderline between white and black.
- Stop dead when the LED on the **inner photocell** (11) lights up.
- Both photocells are to light up simultaneously.
- If required, loosen the screws (13) on the **outer photocell** (12) and adjust the position vertically by means of the screws (14).
- Check distance B between the photocell and the packaging material tube.
- Tighten the screws (14).
- Repeat the setting procedure until the LEDs of both photocells light up exactly simultaneously.

Note! All settings are to be carried out on the outer photocell only.



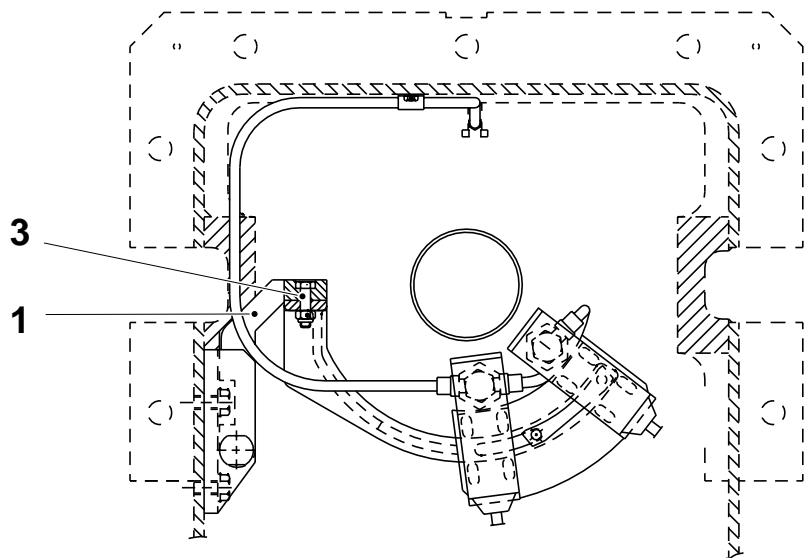
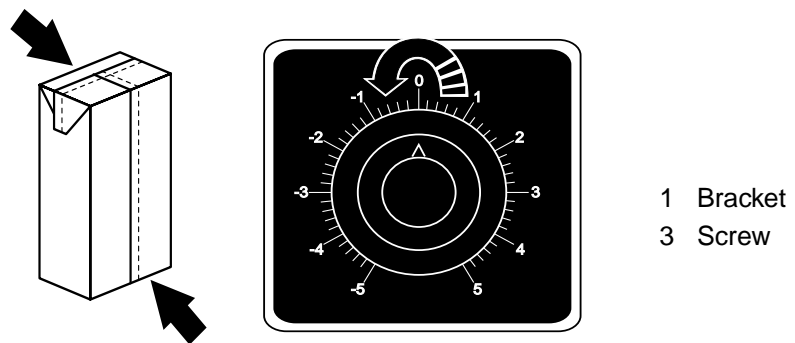
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Final setting

- a) Step up the machine to step **Production**.
- b) Set the potentiometer in position **0**.
- c) Check the crease positions on the packages.
- d) If required, stop the machine and finally set the position of the creases by loosening the screws (3) and raising or lowering the photocells.
- e) Push the bracket (1) against the wall when tightening the screws after adjustment.
- f) Check the levelling, see previous page.
- g) When the mechanical setting has been completed, final adjustment can be made by means of the potentiometer. To shift the crease downwards on the package, turn the potentiometer counter-clockwise.



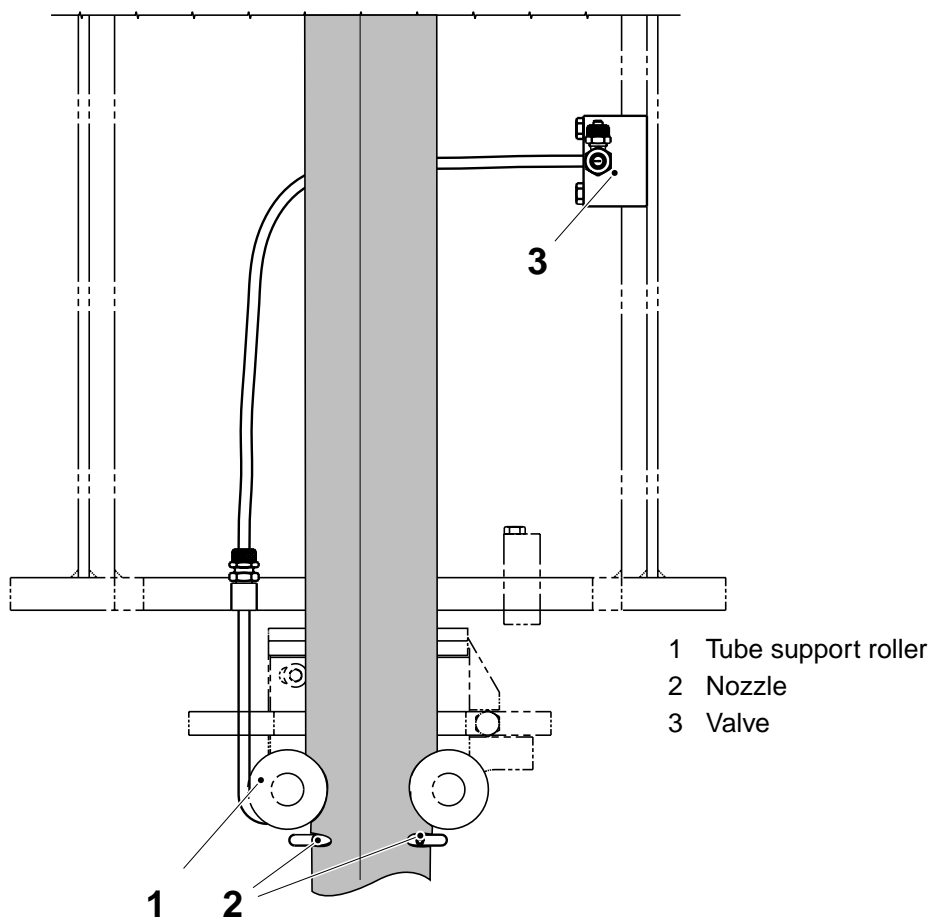
1.18 Tube flushing device

SPC reference	469781-030V
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1.18-1 Tube flushing device - check

Machine status	Production
SPC reference	469781-030V

- Check that the holes of the tube flushing nozzle (2) are not blocked.
- Make sure that the tube flushing nozzle is centered around the packaging material tube. The nozzle (2) should not touch the tube support rollers (1) or the packaging material tube at any point.
- Make sure that the water jets reach the tube. If required, adjust on the valve (3).



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1.19 Filling system

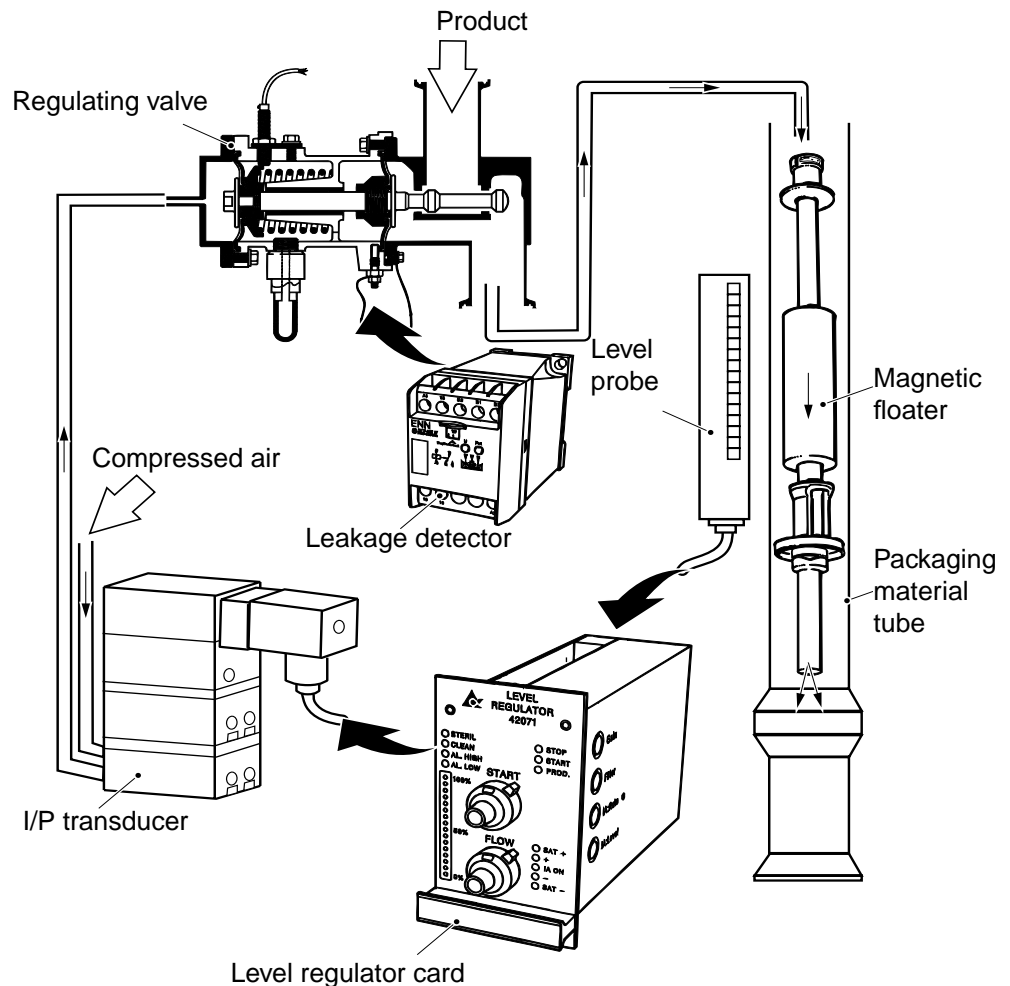
1.19-1 Filling system - function description

Principle

The design of the regulating valve (a constant flow valve) ensures that the product pressure and the product flow from the valve is kept constant (for a specific product).

Inside the packaging material tube there is a floater that registers the product level. The position of the floater is detected by the level probe, that gives a corresponding signal to the level regulator card.

On the card, 16 LEDs show the height of the floater. Depending on the incoming signal and the setting of the card, the card will deliver an electrical signal to the I/P transducer.



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The I/P transducer gives an air pressure corresponding to the received signal. The product flow will be kept correct even if the product viscosity changes. The product flow during start has to be higher than the production flow. It can be adjusted with the setting knob on the level regulator card.

Leakage detector

A leakage detector detects faults in the membranes of the regulating valve.

The membranes are made of two different layers. The first layer is in contact with the product, the second is conductive.

If the first layer breaks, the leakage detector is activated. The alarm signal will hereby occur **before** a leakage occurs. Immediately change membranes in the regulating valve, see *1.2.2-1 Regulating valve - change membranes*.

1.19-2 Filling system - check first package

Machine status	Production
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Pick out the first package inched out of the final folder.

Check-weigh the package to make sure that this package is filled.

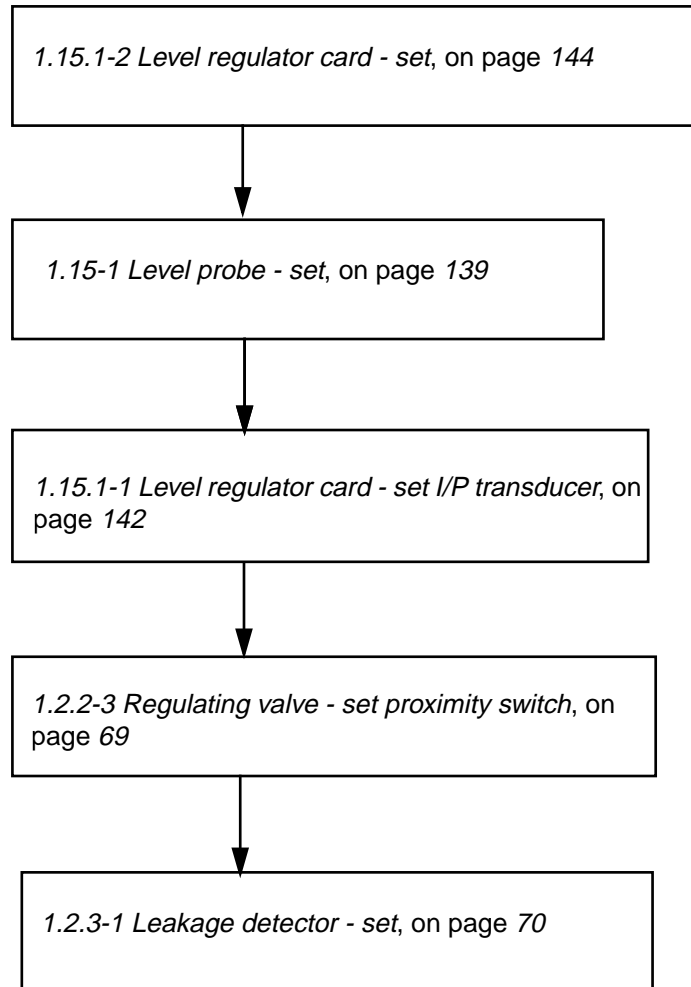
1.19-3 Filling system - check parameters

Check the following items in the filling system and verify their function:

- the magnetic floater, see *1.15-2 Level probe - check filling pipe*
- the level probe, see *1.15-1 Level probe - set*
- the regulating card, see *1.15.1-2 Level regulator card - set*
- the regulating valve, see *1.2.2-3 Regulating valve - set proximity switch*
- the I/P transducer, see *1.15.1-1 Level regulator card - set I/P transducer*

1.19-4 Filling system - setting sequence

If a complete setting of the filling system has to be carried out, follow the sequence below.



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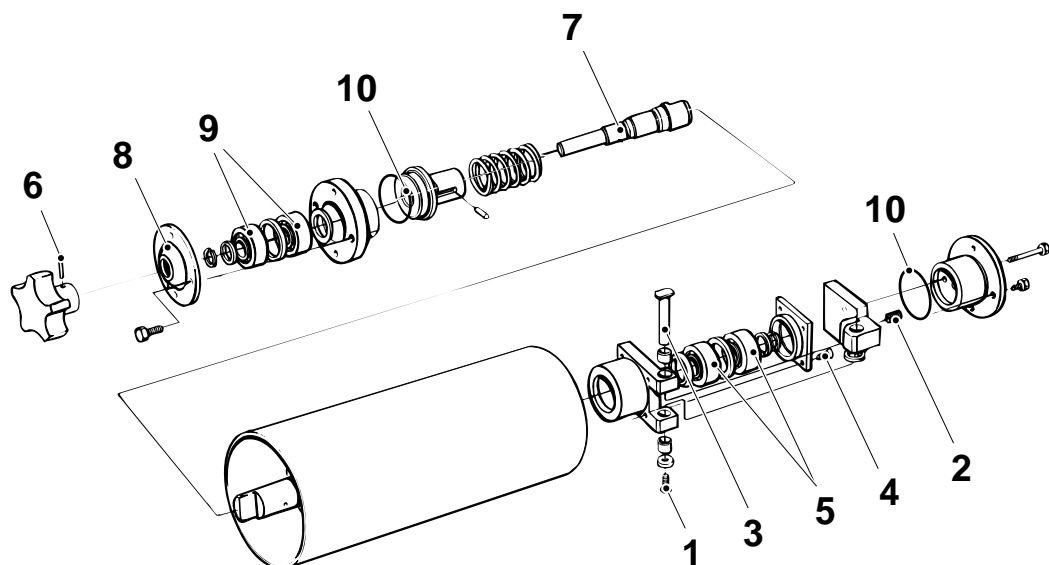
1.20 Crease roller

SPC reference	751088-030V
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1.20-1 Crease roller - change bearings

Consumable - silicon grease	code L
SPC reference	751088-030V

- a) Swing out the crease roller.
- b) Unscrew the screw (1) and the stop screw (2). Pull out the shaft (3) and remove the crease roller.
- c) Unscrew the screws (4) and remove the bearing cover and the O-ring. Remove the rings, the washers, the bearings (5) and the spacer ring.
- d) Remove the pin (6) and pull off the handle. Pull out the axle (7).
- e) Unscrew the four screws and remove the bearing cover (8). Remove the rings, the washers, the bearings (9) and the spacer ring.
- f) If required, remove the bearing seats and change the O-rings (10). Fit the new O-rings with silicon grease.
- g) Change the bearings and assemble in the reverse order.



- | | |
|--------------|-----------------|
| 1 Screw | 6 Pin |
| 2 Stop screw | 7 Axle |
| 3 Shaft | 8 Bearing cover |
| 4 Screw | 9 Bearing |
| 5 Bearing | 10 O-ring |

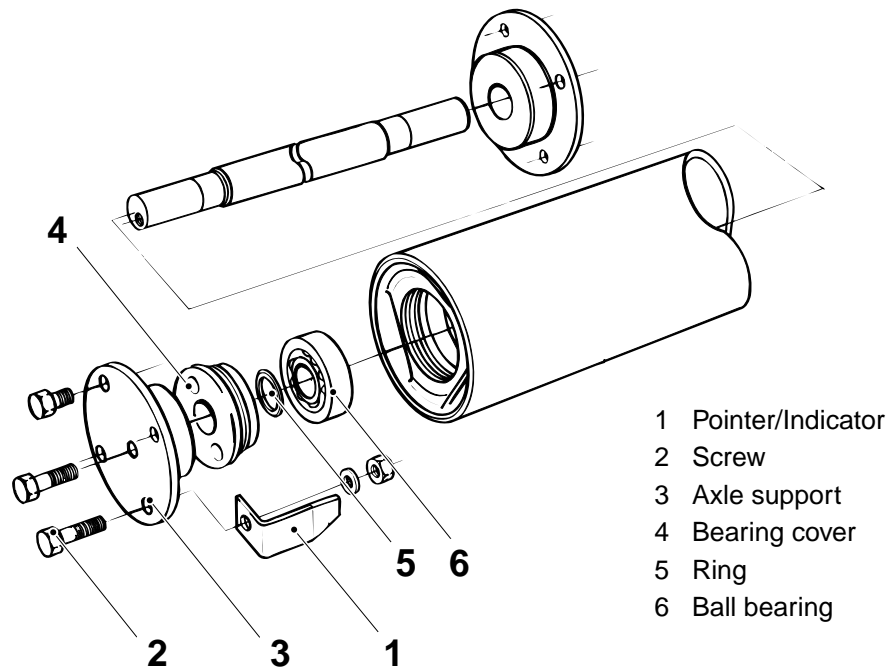
1.21 Bending roller

SPC reference	272004-040V
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1.21-1 Bending roller - change bearings

SPC reference	272004-040V
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- Unscrew the nut and remove the pointer/indicator (1).
- Unscrew the screws (2).
- Remove the axle supports (3) and remove the bending roller.
- Remove the bearing covers (4) and remove the shaft, the rings (5) and the ball bearings (6).
- Change the ball bearings and assemble in the reverse order.

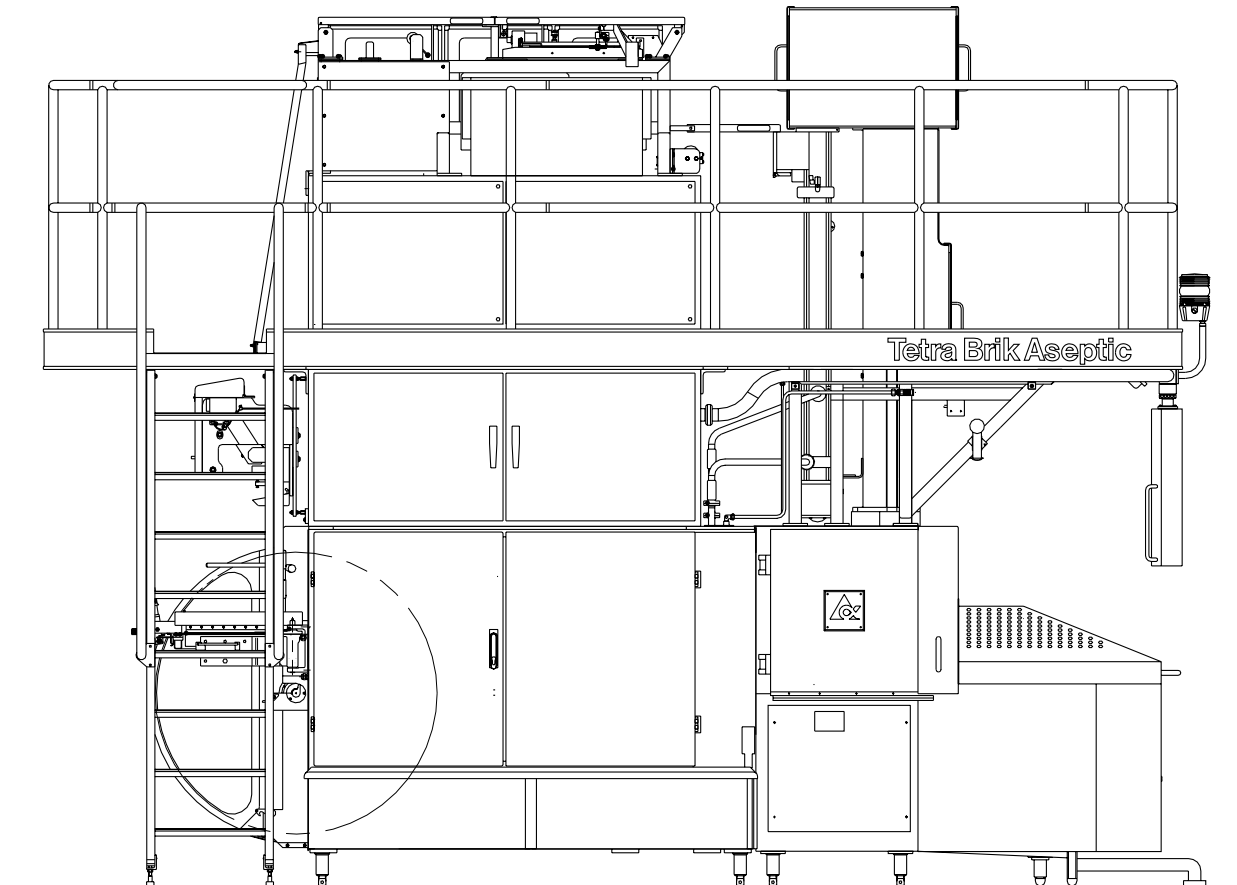


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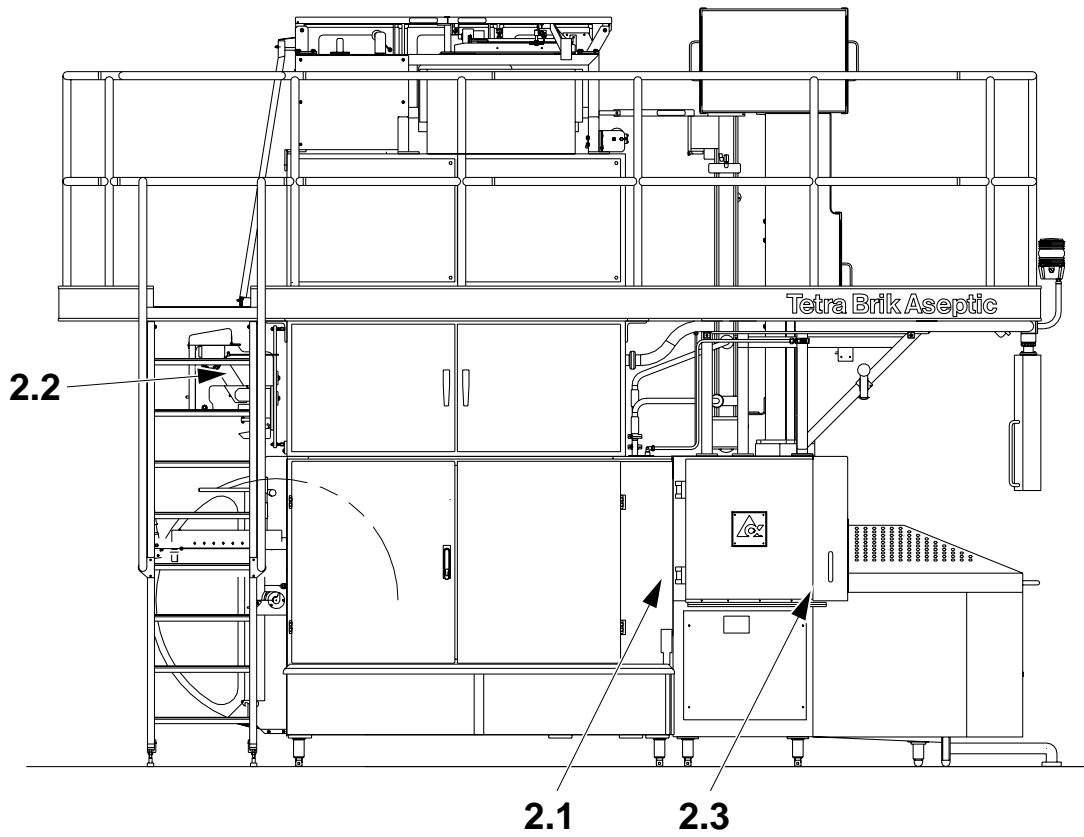
2 Machine body

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2-1 Machine body - description

SPC reference	648102-110V
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- 2.1 Connection box
- 2.2 Dating unit
- 2.3 Drop chute

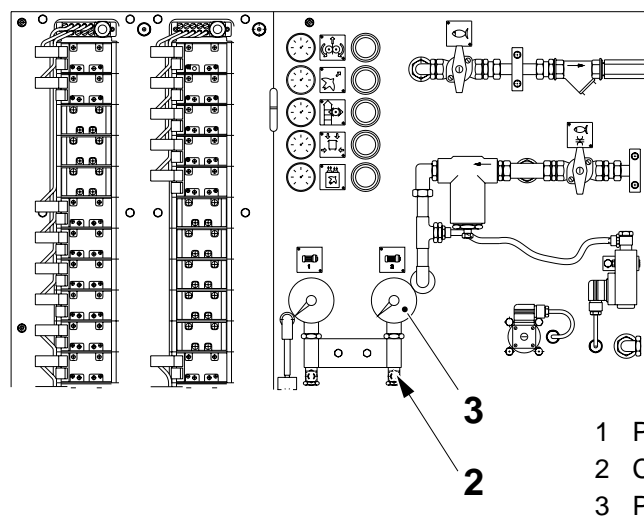
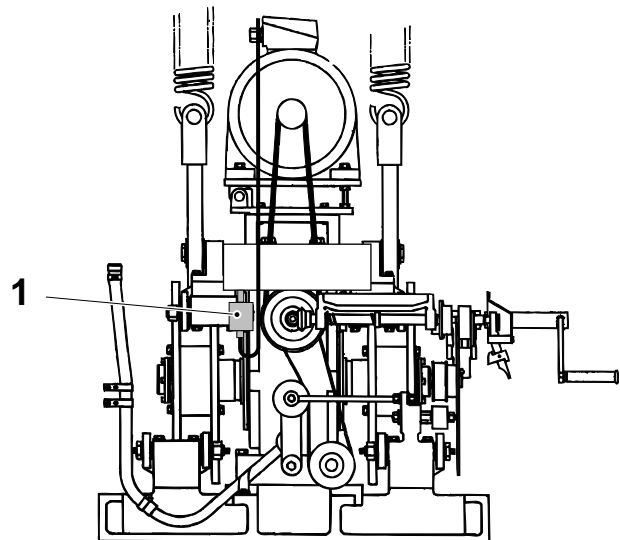
2.1 Connection box

SPC reference	456827-030V
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2.1-1 Connection box - check sterile air pressure switch

Machine status	Preheating II
SPC reference	456827-030V

- Slowly unscrew the pipe connection (2) to the sterile air pressure switch (1).
- Check that the machine steps to **Zero** position when the pressure on the pressure gauge (3) has dropped to about 15 kPa.
- If not, change the pressure switch.



2.2 Dating unit

SPC reference	579241-010V
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2.2.1 Ink unit

2.2.1-1 Ink unit - overhaul

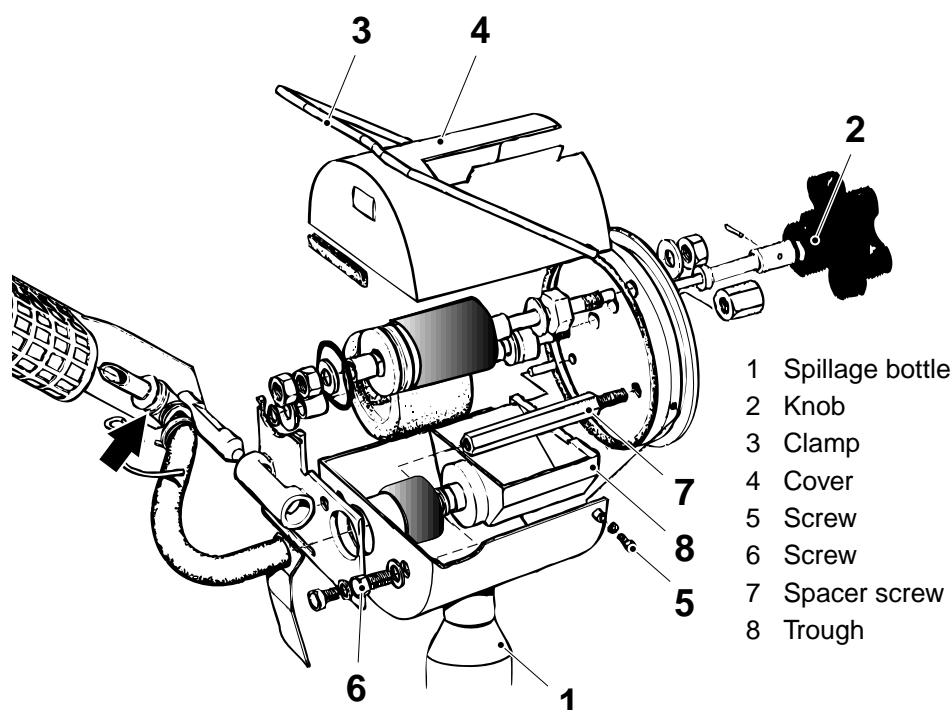
Consumable - solvent	Propylene glycol methyl ether (Dowanol PM)
SPC reference	458192-030V 440286-030V



Chemical products!

Solvent. Follow the *Safety precautions*.

- Remove the ink bottle and the spillage bottle (1).
- Loosen the knob (2) and remove the ink unit.
- Loosen the clamp (3) and remove the cover (4). Loosen the hose at the bottle connection (arrow).
- Loosen the screws (5), the screw (6) and the spacing screw (7). Remove the trough (8).



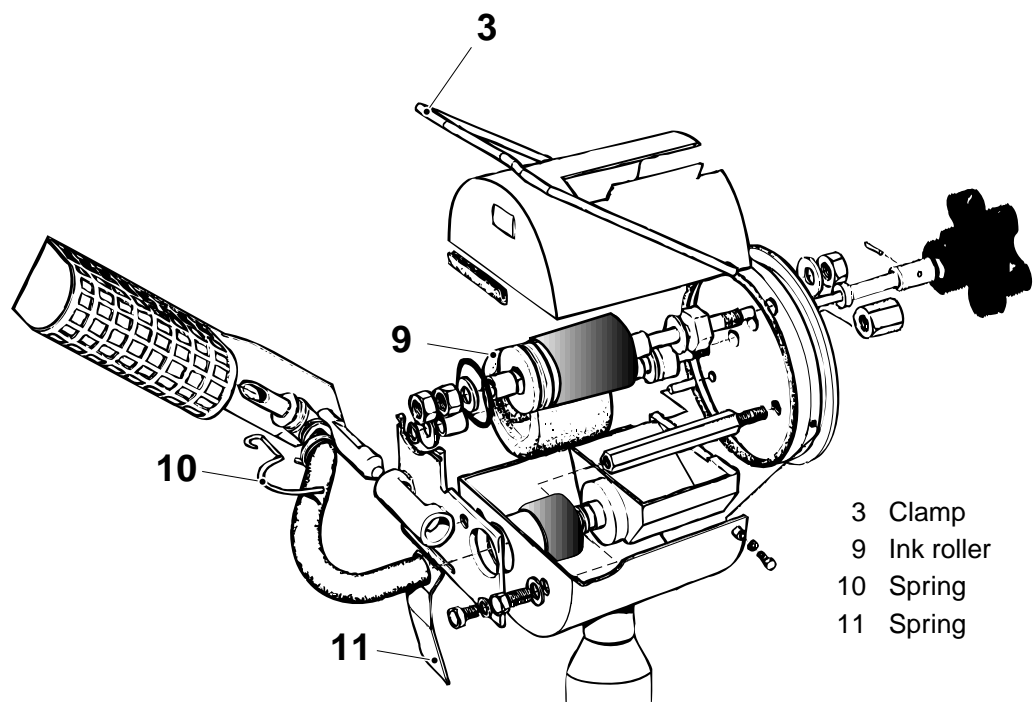
- Spillage bottle
- Knob
- Clamp
- Cover
- Screw
- Screw
- Spacer screw
- Trough

(Cont'd)

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Caution! Do not wash the ink unit with water!

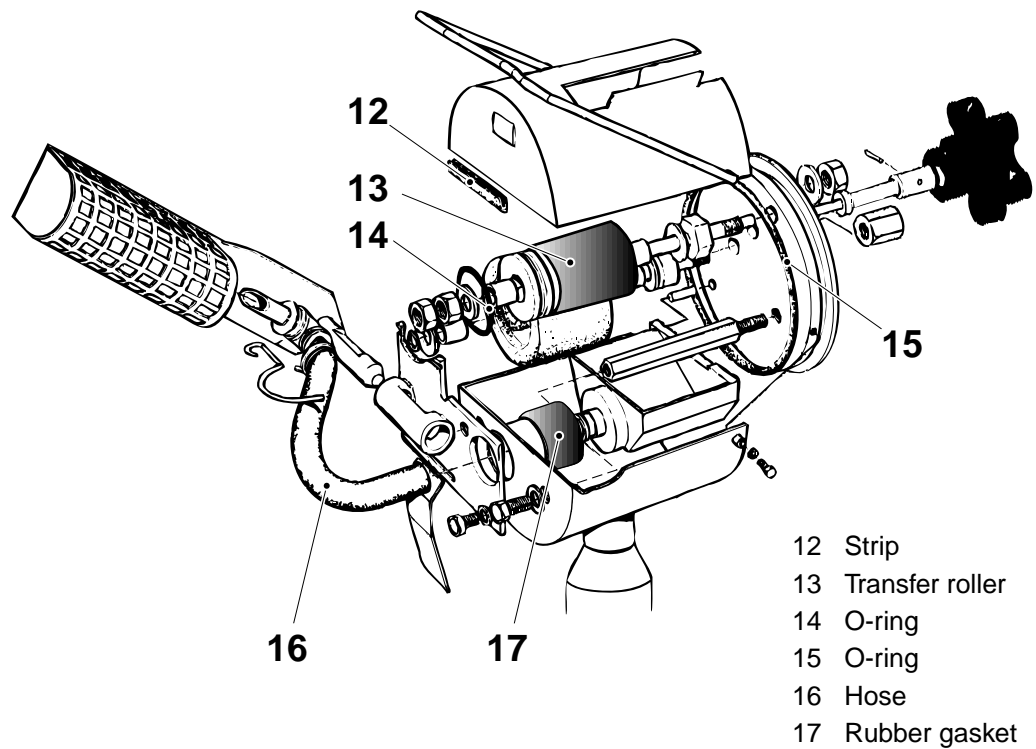
- e) Put the trough, the rollers on the gable and the lower cover with the ink bottle in solvent, rinse them, and let them air-dry.
- f) Check the following details for wear and/or damage:
 - the clamp (3)
 - the ink roller (9): make sure the roller rotates freely
 - the spring (10)
 - the spring (11); make sure that the ink bottle stays in its upper position when it has been raised
- g) Change as required.



(Cont'd)

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- h) Change the following details
- the strip (12)
 - the transfer roller (13)
 - the O-rings (14) and (15)
 - the hose (16); also make sure the hose is not folded when the ink bottle is raised/lowered
 - the rubber gasket (17); also make sure that there is no ink in the spillage bottle
- i) Assemble the ink unit in the reverse order.
- j) Set the ink unit, see 2.2.1-2 *Ink unit - set*.

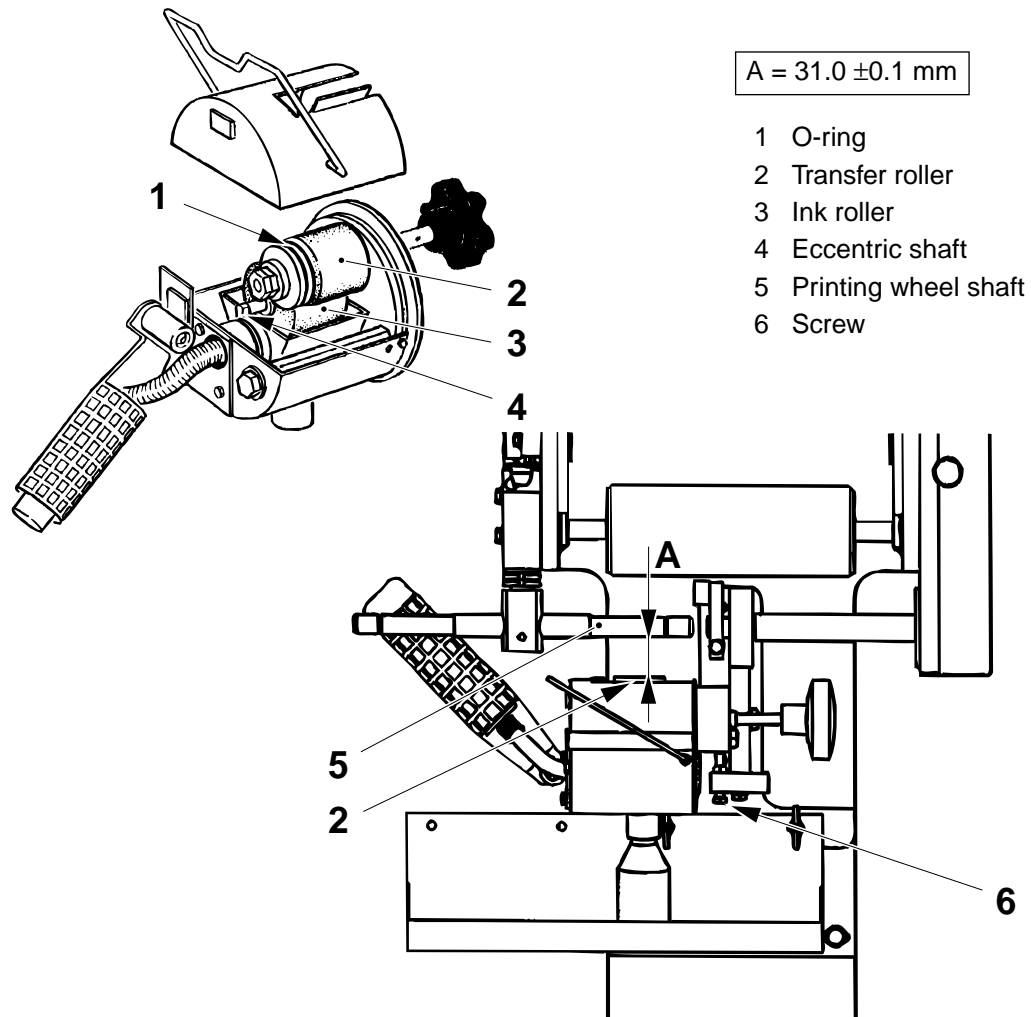


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2.2.1-2 Ink unit - set

Tools	
- template	TP No. 76602
- spirit level	TP No. 90243-165
SPC reference	458192-030V 440286-030V

- Fit a printing wheel and set the transfer roller so that the O-ring (1) is exactly in the middle between the two O-rings of the printing wheel. Adjust by putting shims under the flange of the transfer roller shaft.
- Set the ink roller (3) exactly opposite the transfer roller (2). Adjust by putting shims under the flange of the eccentric shaft (4) of the ink roller.
- Set the ink roller so that there is no slip between the transfer roller and the ink roller. Adjust by turning the eccentric shaft (4) (turning the shaft clockwise closes the roller).
- Apply the template between the printing wheel shaft (5) and the transfer roller (2) and set distance A. Adjust by means of the screw (6).



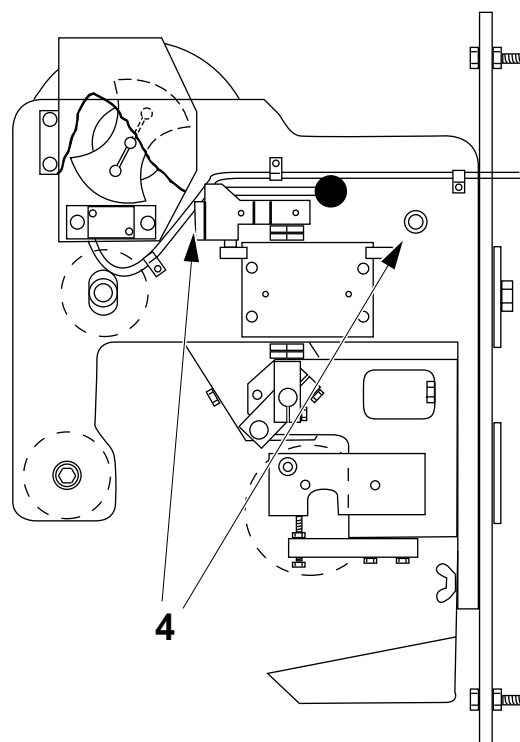
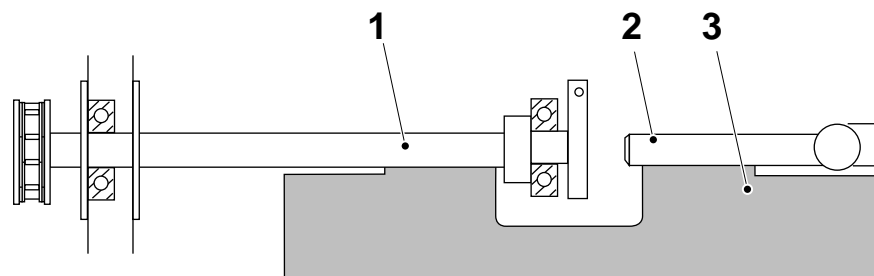
2.2.2 Dating unit

2.2.2-1 Dating unit - set

Tools	
- template	TP No. 76602
- spirit level	TP No. 90243-165
SPC reference	752645-030V 752646-030V

Alignment

- a) Apply the template (3) and set the printing wheel axle (2) parallel sideways to the carrier axle (1). Adjust by means of the stop screws (4).

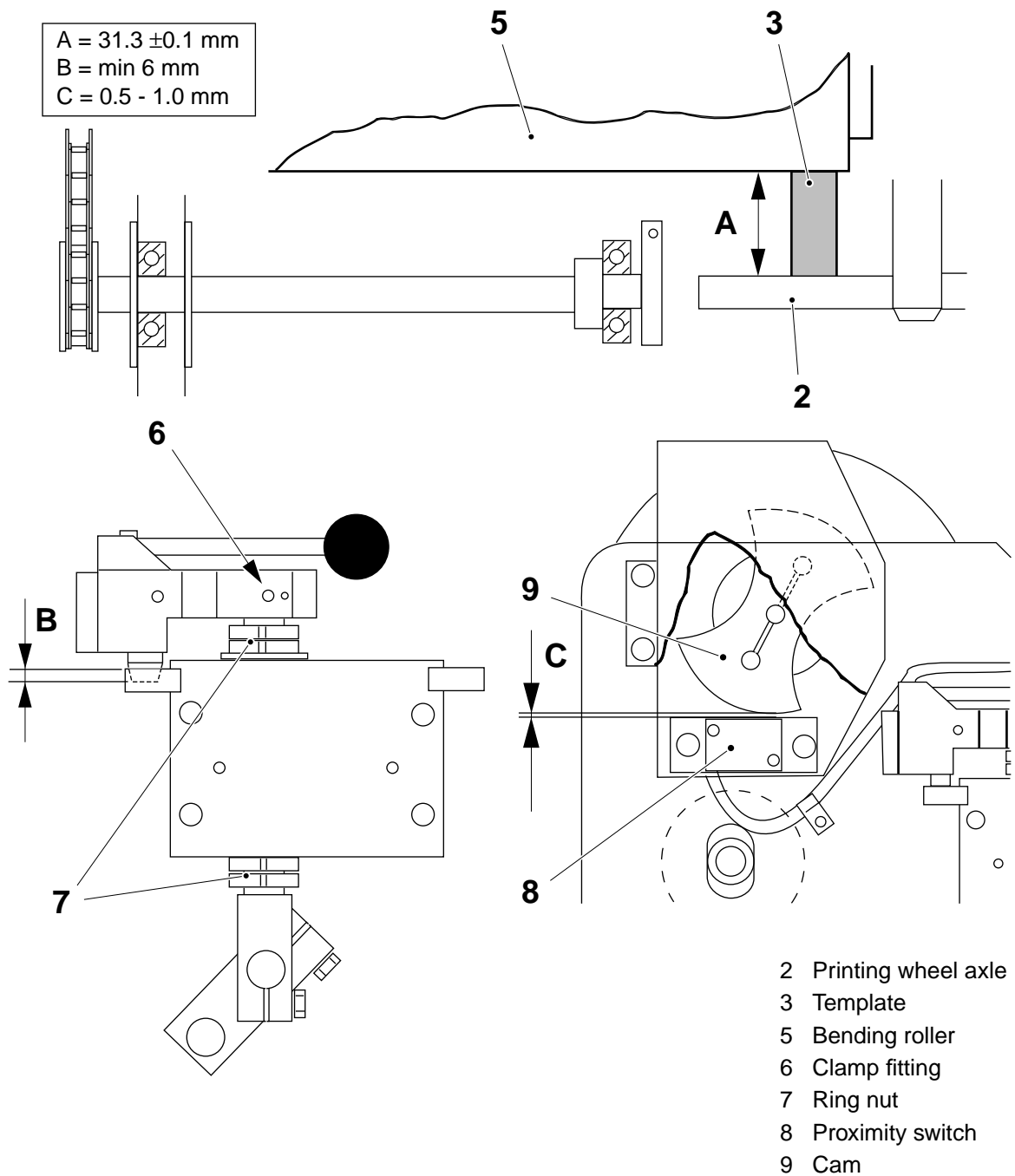


- 1 Carrier axle
- 2 Printing wheel
- 3 Template
- 4 Stop screw

(Cont'd)

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- b) Apply the template (3) between the printing wheel axle (2) and the bending roller (5). Set distance A by means of the ring nuts (7).
- c) Loosen the clamp fitting (6) and adjust distance B.
- d) Set distance C between the proximity switch (8) and the cam (9).
- e) Set the ink unit (set distance A), see 2.2.1-2 Ink unit - set.

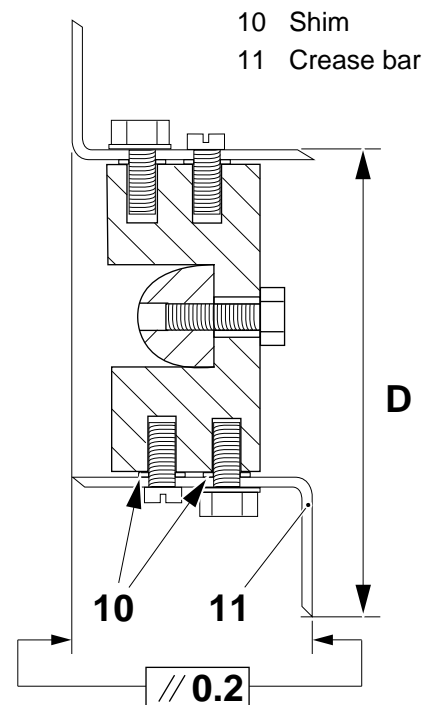
*(Cont'd)*

*(Cont'd)***Crease wheel**

Note! Distance D may vary depending on the packaging material quality. Final adjustment may have to be carried out. Perform the adjustment on a plane surface.

- Set distance D, see table. Adjust by putting shims (10) under the crease bars (11). Make sure that the crease bars are parallel within 0.2 mm.
- Step up the machine to step **Production** and perform a **Short stop**.
- Crank to **X°**, see table.

Package	D ±0.2 (mm)	X°
100 B	69.3	200
125 S	86.0	75
160 S	93.5	110
180 B	75.5	--
200 B	83.0	200
200 M	105.1	147
200 S	118.6	200
236 B	98.4	--
250 B	106.0	120
250 S	130.2	39
284 B	118.9	120
300 S	118.9	335
330 S	136.3	137



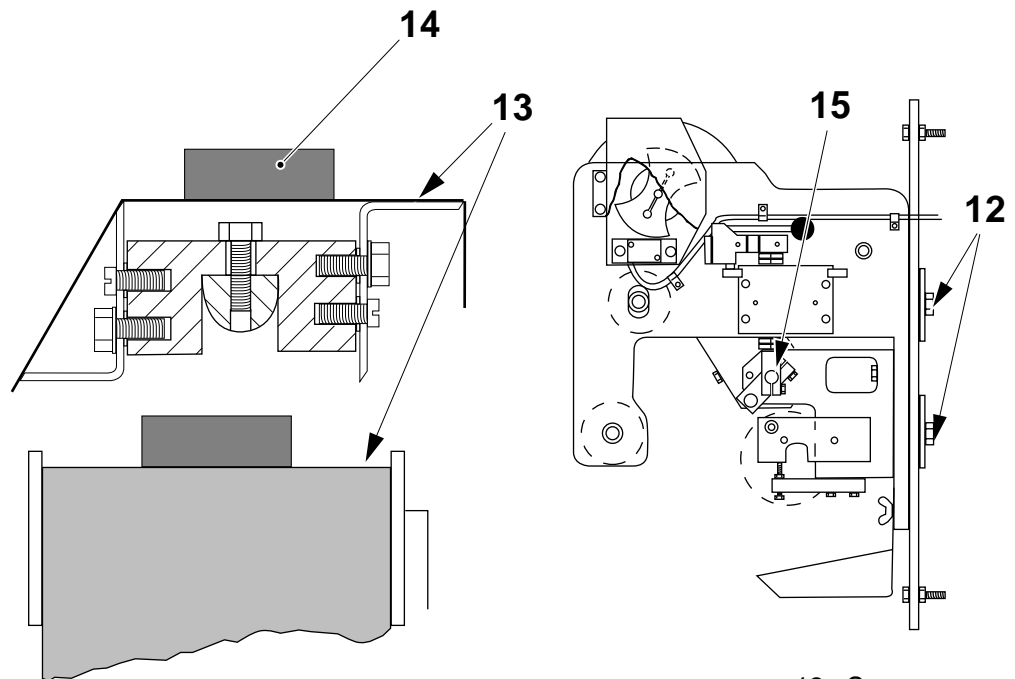
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Note! Make sure that the dating crease wheel is correctly positioned in the creases throughout the setting procedure and that the material web is well tensioned through the machine.

- d) Unscrew the screws (12), apply a spirit level (14), and shift the bracket until the dating crease wheel (13) is horizontal. Tighten the screws.
- e) Mark the position of the clamp union (15) on the axle.



- 12 Screw
 13 Crease wheel
 14 Spirit level
 15 Clamp union

- f) Step up the machine to **Production**.
- g) Pick out packages and check the crease position.
- h) Make a **Short stop**, loosen the clamp union (15) and synchronize the date printing with the printing design on the packaging material web by turning the clamp union.
- i) Step up the machine to **Production** and recheck.
- j) Repeat *f) - i)* until the creases are correctly positioned on the packages.

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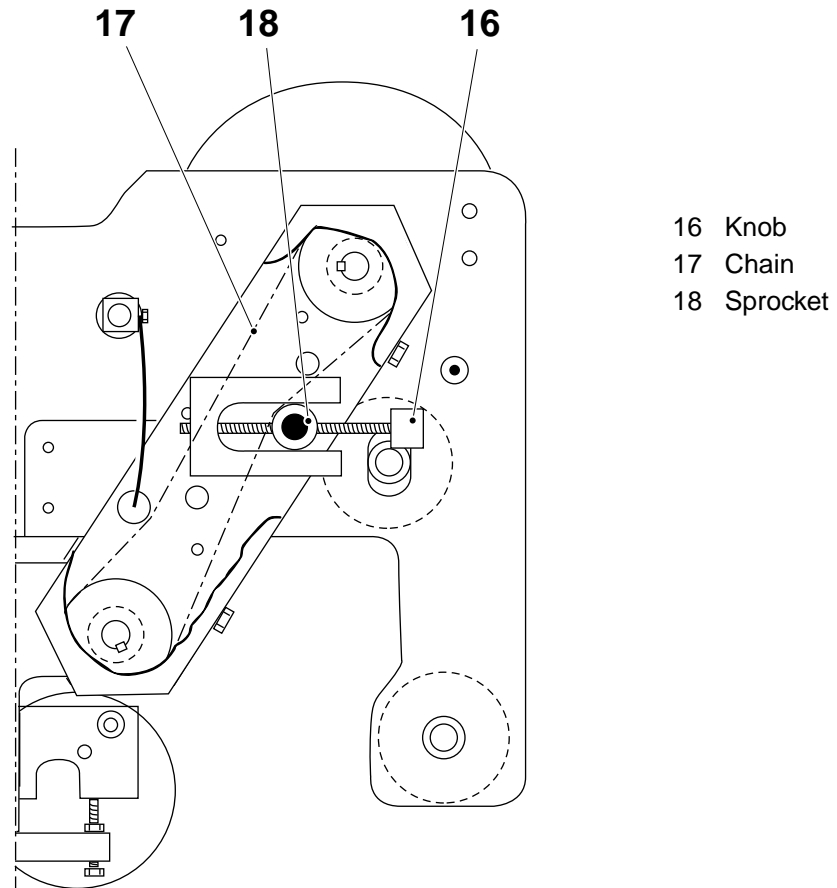
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Final adjustment

a) Final adjustment can be made with the knob (16).

Caution! The chain (17) **must not** be so tensioned that the part running over the sprocket (18) meet the inner side of the chain.

b) Move the sprocket (18) inwards as much as possible by means of the knob (16).



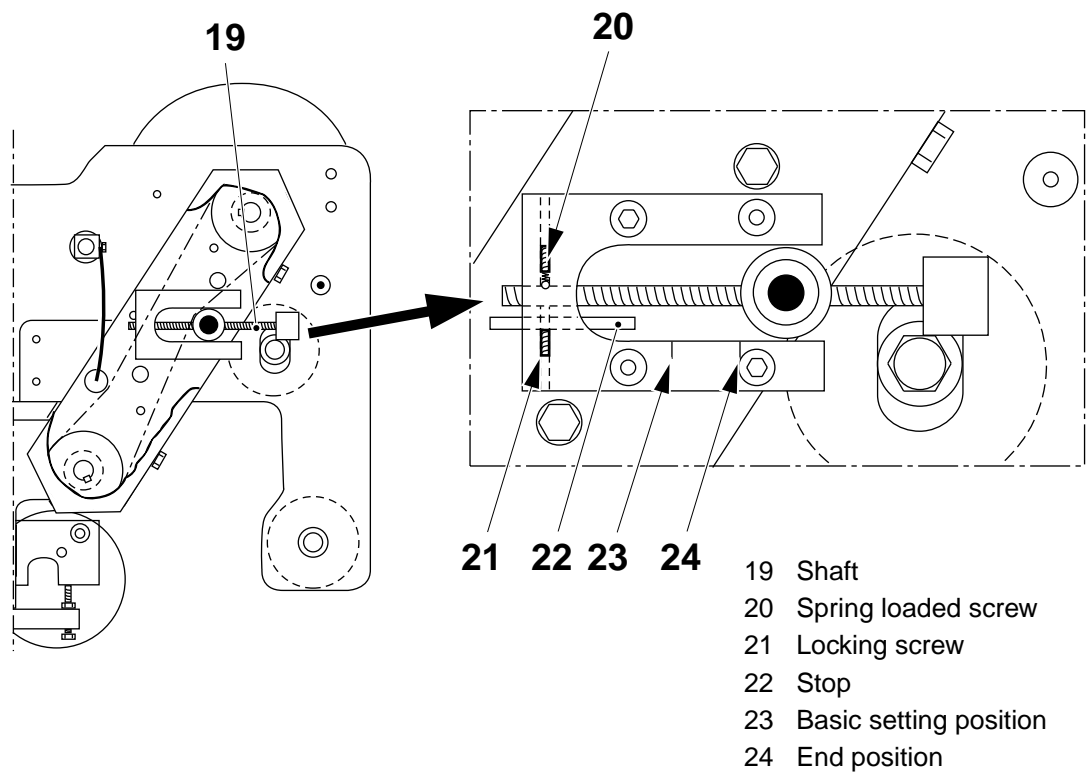
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- c) Set the stop (22) against the sprocket and lock it with the locking screw (21).
- d) Move the sprocket out as far as possible (but not so far out that the chain loses contact with the sprocket). Mark the end position (24).
- e) Move the sprocket in to 2/3 of the adjustable distance. Mark the basic setting position (23).
- f) Step up the machine to step **Production**.
- g) The spring loaded screw (20) must prevent the shaft (19) from rotating during production. Adjust as required.

Note! The shaft must not bind.

- h) Check the stamping position, see below.



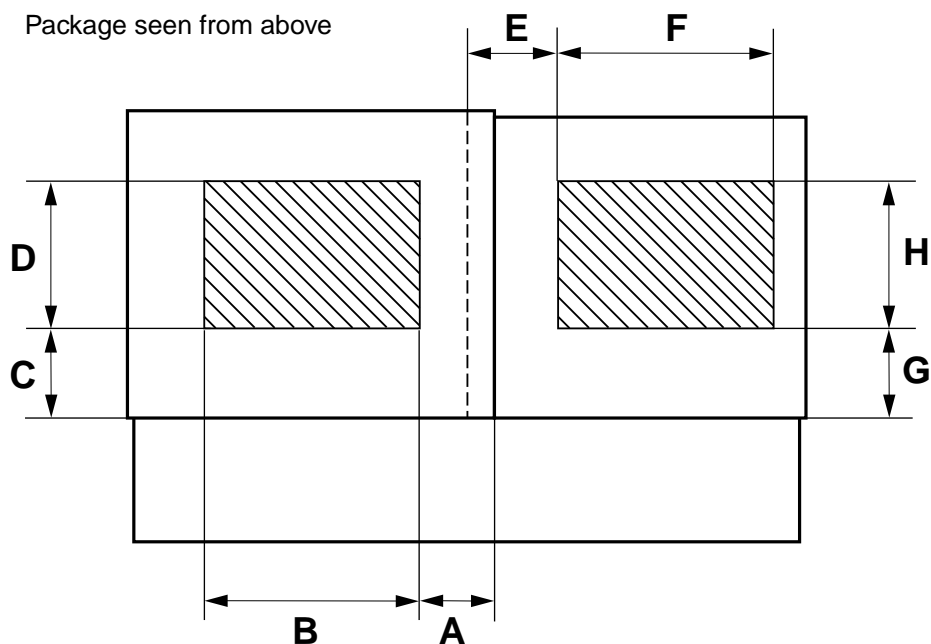
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Stamping position

- Fit the printing wheels, so that stamping is done within the whole of the stamping area (one of the areas marked).
- Check that the stamp is clear within this area.

Package	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)
100 B	4	21.5	8	12	-	-	-	-
125 S	4	21.5	8	12	-	-	-	-
160 S	4	21.5	10.5	12.5	-	-	-	-
180 B	4	30.0	9.5	17.5	-	-	-	-
200 B	-	-	-	-	8	26.5	9.5	17.5
200 M	4	21.5	10.5	12.2	-	-	-	-
200 S	4	21.5	10.5	12.5	-	-	-	-
236 B	4	30.0	9.5	17.5	-	-	-	-
250 B	-	-	-	-	8	26.5	9.5	17.5
250 S	4	21.5	10.5	12.2	-	-	-	-
284 B	-	-	-	-	7.5	26.5	9.5	17.5
300 S	-	-	-	-	7.5	26.5	9.5	17.5
330 S	4	29.5	9.5	17.5	-	-	-	-



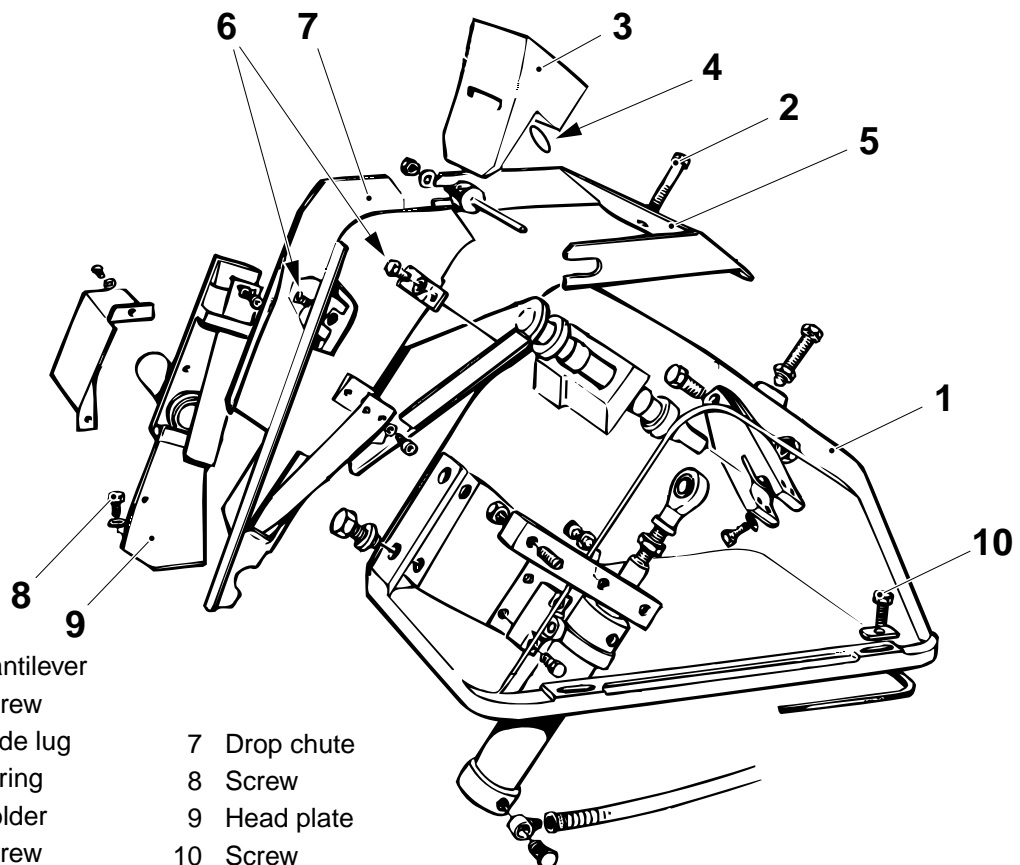
2.3 Drop chute

SPC reference	456180-010V
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2.3-1 Drop chute - remove

Consumable - silicon grease	code L
SPC reference	456180-010V

- Mark the position of the cantilever (1) on the bottom plate.
- Unscrew the screws (2) and remove the slide lug (3), the O-ring (4), and the holder (5). Unscrew the two screws (6) and remove the drop chute (7).
- Unscrew the screws (8) and remove the head plate (9).
- Unscrew the four screws (10) and lift the cantilever. Remove the O-ring.



(Cont'd)

(Cont'd)

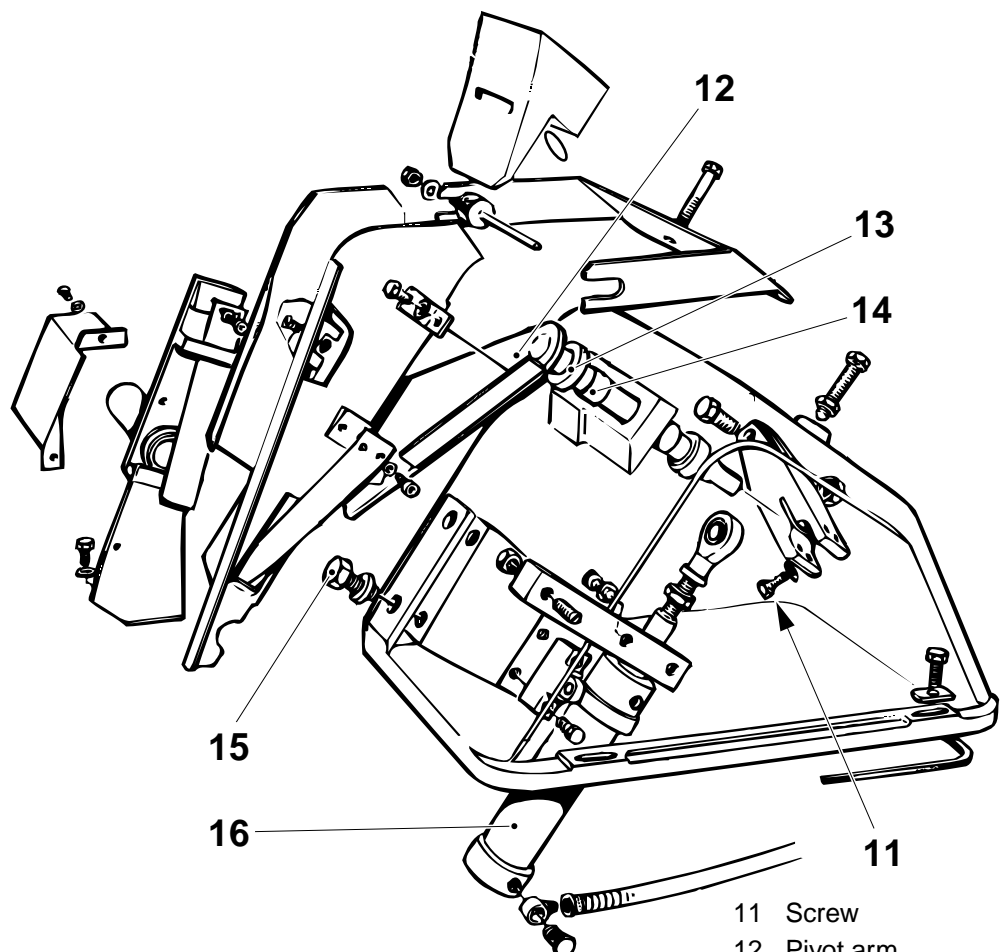
- e) Disconnect the air blow and the air lines to the cylinder.
- f) Loosen the screws (11). Remove the pivot arm (12), the friction bearing (13) and the seal ring (14).
- g) Loosen the screws (15). Remove the cylinder (16). Lift out the cantilever.

**Chemical products!**

Lubricant. Follow the *Safety precautions*.

Note! Apply silicon grease to the O-ring before fitting the cantilever according to the marks on the plate.

- h) Assemble in the reverse order.
- i) Set the drop chute, see 2.3-2 *Drop chute - set*.



- 11 Screw
- 12 Pivot arm
- 13 Friction bearing
- 14 Seal ring
- 15 Screw
- 16 Cylinder

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2.3-2 Drop chute - set

Machine status	Power On Air On
Consumable - silicon	TP No. 90296-6
SPC reference	456180-010V

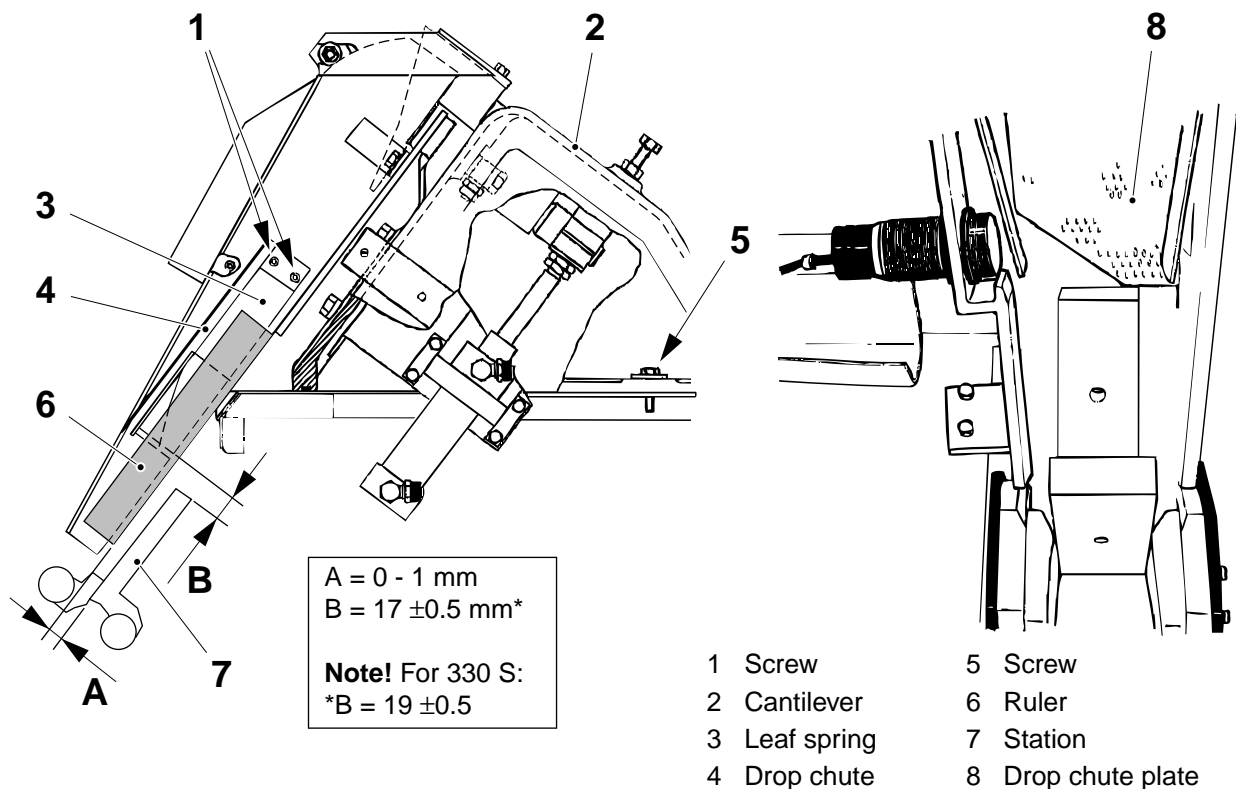
Actuate valve **Y27** so that the drop chute is in production position.

Setting in depth

- Crank until the station chain stops indexing.
- Put a ruler (6) in the drop chute (4). Set distance A by loosening the screws (5) and shifting the cantilever (2).

Note! The drop chute plate (7) must be parallel, within 0.5 mm, with the station (7).

- Tighten the screws (5). Seal with silicon around the edge of the cantilever.
- Set distance B between the station and the leaf spring (3). Loosen the screws (1) to adjust.



(Cont'd)

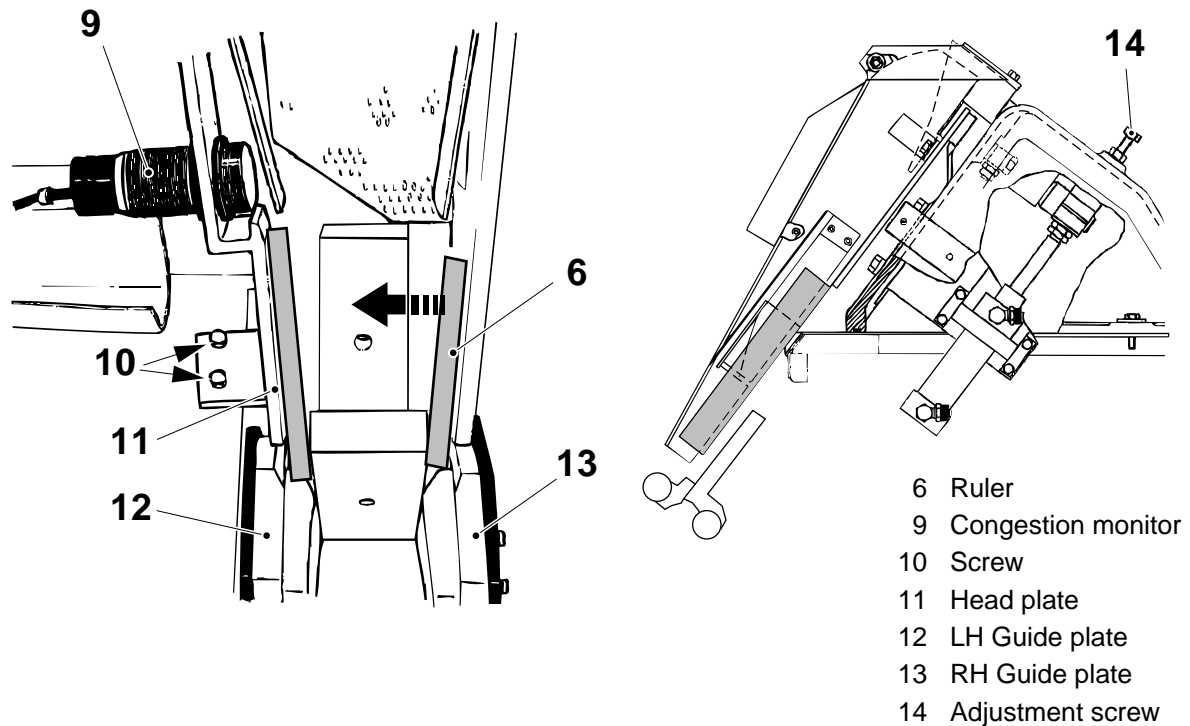
(Cont'd)

Setting sideways

- Place a ruler (6) against the RH side of the drop chute.
- Set the RH side of the drop chute aligned with the RH guide plate (13) on the final folder. Adjust by means of the adjustment screw (14).
- Place the ruler against the LH side of the drop chute.
- Set the head plate (11) aligned with the LH guide plate (12). To adjust, loosen the screws (10) and move the head plate.

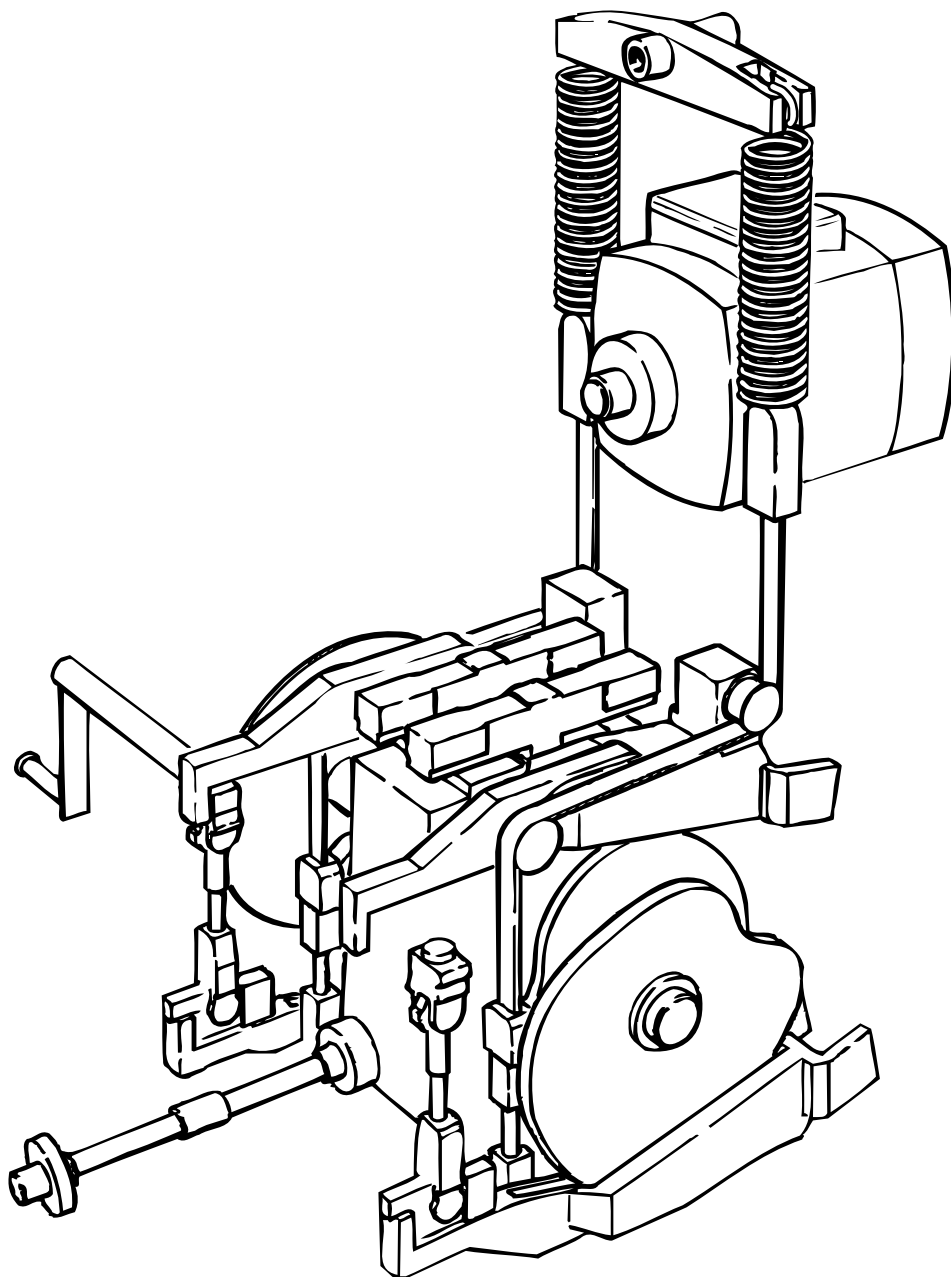
Congestion monitor

- Take a semi-finished package and move it slowly down the drop chute.
- Set the congestion monitor (9) so that it transmits a signal when the package passes and stops to transmit when the package has passed.
- Deactuate valve **Y27**.



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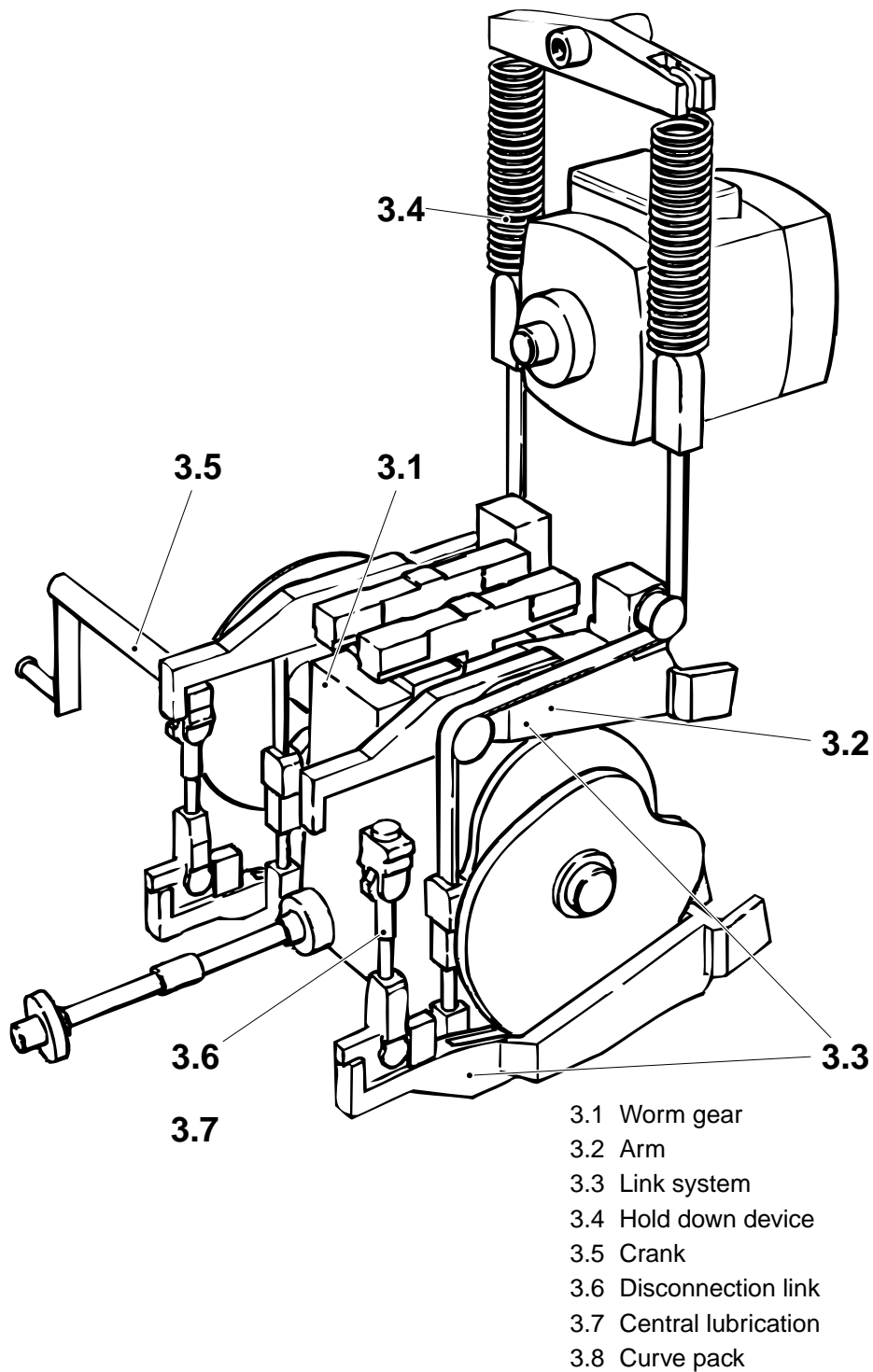
3 Drive



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3-1 Drive - description

SPC reference	648103-100V
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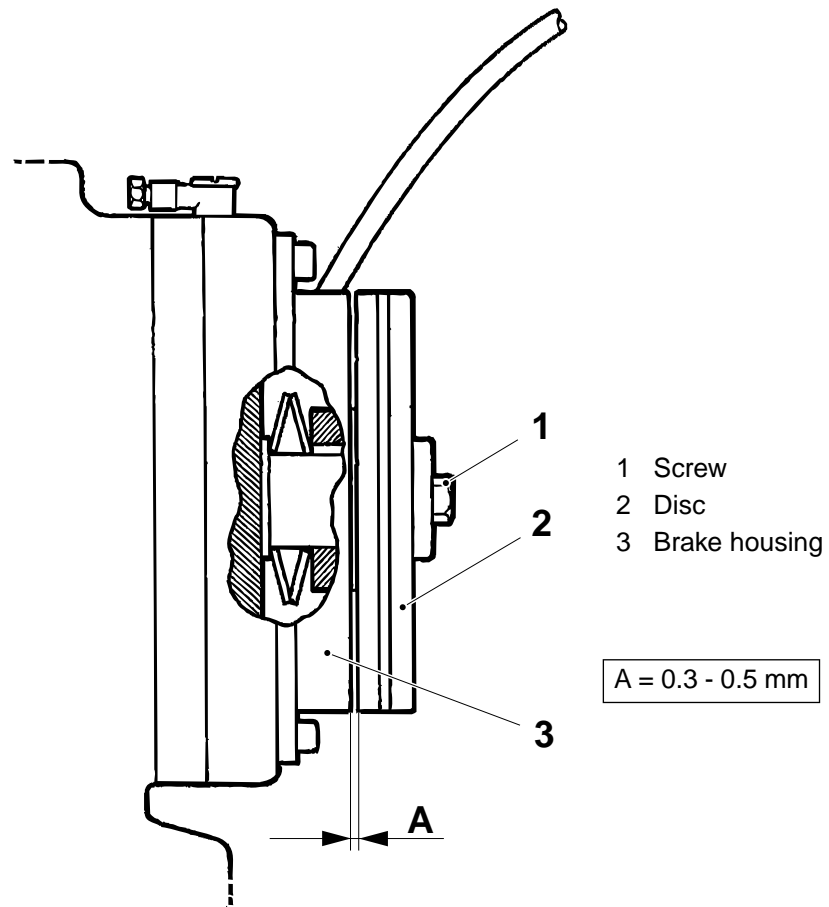
3.1 Worm gear

SPC reference	256173-050V
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3.1-1 Worm gear - set brake gap

Machine status	Preheating I
Consumables - locking fluid	TP No. 90157-16
SPC reference	256173-050V

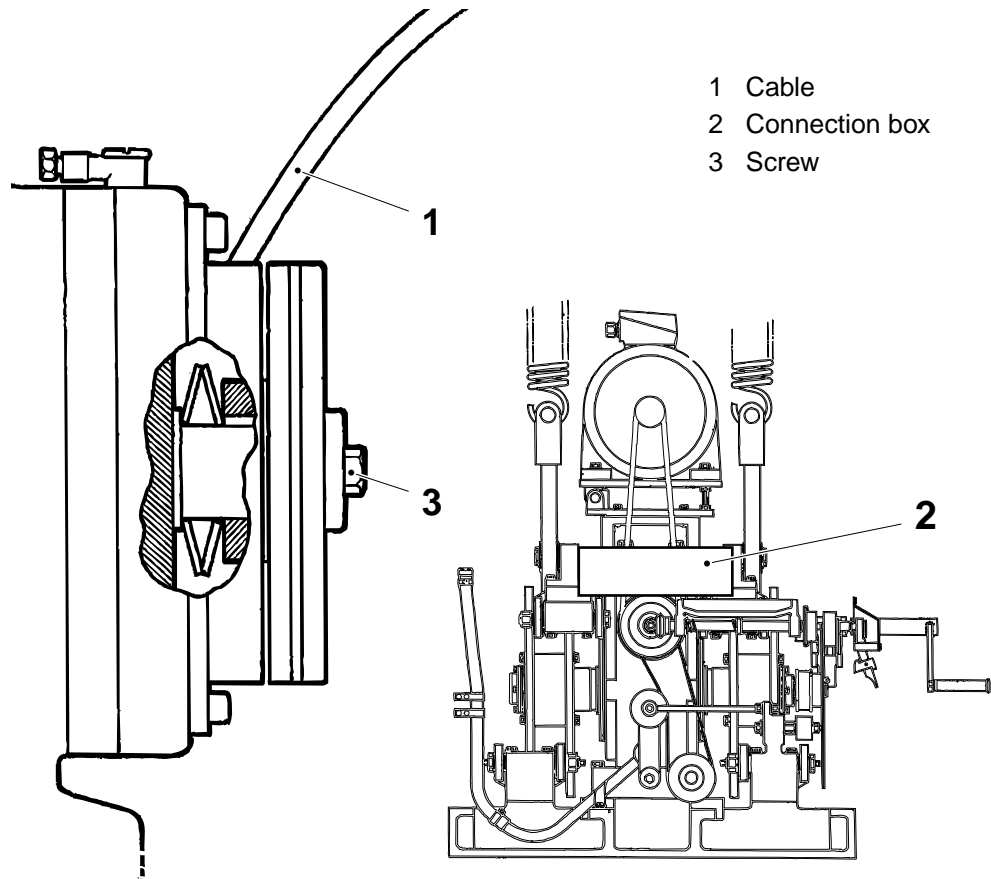
- Unscrew the screw (1), put on some locking fluid and fit it again.
- Set distance A by means of the screw (1). Make sure that the distance is within the tolerances all the way around. If this is not possible to obtain, change the brake, see *3.1-2 Worm gear - change brake*.
- Engage the brake by activating the crank switch a couple of times. Make sure that distance A stays the same.
- Step up the machine to step **Preheating I**.
- Inch the machine in high speed, push the **Emergency stop** button and check that the machine stops immediately.



3.1-2 Worm gear - change brake

Tools - puller	TP No. 76175
SPC reference	256173-050V

- a) Mark and disconnect the cable (1) between the brake and the connection box (2).
- b) Unscrew the screw (3) and pull off the brake by means of the puller.
- c) Assemble in the reverse order and set the brake gap, see *3.1-1 Worm gear - set brake gap*.



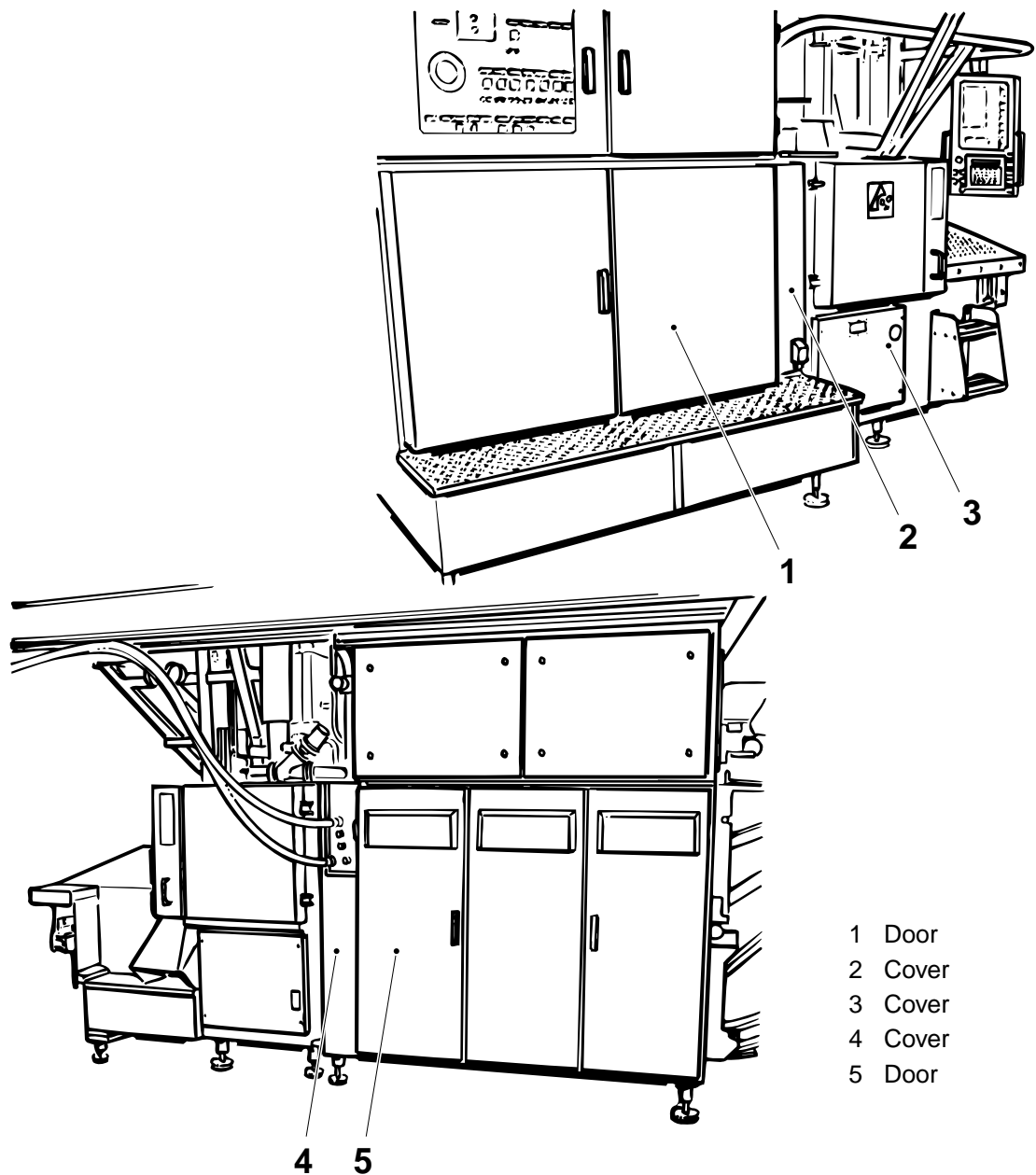
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3.1-3 Worm gear - change clutch bearing

Consumables - locking fluid	TP No. 90157-16
Tools - puller - puller	TP No. 979537 TP No. 76175
SPC reference	256173-050V

On the LH side of the machine, remove the door (1) and the covers (2) and (3).

On the RH side, remove the cover (4) and the door (5).



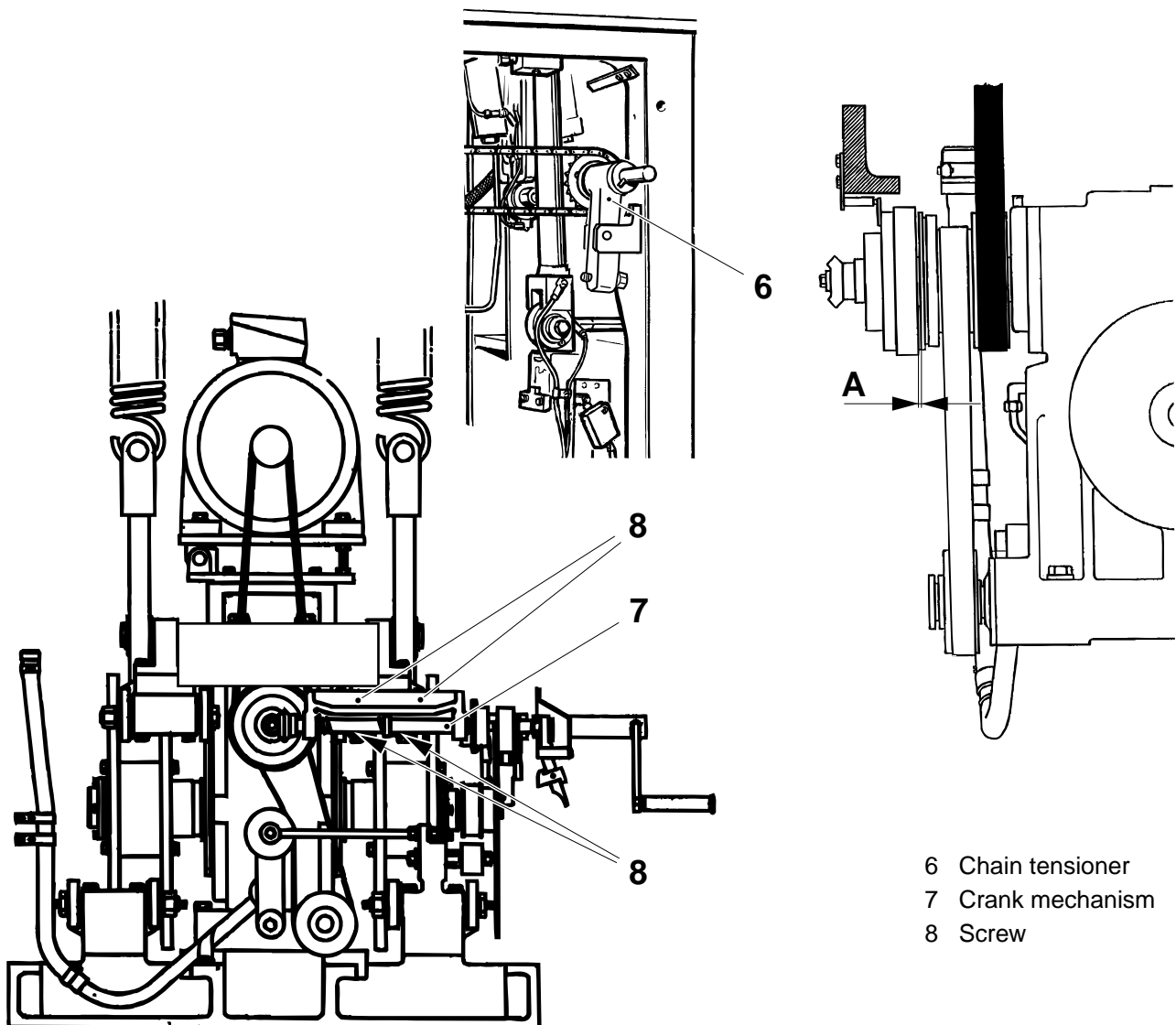
(Cont'd)

*(Cont'd)***Removal**

- a) Slacken the crank chain by means of the chain tensioner (6).
- b) Mark the position of the crank mechanism (7).

Caution! Be careful **not to damage or change** the setting of the pointer.

- c) Remove the degree scale.
- d) Unscrew the screws (8) and move the crank mechanism aside.
- e) Measure and record distance A between the clutch and the disc.



- 6 Chain tensioner
- 7 Crank mechanism
- 8 Screw

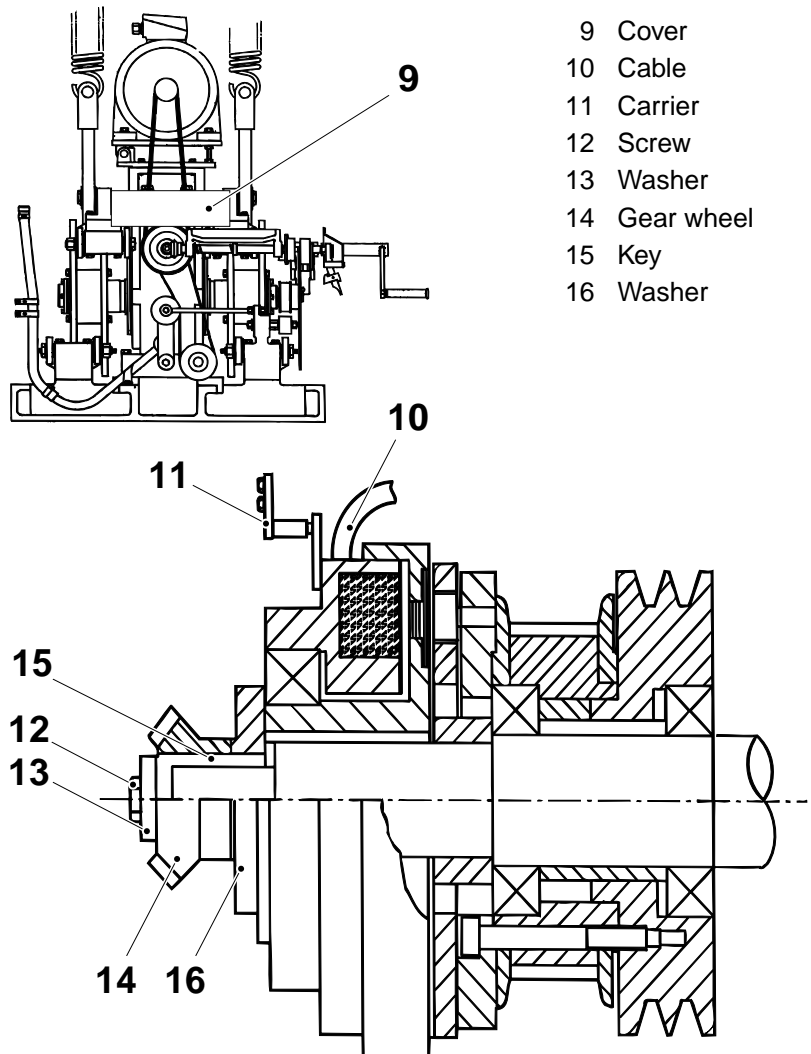
(Cont'd)

(Cont'd)

f) Remove the cover (9) and disconnect the cable (10) for the clutch.

g) Remove the following details:

- the carrier (11)
- the screw (12)
- the washer (13)
- the gear wheel (14) by means of the puller
- the key (15)
- the washer (16) and the ring

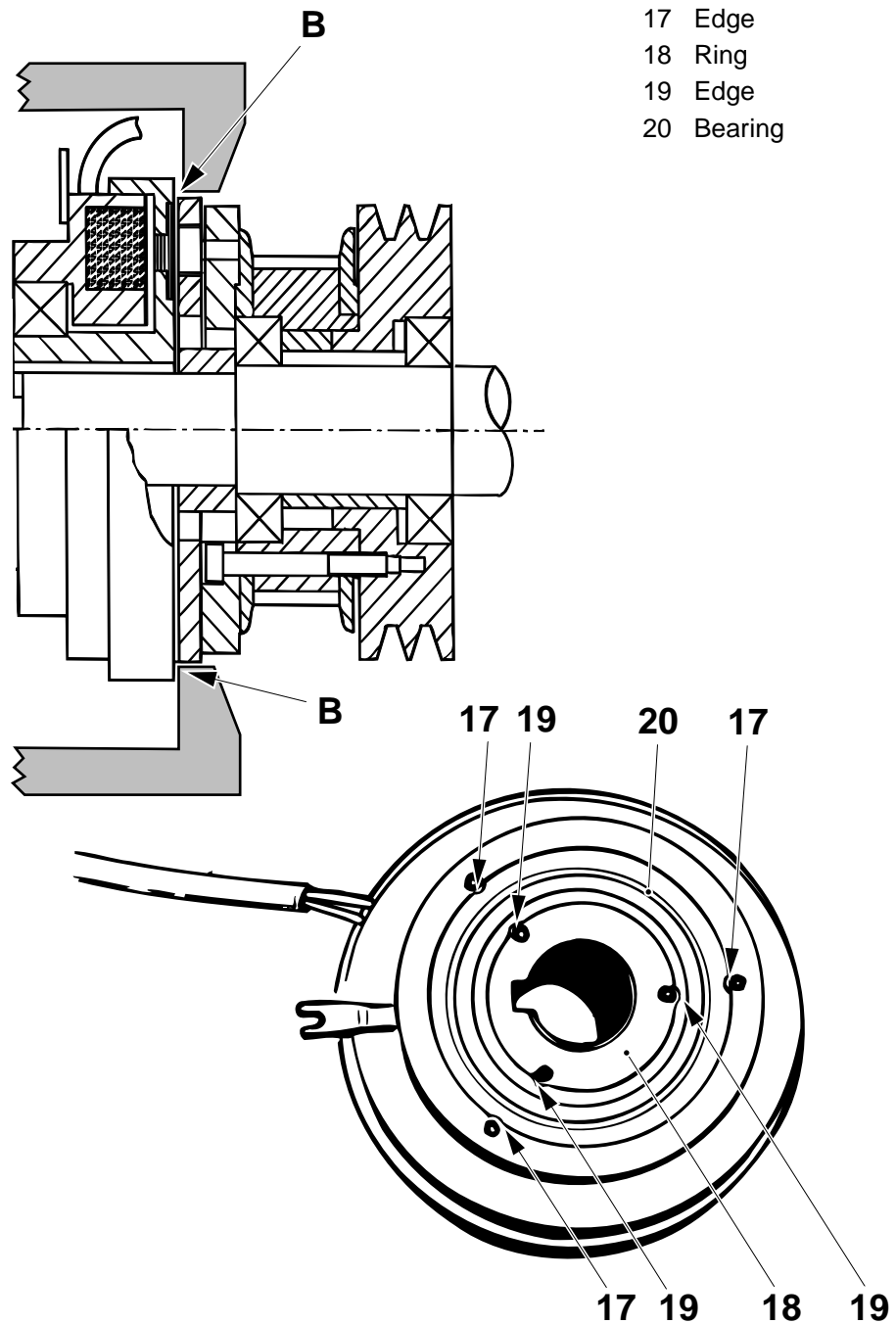


- 9 Cover
- 10 Cable
- 11 Carrier
- 12 Screw
- 13 Washer
- 14 Gear wheel
- 15 Key
- 16 Washer

(Cont'd)

*(Cont'd)***Note!** Do not lose the shims.

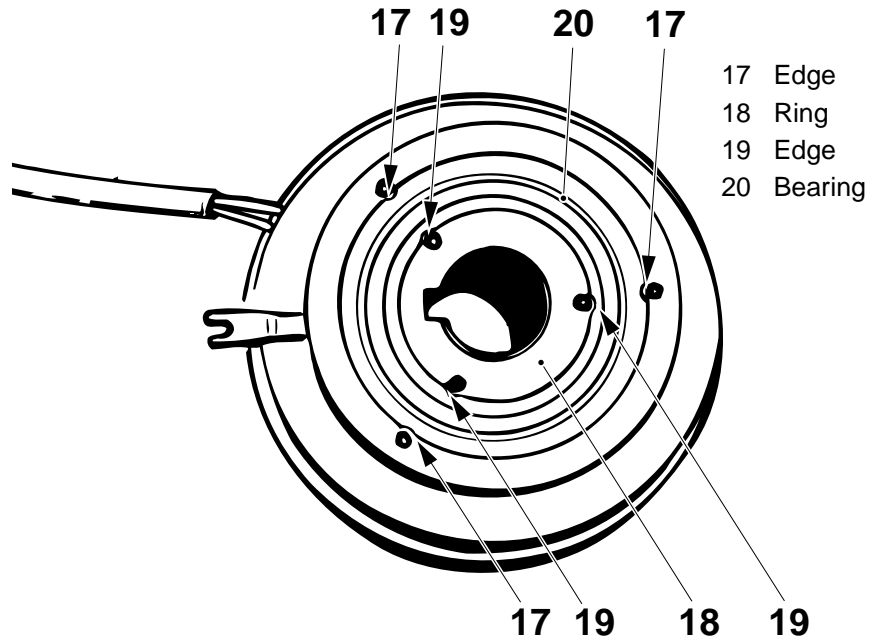
- h) Fit the puller TP No 979537 at points B and pull off the magnetic clutch.
- i) Push back the edges (17) from the punch marks. Fit the other puller.
- j) From the back, press out the inner ring (18) and the bearing (20).
- k) Push back the edges (19) from the punch marks.
- l) Press out and change the bearing (20).

*(Cont'd)*

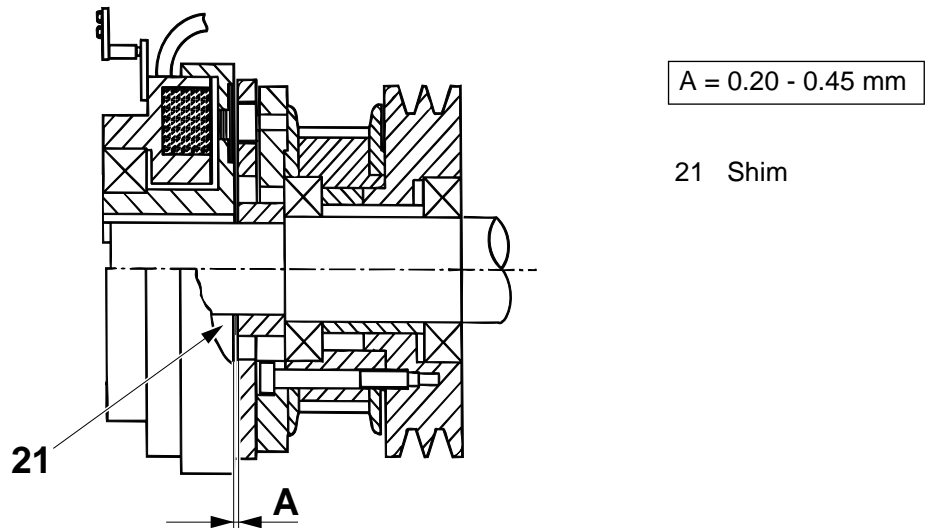
(Cont'd)

Assembly

- a) Fit the bearing (20) in the inner ring (18). Make the punch marks to get the edges (19)
- b) Fit the inner ring and the bearing and make the punch marks to get the edges (17).



Note! If the measured distance A was not within the limits, adjust with shims (21) before fitting the magnetic clutch.

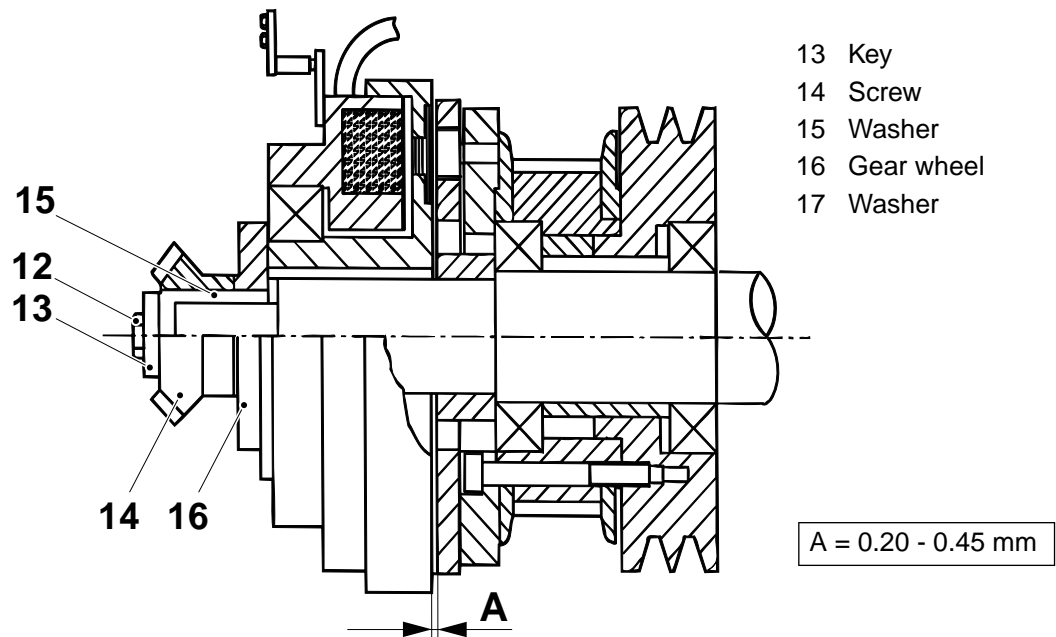


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(Cont'd)

- c) Fit the washer (16), the key (15), the gear wheel (14) and the washer (13).
- d) Put some locking fluid on the screw (12) and fit it.
- e) Verify distance A.
- f) Assemble the remaining details in the reverse order and connect the cable in the connection box.



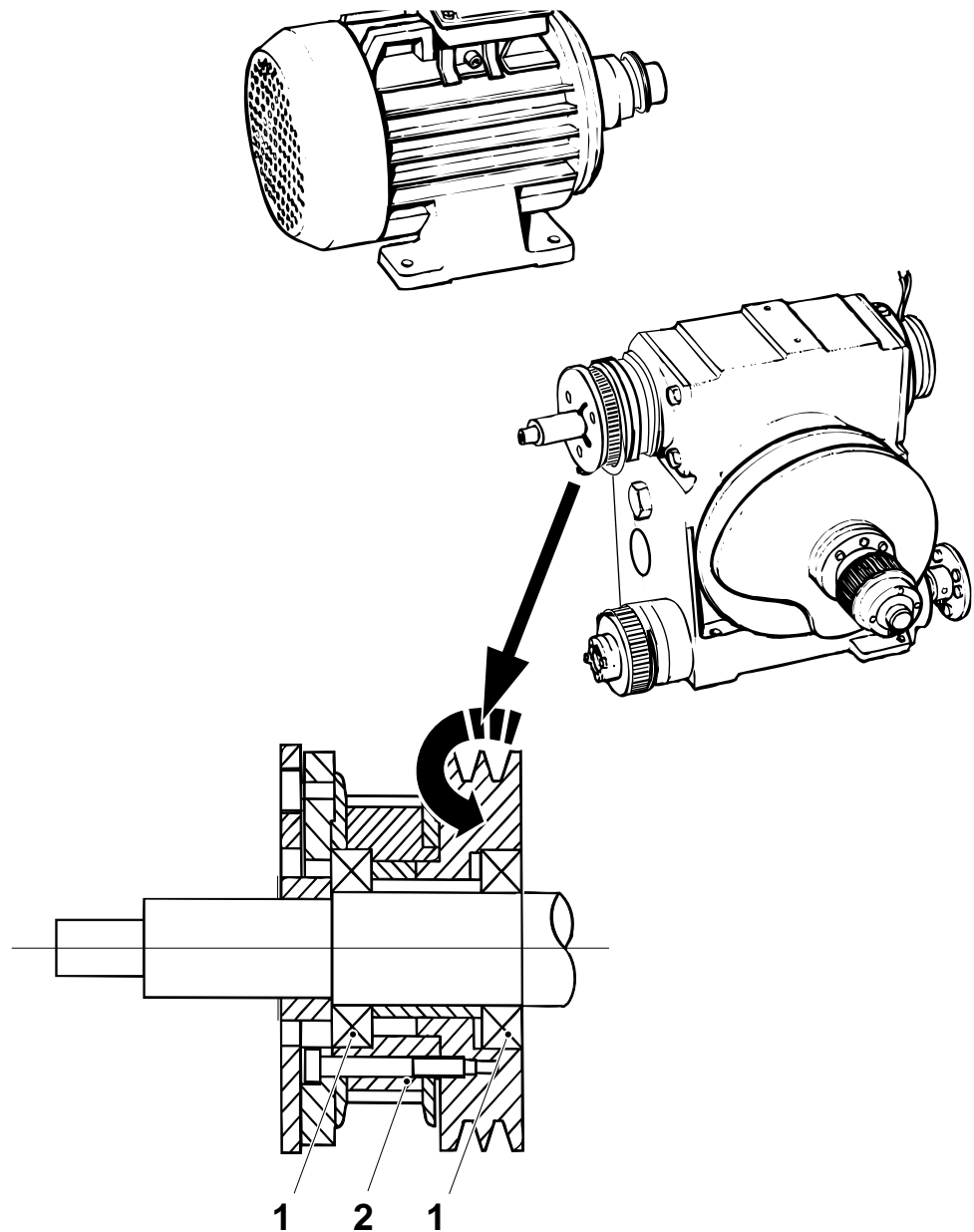
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3.1-4 Worm gear - check bearings

SPC reference	256173-050V
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Manually turn the belt pulley (2) and check that it rotates easily and without any abnormal noise.

Change the bearings (1) as required, see *3.1-5 Worm gear - change bearings*.

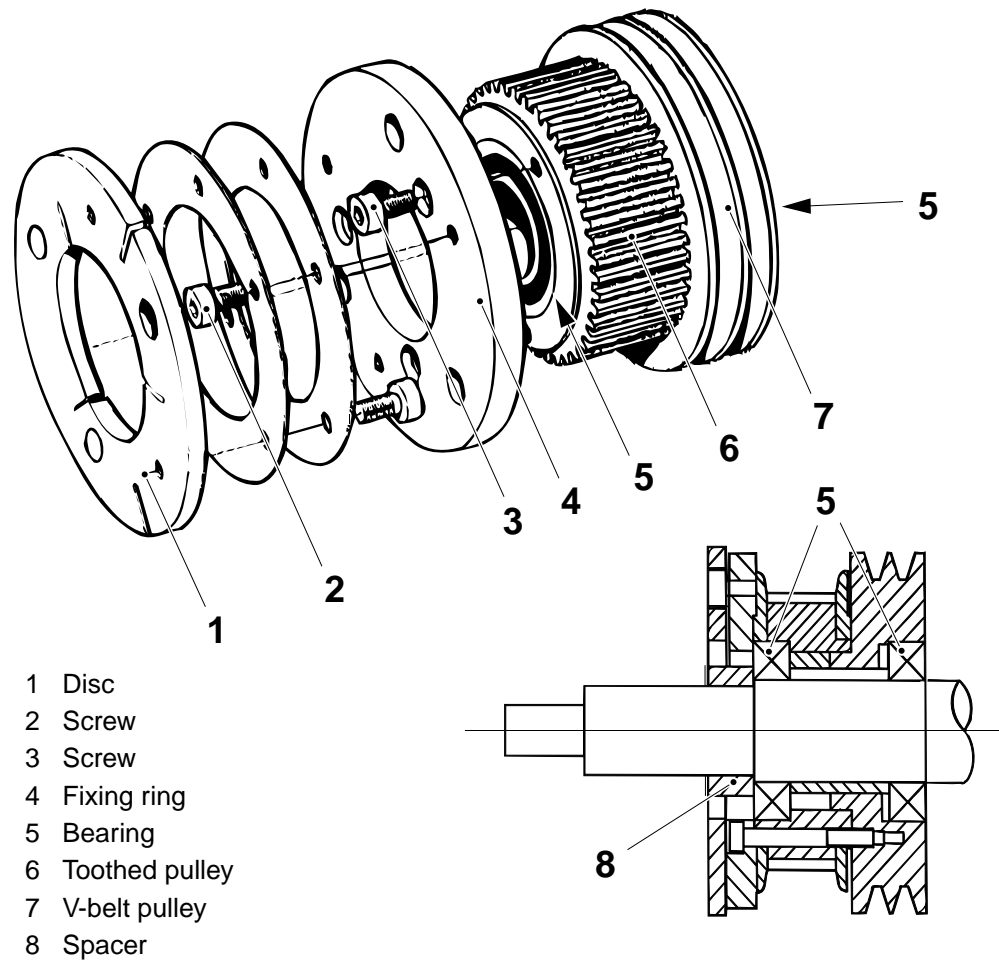


- 1 Bearing
- 2 Belt pulley

3.1-5 Worm gear - change bearings

Consumable - locking fluid	TP No. 90157-16
Tools - puller - torque wrench - spring balance	TP No. 979537 min 18 Nm TP No. 74767-102
SPC reference	256173-050V

- a) Remove the magnetic clutch, see 3.1-3 *Worm gear - change clutch bearing*. Slacken the belts and lift them off the pulleys (6) and (7).
- b) Unscrew the screws (2) and remove the disc (1).
- c) Unscrew the screws (3) and remove the fixing ring (4).
- d) Remove the pulleys (6) and (7) with the aid of the puller.
- e) Take the pulleys apart and change the bearings (5).
- f) Fit the V-belt pulley (7) and the toothed pulley (6).
- g) Fit the fixing ring (4) and torque the screws (3) to 10 ± 1 Nm.
- h) Fit the spacer (8) and the disc (1), and torque the screws (2) to 16 ± 2 Nm.

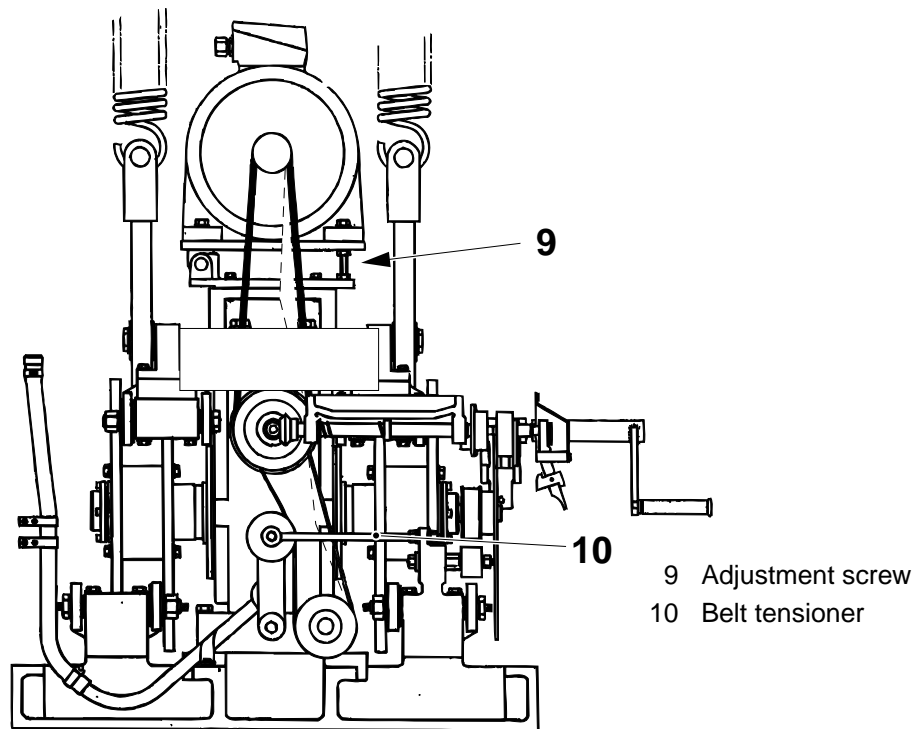


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(Cont'd)

- i) Place the belts on the pulleys.
- j) Fit the magnetic clutch and connect its cable in the connection box, see *3.1-3 Worm gear - change clutch bearing*.
- k) Apply the spring balance at right angles to the belts and in the middle of the span.
- l) Set the V-belt tension, see table, by means of the adjustment screw (9).
- m) Set the timing belt tension, see table, by means of the belt tensioner (10).
- n) Fit the doors and the covers.

Belt	Load force (N)	Deflection (mm)
Timing belt	14 - 16	4 - 6
V-belt	24 - 26	9 - 11

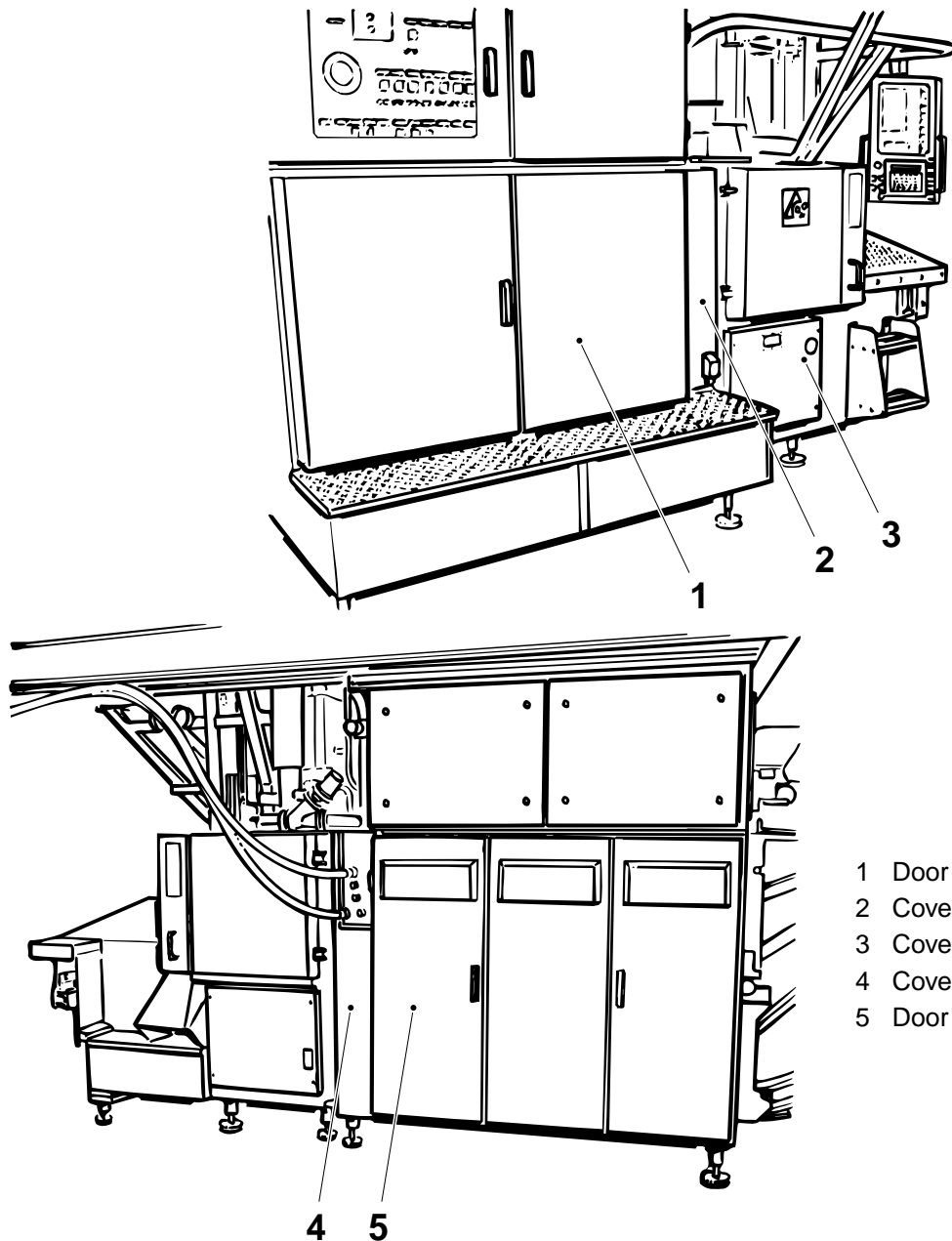


3.1-6 Worm gear - change V-belt

Tools	
- spring balance	TP No. 74767-102
SPC reference	256173-050V

On the LH side of the machine, remove the door (1) and the covers (2) and (3).

On the RH side, remove the cover (4) and the door (5).



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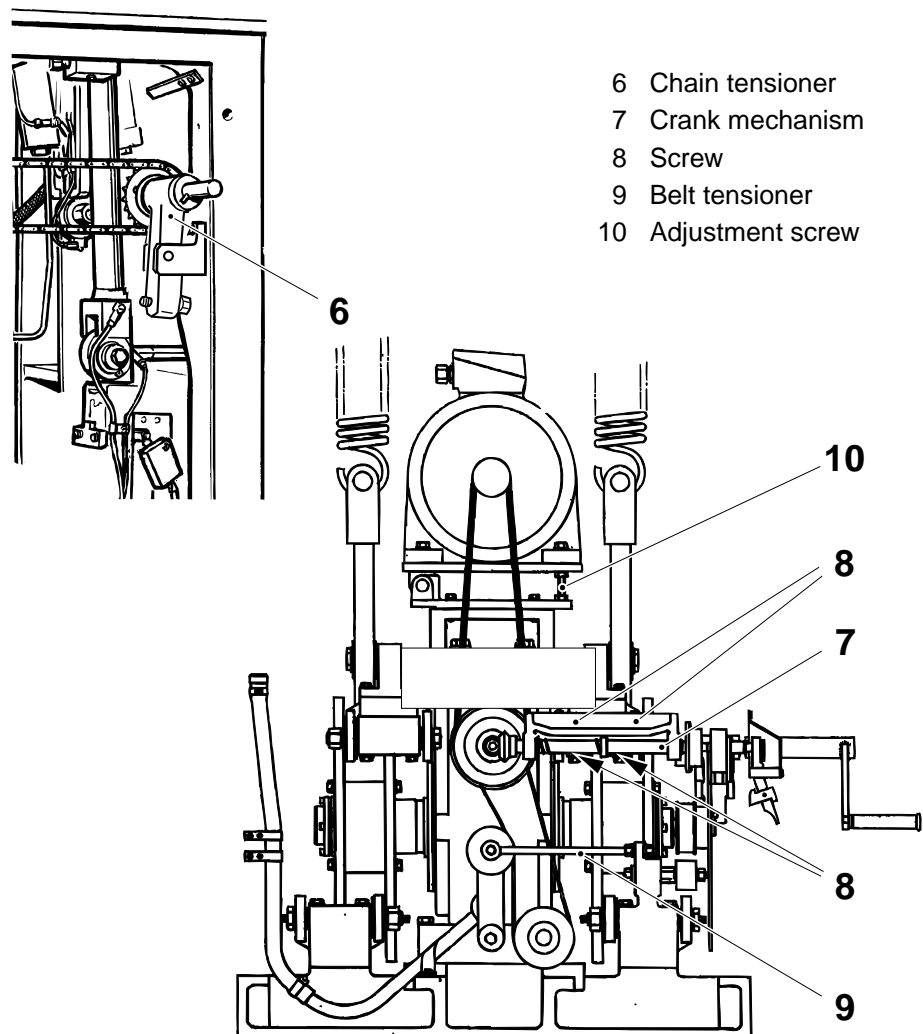
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*(Cont'd)***Removal**

- a) Slacken the crank chain by means of the chain tensioner (6).
- b) Mark the position of the crank mechanism (7).

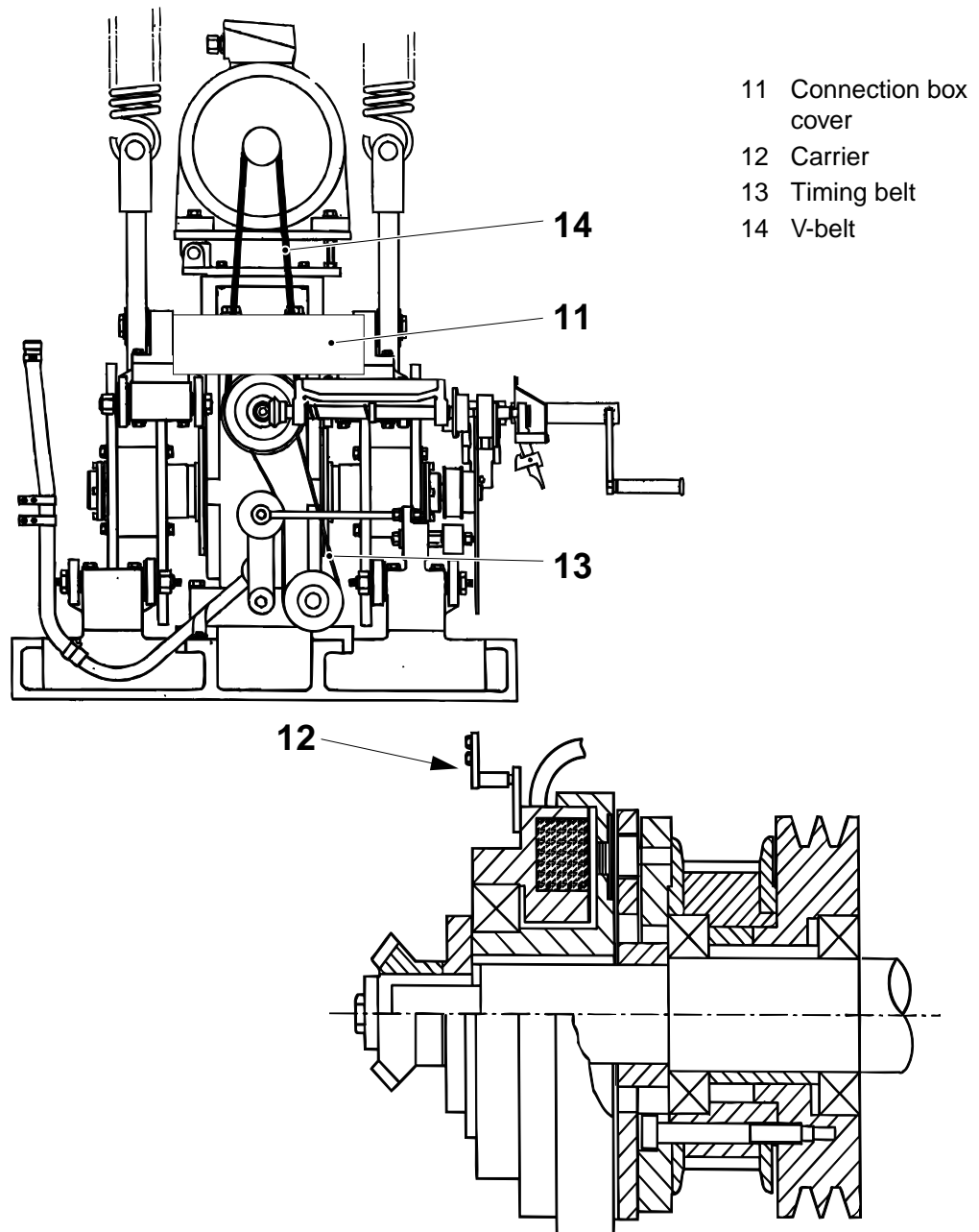
Caution! Be careful **not to damage or change** the setting of the pointer.

- c) Remove the degree scale.
- d) Unscrew the screws (8) and move the crank mechanism aside.
- e) Loosen the belt tension by means of the belt tensioner (9) and the adjustment screw (10).

*(Cont'd)*

(Cont'd)

- f) Remove the cover (11) and disconnect the cable for the clutch.
- g) Remove the carrier (12).
- h) Remove the timing belt (13).
- i) Change the V-belt (14).
- j) Assemble in the reverse order.



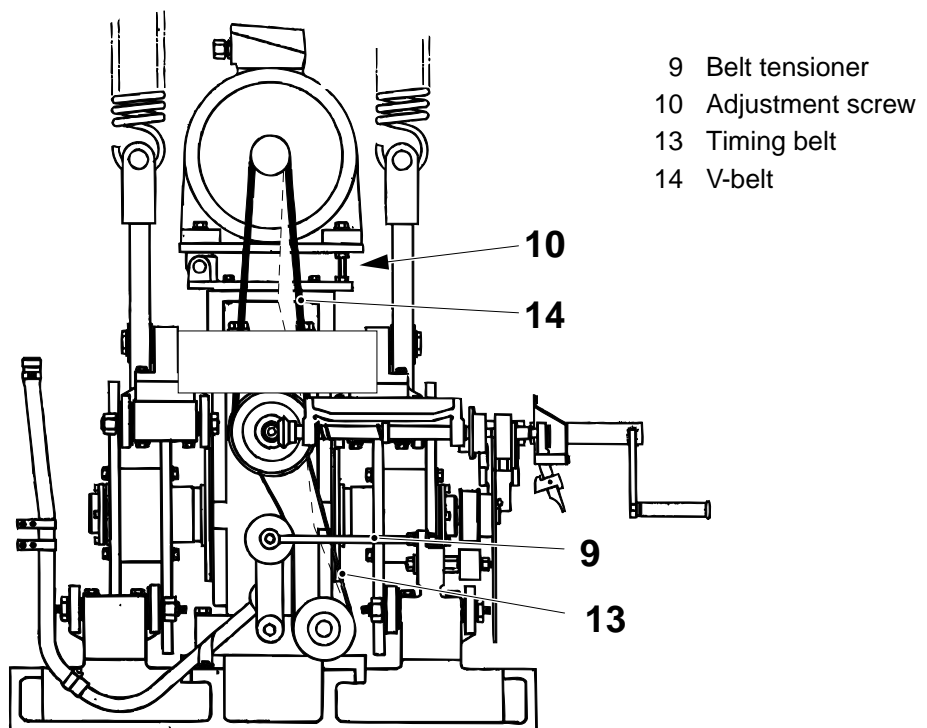
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- k) Apply a spring balance at right angles to the V-belt (14) and in the middle of the span of the belt and measure the tension.
Set the tension by means of the adjustment screw (10).
- l) Apply the spring balance the same way to the timing belt (13). Set the tension by means of the belt tensioner (9).
- m) Fit the doors and the covers.

Belt	Load force (N)	Deflection (mm)
Timing belt	14 - 16	4 - 6
V-belt	24 - 26	9 - 11

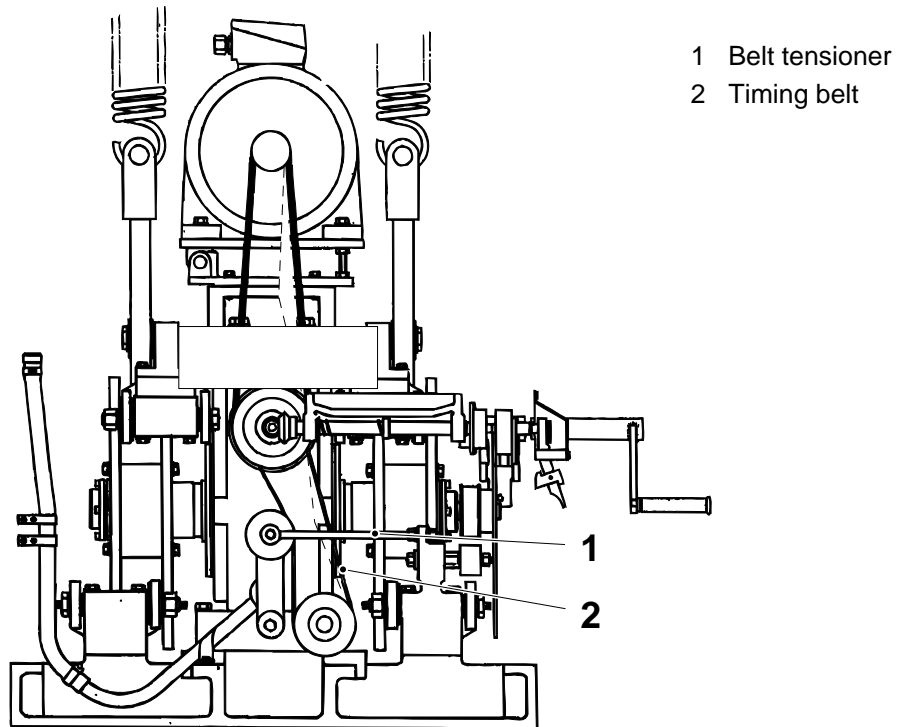


3.1-7 Worm gear - change timing belt

Tools	
- spring balance	TP No. 74767-102
SPC reference	256173-050V

Slacken the belt tension on the belt tensioner (1) and change the timing belt (2).

Reassemble and tension the timing belt. Check the belt tension, see *3.1- 8 Worm gear - check belt tension*.



3.1- 8 Worm gear - check belt tension

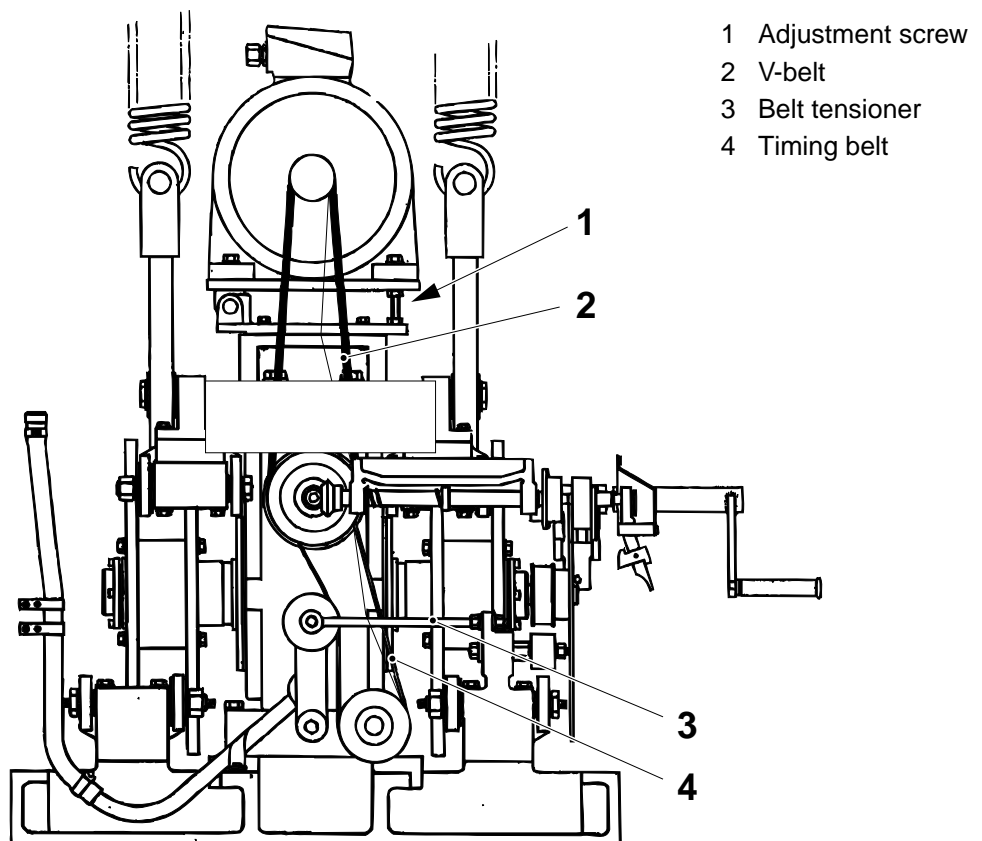
Tools - spring balance	TP No. 74767-102
SPC reference	256173-050V

Check the V-belt (2) and the timing belt (4) tension with the aid of the spring balance. The spring balance is to be applied at right angles to the belts and in the middle of the span of the belt.

Adjust the V-belt tension by means of the adjustment screw (1).

Adjust the timing belt tension by means of the belt tensioner (3).

Belt	Load force (N)	Deflection (mm)
Timing belt	14 - 16	4 - 6
V-belt	24 - 26	9 - 11



3.1-9 Worm gear - change oil

Consumable - oil	code H
SPC reference	256173-050V

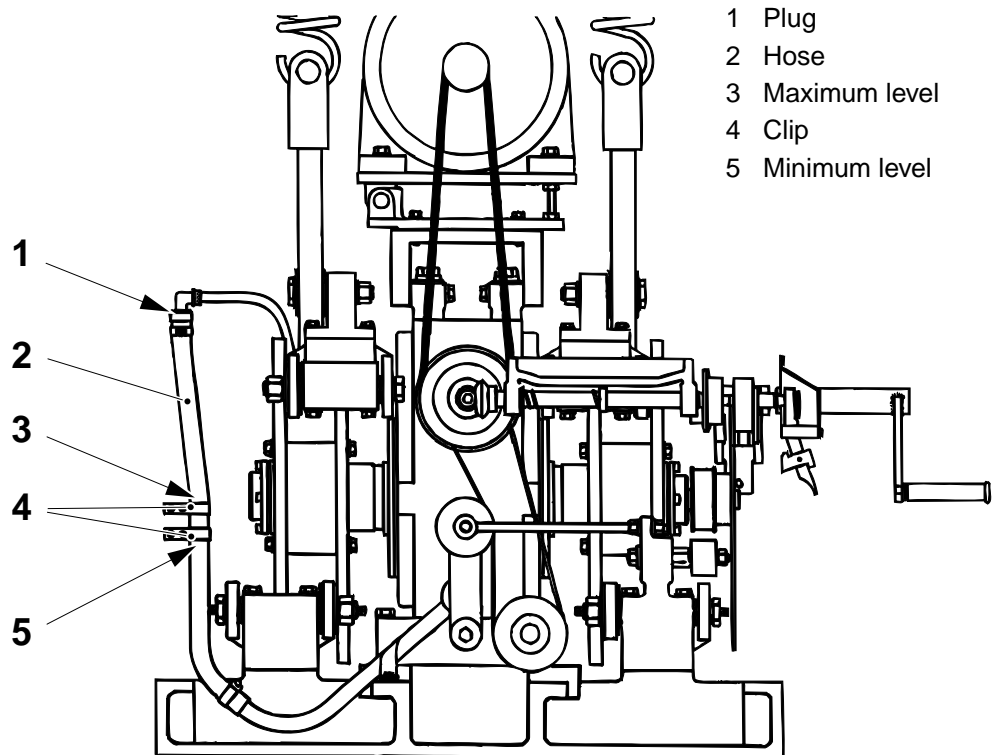
Note! Always fill oil into the worm gear when it is **cold**.



Chemical products!

Lubricant. Follow the *Safety precautions*.

- Undo the plug (1).
- Remove the hose (2) from the clips (4) and drain the oil.
- Fill up with oil, code H, see *10.2 Lubricants*.
- Fit the plug (1).



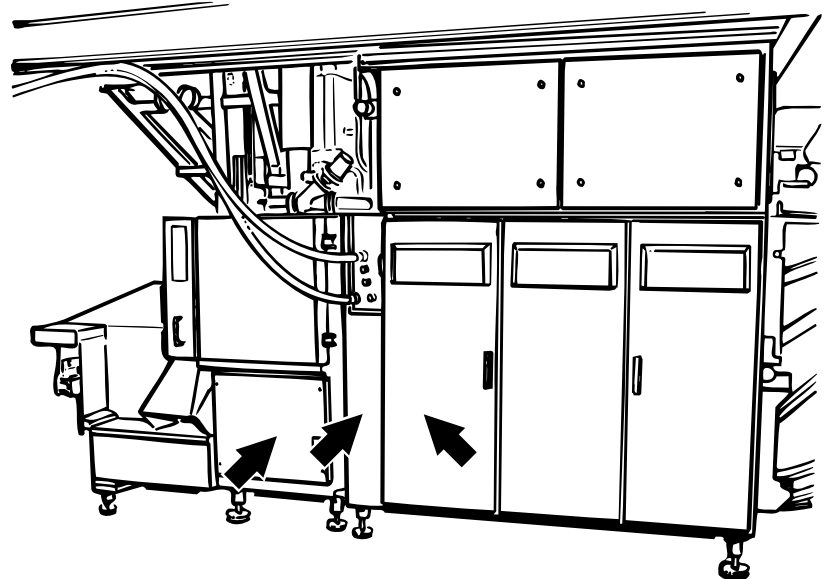
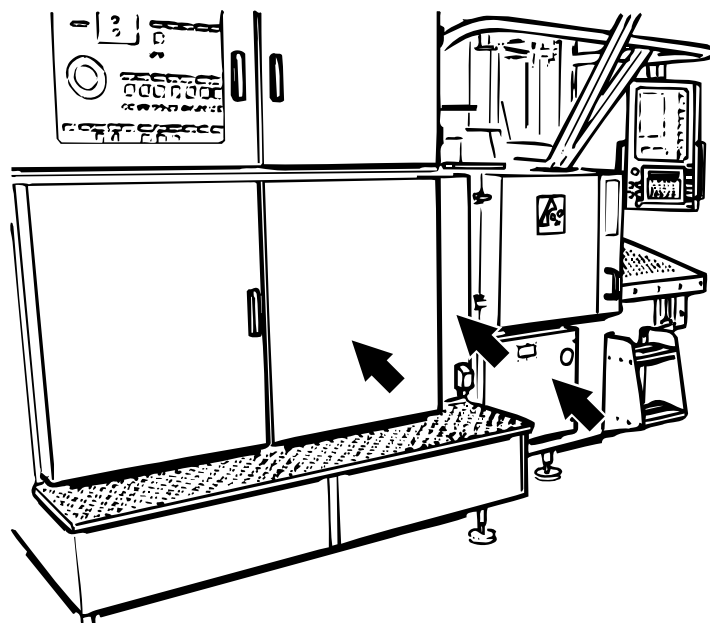
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3.1-10 Worm gear - change

Consumable - oil	code H
Tools - puller - puller - torque wrench - wooden blocks	TP No 76175 TP No 979537 min 85 Nm
SPC reference	256173-050V

Removal

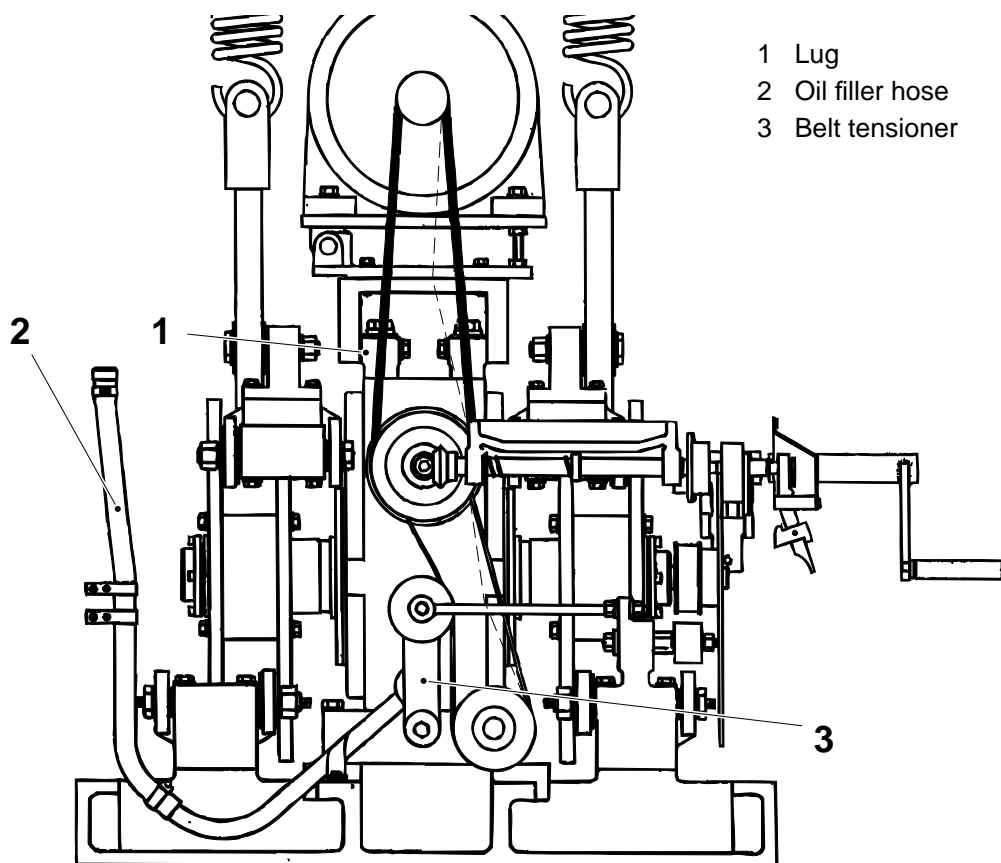
- On the LH side of the machine, remove the door and the covers indicated (arrows).
- On the RH side, remove the covers and the door indicated.



(Cont'd)

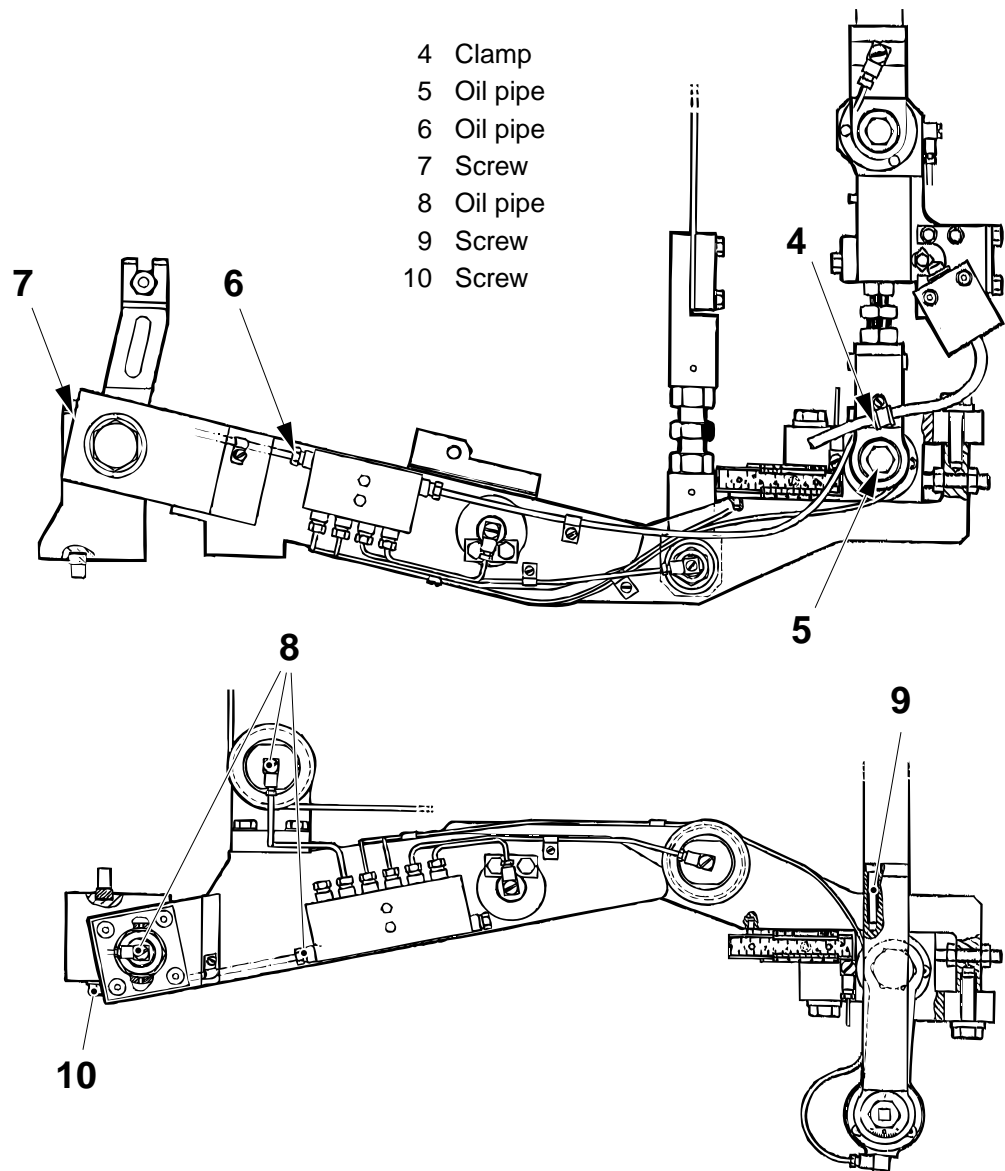
(Cont'd)**Chemical products!**Lubricant. Follow the *Safety precautions*.

- c) Drain the oil from the worm gear.
- d) Remove the drop chute, see *2.3-1 Drop chute - remove*.
- e) Remove the lugs (1) holding the top of the worm gear against the frame.
- f) Mark and disconnect the cable between the brake and the terminal box above the gear and the cable between the coupling and the box underneath the drive motor.
- g) Remove the LH and RH curve packs, see *3.8-1 Curve pack - change*, and the alignment templates, if any.
- h) Remove the oil filler hose (2) from the frame and tie up the hose to the gear.
- i) Remove the belt tensioner (3) and lift off the timing belt from the pulley. Disconnect the two oil pipes on the gear.

*(Cont'd)*

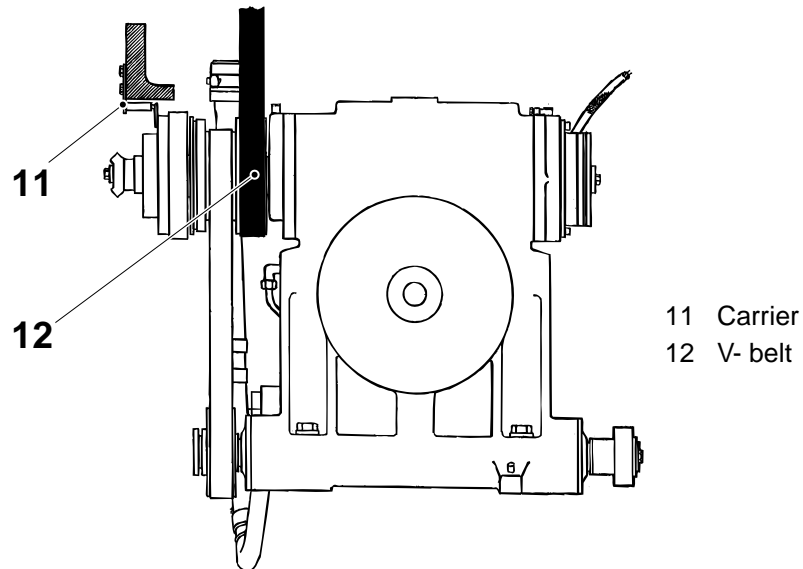
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- j) Remove the micro switch cables from the clamps (4) on the LH slewing bracket.
- k) Disconnect the oil pipes (5) and (6), unscrew the screws (7) and lift out the slewing bracket.
- l) Disconnect the oil pipes (8) on the LH arm. Lift the timing belt out of the way.
- m) Remove the crank mechanism.
- n) Unscrew the four screws (9) and the screws (10). Lift out the arm.

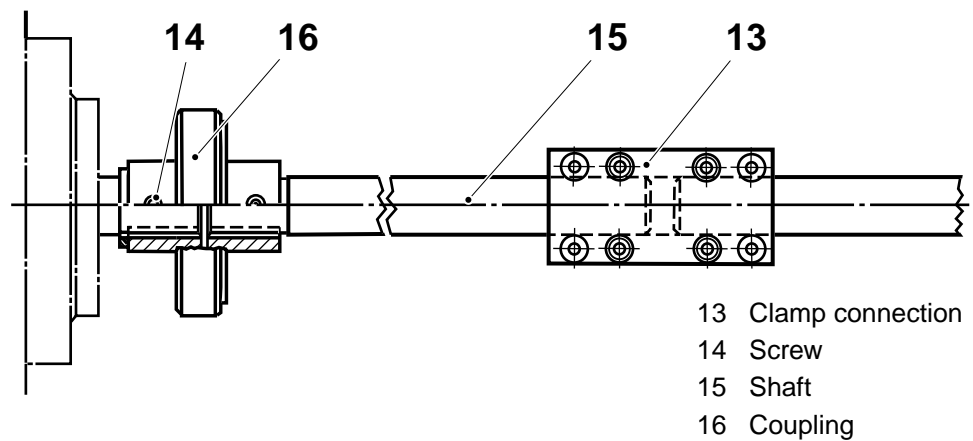
*(Cont'd)*

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- o) Remove the slewing bracket and the arm on the RH side. Follow the procedure in *j) - n)*.
- p) Remove the carrier (11). Slacken the V-belt (12) and remove it.



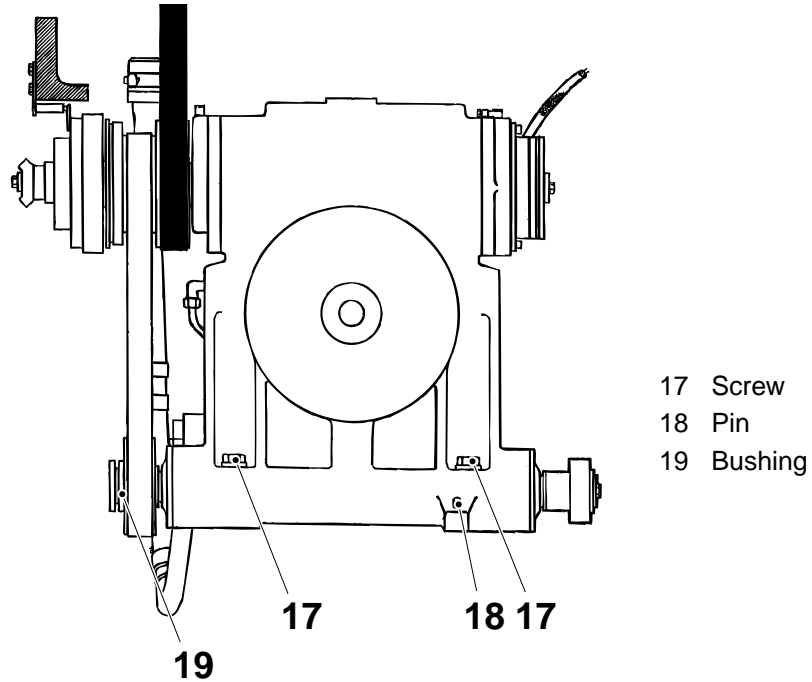
- q) Remove the clamp connection (13).
- r) Loosen the screw (14) and remove the shaft (15) and the coupling (16).
- s) Place wooden blocks on the bottom of the frame, on the side where the worm gear shall be removed (to prevent the worm gear from getting stuck).



(Cont'd)

(Cont'd)

- t) Unscrew the screws (17), remove the pins (18) and lift out the worm gear to the right.
- u) Remove the brake.
- v) Loosen the screws to the bushing (19), half a turn at a time **in sequence** around the flange, and remove the pulley.
- w) Remove the magnetic clutch from the worm gear.
- x) Change the worm gear.



Assembly

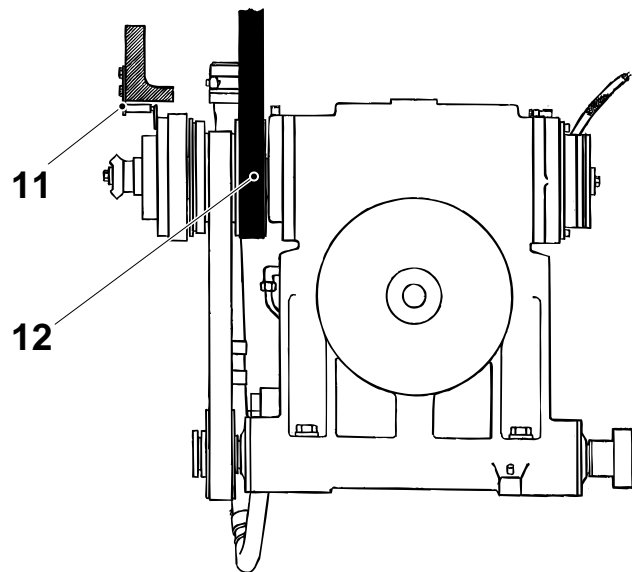
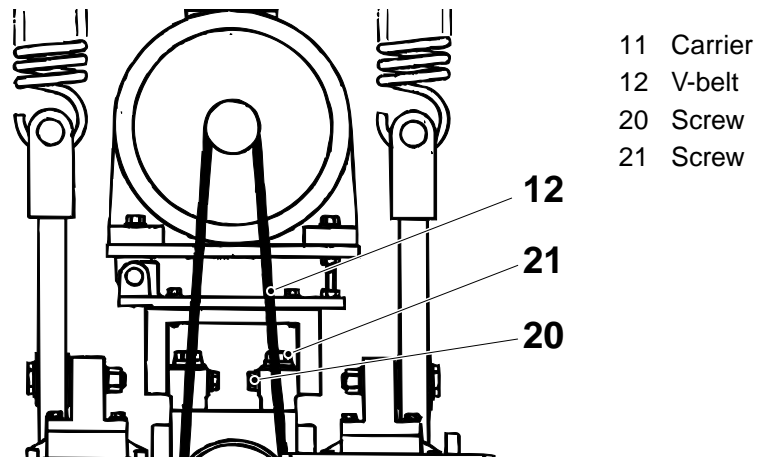
Note! Before assembly, fit the brake on the worm gear and set it, see *3.1-1 Worm gear - set brake gap*. Also make sure that the flat wedge fits properly in the magnetic clutch before fitting the worm gear in the machine.

- a) Place the gear in the machine. Place the four screws in the holes.
- b) Set the worm gear, see *3.1-12 Worm gear - set*.

(Cont'd)

(Cont'd)

- c) Fit the two lugs. Torque the four screws (20) to 45 ± 3 Nm. Torque the two screws (21) to 80 ± 3 Nm.
- d) Fit the V-belt (12) between the drive motor and the worm gear.
- e) Place the timing belt over the pulley and attach the bow of the clutch to the carrier (11) on the frame.



- f) Tension the V-belt, see 3.1- 8 Worm gear - check belt tension.
- g) Refit the crank mechanism bracket and set it, see 3.5-3 Crank - fit.

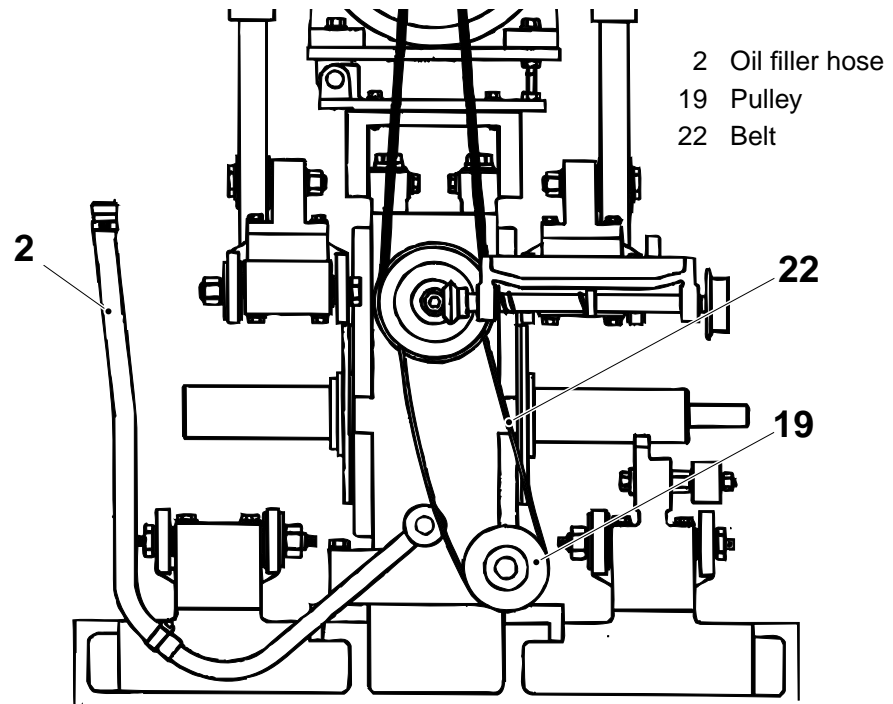
(Cont'd)

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- h) Fit the final folder couplings and the worm gear oil pipes.
- i) Reconnect the cables from the worm gear brake and from the clutch to the connection box. Fit the oil filler hose (2).
- j) Fit the pulley and the bushing (19), and torque the screws **in sequence** around the flange, half a a turn at a time, to 8 ± 0.5 Nm.

Note! Make sure that there is the same distance all around the clamp fitting.

- k) Fit the belt (22).



- l) Fit and set the alignment templates, if any, on the worm gear, see 3.1-11 *Worm gear - set alignment template*.

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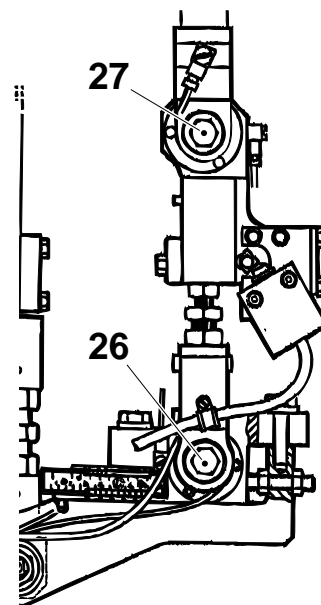
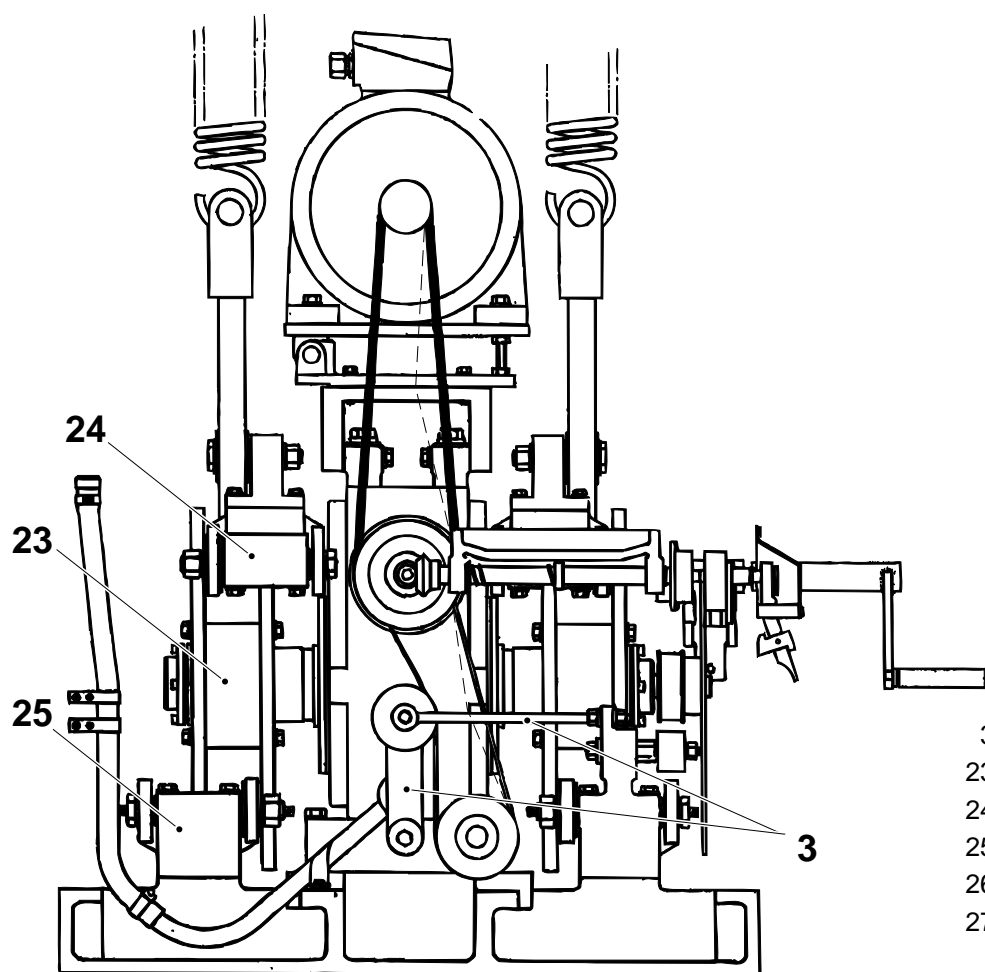
- m) Fit the LH and RH slewing brackets (24) and the arms (25). Attach the timing belts.
- n) Make sure that the arms are fitted so that the forked link (26) and the link head (27) are **in line** vertically above each other.
- o) Fit all oil connections to the slewing brackets and the arms.
- p) Fit the micro switch cables to the slewing brackets.
- q) Fit and set the curve packs (23), see 3.8-1 *Curve pack - change*.
- r) Fit the belt tensioner (3) and tension the timing belt, see 3.1- 8 *Worm gear - check belt tension*.
- s) Fit and set the drop chute, see 2.3-2 *Drop chute - set*.



Chemical products!

Lubricant. Follow the *Safety precautions*.

- t) Top up the worm gear with oil, code H, see 10.1 *Technical data*.
- u) Refit the covers and the doors.



- 3 Belt tensioner
- 23 Curve pack
- 24 Slewing bracket
- 25 Arm
- 26 Forked link
- 27 Link head

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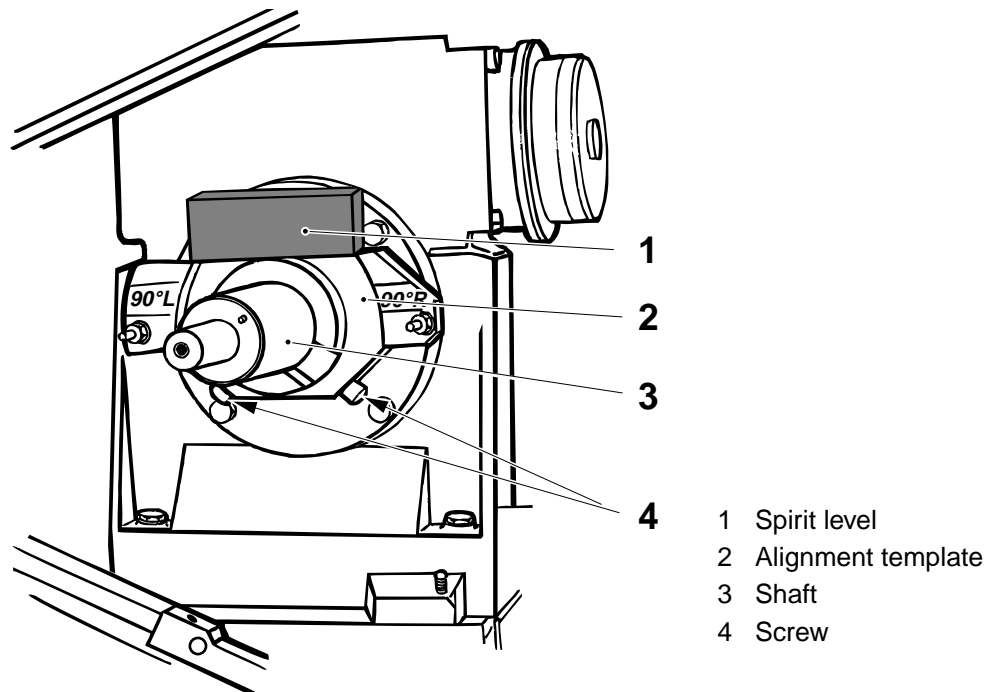
3.1-11 Worm gear - set alignment template

Tools - spirit level	TP No. 90243-165
SPC reference	256173-050V

Level the templates relative one another **within 3 scale divisions** on the spirit level.

Note! Before assembly, thoroughly clean the templates and the shafts.

- a) Place the template (2) on the RH gear shaft.
- b) Apply the spirit level (1) on the template and set the template horizontal.
- c) Tighten the screws (4).
- d) Put the other template on the LH gear shaft. Apply the spirit level.
- e) Make sure that the template is horizontal and tighten the screws.

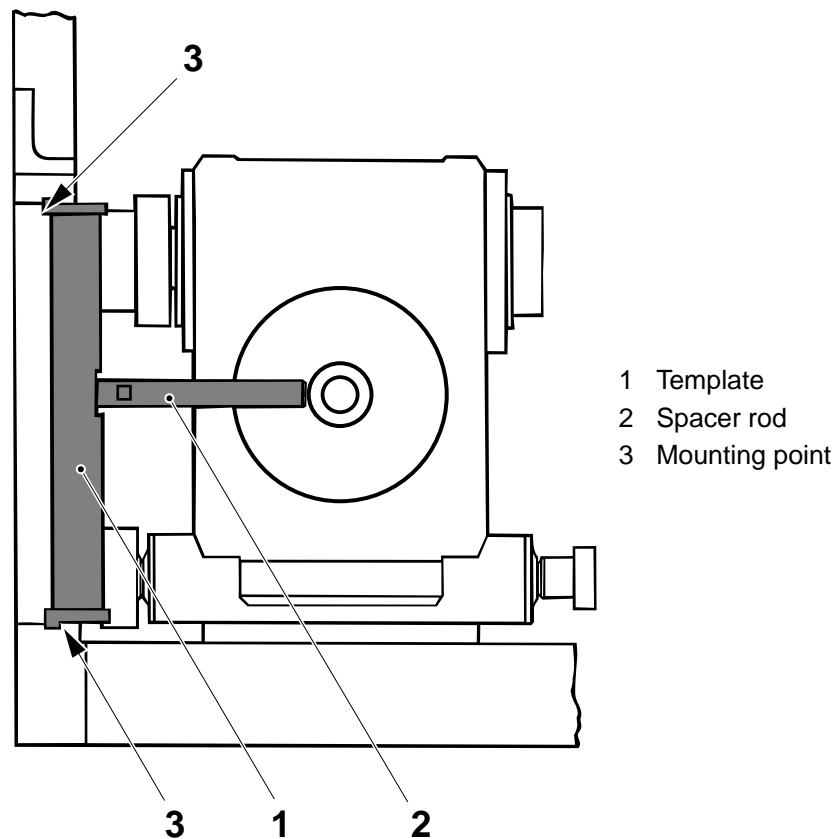


3.1-12 Worm gear - set

Tools	
- template	TP No. 75453
- spacer rod	TP No. 75454
- template	TP No. 978421
- torque wrench	min 85 Nm
SPC reference	256173-050V

Note! The worm gear is pinned, but if setting has to be redone, proceed as follows.

- a) On the RH and the LH side, fit the setting templates (1), together with the spacer rod (2), at the mounting points (3) of the slewing bracket and the arms.
- b) Move the gear towards the templates so that the shafts of the gear bears against the spacer rods.



(Cont'd)

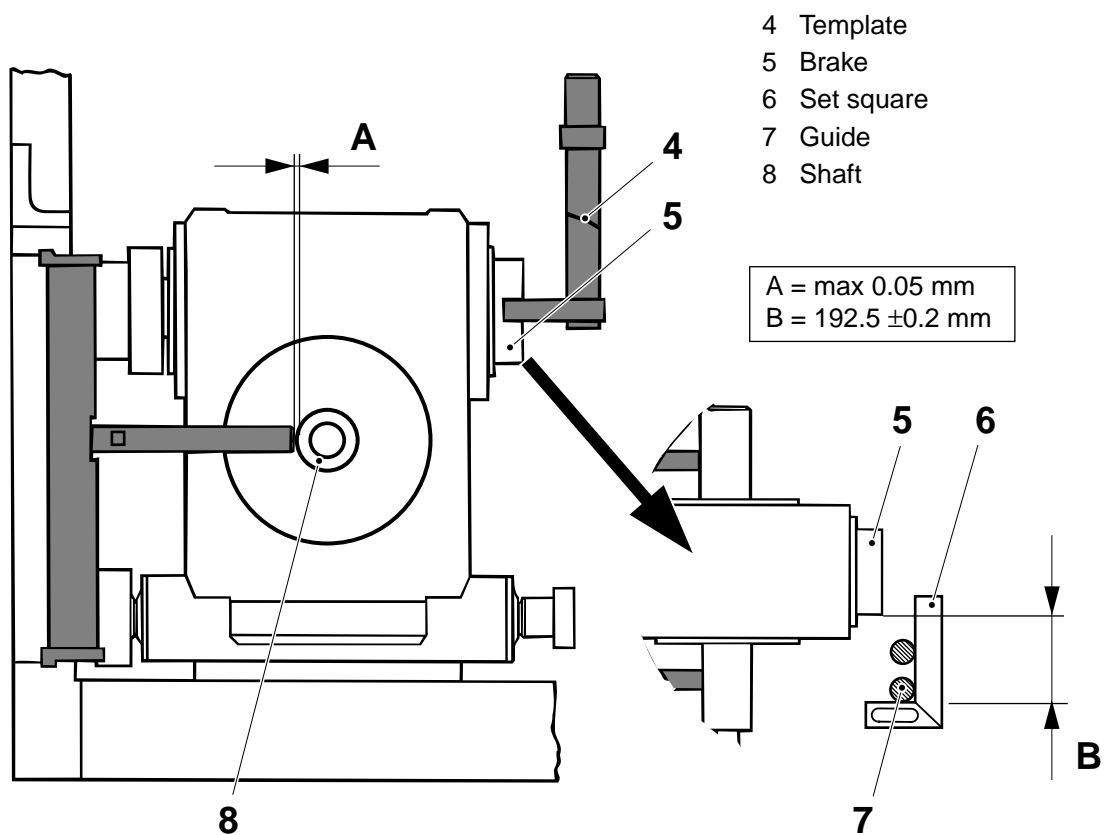
(Cont'd)

- c) **Alt 1** - If the guides are removed:
Fit the template (4) in the holes for the LH side guides and move the worm gear sideways towards the template so that the brake (5) bears against the template.

Alt. 2 - If the guides are fitted:

Put a set square (6) against the guides (7), and set distance B.

- d) Fit the worm gear screws and torque them to 80 ± 3 Nm.
e) Make sure that there is distance A between the spacer rods and the shafts (8) on both sides.
f) Pin the gear.



3.1-13 Worm gear - check oil level

Consumable - oil	code H
SPC reference	256173-050V

- a) Check the oil level in the worm gear.

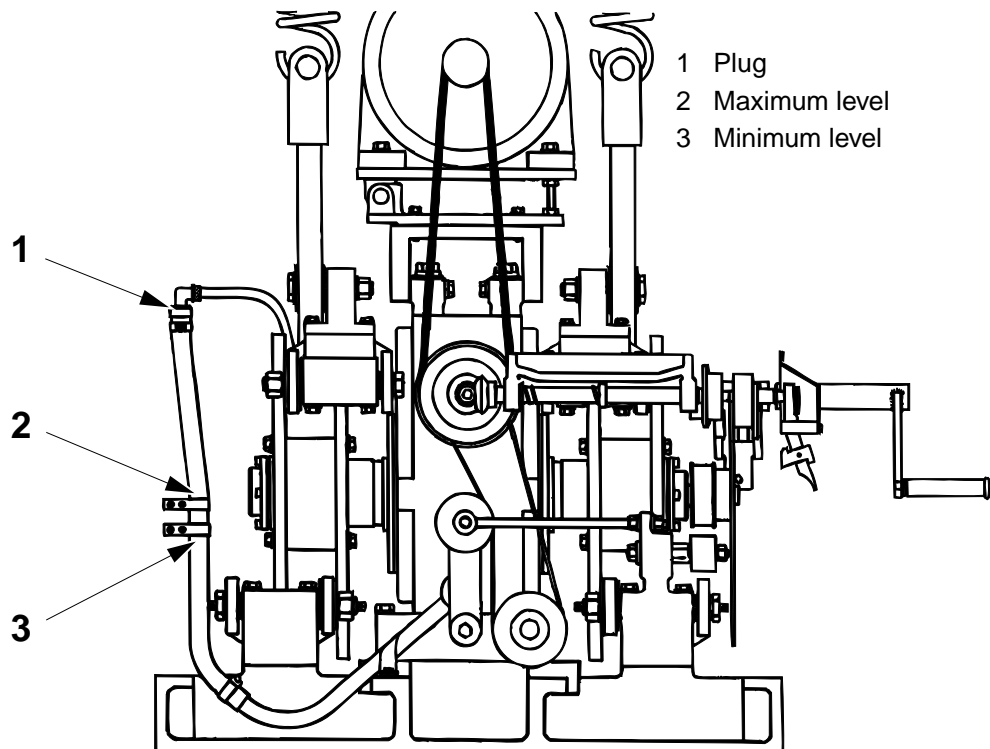
Note! Always top up oil into the worm gear when it is **cold**.



Chemical products!

Lubricant. Follow the *Safety precautions*.

- b) If required, remove the plug (1) and top up with oil, code H, see *10.2 Lubricants*.
- c) Fit the plug.

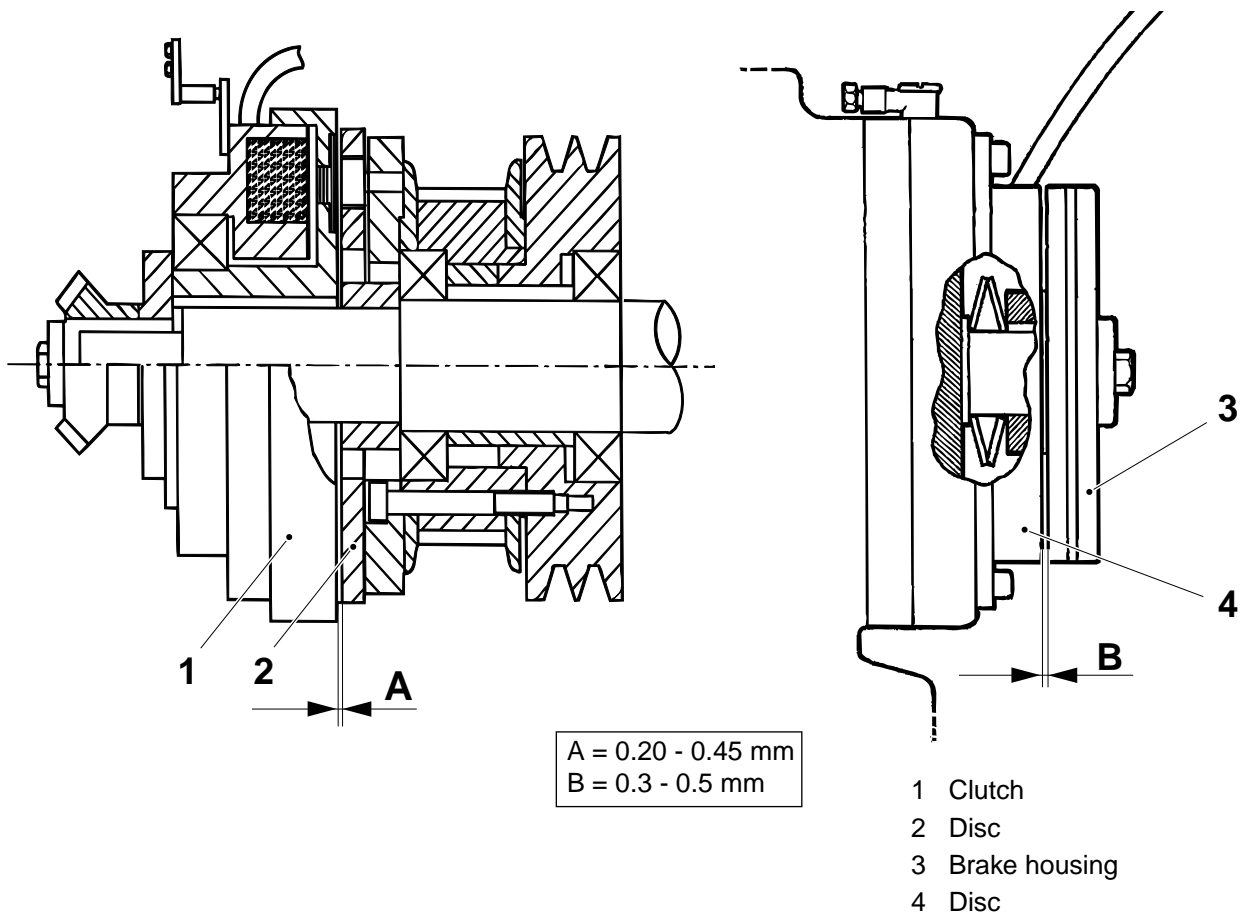


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3.1-14 Worm gear - check clutch and brake gap

SPC reference	256173-050V
---------------	-------------

- Measure distance A between the clutch (1) and the disc (2).
- If required, set the clutch gap. Follow the procedure in 3.1-3 *Worm gear - change clutch bearing*.
- Step up to **Preheating I**.
- Measure distance B between the brake housing (3) and the disc (4).
Make sure that the distance is within the tolerances all the way around.
- If required, set the brake gap, see 3.1-1 *Worm gear - set brake gap*.



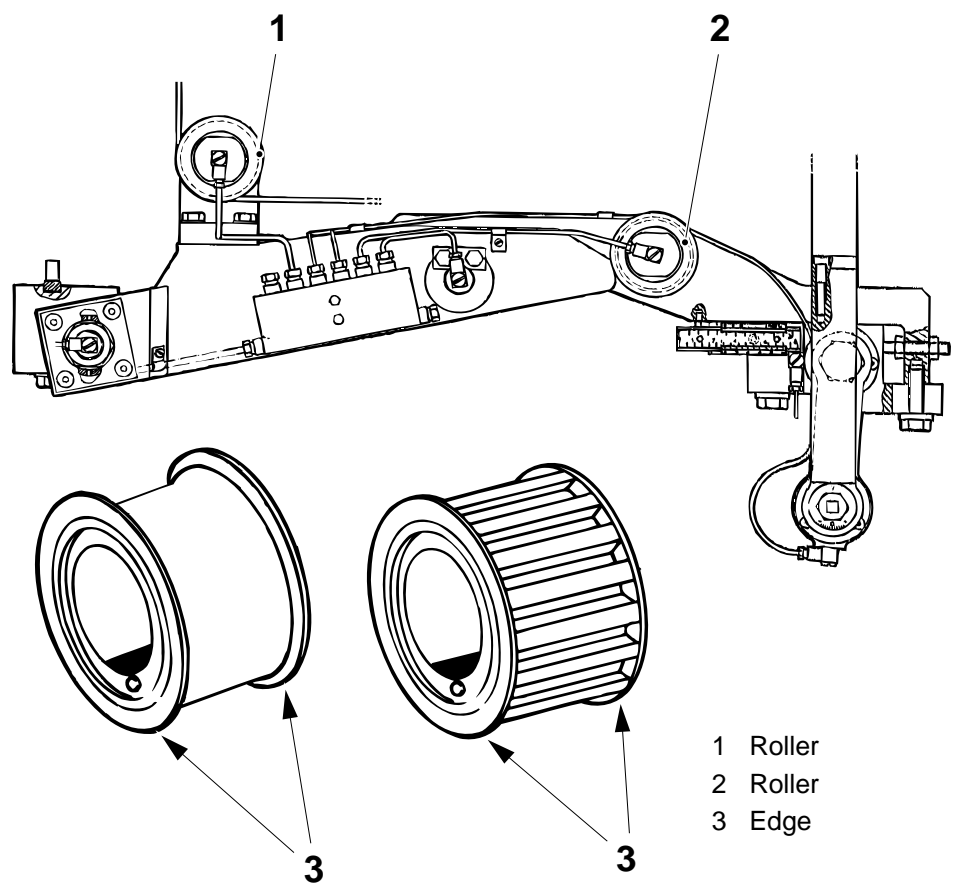
3.2 Arm

SPC reference	256197-050V
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3.2-1 Arm - check timing belt rollers

SPC reference	256197-050V
---------------	-------------

- Check that the timing belt rollers (1) and (2) rotate freely and that there is no play in the bearings.
- Check that the edges (3) of the rollers are straight and not damaged. Damaged edges may damage the timing belt.
- Change the rollers and/or bearings as required.



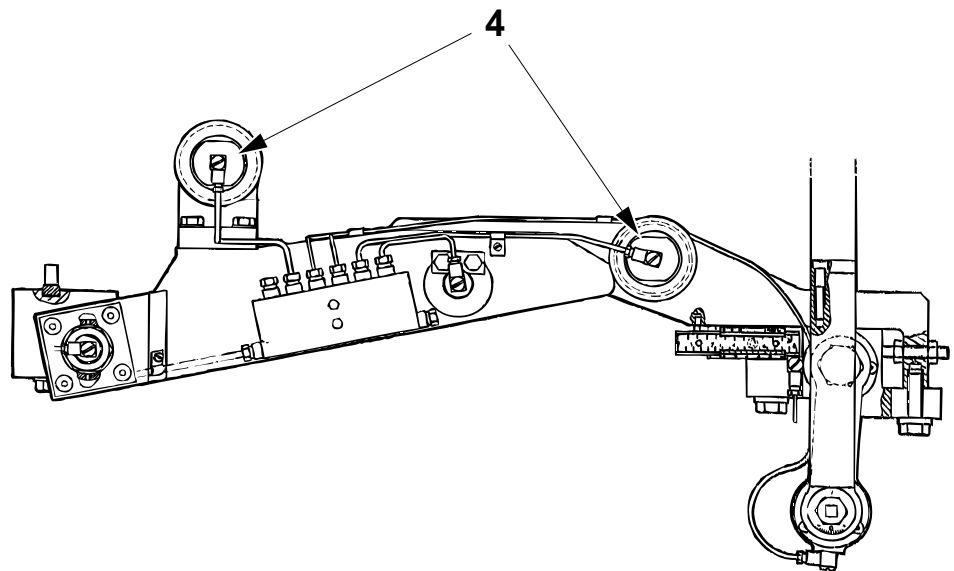
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(Cont'd)

(Cont'd)

Change

- a) Unscrew the banjo connections (4).
- b) Remove the axle pins.
- c) Remove the washers (5) and change the bearings (6) and/or the rollers.
- d) Assemble in the reverse order.



- 4 Banjo connection
5 Washer
6 Bearing

3.3 Link system

SPC reference	491814-020V
	491815-020V
	491787-020V
	491788-020V
	256197-050V

3.3-1 Link system - check cam roller condition

SPC reference	491814-020V
	256197-050V

- Check the surface of the cam rollers (1). Make sure that the rollers rotate freely.
- If required, unscrew the banjo connection (2), remove the bracket (3), pull out the shaft and change the rollers.
- Assemble in the reverse order.

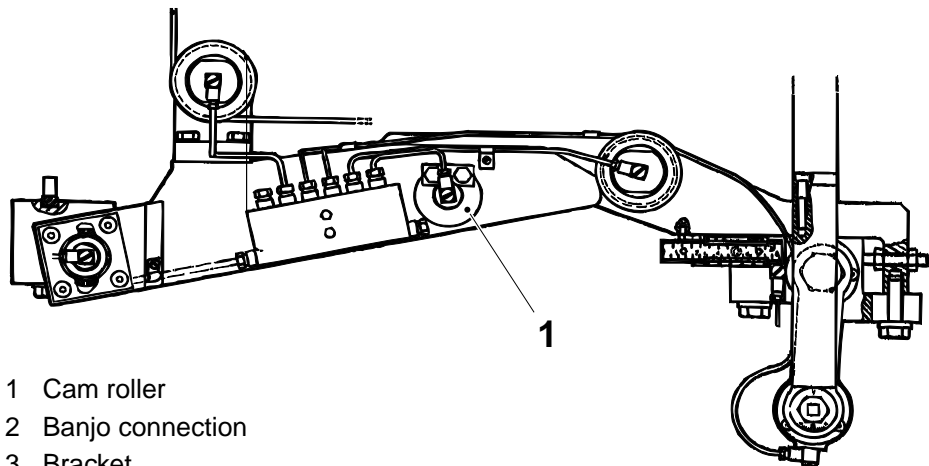
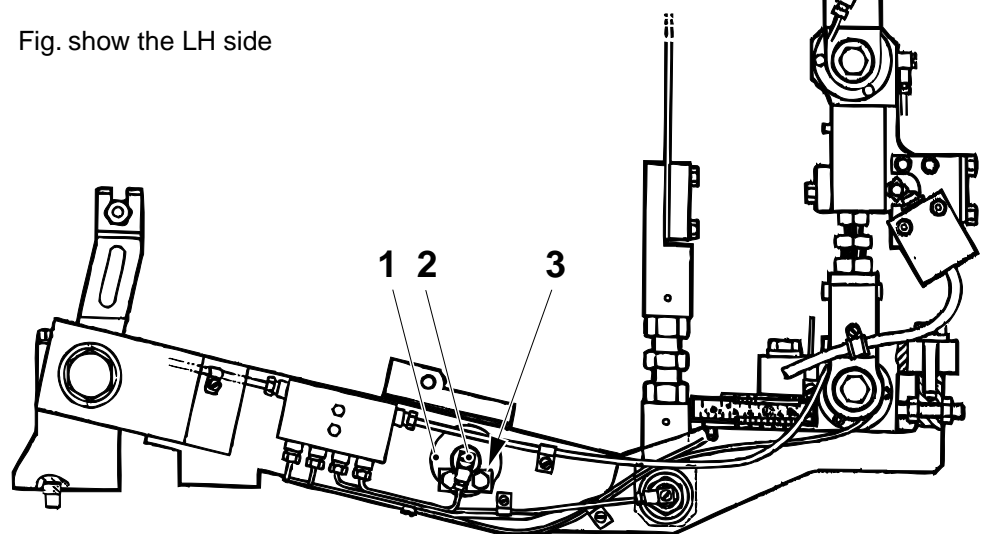


Fig. show the LH side



(Cont'd)

(Cont'd)

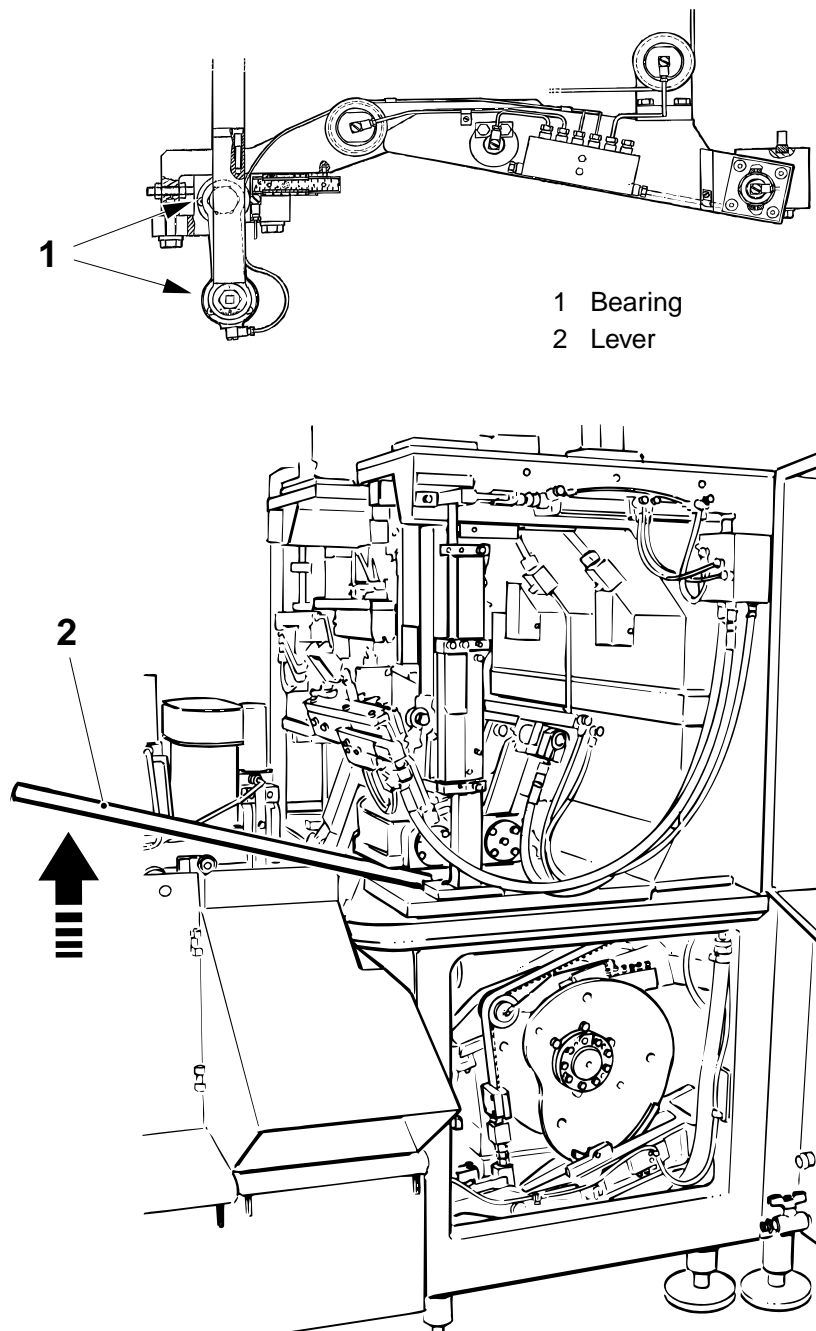
- d) Set the lower turning position, see *4.7-1 Yoke - set turning position*
- e) Check the setting of the jaw gap, see *4.7-3 Jaw gap - check.*
- f) Check the setting of the stroke, see *4.7-6 Stroke - check.*
- g) Check the setting of the jaw over jaw, see *4.7-16 Jaw over jaw - check.*

3.3-2 Link system - check arm bearings

Tools - lever	
SPC reference	256197-050V

Check for play in the bearings (1) by lifting the yokes with a lever (2).

If required, change the bearings, see 3.3-3 *Link system - change arm bearings*.



3.3-3 Link system - change arm bearings

Tools	
- torque wrench	min 32 Nm
- extractor	TP No. 77165
- wooden blocks	
SPC reference	256197-050V

Bearings in drive

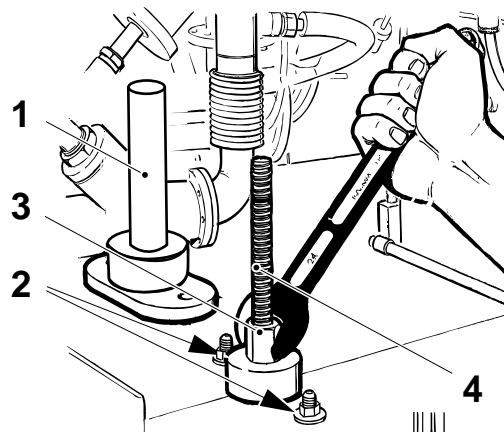
- a) Remove the cover (1).
- b) Unscrew the nuts (2).

Caution! Risk of damage to the equipment! The nut (3) **must not** be unscrewed.

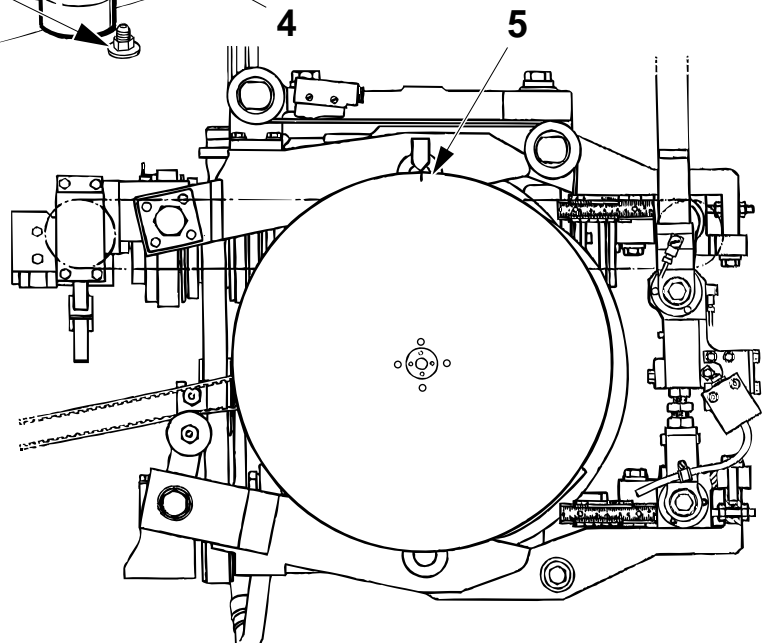
- c) Loosen the nut (3) to release the spring force of the hold-down device.

Caution! Take care **not to alter** the setting of the pointer (4) when removing the degree scale.

- d) Remove the degree scale.



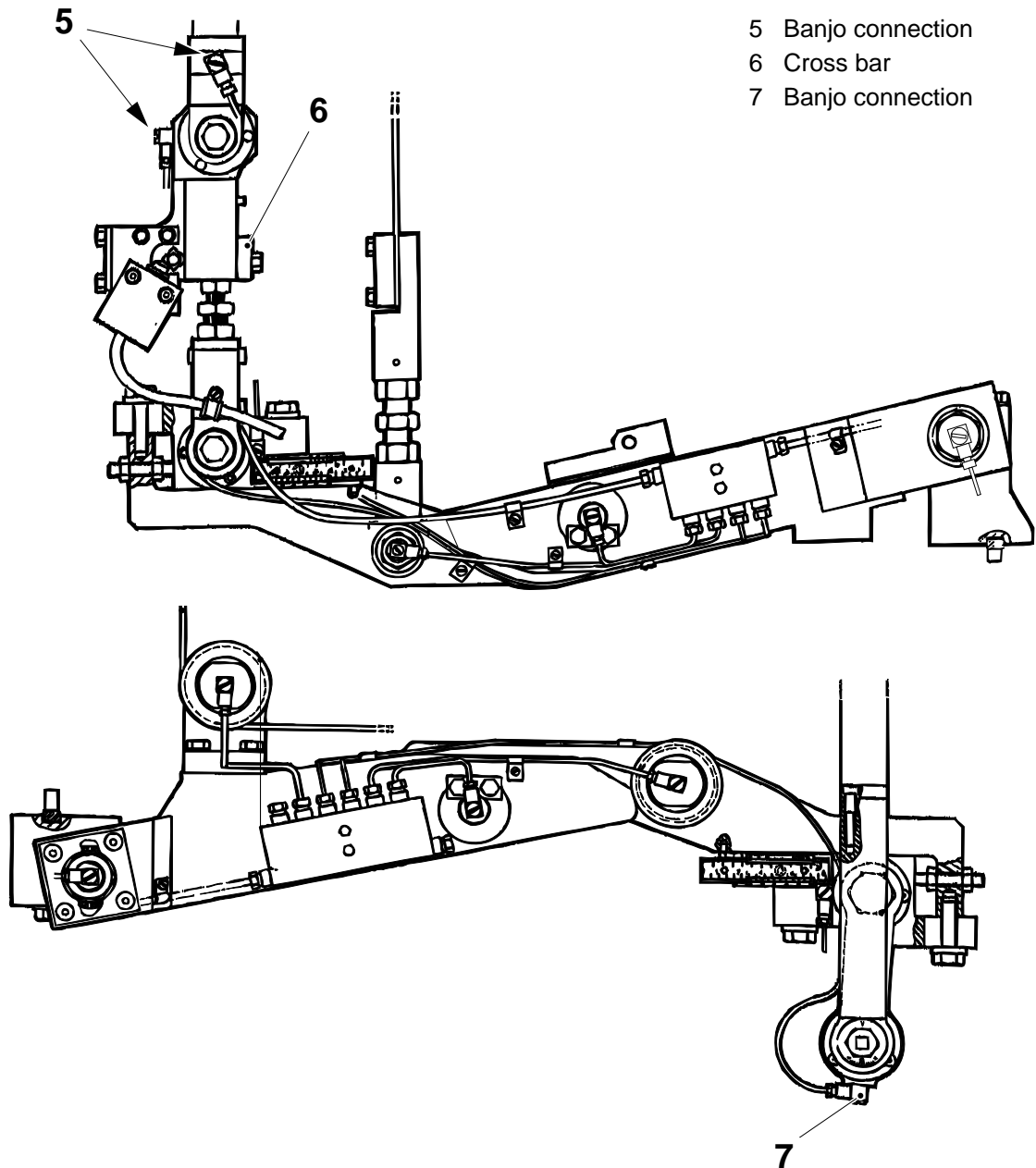
- 1 Cover
- 2 Nut
- 3 Nut
- 4 Pointer



(Cont'd)

(Cont'd)

- e) Unscrew the banjo connections (5).
- f) Loosen the cable to the micro switch.
- g) Remove the cross bar (6) and separate the disconnection link. Lower the link arm to the bottom.
- h) Unscrew the banjo connection (7).

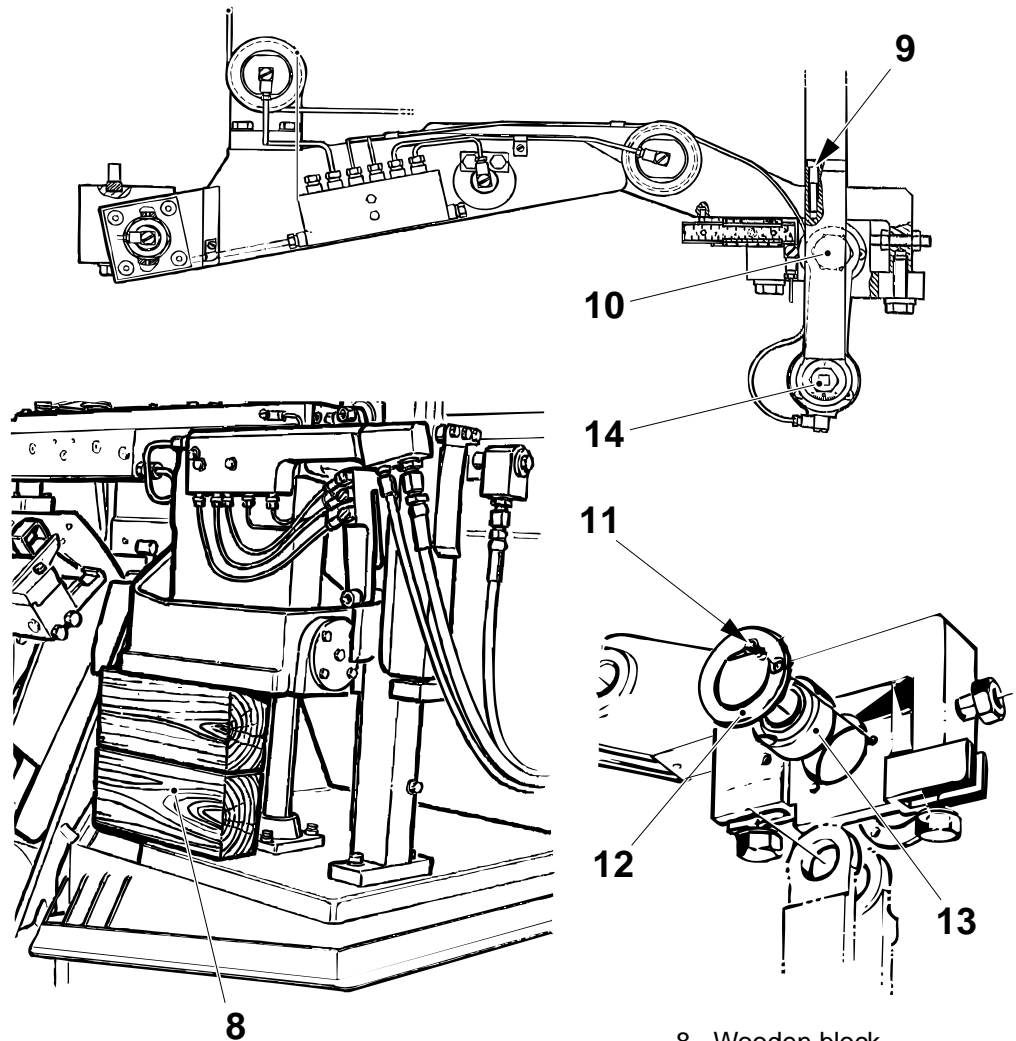


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(Cont'd)

(Cont'd)

- i) Place wooden blocks (8) as support under the yoke.
- j) Unscrew the screws (9).
- k) Unscrew the screw (10), apply the extractor and pull out the shaft.
- l) Unscrew the screws (11) and remove the washer (12).
- m) Change the bearing (13).
- n) Record the setting of the eccentric axle (14). Remove the eccentric axle and repeat items l) and m).

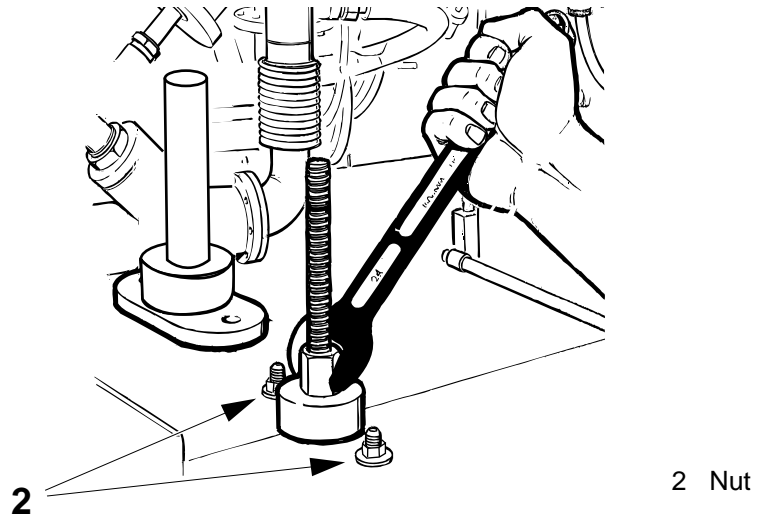


- 8 Wooden block
- 9 Screw
- 10 Screw
- 11 Screw
- 12 Washer
- 13 Bearing
- 14 Eccentric axle

(Cont'd)

(Cont'd)

- o) Assemble in the reverse order. Torque the nuts (2) to 30 ± 2 Nm.
- p) Set the micro switch, see 3.6-2 *Disconnection link - set*.
- q) Check the setting of the jaw gap, see 4.7-3 *Jaw gap - check*.
- r) Check the setting of the jaw over jaw, see 4.7-16 *Jaw over jaw - check*.

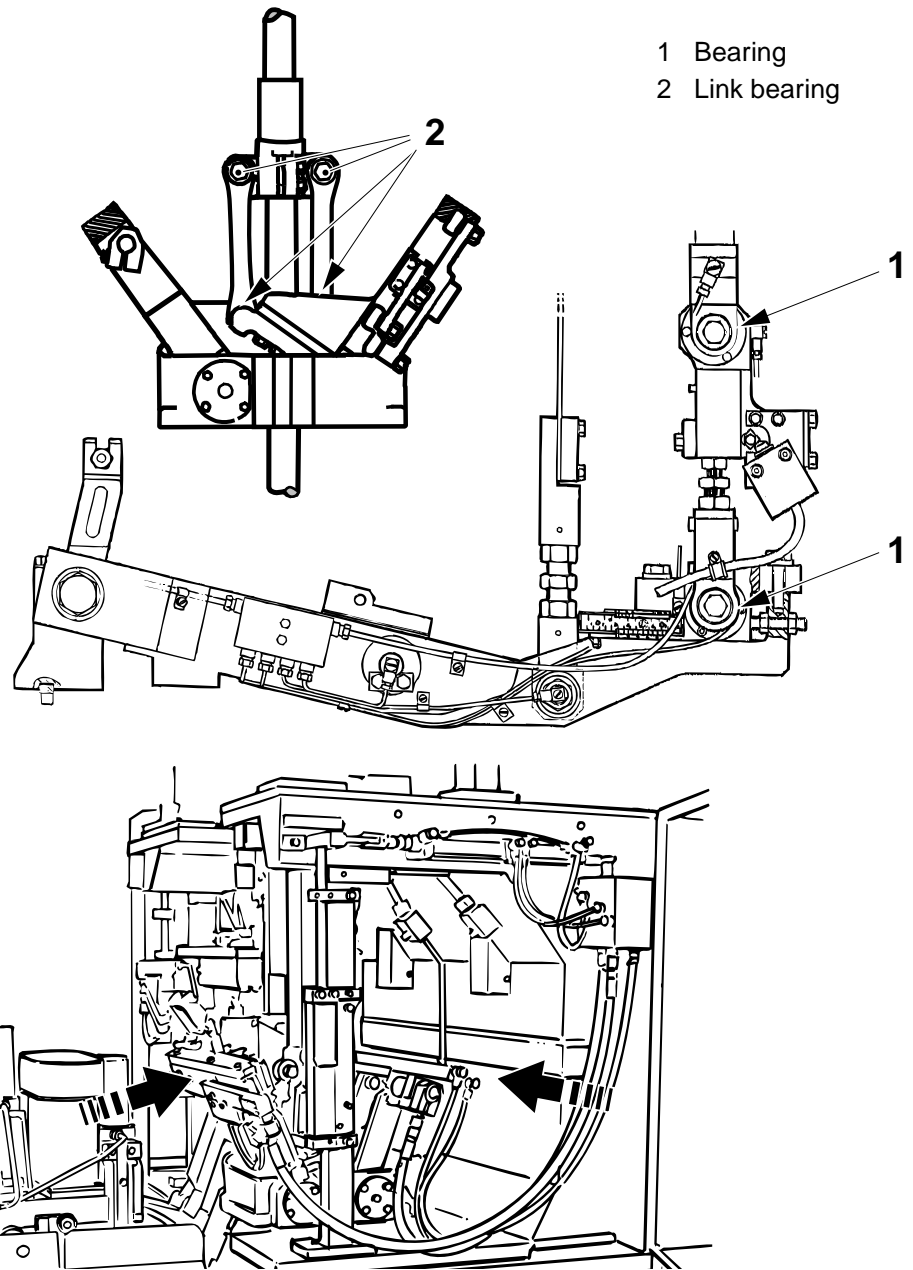


3.3-4 Link system - check slewing bracket bearings

SPC reference	491814-020V 491787-020V
---------------	----------------------------

Check for play in the bearings (1) and the link bearings (2) by moving the jaws manually.

If required, change the bearings, see 3.3-5 *Link system - change slewing bracket bearings*.



- 1 Bearing
- 2 Link bearing

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3.3-5 Link system - change slewing bracket bearings

Tools	
- torque wrench	min 32 Nm
- extractor	TP No. 77165
SPC reference	491814-020V 491787-020V

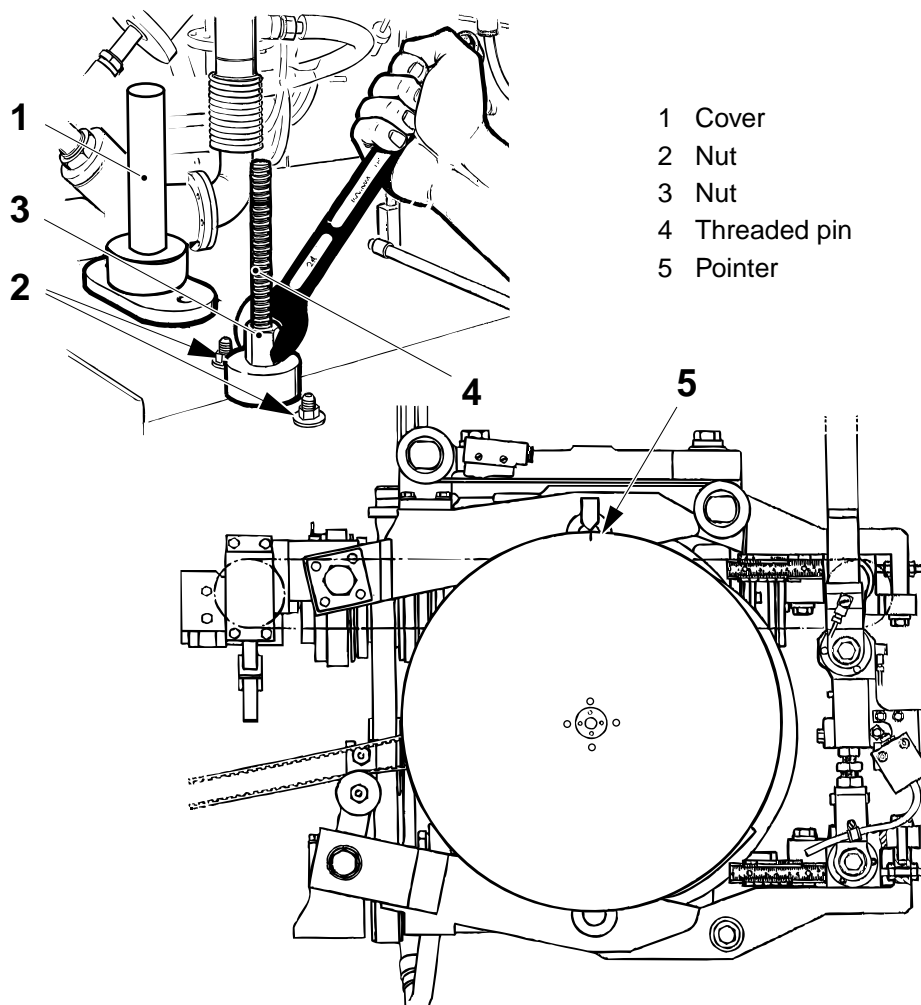
- a) Remove the cover (1).
- b) Unscrew the nuts (2).

Caution! Risk of damage to the equipment! The nut (3) **must not** be completely unscrewed and removed from the threaded pin (4).

- c) Loosen the nut (3) to release the spring force of the hold-down device.

Caution! Take care **not to alter** the setting of the pointer (5) when removing the degree scale.

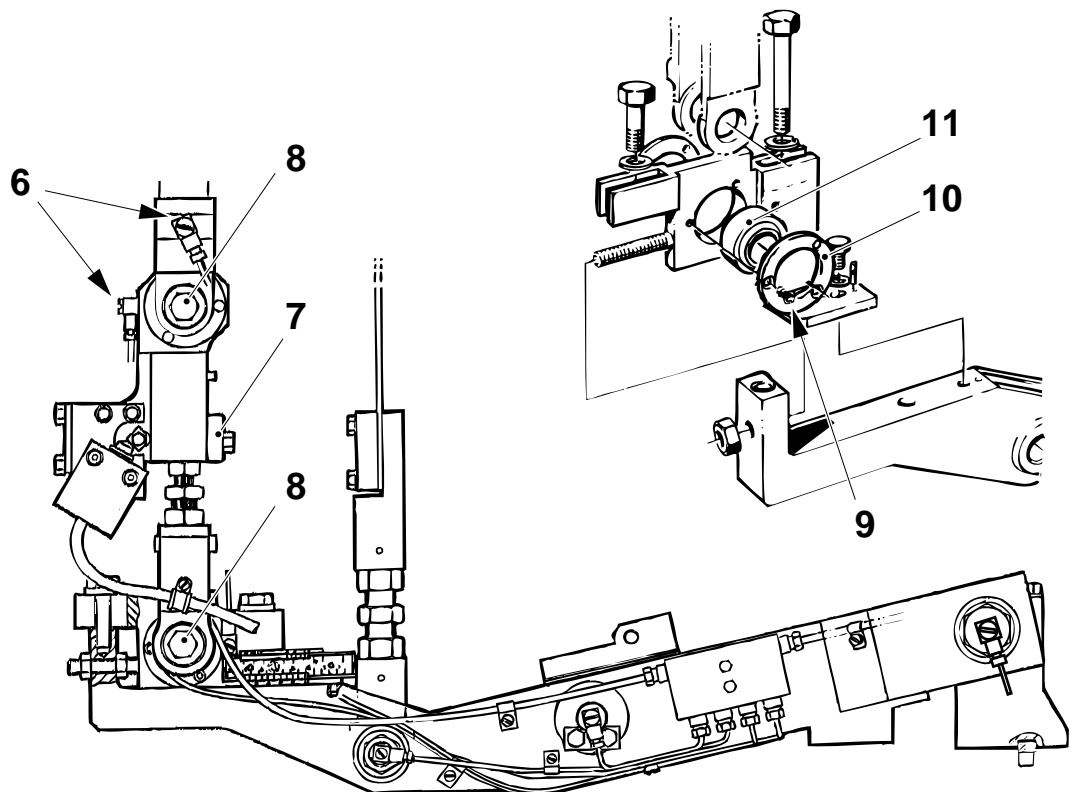
- d) Remove the degree scale.



(Cont'd)

(Cont'd)

- e) Unscrew the banjo connections (6).
- f) Loosen the cable to the micro switch.
- g) Remove the cross bar (7) and separate the disconnection link. Lower the link arm to the bottom.
- h) Unscrew the screws (8), apply the extractor and pull out the shaft.
- i) Remove the screws (9) and the washer (10).
- j) Change the bearing (11).
- k) Repeat items *i*) and *j*) for the other bearing.

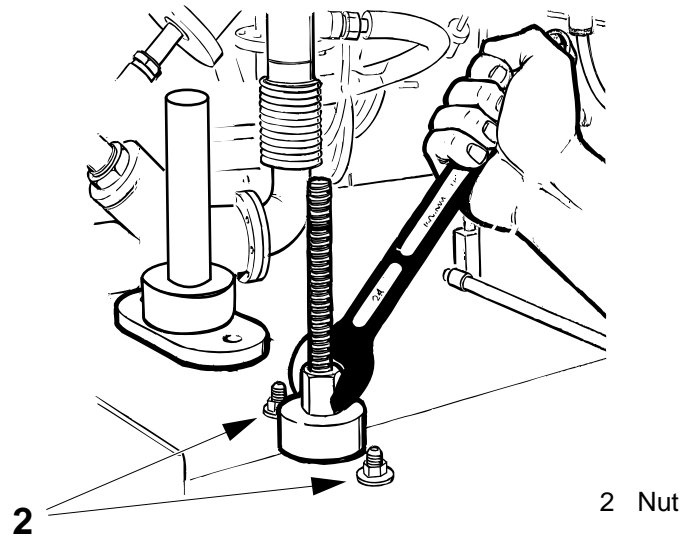


- 6 Banjo connection
- 7 Cross bar
- 8 Screw
- 9 Screw
- 10 Washer
- 11 Bearing

(Cont'd)

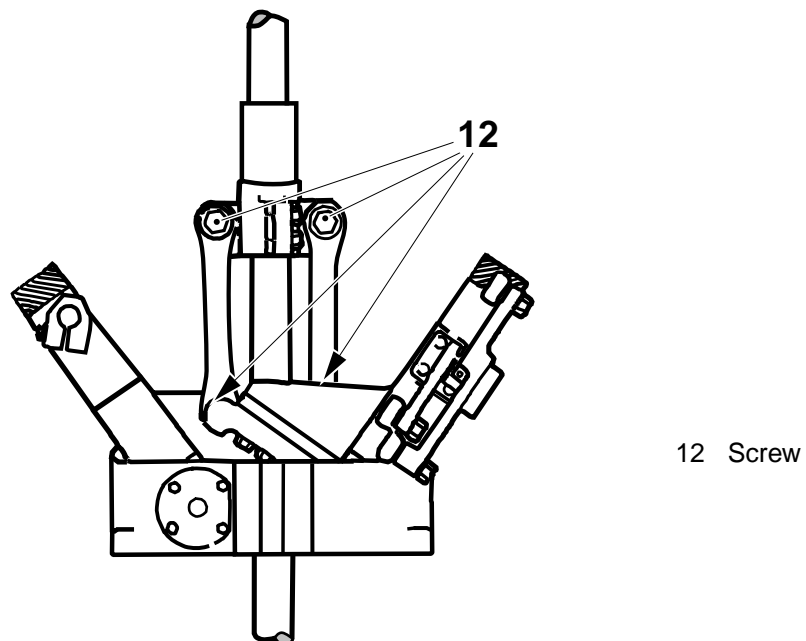
(Cont'd)

- l) Assemble in the reverse order. Torque the nuts (2) to 30 ± 2 Nm.
- m) Set the micro switch see, 3.6-2 *Disconnection link - set*.



Link bearings

- a) Crank until one jaw pair is fully open.
- b) Unscrew the screws (12).
- c) Change the link bearings.
- d) Assemble in the reverse order.



3.4 Hold-down device

SPC reference	572760-010V
---------------	-------------

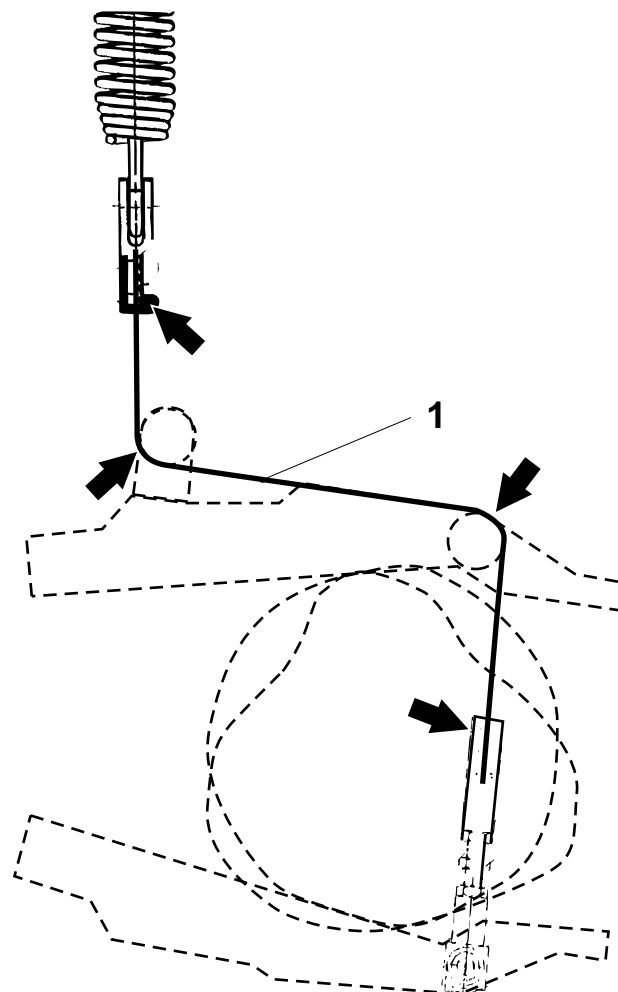
3.4-1 Hold-down device - check timing belts

SPC reference	572760-010V
---------------	-------------

Check the inside and outside of the timing belts (1) for wear and/or damage, especially at the stress points (arrows).

Crank to get all parts of the timing belt accessible.

If required, change the timing belts, see 3.4-2 *Hold-down device - change timing belts*.



1 Timing belt

3.4-2 Hold-down device - change timing belts

Tools - torque wrench	min 32 Nm
SPC reference	572760-010V

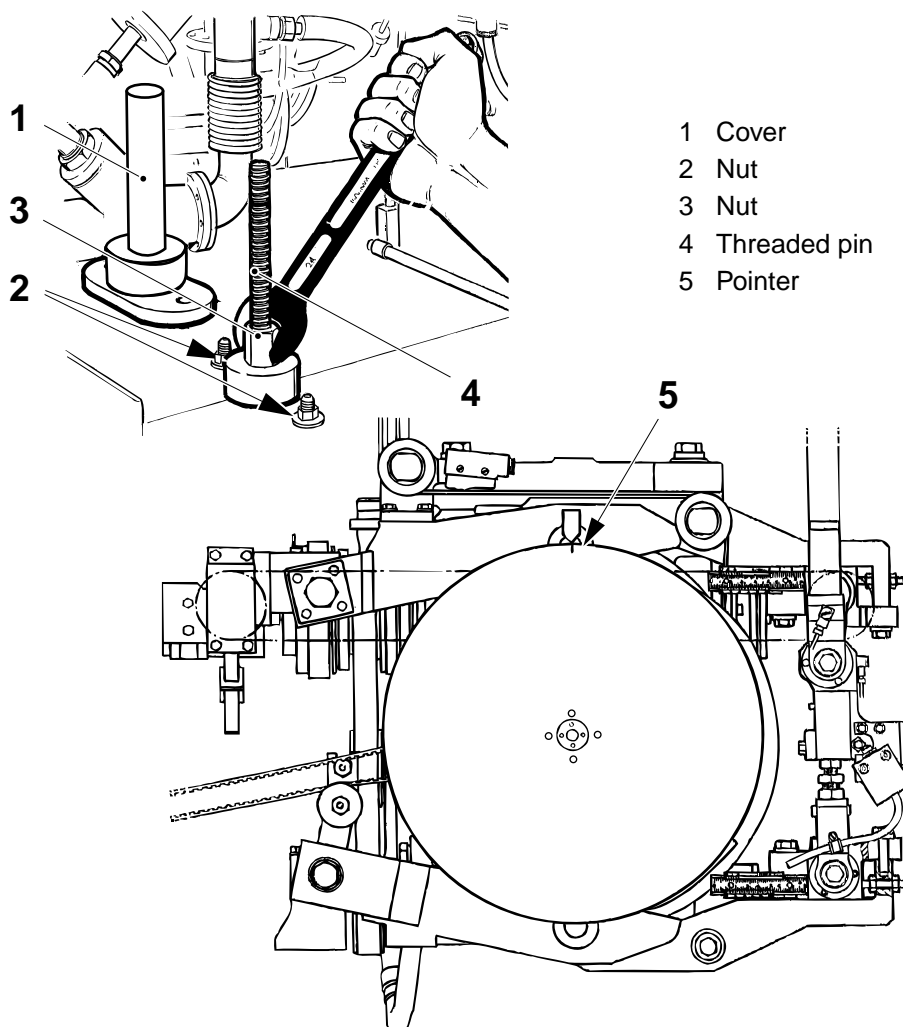
- a) Crank to 145°.
- b) Remove the cover (1).
- c) Loosen half a turn the nut (3).
- d) Unscrew the nuts (2).

Caution! Risk of damage to the equipment! The nut (3) **must not** be completely unscrewed and removed from the threaded pin (4).

- e) Loosen the nut (3) to release the spring force of the hold-down device.

Caution! Take care **not to alter** the setting of the pointer (5) when removing the degree scale.

- f) Remove the degree scale.



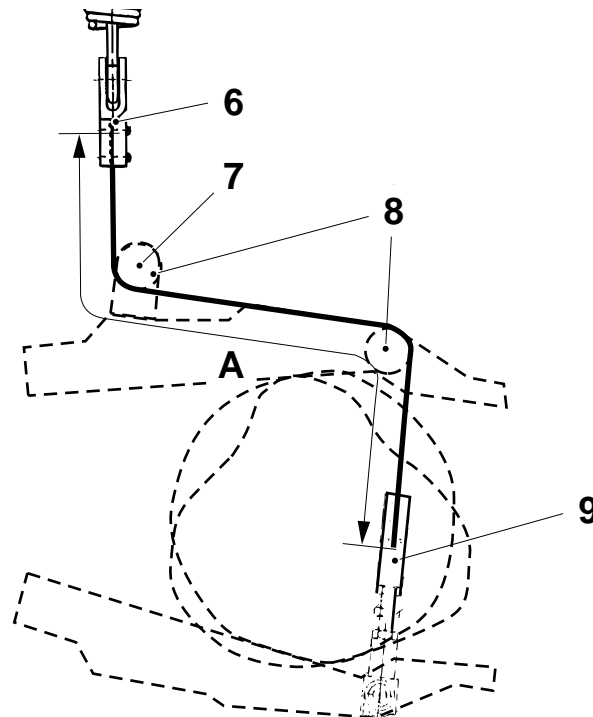
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(Cont'd)

(Cont'd)

- g) Unscrew the banjo connections (7).
- h) Lift the timing belt off the timing belt rollers (8). Remove the upper bracket (6) from the spring.
- i) Remove the brackets (6) and (9) from the belt.
- j) Fit the brackets to the new belt, see table below.
- k) Fit the belts and the banjo connections.

Package	Belt, TP No.	Length A (mm)
100 B	566404-1	740
125 S	566404-1	740
160 S	566404-1	740
180 B	566404-1	740
200 B	566404-1	740
200 M	566404-3	700
200 S	566404-2	710
236 B	566404-1	740
250 B	566404-2	710
250 S	566404-3	700
284 B	566404-3	700
300 S	566404-3	700
330 S	566404-5	690



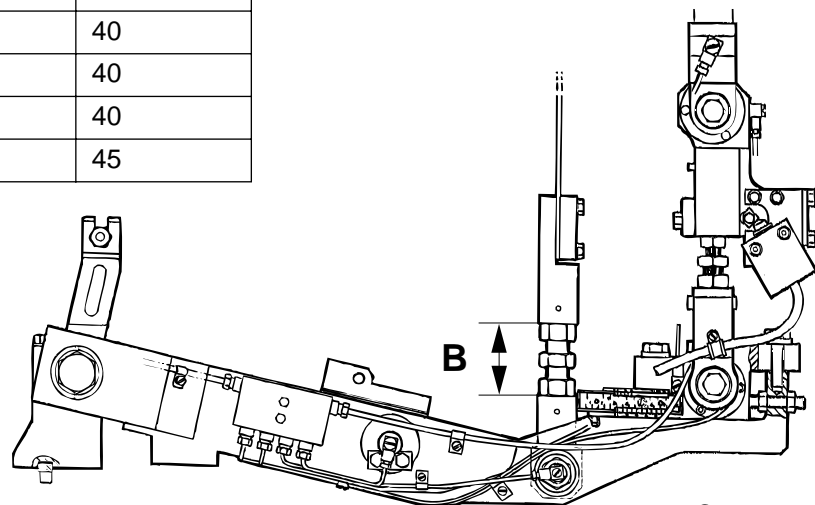
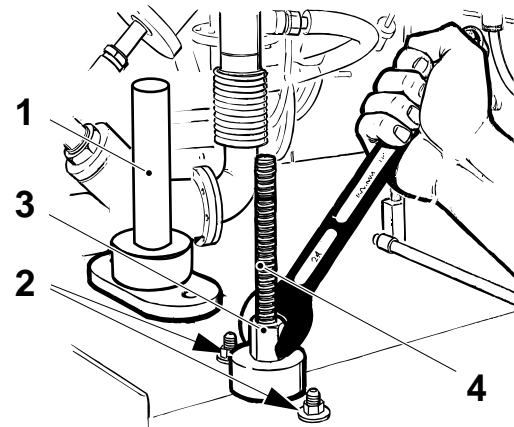
- 6 Bracket
- 7 Banjo connection
- 8 Roller
- 9 Bracket

(Cont'd)

(Cont'd)

- l) Tighten the nut (3) of the hold-down device on the threaded pin (4).
- m) Fit and tighten the nuts (2). Torque the nuts to 30 ± 2 Nm.
- n) Fit the cover (1).
- o) Make sure that distance B is correct on the LH and RH rigging screws, see table.
- p) Reassemble the degree scale.

Package	B ± 1 (mm)
100 B	70
125 S	70
160 S	45
180 B	63
200 B	52
200 M	45
200 S	45
236 B	45
250 B	60
250 S	40
284 B	40
300 S	40
330 S	45



- 1 Cover
- 2 Nut
- 3 Nut
- 4 Threaded pin

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3.4.1 Rocker arm

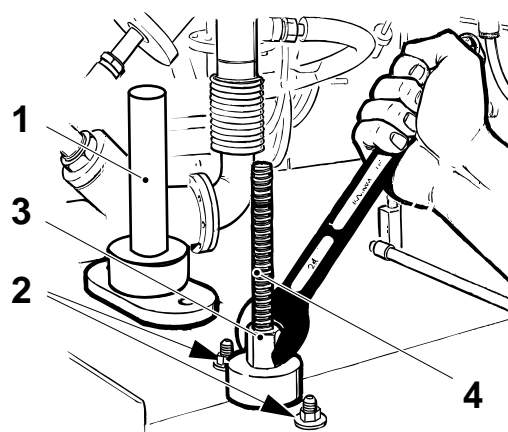
3.4.1-1 Rocker arm - check bearing play

SPC reference	572750-010V
---------------	-------------

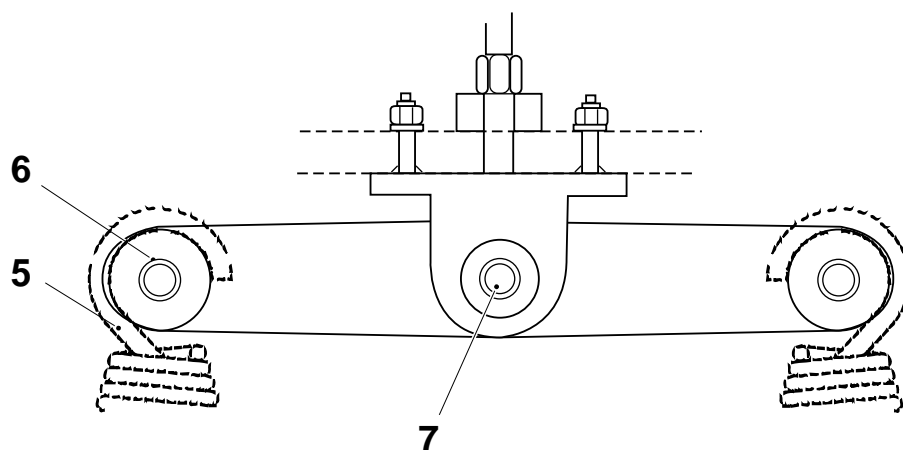
- a) Crank to 145°.
- b) Remove the cover (1).
- c) Loosen half a turn the nut (3).
- d) Unscrew the nuts (2).

Caution! Risk of damage to the equipment! The nut (3) **must not** be completely unscrewed and removed from the threaded pin (4).

- e) Loosen the nut (3) to release the spring force of the hold-down device.
- f) Unhook the springs (5) from the spring bracket (6).
- g) Check for play in the ball bearings (7) by moving the arm sideways.



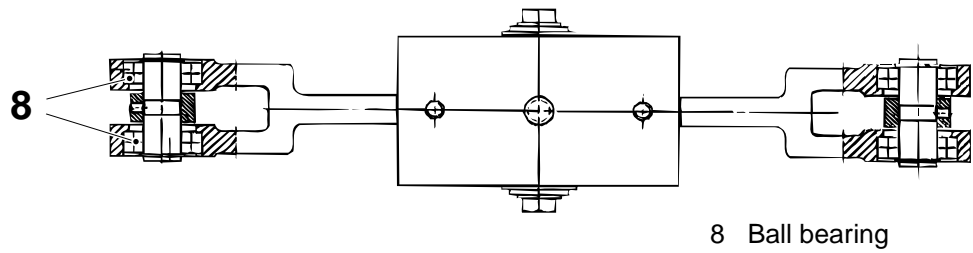
- 1 Cover
- 2 Nut
- 3 Nut
- 4 Threaded pin
- 5 Spring
- 6 Spring bracket
- 7 Ball bearing



(Cont'd)

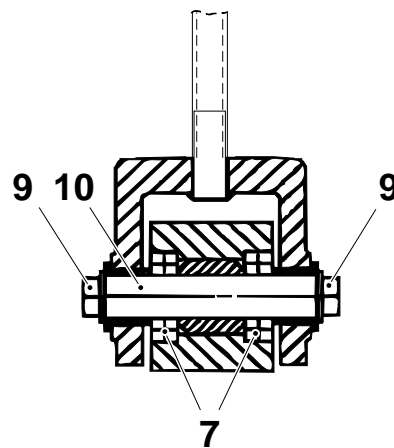
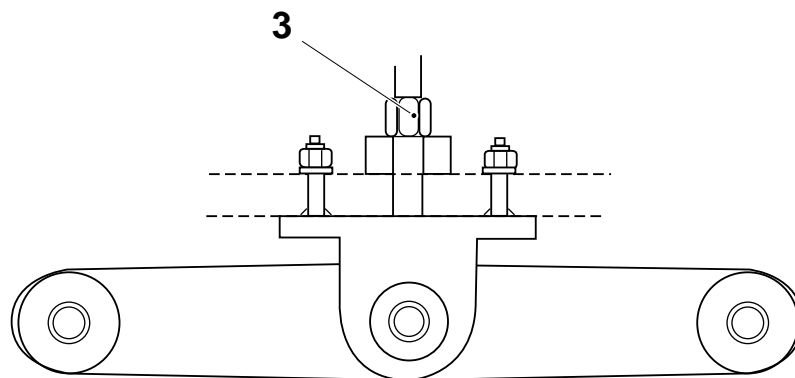
(Cont'd)

h) Check for play in the ball bearings (8). Change as required.



Change bearings

- a) Unscrew the nut (3) and remove the rocker arm.
- b) Unscrew the screws (9) and remove the shaft (10).
- c) Remove the rocker arm from the bracket.
- d) Change the ball bearings (7).



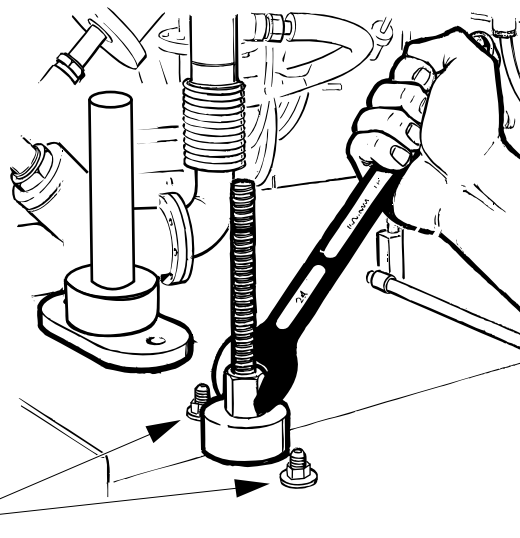
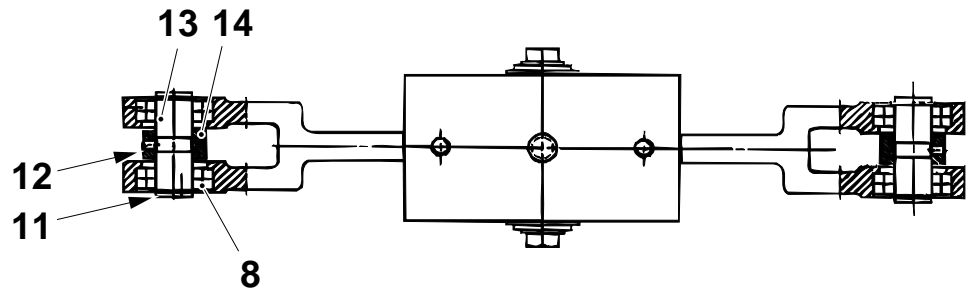
- 3 Nut
- 7 Ball bearing
- 9 Screw
- 10 Shaft

(Cont'd)

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(Cont'd)

- e) Remove the circlips (11) and loosen the stop screw (12).
- f) Remove the shafts (13).
- g) Remove the spring bracket (14)
- h) Change the ball bearings (8).
- i) Assemble in the reverse order. Torque the nuts (2) to 30 ± 2 Nm.



- 2 Nut
- 8 Ball bearing
- 11 Circlip
- 12 Stop screw
- 13 Shaft
- 14 Spring bracket

3.5 Crank

SPC reference	256806-030V
---------------	-------------

3.5-1 Crank - check mechanism and switch

Machine status	Power On
SPC reference	256806-030V

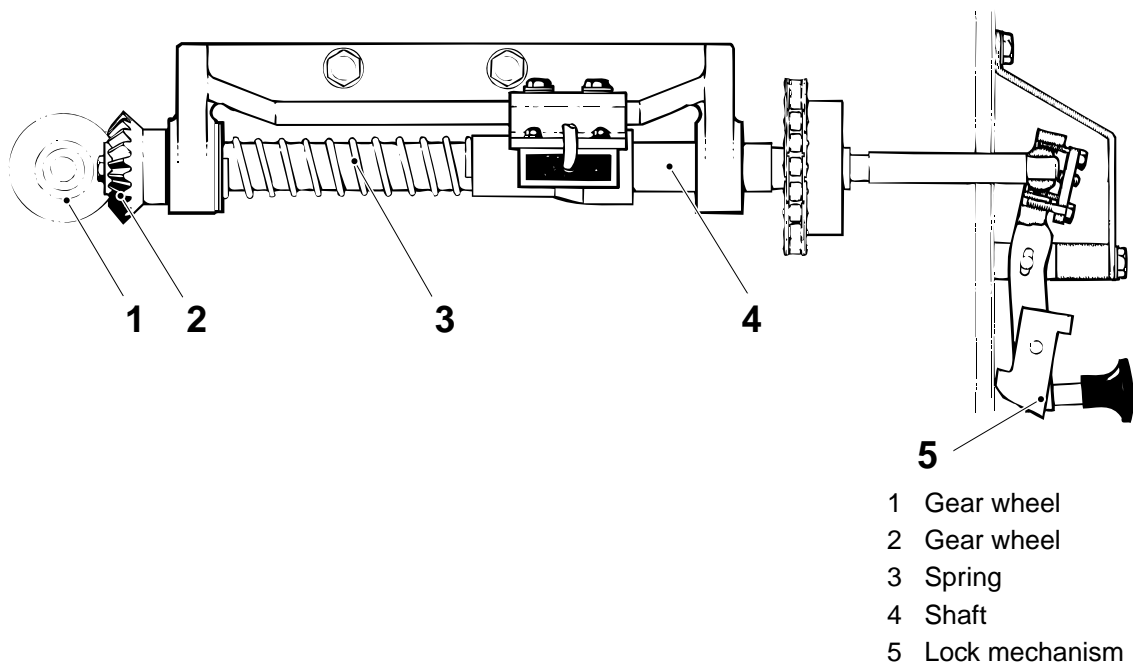
Check the following details for wear and/or damage:

- the gear wheels (1) and (2)
- the spring (3)
- the shaft (4)

Change as required.

Pull out the lock mechanism (5) and, at the same time, crank the machine. Make sure that the gear wheels (1) and (2) do not touch each other until signal lamp **Safety monitor** (see OM) on the control panel lights up.

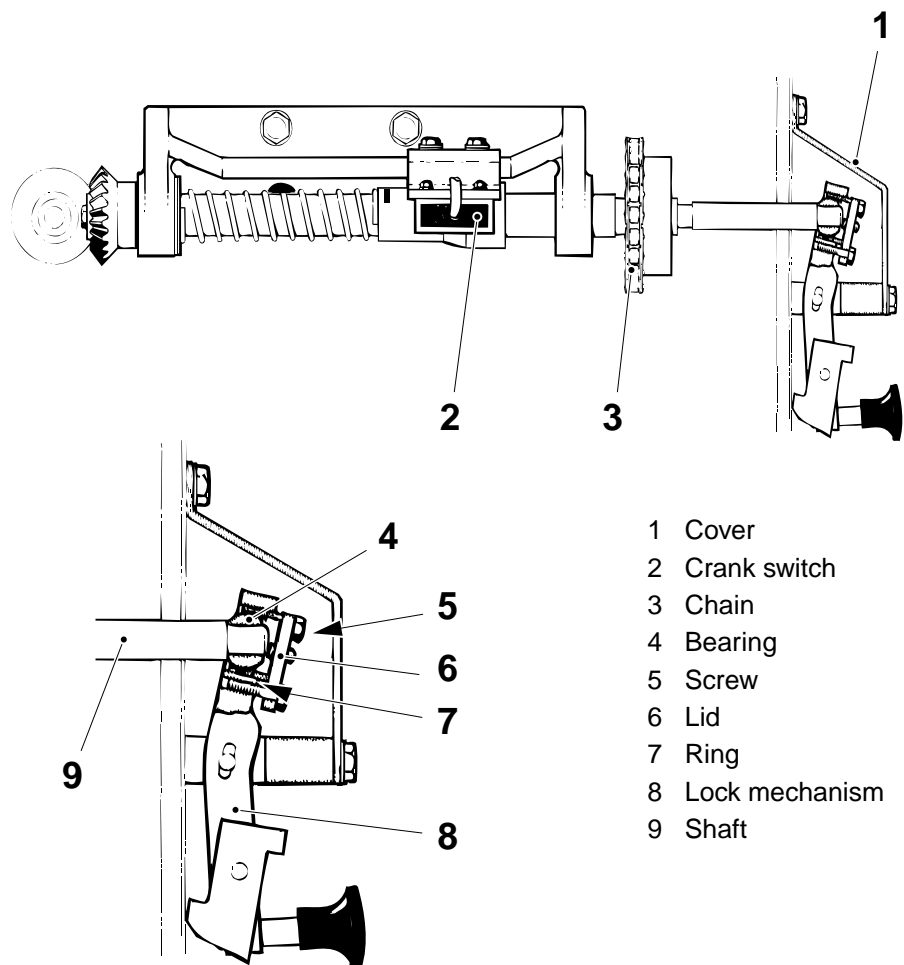
Set the switch as required, see 3.5-4 *Crank - set switch*.



3.5-2 Crank - remove

Tools - puller	
SPC reference	256806-030V

- a) Slacken the tension of the chain (3) by means of the chain tensioner. Remove the chain lock and lift off the chain.
- b) Remove the crank switch (2).
- c) Remove the cover (1).
- d) Unscrew the screws (5). Remove the lid (6) and the ring (7).
- e) Fit a puller and pull the bearing (4) and lock mechanism (8) off the shaft (9).



- 1 Cover
- 2 Crank switch
- 3 Chain
- 4 Bearing
- 5 Screw
- 6 Lid
- 7 Ring
- 8 Lock mechanism
- 9 Shaft

(Cont'd)

(Cont'd)

f) Unscrew the screws (10) and lift out the crank mechanism.

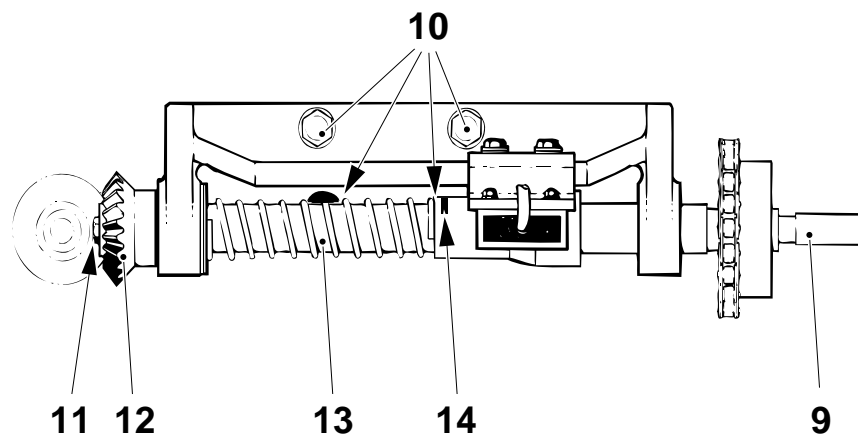
g) Unscrew the screws (11) and remove the gear wheel (12).



Risk of personal injury!

Compressed springs! Take care when removing/assembling components.

h) Remove the pin (14), the spring (13) and the shaft (9) with the sleeve.

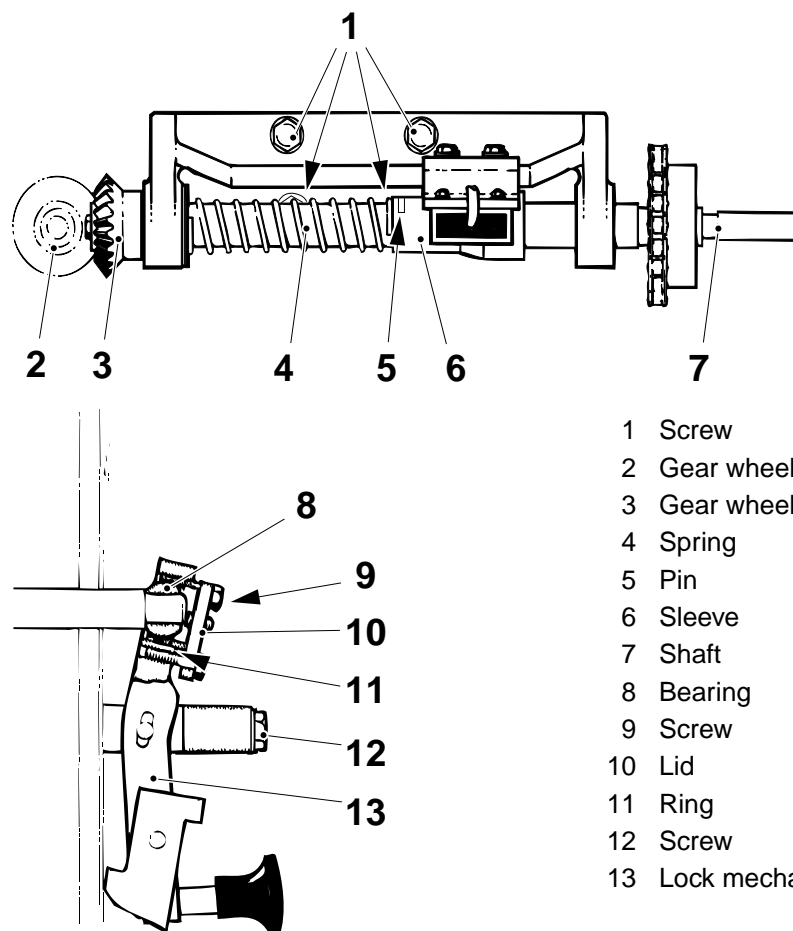


- 9 Shaft
- 10 Screw
- 11 Screw
- 12 Gear wheel
- 13 Spring
- 14 Pin

3.5-3 Crank - fit

SPC reference	256806-030V
---------------	-------------

- Fit the spring (4) and the shaft (7) with the sleeve (6). Secure the shaft with the pin (5).
- Fit the gear wheel (3).
- Fit the crank mechanism without tightening the screws (1).
- Align the gear wheels (2) and (3) and then tighten the screws (1).
- Fit the bearing (8), the ring (11), and the lid (10). Tighten the screws (9).
- Secure the lock mechanism (13) with the screws (12).
- Lock the mechanism in engaged position.



(Cont'd)

(Cont'd).

h) Set the gear play as follows:

– **To decrease the play:**

Loosen the screws (9) a little and tighten the screw (17) until the correct gear play is obtained. Tighten the screws (9).

– **To increase the play:**

Release the lock mechanism (13). Loosen the screws (17) and (9) and tap the lock mechanism to shift it slightly on the bearing (8). Lock the mechanism in engaged position.

If there is not enough adjustment range left, loosen the screws (1) and shift the bracket sideways or, if the range is still not enough, put shims behind the gear wheel (2).

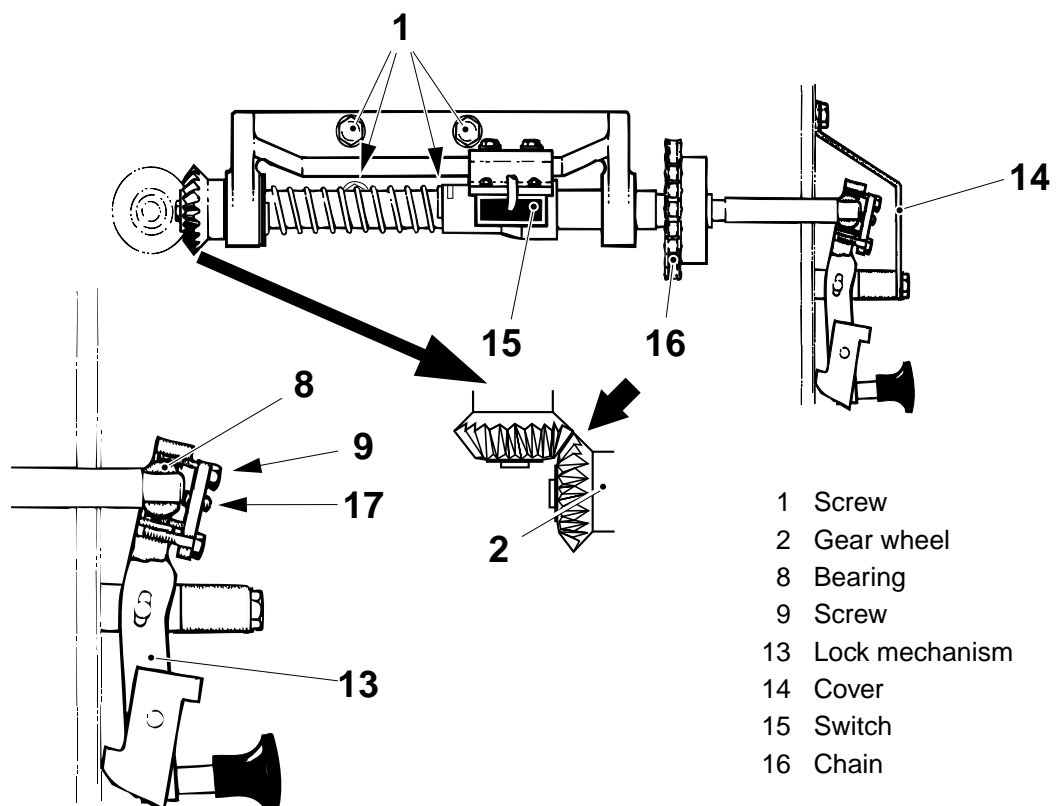
i) Repeat item h).

Note! Make sure that the gear wheels are aligned and that the passage between the two gear wheels is smooth. If required, adjust by means of shims under the gear wheel (2).

j) Fit the cover (14).

k) Fit and set the switch (15), see 3.5-4 Crank - set switch.

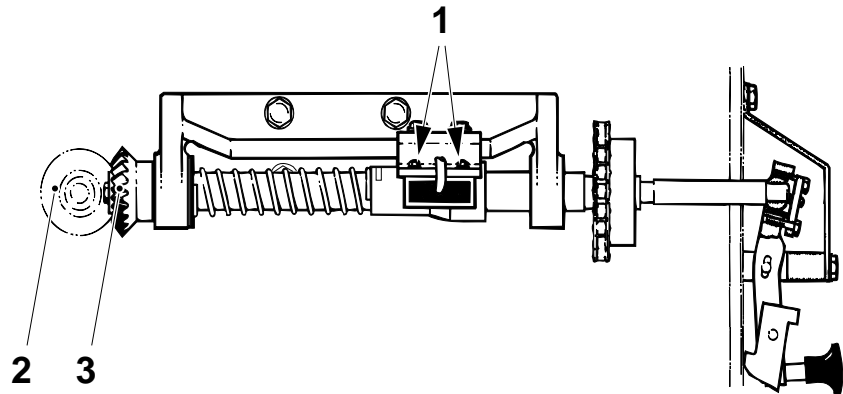
l) Fit and tension the chain (16).



3.5-4 Crank - set switch

Machine status	Power On
SPC reference	256806-030V

- a) Engage the crank switch.
- b) Adjust on the screws (1) so that the gear wheels (2) and (3) do not touch each other before the **Safety monitor** signal lamp (see *OM*) on the monitor panel lights up.



- 1 Screw
- 2 Gear wheel
- 3 Gear wheel

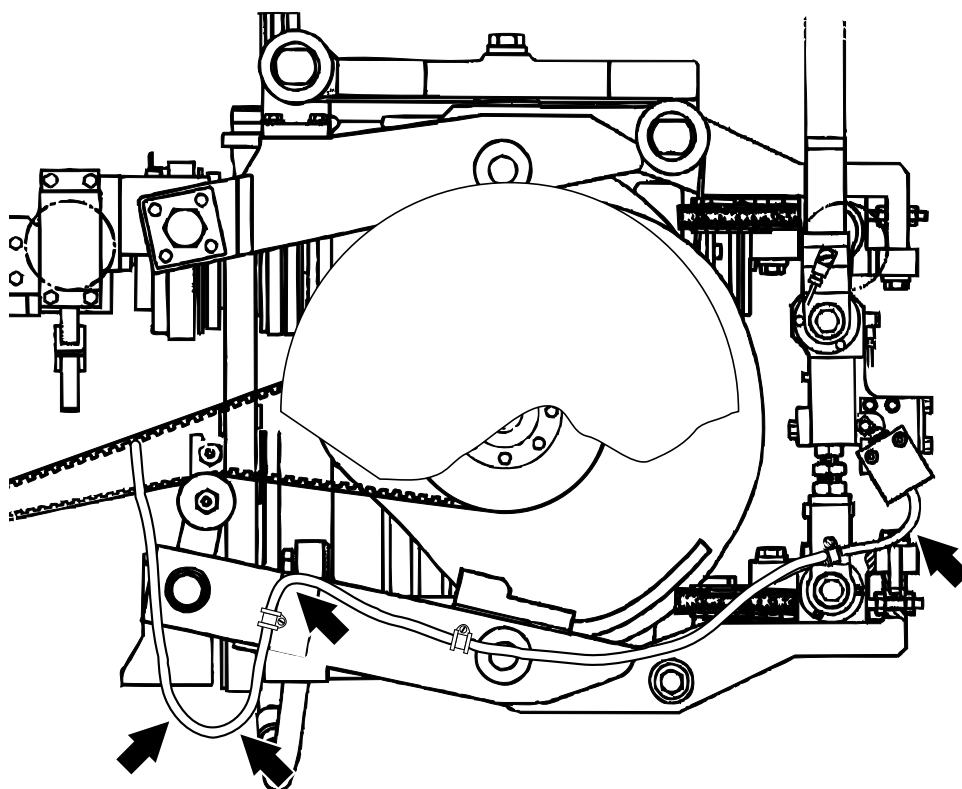
3.6 Disconnection link

SPC reference	491787-020V 491788-020V
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3.6-1 Disconnection link - check and lubricate

Machine status	Power On
Consumable - lubricant (Molykote) - overload protection	TP No. 92296-2 TP No. 563740-101
SPC reference	491787-020V 491788-020V

- a) Check the micro switch cables for cracks, by twisting and bending at the curves. If the signal lamp **Jaw system overload** lights up change the cables.
- b) If required, change the micro switch, see 3.6-3 *Disconnection link - change micro switch*.



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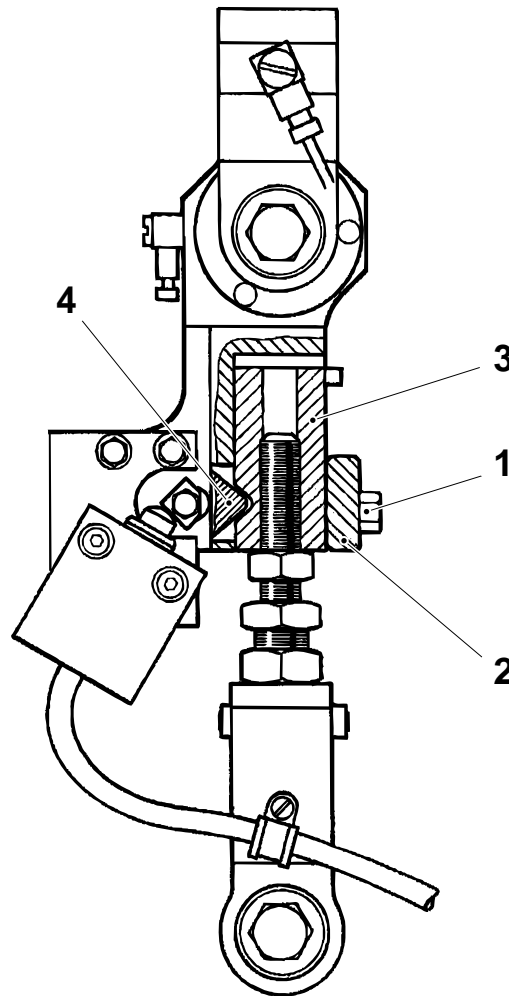
(Cont'd)

RH side

- c) Crank to 120°.
- d) Remove the screws (1) and the cross piece (2).
- e) Swing out the slide lug (3).
- f) Lubricate all friction surfaces of the slide lug (3) and the piston (4).
- g) Assemble in the reverse order.

LH side

- h) Crank to 300° and repeat items d) - g).



- 1 Screw
- 2 Cross piece
- 3 Slide lug
- 4 Piston

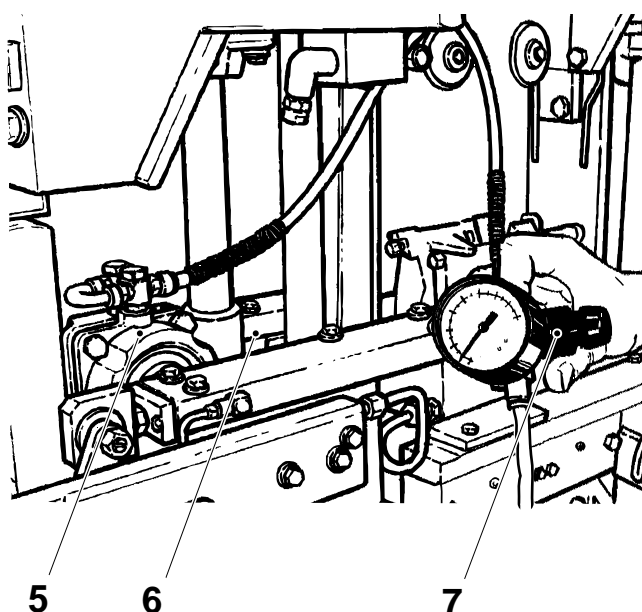
(Cont'd)

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Caution! The lubrication hoses are to be **so long** that the disconnection link can cut-out without damaging or stretching them.

LH side

- i) Crank to approx. 75° (135° for **330 S**).
- j) Place the tool (5) between the carriers. Make sure that the plate on the back of the tool bears against the inner carrier (6).
- k) Close the regulator (7).
- l) Connect the tool to the compressed air connection on the valve panel of the machine.
- m) Slowly increase the air pressure by means of the regulator (7) until the overload protection cuts out mechanically.



- 5 Tool
- 6 Inner carrier
- 7 Regulator

Caution! Make sure the cam roller on the folding flap cam **returns** to its **correct** position. Crank the machine as required.

- n) Gently move the jaws back to their initial position.
- o) Repeat one more time and make sure that the overload protection cuts out when the pressure is 3.0 - 4.5 bar.
- p) If required, set the cut-out force, see 3.6-4 *Disconnection link - set cut-out force*.

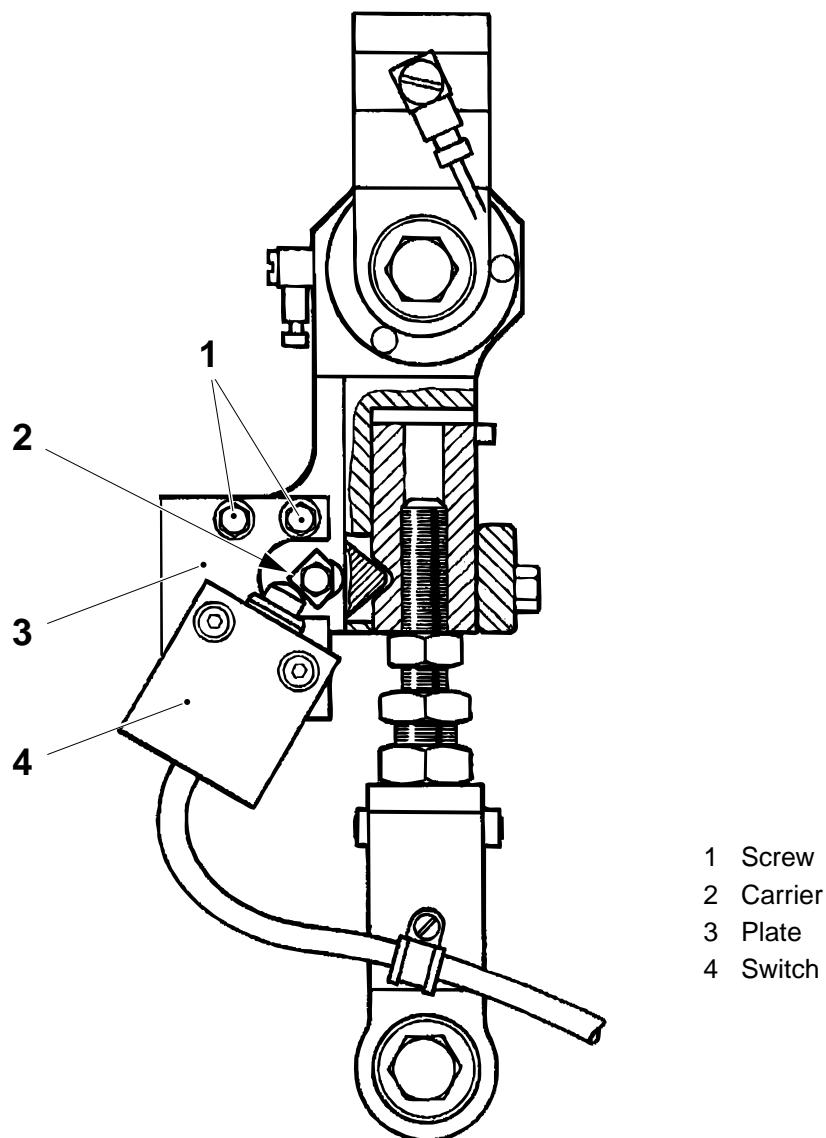
RH side

- q) Crank to approx. 255° (315° for **330 S**) and repeat items j) - p).

3.6-2 Disconnection link - set

Machine status	Power On
SPC reference	491787-020V 491788-020V

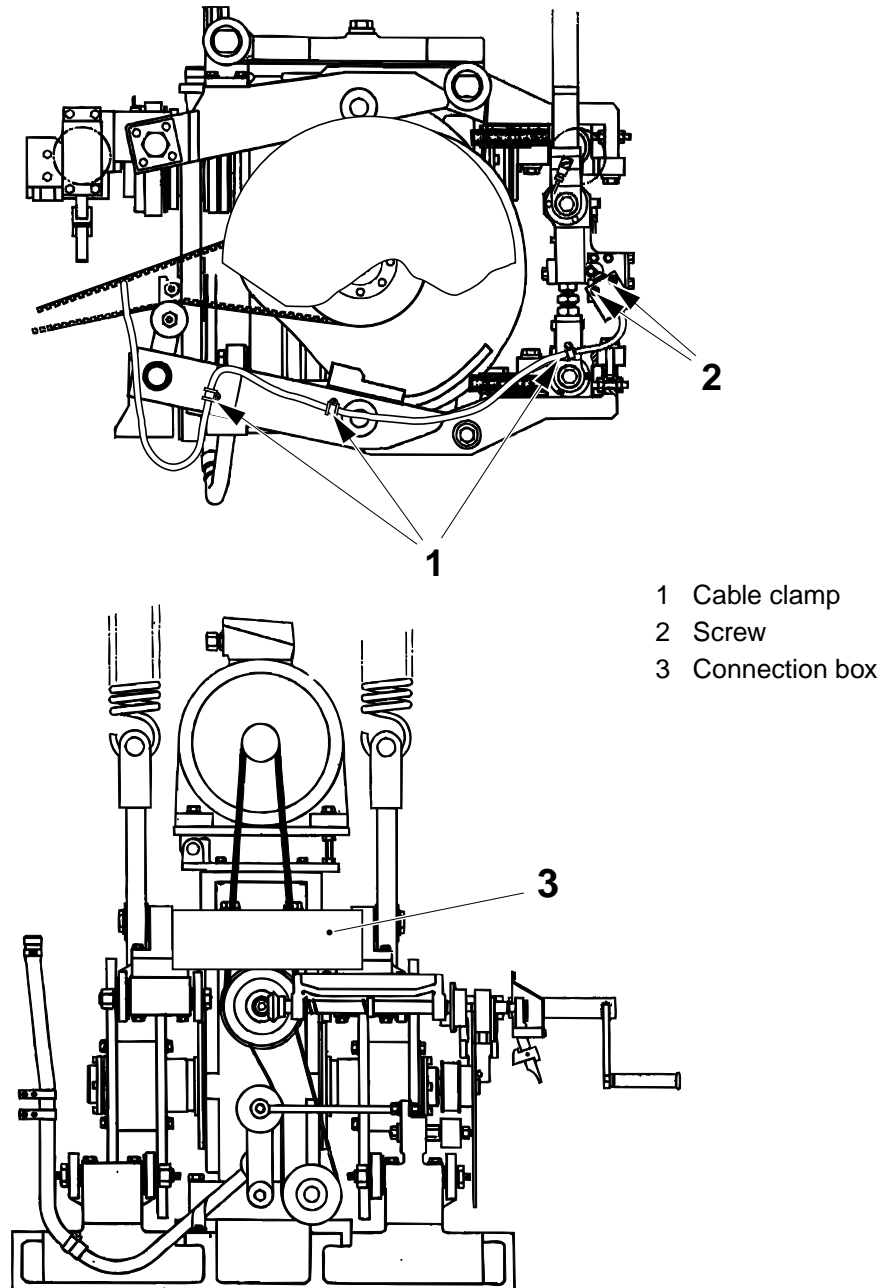
- a) Loosen the screws (1).
- b) Shift the plate (3) and set the gap between the switch (4) and the carrier (2) to satisfy the following conditions:
 - the signal lamp **Jaw system overload** (see *OM*) **must not** light up when a 0.8 mm feeler gauge is inserted between the switch and the carrier
 - the signal lamp **must** light up when a 0.9 mm feeler gauge is inserted. To deactivate the alarm push **Alarm reset** pushbutton.
- c) Tighten the screws (1).
- d) Check the disconnection link, see 3.6-1 *Disconnection link - check and lubricate*.



3.6-3 Disconnection link - change micro switch

SPC reference	491787-020V 491788-020V
---------------	----------------------------

- a) Loosen the cable clamps (1) and unscrew the screws (2).
- b) Disconnect the cable in the connection box (3).



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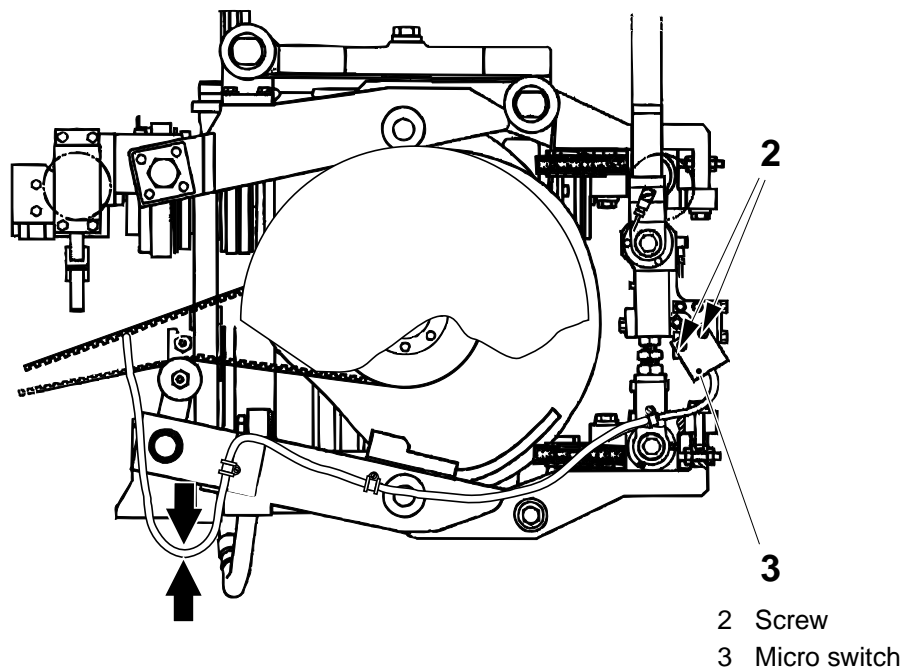
(Cont'd)

(Cont'd)

- c) Change the micro switch (3).
- d) Fit the micro switch cable in the clamps. The cable turns are to be so long that the disconnection link can cut-out without damaging or stretching the cable.

Note! Make sure that the cable make a soft turn between the yoke arm and the frame.

- e) Connect the cable in the connection box and set the micro switch, see 3.6-2 *Disconnection link - set*.



3.6-4 Disconnection link - set cut-out force

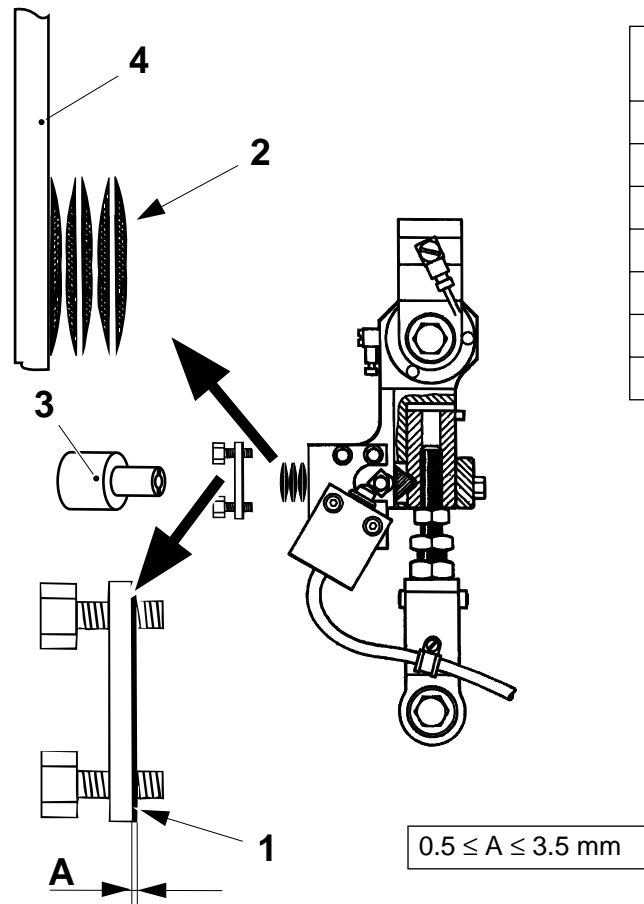
Tools - tool	TP No. 77247
SPC reference	491787-020V 491788-020V

Make sure that there are 42 disc springs (2) and that the first touches the lid (4) with its larger part.

Set the cut-out force by means of shims (1). Reduce the shimming thickness to increase the spring force.

Basic setting distance $A = 2.0$ mm.

Note! Distance A **must be** within the limits. If not, insert the tool (3), unscrew the screws and change the disc springs (2).



Shim, TP No.	Thickness (mm)
752674-5	0.4
752674-1	0.5
752674-2	0.6
752674-3	0.7
752674-4	0.8
752674-7	1.0
752674-6	1.5

- 1 Shim
- 2 Disc spring (42 pcs)
- 3 Tool
- 4 Lid

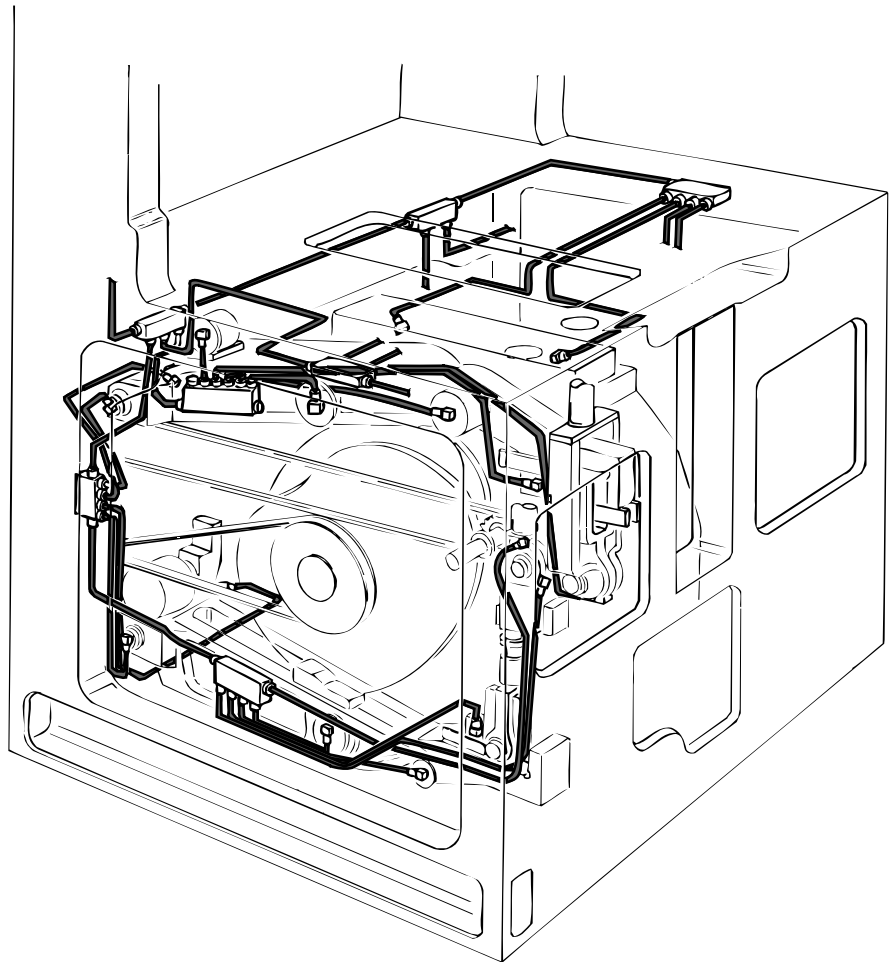
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3.7 Central lubrication

3.7-1 Central lubrication - check oil distribution

Machine status	Power On Air On Water On
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Push the **Manual lubrication** button and make sure that lubrication oil is distributed to all lubrication points.



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3.8 Curve pack

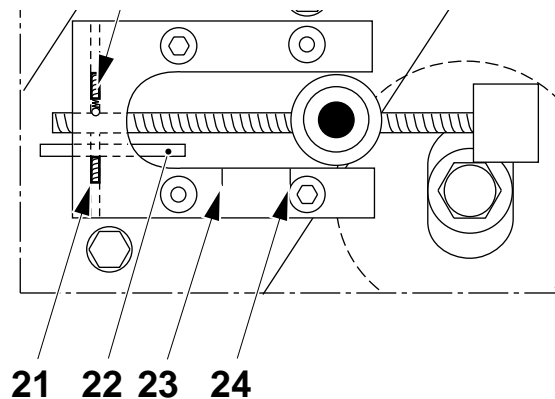
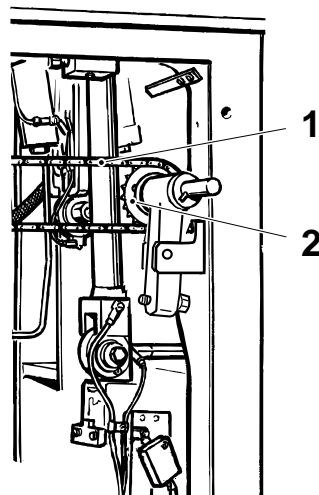
SPC reference	256202-060V
---------------	-------------

3.8-1 Curve pack - change

Consumables - oil	code D
Tools - guide pin - spirit level - spring balance - template - torque wrench - wooden blocks	TP No. 75451 TP No. 90243-163 TP No. 74767-102 TP No. 76338 min 32 Nm
SPC reference	256202-060V

Removal

- Crank to 0°, compare with the impulse transmitter display.
- Slacken the crank chain (1) and remove it from the chain tensioner sprocket (2).
- Place wooden blocks (3) underneath both yokes.

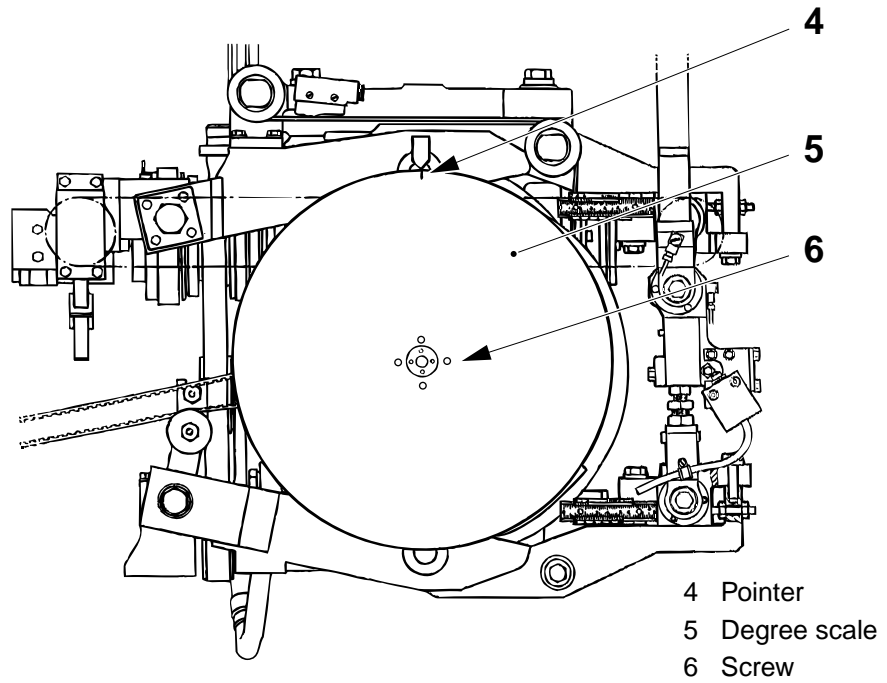


- Crank chain
- Chain tensioner sprocket
- Wooden block

(Cont'd)

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- d) Remove the pointer (4).
- e) Unscrew the screws (6) and remove the degree scale (5).



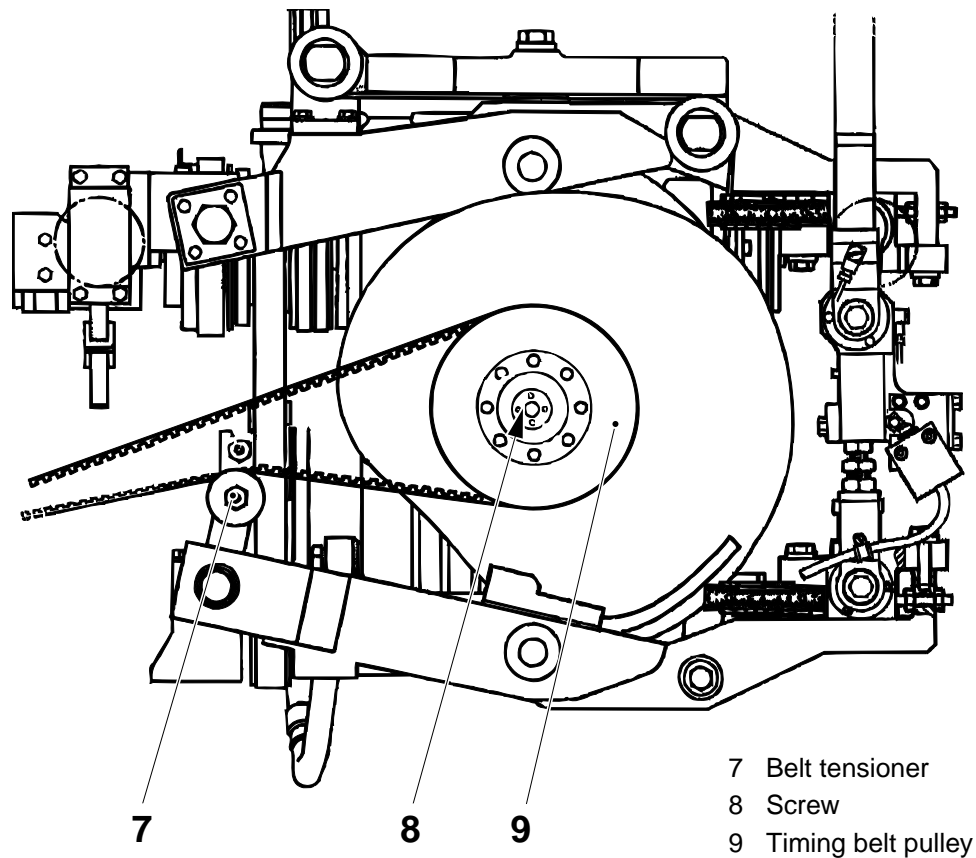
(Cont'd)

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- f) Slacken the belt tensioner (7) and remove the belt.

Caution! Risk of damage to the equipment. The screws (8) **must not be** unscrewed.

- g) Loosen the clamping element by screwing out the screws (8) **in sequence** around the flange, half a turn at a time. If the clamping element sticks to the timing belt pulley (9) and the spacer, long screws may be used as puller tools.
- h) Remove the belt pulley.



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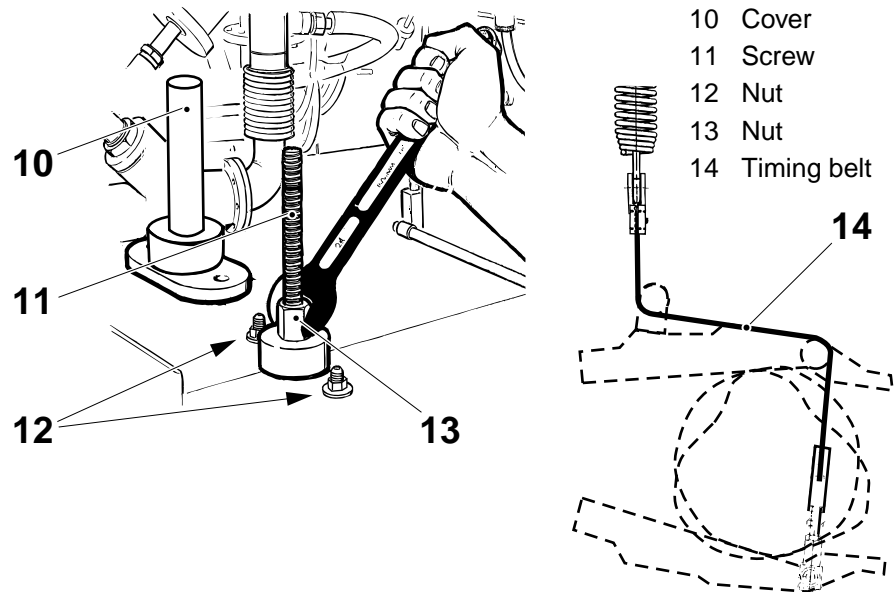
(Cont'd)

i) Remove the cover (10) and unscrew the nuts (12).

Caution! Risk of damage to the equipment! The nut (13) **must not** be completely unscrewed and removed.

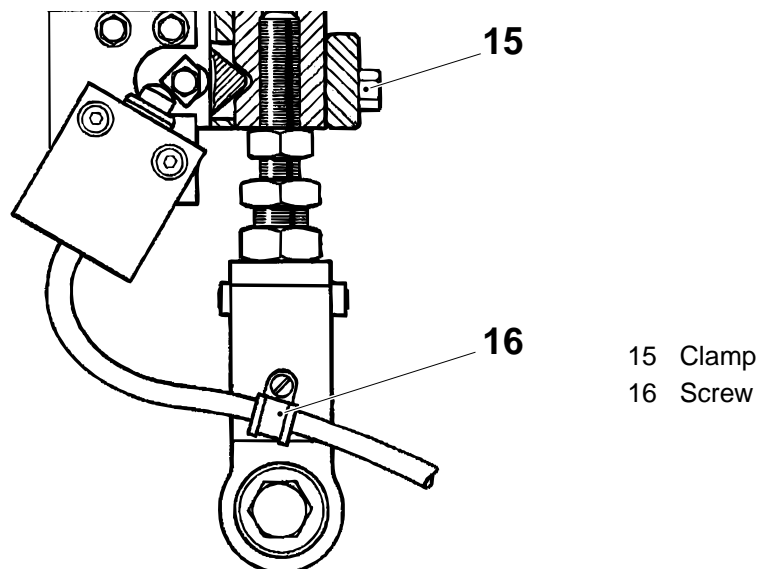
j) Screw out the nut (13) until the top of it is in level with the top of the screw (11).

k) Unhook the timing belts (14) from the hold down device.



l) Loosen the cable clamps (16) and remove the cables from them.

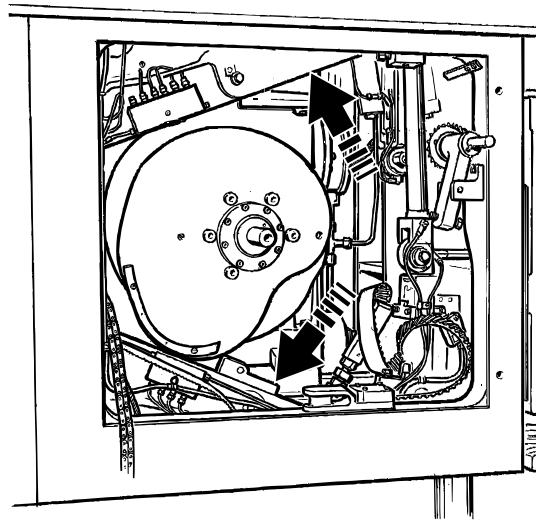
m) Unscrew the screws (15) and split the disconnection links.



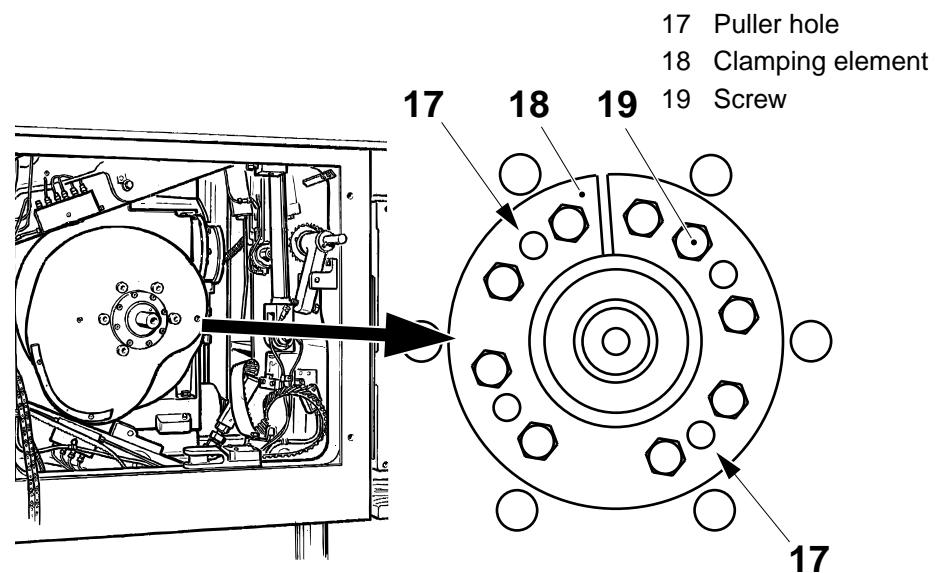
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- n) Lower the slewing brackets towards the base plate and raise the arms towards the top plate.



- o) Loosen the clamping element (18) by screwing out the screws (19) a couple of turns.
 p) Fit two of the screws (19) in the puller holes (17) and tighten **crosswise**, in small steps, until the outer sleeve comes off the inner one.
 q) Lift out the curve pack and remove the clamping element.
 r) Repeat items o) - q) for the other curve pack.



(Cont'd)

(Cont'd)

Assembly - machines equipped with alignment template

Assembly - machines not equipped with alignment template, see page 267.

Note! The curve packs are marked with arrows. On the LH curve pack, the arrow points **clockwise**, and on the RH curve pack **counter-clockwise**.

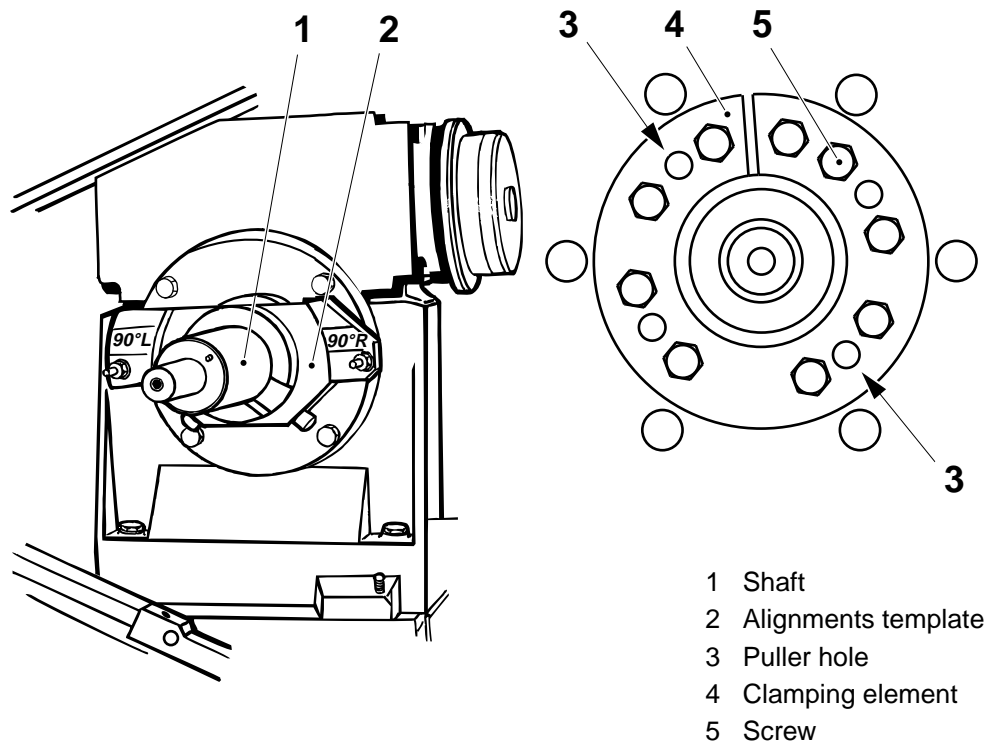
- a) Clean the worm gear shaft (1), the centre hole of the curve pack and the clamping element (4).



Chemical products!

Lubricant. Follow the *Safety precautions*.

- b) Apply a small amount of oil to the clamping element (4). Use oil code D, see *10.2 Lubricants*.
- c) Put the clamping element on the curve pack and fit the curve pack on the worm gear shaft. Make sure the marks on the curve pack (90°L and 90°R) coincide with the marks on the alignment template (2).
- d) Fit back the screws (5) from the puller holes (3).
- e) Torque the screws crosswise, first to 14 ± 1 Nm and then finally to 28 ± 1 Nm.

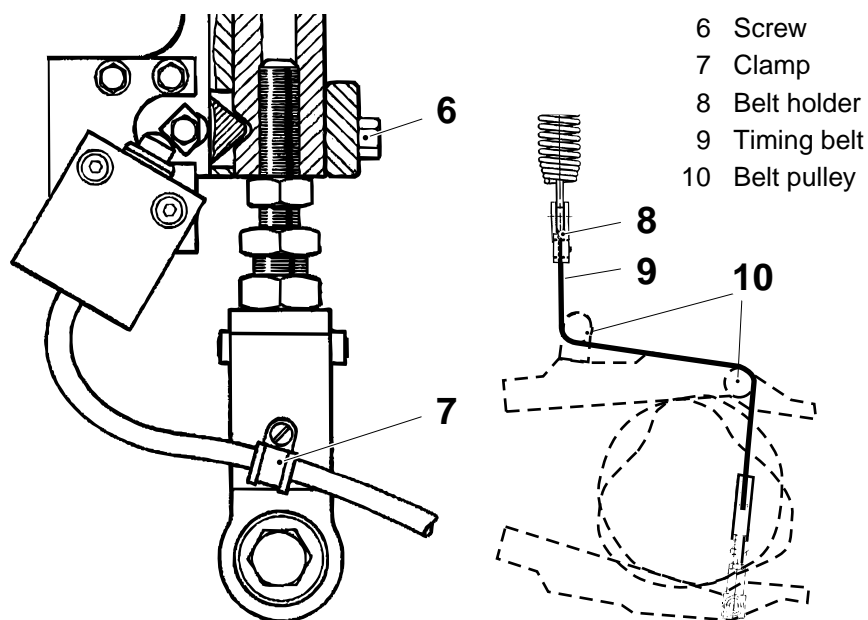


- 1 Shaft
- 2 Alignments template
- 3 Puller hole
- 4 Clamping element
- 5 Screw

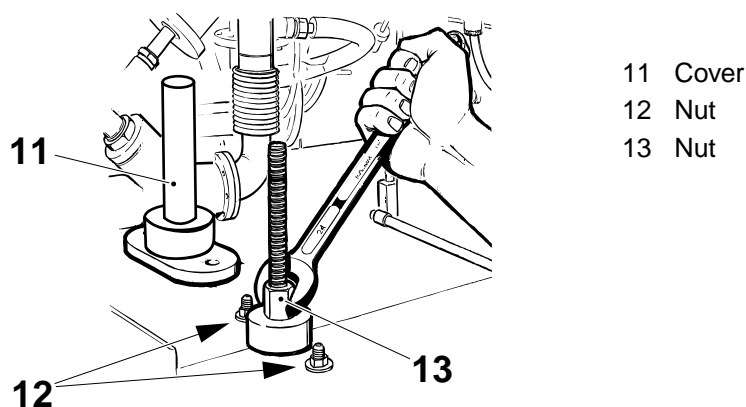
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- f) Assemble the disconnection link and tighten the screw (6). Fit back the cable in the clamp (7) and remove the wooden blocks.
- g) Hook the timing belt holder (8) to the spring of the counter device. At the same time, put the timing belt (9) over the belt pulleys (10).



- h) Repeat items a) - g) for the other curve pack.
- i) Tighten the nut (13) of the hold down device.
- j) Fit and torque the nuts (12) to 30 ± 2 Nm.
- k) Fit the cover (11).

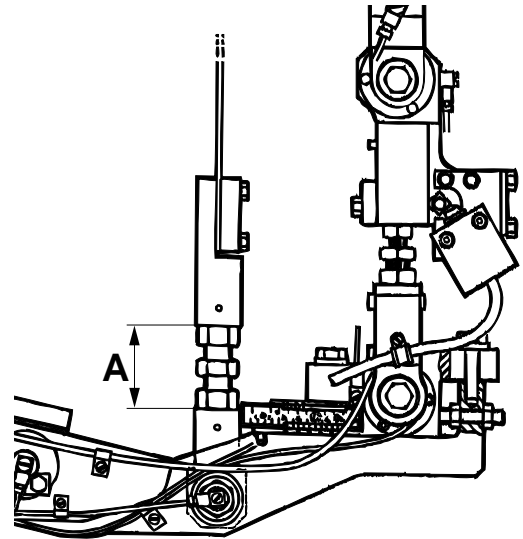


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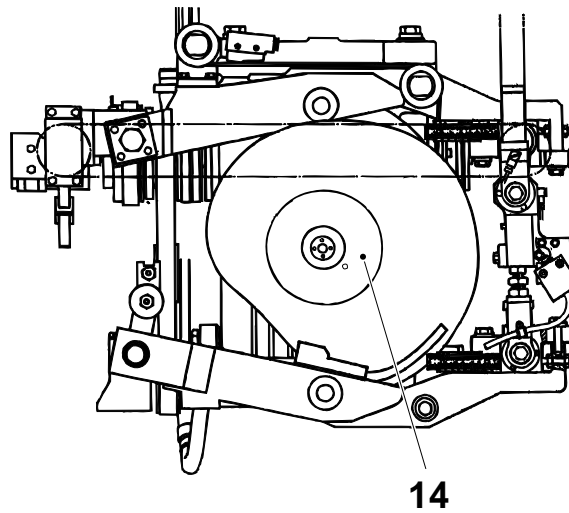
- l) Make sure that distance A is correct on the LH and RH rigging screws, see table below.

Package	A ±1 (mm)
100 B	70
125 S	70
160 S	45
180 B	63
200 B	52
200 M	45
200 S	45
236 B	45
250 B	60
250 S	40
284 B	40
300 S	40
330 S	45



- m) Fit the timing belt pulley (14) and the timing belt. Make sure that the pin on the back of the pulley is positioned correctly.

Note! Make sure that the position of the impulse transmitter cam disc is not altered.



14 Belt pulley

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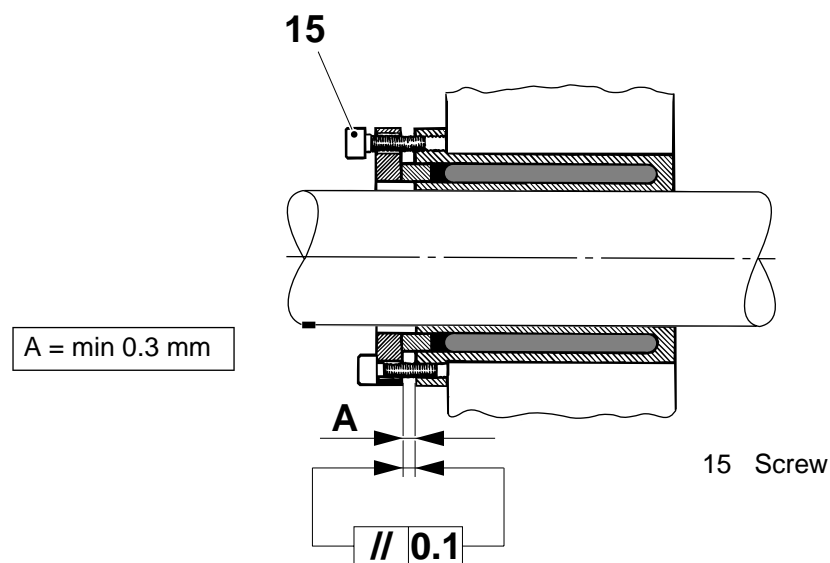
n) Lubricate the screws (15).

**Risk of serious damage!**

Never adjust the tightening torque afterwards by screwing out the screws. The result may be that the screws shake loose.

Caution! Make sure to keep **distance A** when tightening the screws.

o) Torque the screws (15) **in sequence** around the flange, half a turn at a time, until 8.0 ± 0.5 Nm is reached.

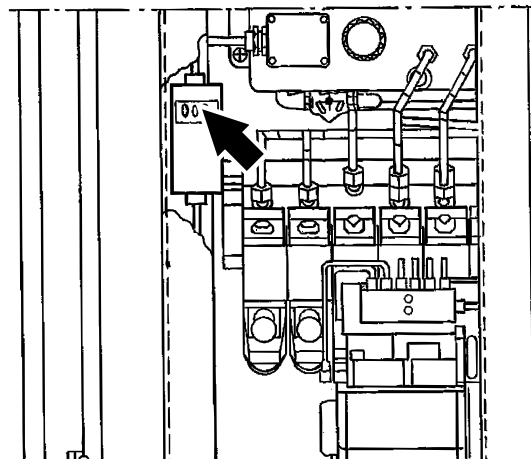
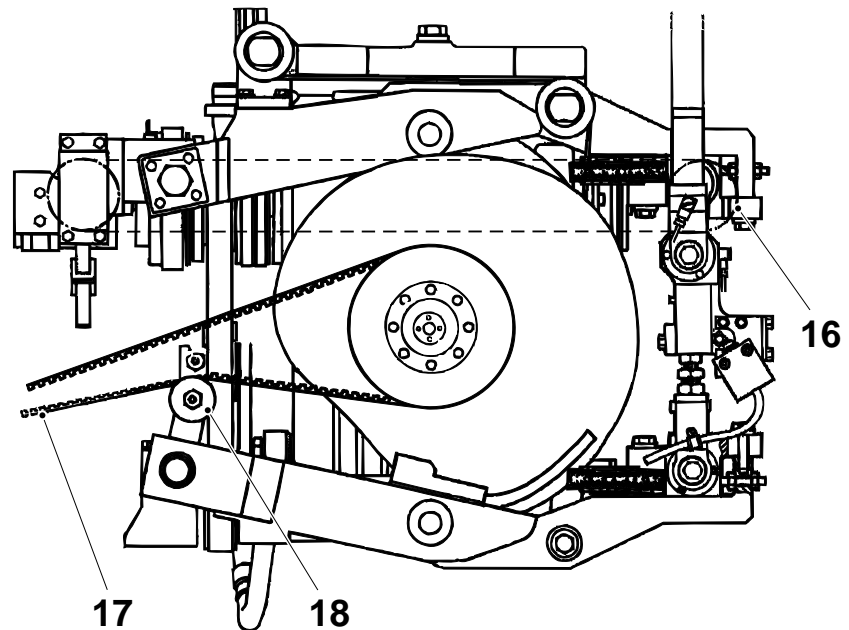


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- p) Tension the timing belt (17) by means of the belt tensioner (18).
- q) Make sure that the display (arrow) still shows 0°. If required, slacken the belt and skip teeth.
- r) Fit the degree scale pointer.
- s) By means of the spring balance, set the timing belt (17) tension to 8 ± 1 mm deflection with 15 ± 1 N load force.
- t) Fit and tension the crank chain (16).

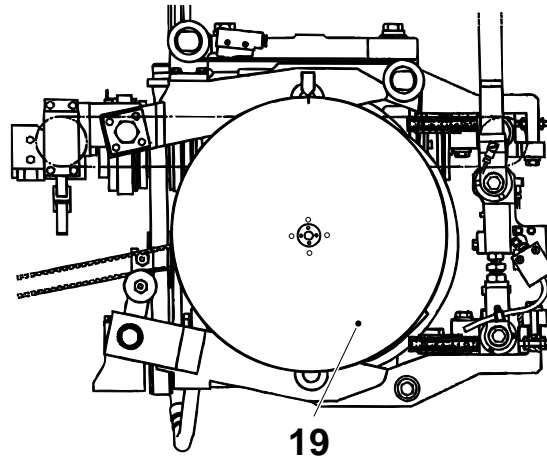


- 16 Crank chain
- 17 Timing belt
- 18 Belt tensioner

(Cont'd)

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- u) Fit the degree scale (19). Make sure that the two pins on the belt pulley have entered the holes on the degree scale.
- v) The degree scale and the display are to show 0°. If required, set the degree scale, see 3.8-2 *Curve pack - set degree scale* and the pointer, see 3.8-3 *Curve pack - set pointer*.



19 Degree scale

- w) Check the following:
 - 4.7-6 *Stroke - check*.
 - 4.7-3 *Jaw gap - check*.
 - 4.7-16 *Jaw over jaw - check*.

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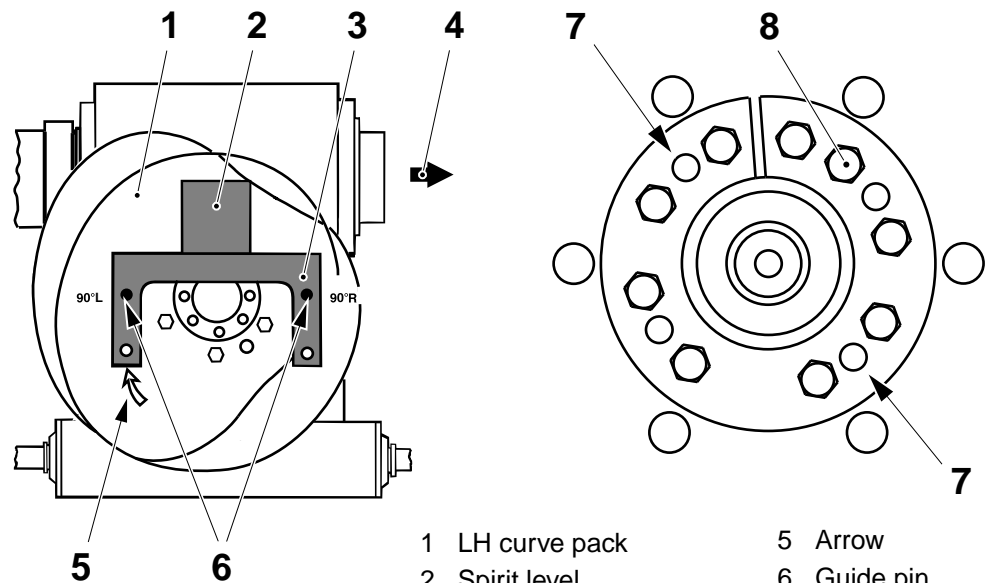
(Cont'd)

Assembly - machines not equipped with alignment template

Assembly - machines equipped with alignment template, see page 261.

Note! The curve packs are marked with arrows (5). On the LH curve pack (1), the arrow points clockwise, and on the RH curve pack counter-clockwise.

- a) Clean the worm gear shafts, the centre holes of the curve packs and the clamping elements.
- b) Apply a small amount of oil to the clamping elements. Use oil code D, see 10.2 Lubricants.
- c) Put a clamping element on the LH curve pack and fit the curve pack on the worm gear shaft.
- d) Fit back the screws (8) from the puller holes (7).
- e) Insert the two guide pins (6) into the holes marked 90°L and 90°R.
- f) Fit the template (3) to the guide pins and place the spirit level (2) on the top.

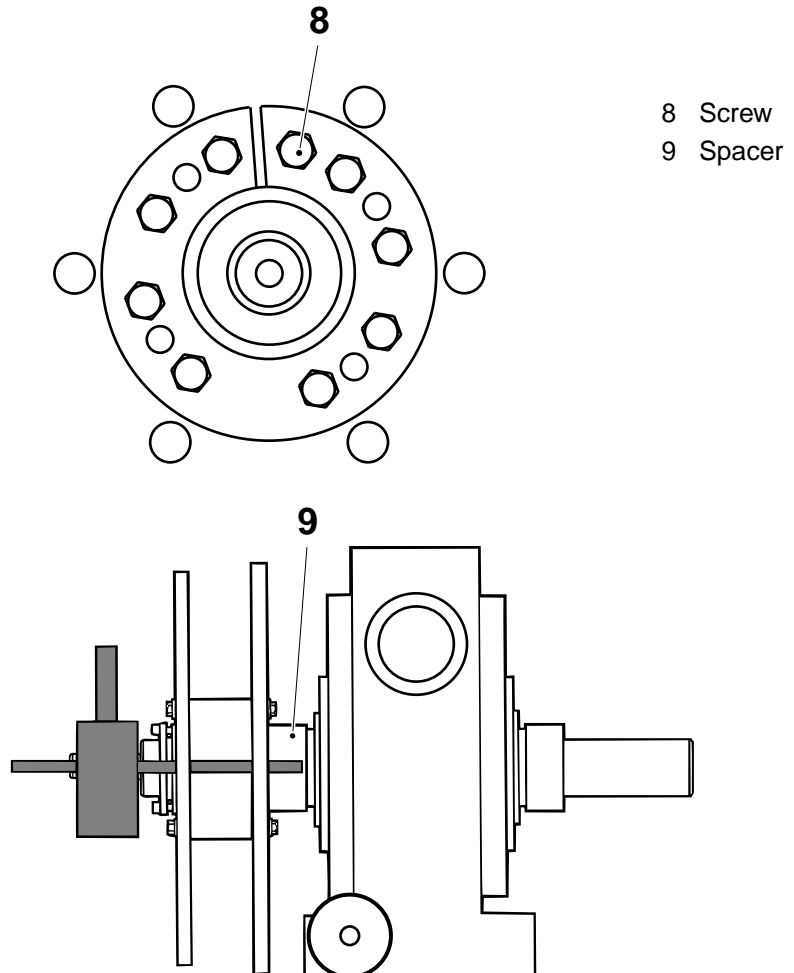


- | | |
|-----------------------------|---------------|
| 1 LH curve pack | 5 Arrow |
| 2 Spirit level | 6 Guide pin |
| 3 Template | 7 Puller hole |
| 4 Direction of final folder | 8 Screw |

(Cont'd)

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- g) Tighten the screws (8) **crosswise** by hand and turn the curve pack so that it is horizontal. Make sure the curve pack bears against the spacer (9).
- h) Torque the screws **crosswise**, first to 14 ± 1 Nm and then finally to 28 ± 1 Nm.

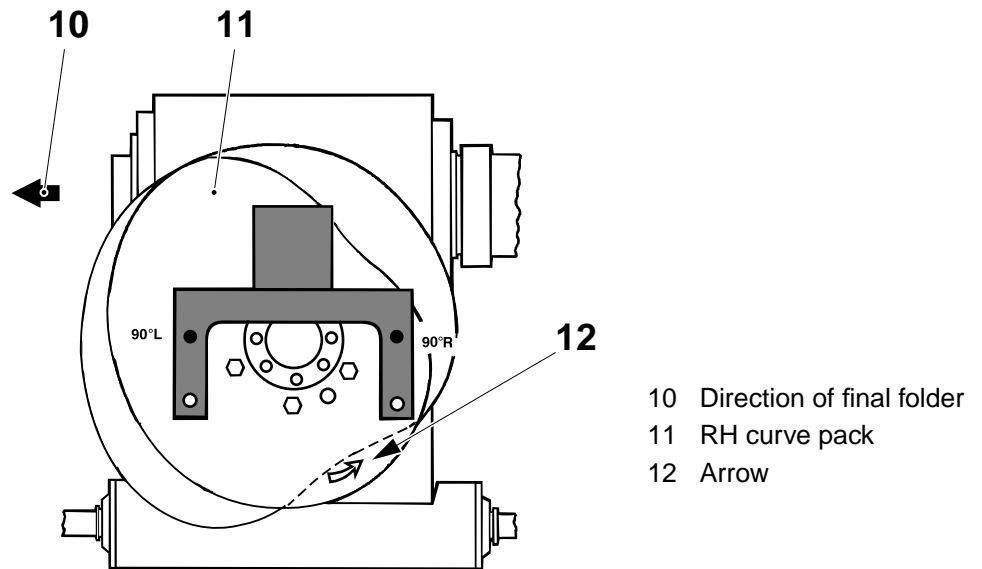


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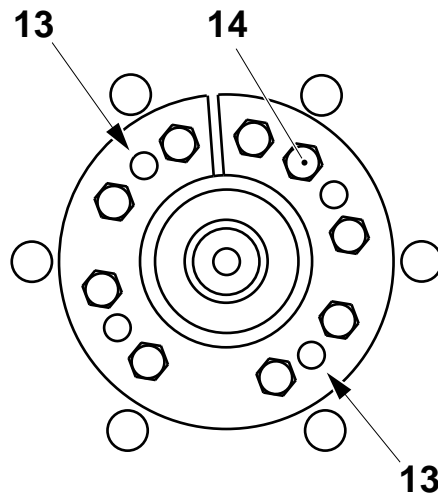
- i) Put the clamping element on the RH curve pack (11) and fit the curve pack on the worm gear shaft. Make sure that the arrow (12) on the curve pack points counter-clockwise.
- j) Turn the curve pack until it is displaced by 180° in relation to the LH curve pack.



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- k) Fit back the screws (14) from the puller holes (13).

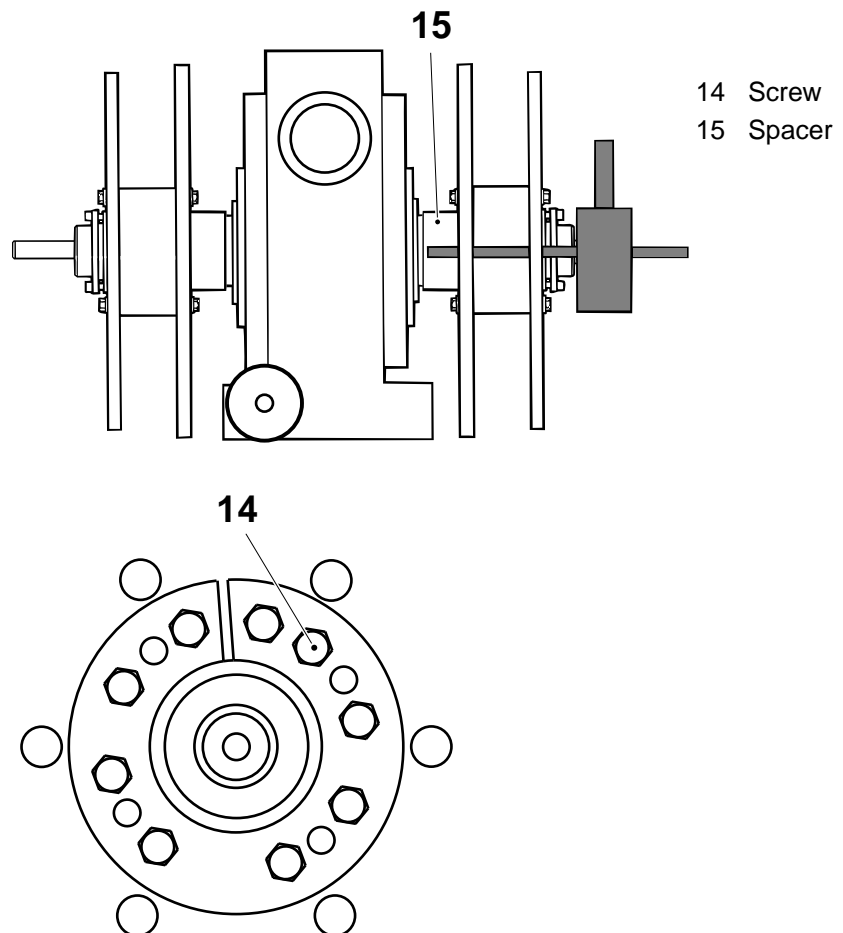


- 13 Puller hole
- 14 Screw

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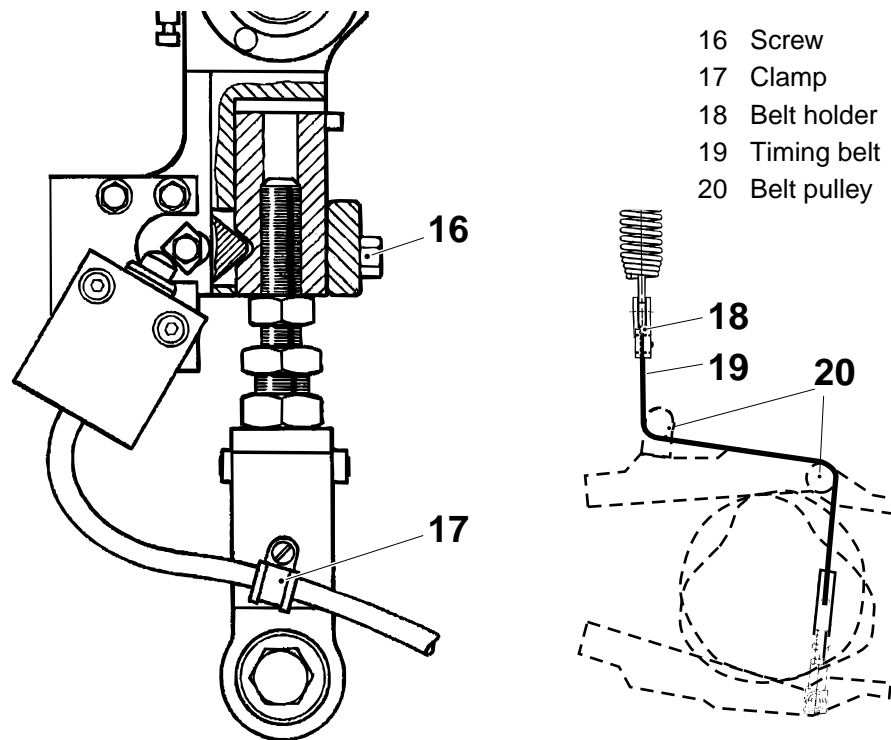
- l) Tighten the screws (14) to the clamping element **crosswise** by hand and turn the curve pack so that it is horizontal. Make sure that the curve pack bears against the spacer (15).
- m) Fit the setting templates to the RH curve pack.
- n) Level the curve packs relative one another **within 3 scale divisions** on the spirit level.
- o) Torque the screws (14) **crosswise**, first to 14 ± 1 Nm and then finally to 28 ± 1 Nm.



(Cont'd)

(Cont'd)

- p) Make sure that the LH curve pack is still horizontal. Remove the setting templates.
- q) Assemble the disconnection link and tighten the screw (16). Fit back the cable in the clamp (17) and remove the wooden blocks.
- r) Hook the timing belt holder (18) to the spring of the counter device. At the same time, put the timing belt (19) over the belt pulleys (20).



- s) Proceed according to *Assembly - machines equipped with alignment template items i) - w).*

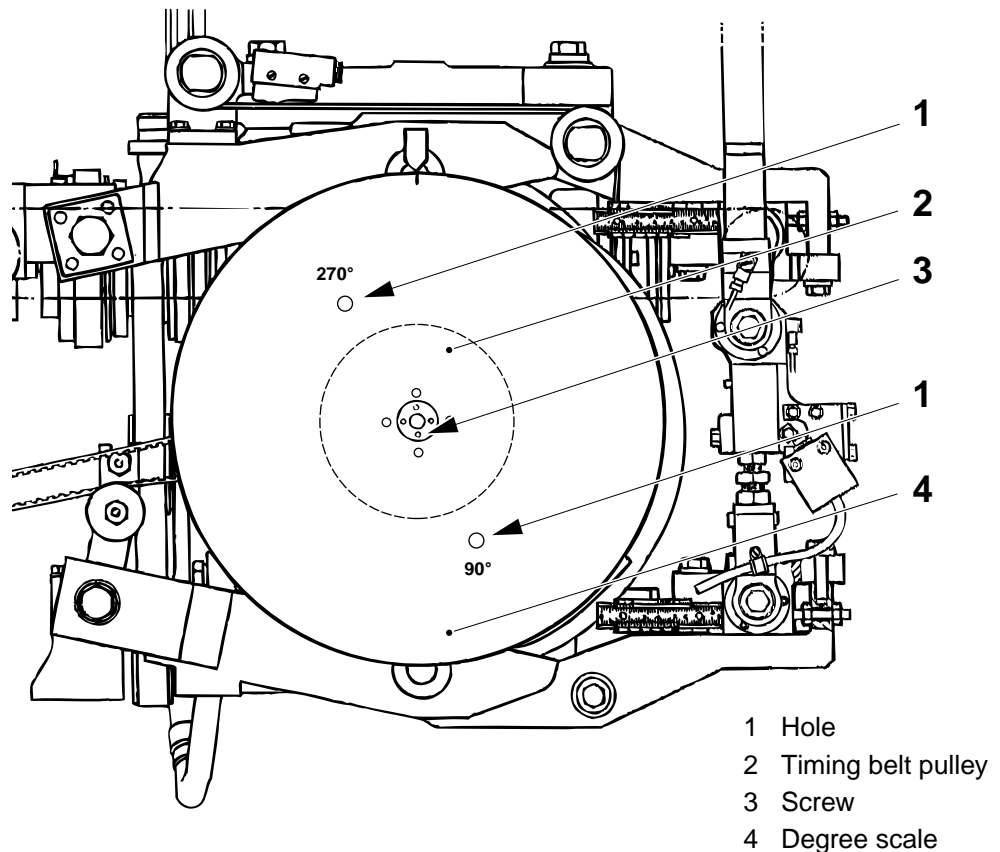
3.8-2 Curve pack - set degree scale

Tools	
- guide pin	TP No. 75451
- torque wrench	min 8 Nm
SPC reference	256202-020V

- a) Crank the machine until the RH yoke is in its upper turning position.
- b) Fit the degree scale (4) on the timing belt pulley (2). Make sure that the two pins on the belt pulley have entered the holes on the degree scale.

Caution! The screws **must not** be unscrewed.

- c) Loosen the clamping element by screwing out the screws (3) **in sequence** around the flange, half a turn at a time. If the clamping element sticks to the pulley (2), long screws may be used as puller tools.
- d) Turn the degree scale so that the 230° - 240° divisions face upwards.
- e) Set the degree scale so that the hole at the 270° divisions is in front of the hole marked 90°R on the arm cam behind.
- f) Insert the guide pins through the holes (1) at the 90° and 270° divisions and through the arm cam and yoke cam.



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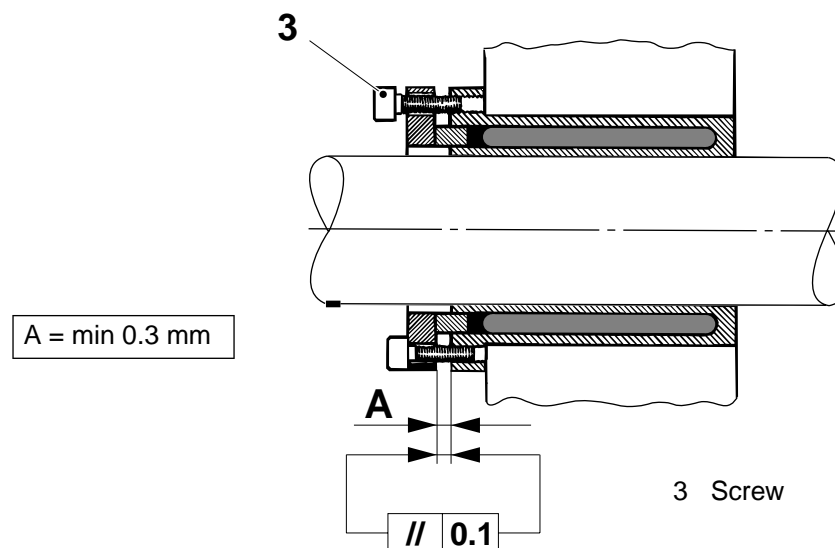
g) Lubricate the screws (3).

**Risk of serious damage!**

Never adjust the tightening torque afterwards by screwing out the screws. The result may be that the screws shake loose.

Caution! Leave **distance A** when tighten the screws.

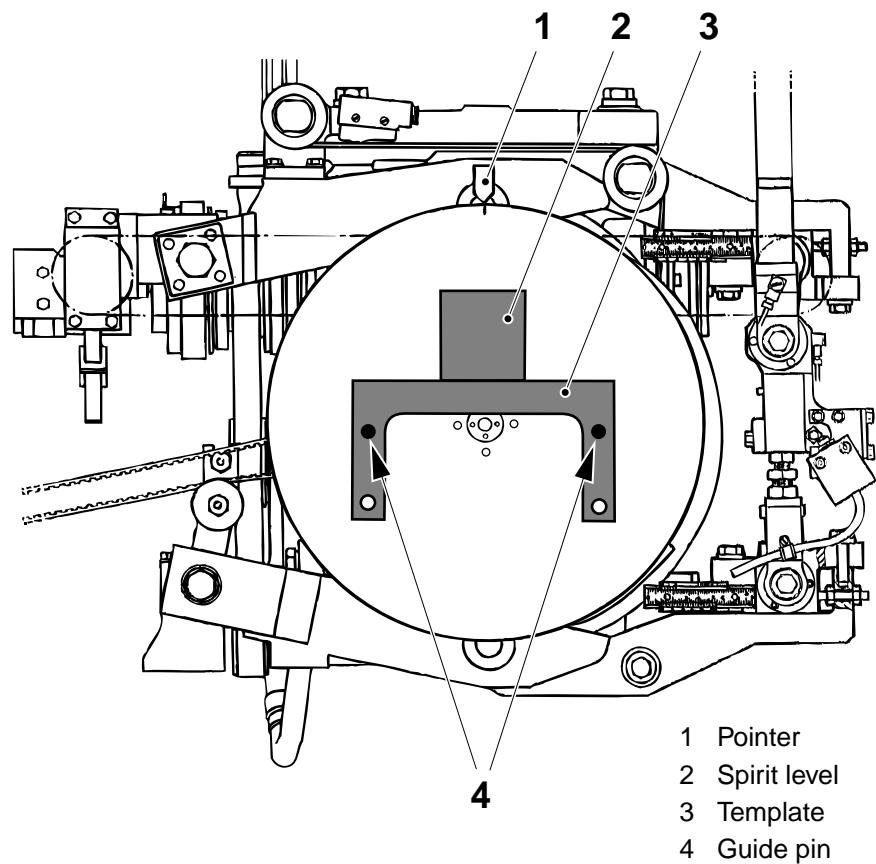
- h) Torque the screws (3) in sequence around the flange, half a turn at a time, until 8.0 ± 0.5 Nm is reached.
- i) Pull out the guide pins.
- j) Set the pointer, see 3.8-3 Curve pack - set pointer.
- k) Set the zero position on the impulse transmitter, see 6.6-3 Impulse transmitter - set zero position.



3.8-3 Curve pack - set pointer

Tools	
- spirit level	TP No. 90243-163
- guide pin	TP No. 75451
- template	TP No. 76338
SPC reference	256202-020V

- a) Crank to 0°.
- b) Fit the guide pins (4), the template (3) and the spirit level (2) on the cam pack.
- c) Crank until the spirit level is horizontal.
- d) Set the pointer (1) opposite 0° on the degree scale.



3.8-4 Curve pack - synchronise

Tools	
- template	TP No. 76338
- guide pin	TP No. 75451
SPC reference	256202-020V

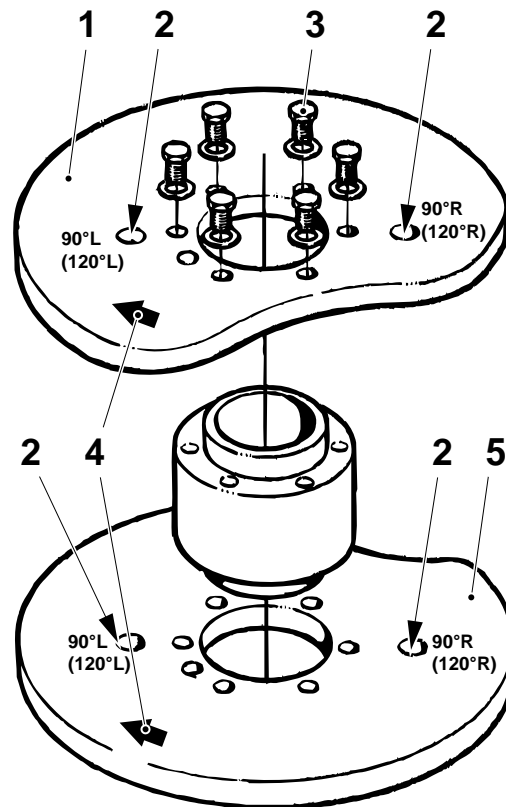
LH side curve pack

a) Place the arm cam (1) and the yoke cam (5) so that the text by the holes (2) reads right side up and so that the arrow (4) points **clockwise**.

Note! The cams are marked on both sides, since they are used for both RH and LH cam packs.

b) Fit the cams together and tighten the screws (3) lightly.

Note! Make sure that the hole marked 90°L on the upper cam is positioned above the hole marked 90°L on the lower cam.



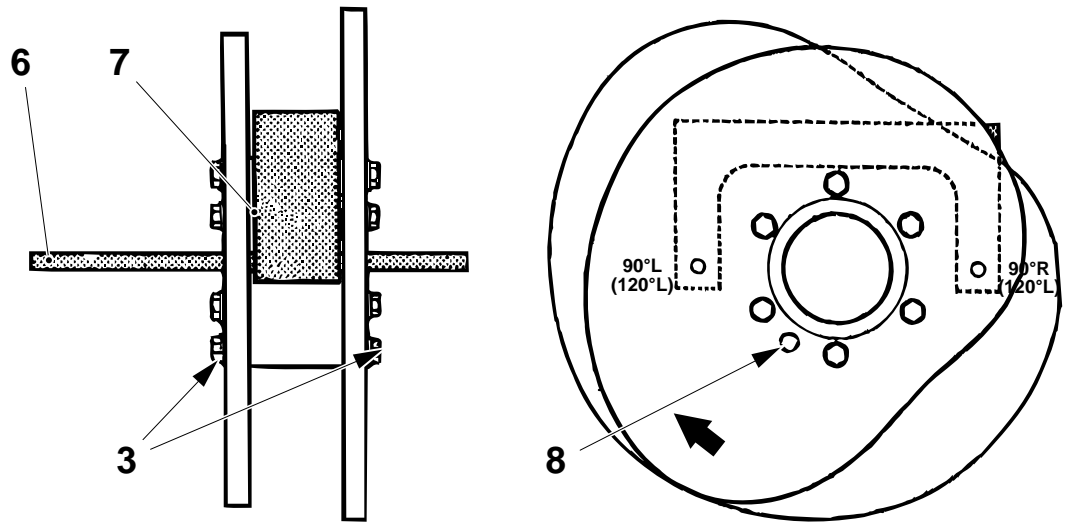
- 1 Arm cam
- 2 Hole
- 3 Screw
- 4 Arrow
- 5 Yoke cam

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- c) Place the template (7) between the cams. Insert the guide pin (6) through the cams and the template.
- d) Torque the screws (3) to 50 ± 2 Nm. Fit the pin (8).
- e) Remove the template and the guide pins.



- 3 Screw
- 6 Guide pin
- 7 Template
- 8 Pin

(Cont'd)

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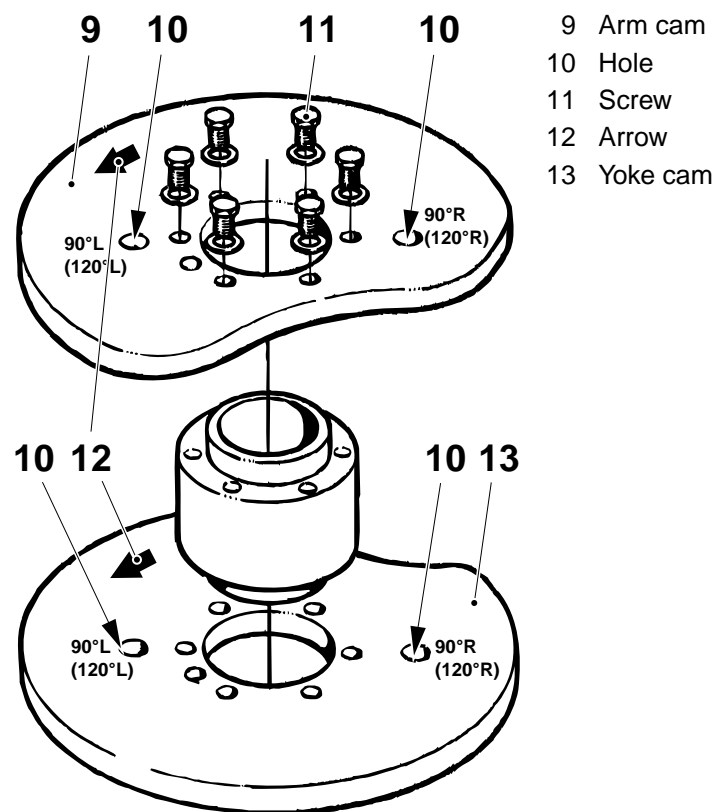
RH side curve pack

- a) Place the arm cam (9) and the yoke cam (13) so that the text by the holes (10) reads right side up and so that the arrow (12) points **counter-clockwise**.

Note! The cams are marked on both sides, since they are used for both RH and LH cam packs.

- b) Fit the cams together and tighten the screws (11) lightly.

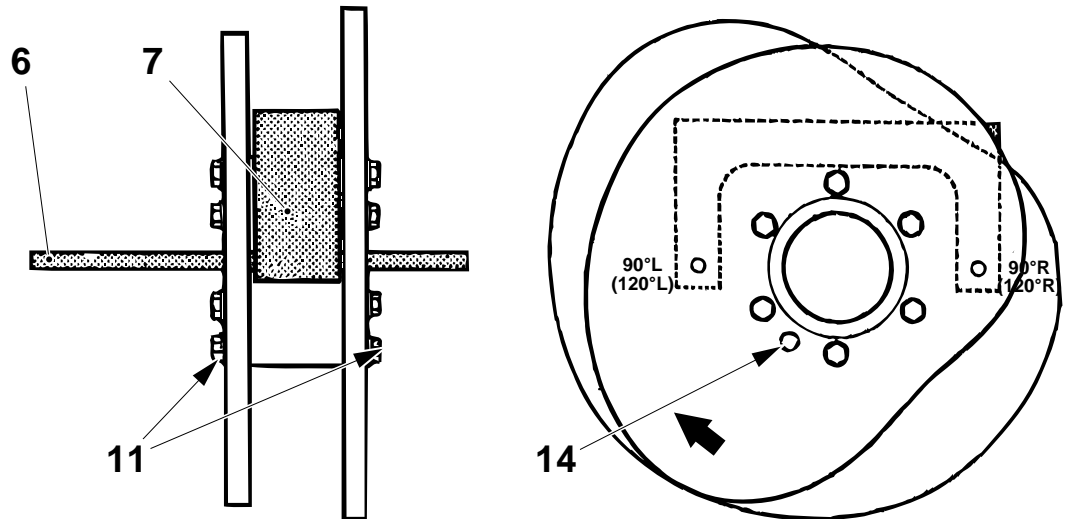
Note! Make sure that the hole marked 90°L on the upper cam is positioned above the hole marked 90°L on the lower cam.



(Cont'd)

(Cont'd)

- c) Place the template (7) between the cams. Insert the guide pin (6) through the cams and the template.
- d) Torque the screws (11) to 50 ± 2 Nm. Fit the pin (14).
- e) Remove the template and the guide pins.

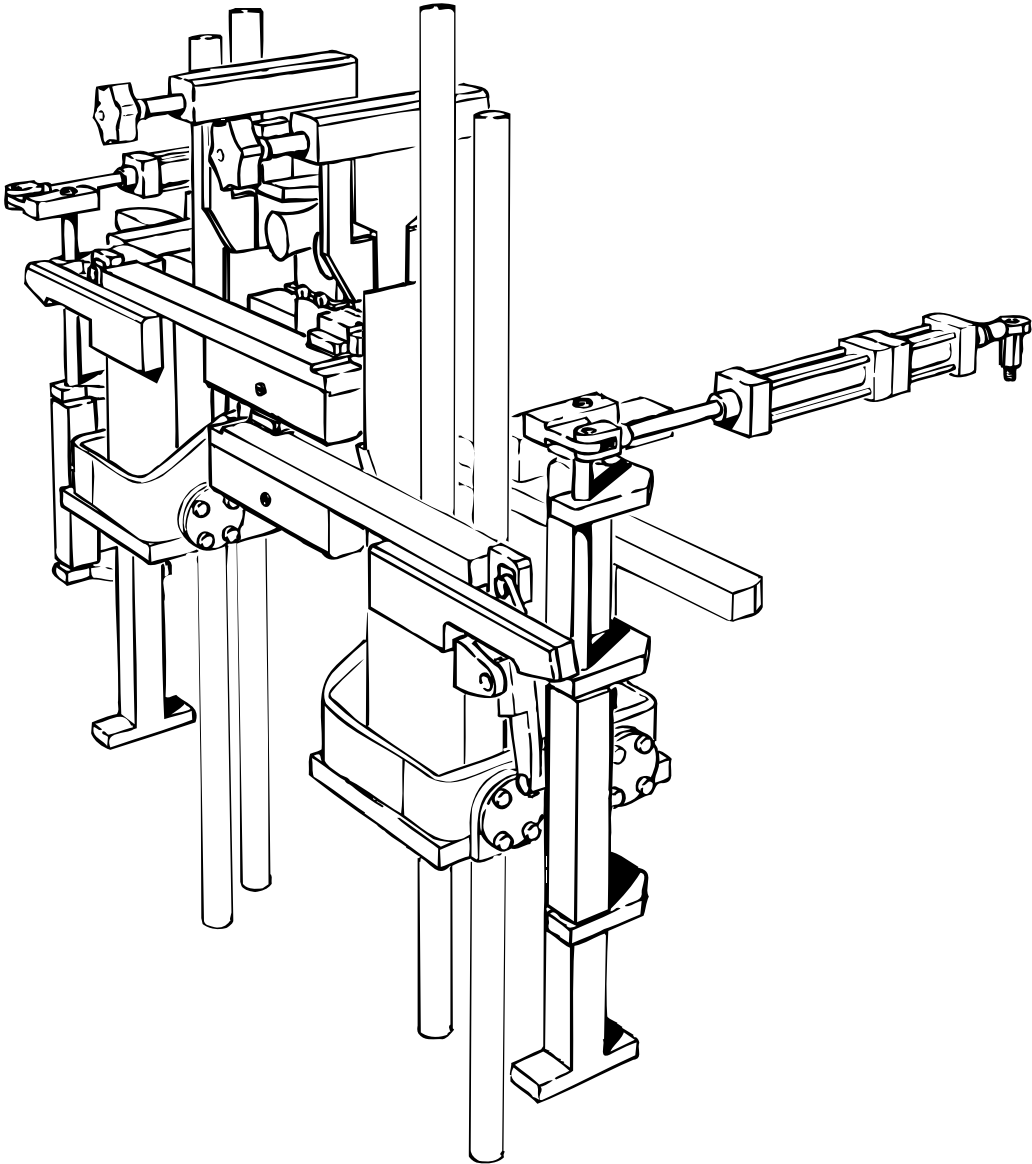


- 6 Guide pin
- 7 Template
- 11 Screw
- 14 Pin

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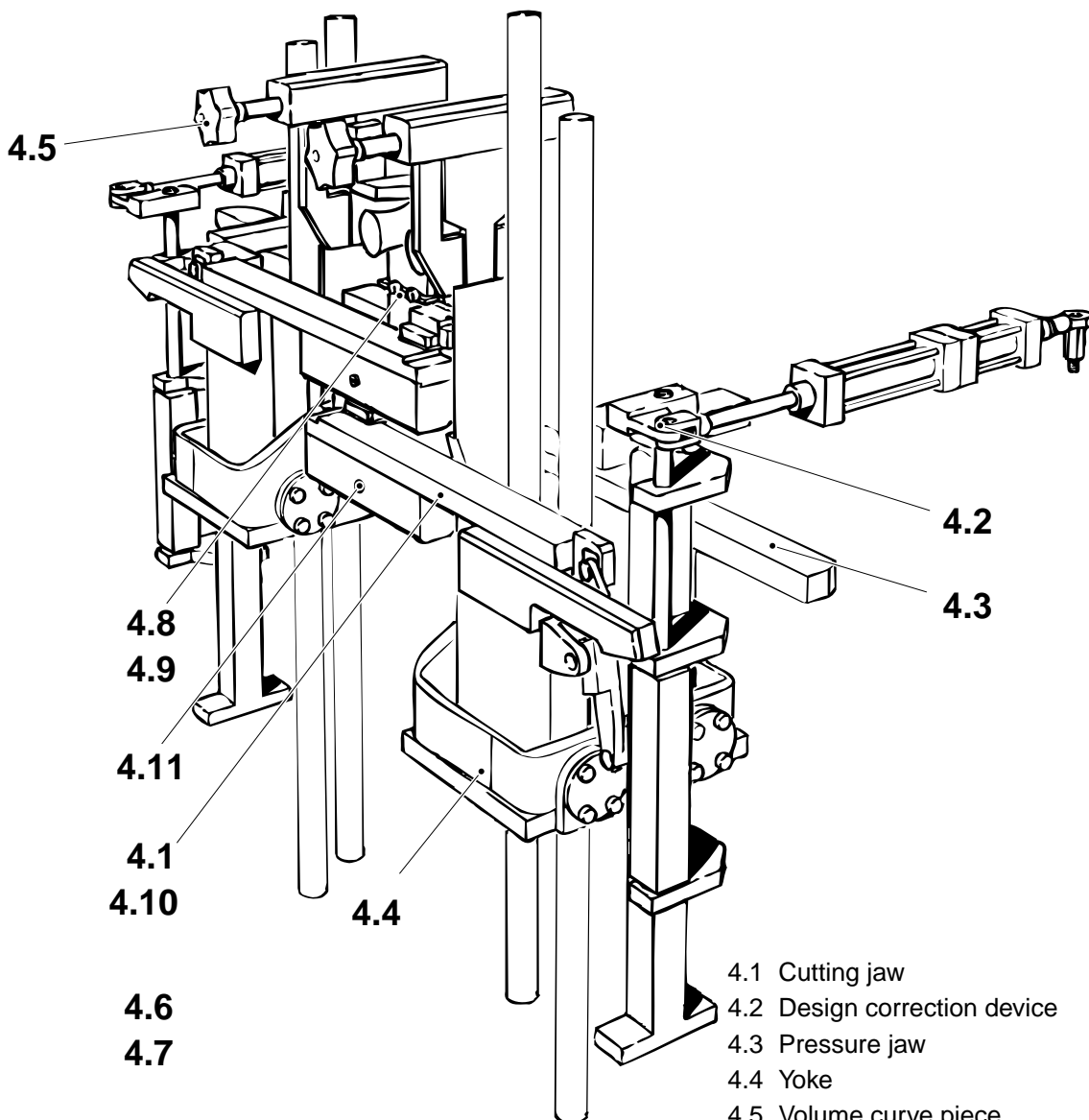
4 Jaw system



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4-1 Jaw system - description

SPC reference 648104-110V



- 4.1 Cutting jaw
- 4.2 Design correction device
- 4.3 Pressure jaw
- 4.4 Yoke
- 4.5 Volume curve piece
- 4.6 Central lubrication
- 4.7 Basic jaw system setting
- 4.8 Shock absorber
- 4.9 Volume flap
- 4.10 Pressure rail
- 4.11 Knife holder

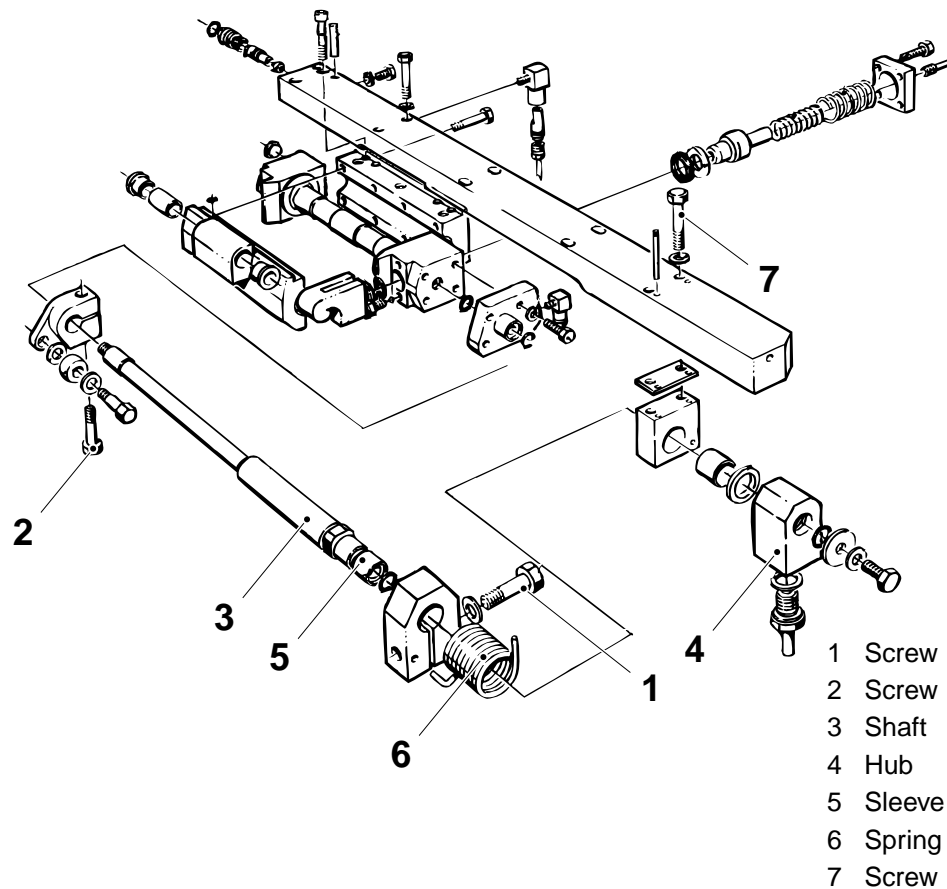
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4-2 Jaw system - change pressure and cutting jaws

Consumable - oil - adhesive tape	code H
SPC reference	256205-060V 256212-060V 256213-060V

Pressure jaw - change

- Crank until one of the jaw pairs is open
- Unscrew the IH rail from the pressure jaw.
- Unscrew the banjo connections and the oil connections.
- Loosen the screw (1) and the screw (2).
- Unscrew the shaft (3) and pull it out together with the hub (4), the sleeves (5) and the spring (6).
- Unscrew the four screws (7) and remove the pressure jaw and the shims.
- Change the pressure jaw and assemble in the reverse order.



(Cont'd)

4 Jaw system

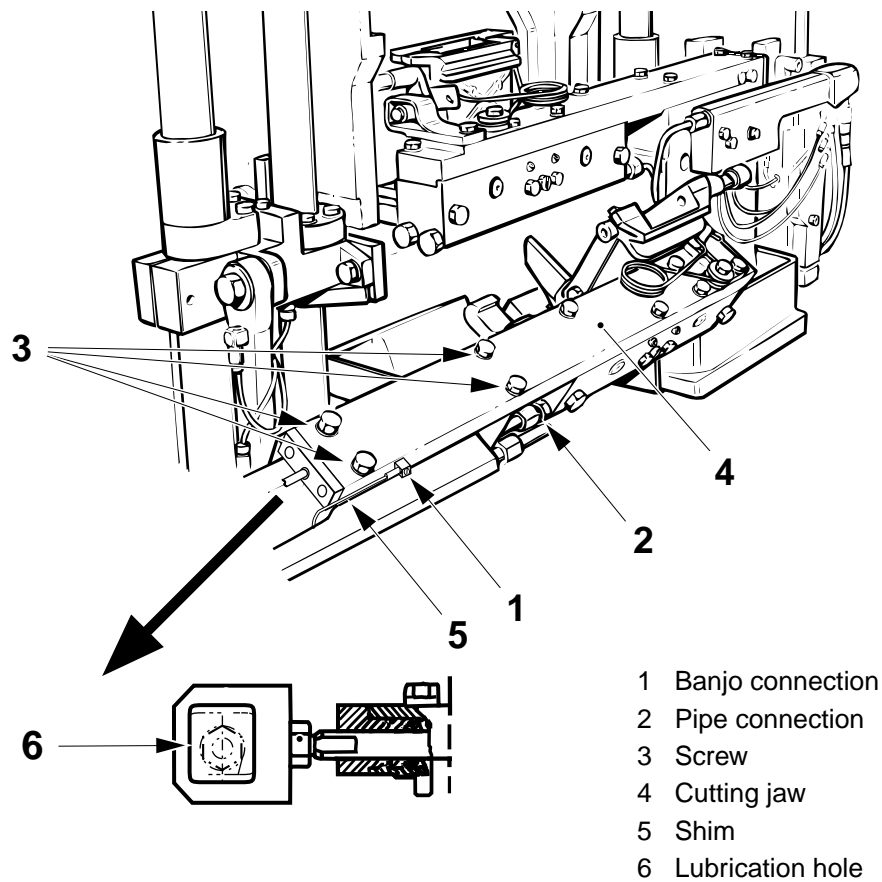
(Cont'd)

Cutting jaw - removal

- a) Crank until one of the jaw pairs is fully open.
- b) Unscrew the banjo connection (1) and the pipe connection (2).
- c) Unscrew the four screws (3) and change the cutting jaw (4) and the shims (5).
- d) Repeat on the other cutting jaw.

Cutting jaw - fitting

- a) Assemble in the reverse order. Make sure that the lubrication hole (6) in the end piece is pointing outwards.



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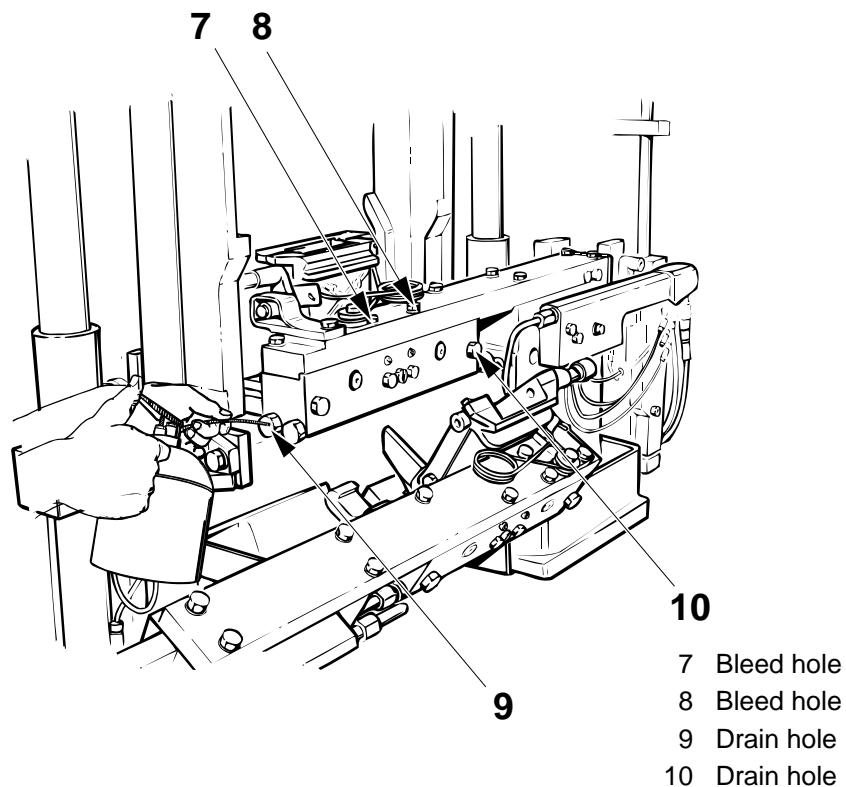


(Cont'd)

Chemical products!

Lubricant. Follow the *Safety precautions*.

- b) Unscrew the screws from the bleed holes (7) and (8) and from the drain holes (9) and (10).
- c) Top up with oil through the drain hole (9).
Oil code H, see *10.2 Lubricants*.
- d) When oil is flowing out through the bleed hole (7), put a finger over the hole, remove the oil can and fit the screw in the drain hole (9).
- e) Repeat the same procedure and top up through the drain hole (10).
- f) When oil is flowing out through the bleed hole (8), put a finger over the hole, remove the oil can and fit the screw in the drain hole (10).
- g) Fit the bleed hole screws.
- h) Crank until the other jaw pair is open and **repeat items b) - g)** for the other cutting jaw.



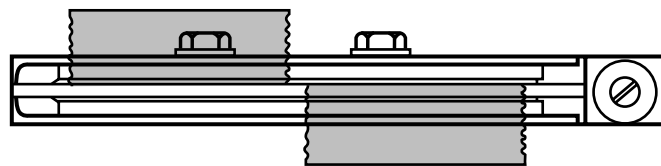
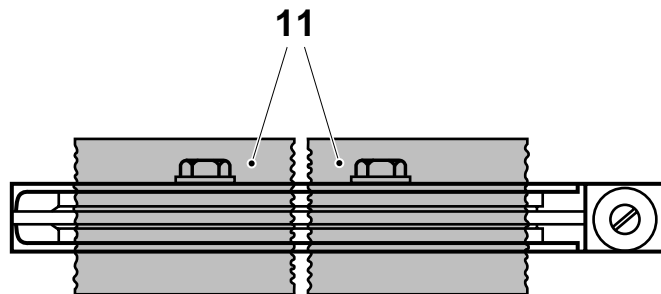
- i) Crank to 30°.

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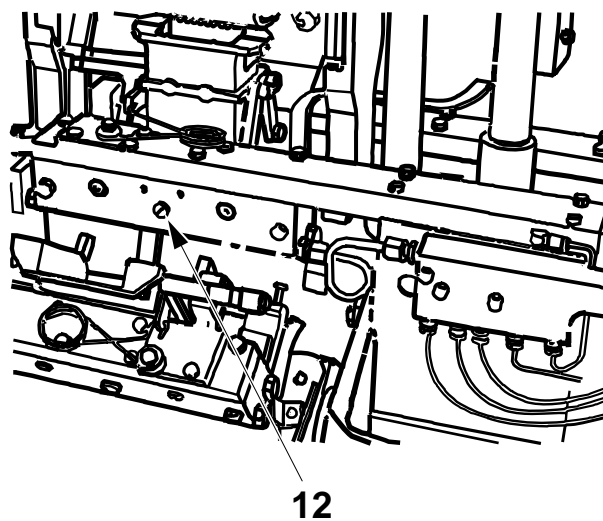
4 Jaw system

(Cont'd)

- j) Stick two pieces of adhesive tape (11) to the inductor.
- k) Crank to 79°.
- l) Tap the head of the knife screw (12) lightly so that the knife cuts through the tape.
- m) Crank the jaws open. Remove the upper RH and lower LH pieces of tape.
- n) Check the vertical position. The knife must **not** hit the edge of the groove. If required remove the cutting jaw and add/remove shims.
- o) Crank to 210°.
- p) Stick two pieces of adhesive tape to the inductor.
- q) Crank to 259° and repeat items l) - n).



- 11 Adhesive tape
12 Knife screw



(Cont'd)

(Cont'd)

- r) Bleed the pistons, see *4-3 Jaw system - bleed pressure and cutting jaws*.
- s) Check the following:
 - *4.7-14 Volume flap - alignment*
 - *4.7-13 Folding flap mechanism - check*
 - *4.7-3 Jaw gap - check*
- t) Check and, if required, set the package weight, see *4.7-10 Volume flap - set package weight*.

4-3 Jaw system - bleed pressure and cutting jaws

Machine status	Power On Water On Service switch On
SPC reference	256205-060V 256212-060V 256213-060V

Pressure jaw

- Crank to 0°.
- Reduce the hydraulic pressure (jaw pressure) to approx. 4 MPa. Loosen the lock nut (1) and set with the adjustment wheel (2). Read the pressure on the pressure gauge (3).



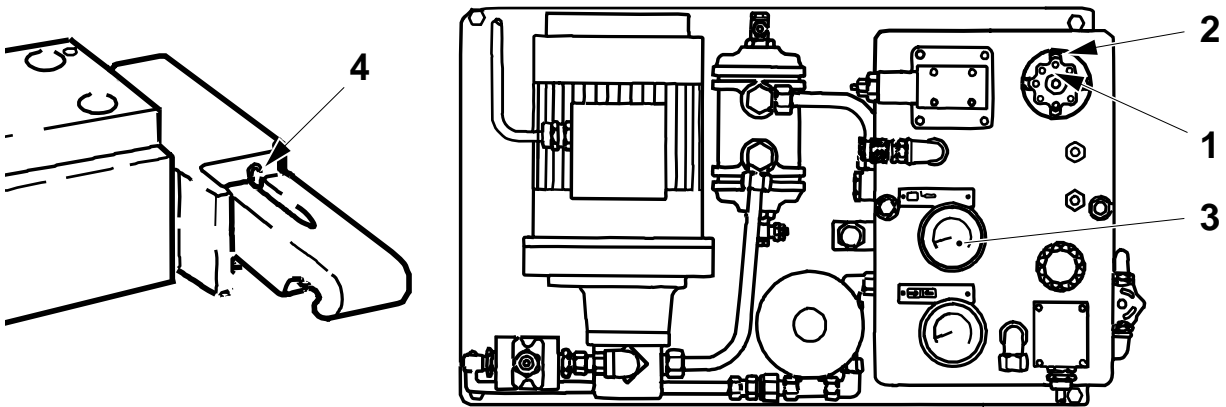
Risk of personal injury!

Watch out for splashing. Wear protective glasses.

Caution!

Do **not** overtighten.

- Tighten the screws.
- Crank to 180° and bleed the catches of the LH side.
- Set the correct hydraulic pressure, see *10.1 Technical data*. Follow the procedure in *b*).



- Lock nut
- Adjustment wheel
- Pressure gauge
- Bleeding screw

(Cont'd)

(Cont'd)

Cutting jaw

- a) Crank to 75°.
- b) Reduce the hydraulic pressure (cutting pressure) to approx. 4 MPa.
Unscrew the lock nut (2) and set with the screw (1). Read the pressure on the pressure gauge (3).



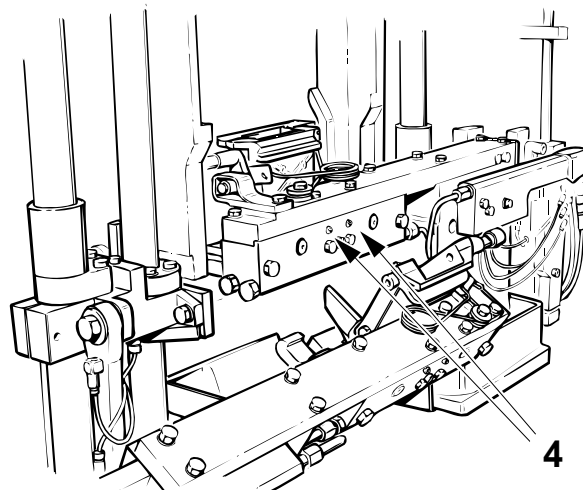
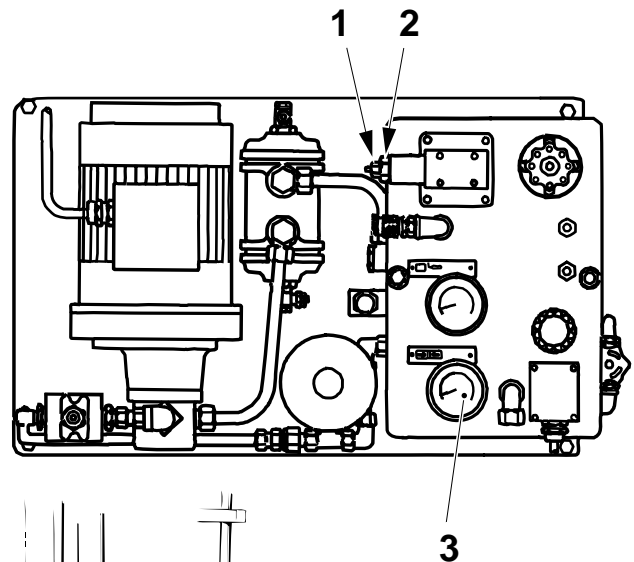
Risk of personal injury!

Watch out for splashing. Wear protective glasses.

Caution! Do **not** overtighten.

- c) Loosen the screws (4) carefully and bleed the cutting mechanism on the RH side.

- d) Tighten the screws.



- 1 Setting screw
- 2 Lock nut
- 3 Pressure gauge
- 4 Screw

(Cont'd)

4 Jaw system

(Cont'd)

- e) Crank to 255° and bleed the cutting mechanism on the LH side.
- f) Set correct hydraulic pressure, see *10.1 Technical data*. Follow the procedure in *b*).
- g) Make sure that there is no oil leakage.

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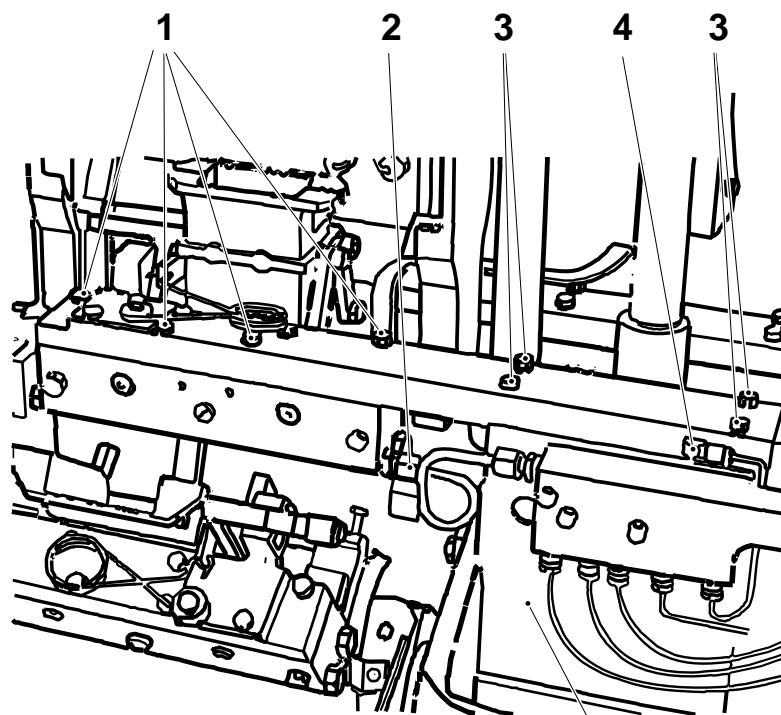
4.1 Cutting jaw

SPC reference	256205-060V
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4.1-1 Cutting jaw - set folding flap parallelity

Consumable - oil - adhesive tape	code H
SPC reference	256205-060V

- Unscrew the banjo connection (4) and the pipe connection (2).
- Mark the position of the cutting jaw on the yoke (5) with the adhesive tape.
- Unscrew the four screws (3) and remove the cutting jaw. Note the shims under the cutting jaw.
- Unscrew the four screws (1) and remove the bearing housing from the carrier.



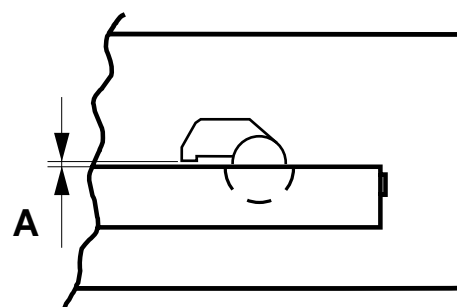
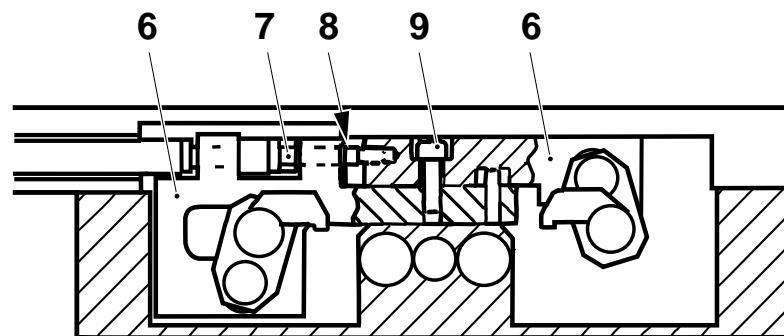
5

- 1 Screw
- 2 Pipe connection
- 3 Screw
- 4 Banjo connection
- 5 Yoke

(Cont'd)

(Cont'd)

- e) Loosen the screws (7) and (9).
- f) Set the folding flaps parallel by adding or removing shims (8) in the carrier ruler (6). (Altering the shim thickness 0.05 mm changes the distance A 0.07 mm.)
- g) Tighten the screws (7) and (9). Fit the bearing housing on the carrier. Place a 0.7 mm feeler gauge under one folding flap and move the carrier ruler into non-corrective position.
- h) Check that there is distance A under the other folding flap. If not repeat items *d) - g)*.



$$A = 0.7 \pm 0.05 \text{ mm}$$

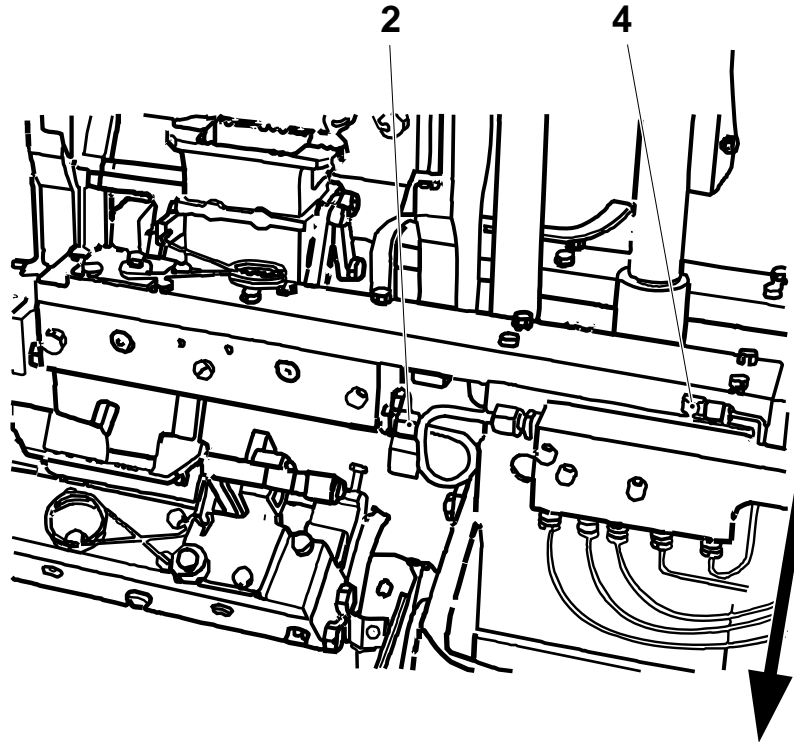
- 6 Carrier ruler
- 7 Screw
- 8 Shim
- 9 Screw

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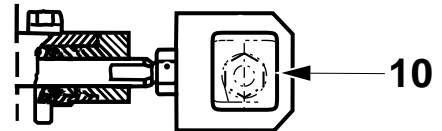
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- i) Fit the cutting jaw, use the marks from above. Make sure that the lubrication hole (10) in the end piece is pointing outwards and that the shims are fitted under the cutting jaw.
- j) Fit the pipe connection (2) and the banjo connection (4).



- 2 Pipe connection
- 4 Banjo connection
- 10 Lubrication hole



(Cont'd)

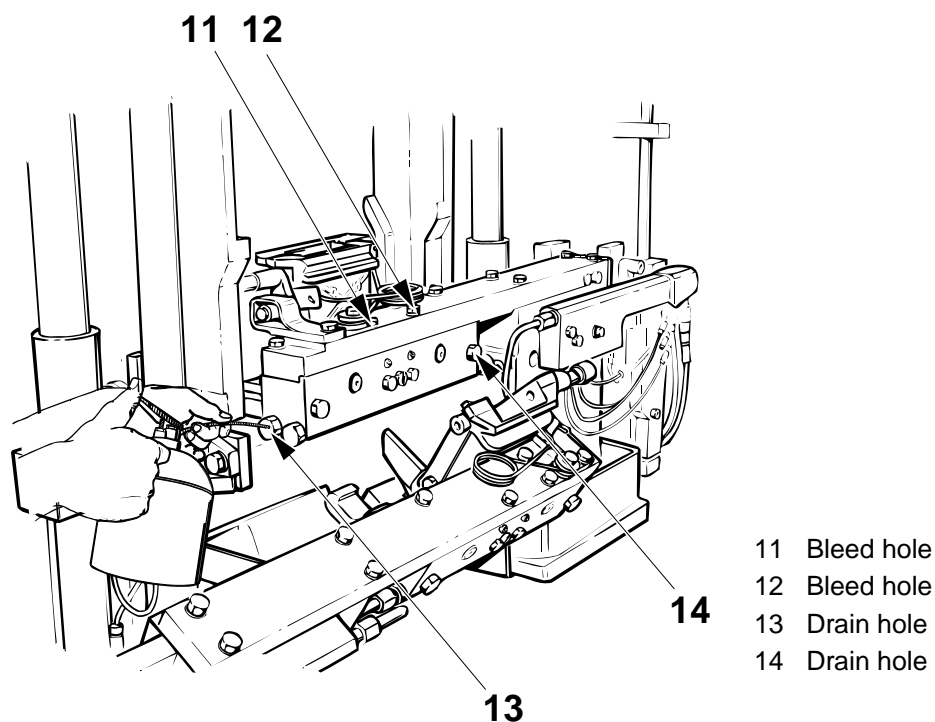


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Chemical products!

Lubricant. Follow the *Safety precautions*.

- k) Unscrew the screws from the bleed holes (11) and (12) and from the drain holes (13) and (14).
- l) Top up with oil through the drain hole (13). Oil code H, see *10.2 Lubricants*.
- m) When oil is flowing out through the bleed hole (11), put a finger over the hole, remove the oil can and fit the screw in the drain hole (13).
- n) Repeat the same procedure and top up through the drain hole (14).
- o) When oil is flowing out through the bleed hole (12), put a finger over the hole, remove the oil can and fit the screw in the drain hole (14).
- p) Fit the bleed hole screws.



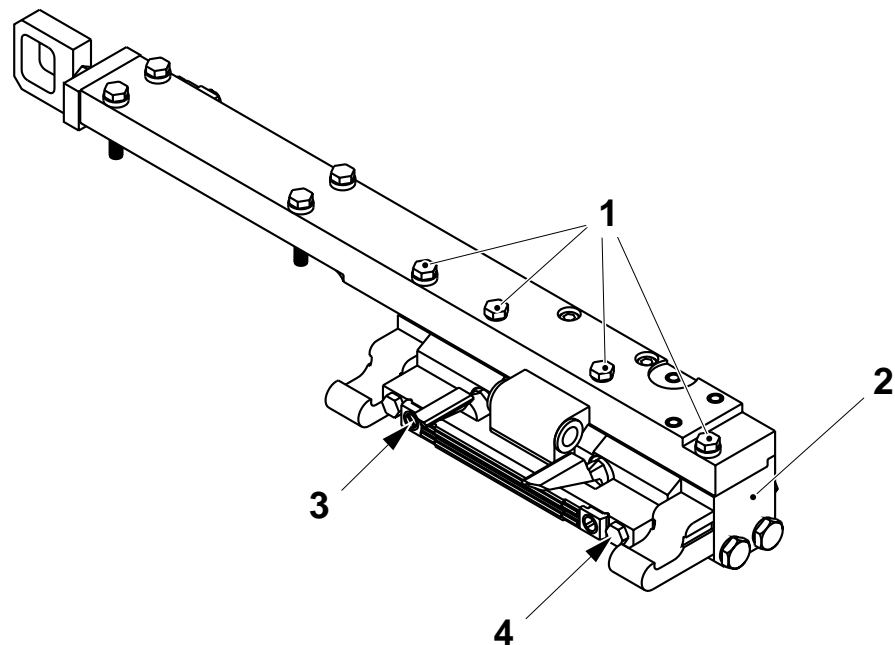
- 11 Bleed hole
- 12 Bleed hole
- 13 Drain hole
- 14 Drain hole

- q) Bleed the cutting pistons, see *4-3 Jaw system - bleed pressure and cutting jaws*.
- r) Set the volume flap alignment, see *4.7-14 Volume flap - alignment*.
- s) Set the folding flap mechanism, see *4.7-13 Folding flap mechanism - check*.

4.1-2 Cutting jaw - overhaul

Consumable - adhesive	
Tools - assembly cone - assembly tool - calibration tool	TP No. 76131 TP No. 76132 TP No. 78801
SPC reference	256205-060V

- a) Remove the volume flaps and the shock absorber from the cutting jaw.
- b) Unscrew the four screws (1) and remove the bearing housing (2).
- c) Unscrew the screws (3) and pull off the dollies. Unscrew the screws (4) and remove the knife holder. Change the dollies and, if required the cutting jaw.
- d) Overhaul the knife holder, see *4.11 -1 Knife holder - overhaul*.



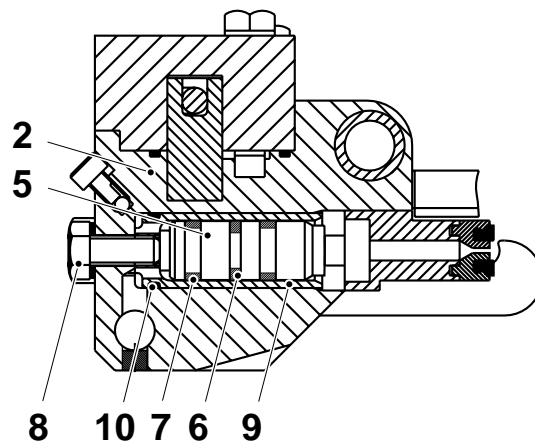
- 1 Screw
- 2 Bearing housing
- 3 Screw
- 4 Screw

(Cont'd)

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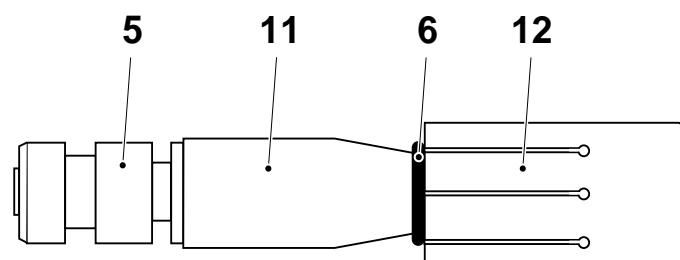
Note! To make it easier to remove the plungers, apply a small compressed air flow through the hydraulic oil pipe connection.

- e) Pull out the plungers (5) and remove the sealing rings (6) and the guide rings (7).
- f) Unscrew the screws (8) and remove the sleeves (9). Remove the O-rings (10).
- g) Check and, if required, change the bearing housing (2). Change the sealing rings, the guide rings and the O-rings. Change the plungers as required.



- 2 Bearing housing
- 5 Plunger
- 6 Sealing ring
- 7 Guide ring
- 8 Screw
- 9 Sleeve
- 10 O-ring

- h) Fit back O-rings and the sleeves.
- i) Slide the assembly cone (11) on to the plunger (5). Slide the sealing ring (6) over the cone. Move the sealing ring into the groove in the plunger with the aid of the assembly tool (12).



- 5 Plunger
- 10 O-ring
- 11 Assembly cone
- 12 Assembly tool

(Cont'd)

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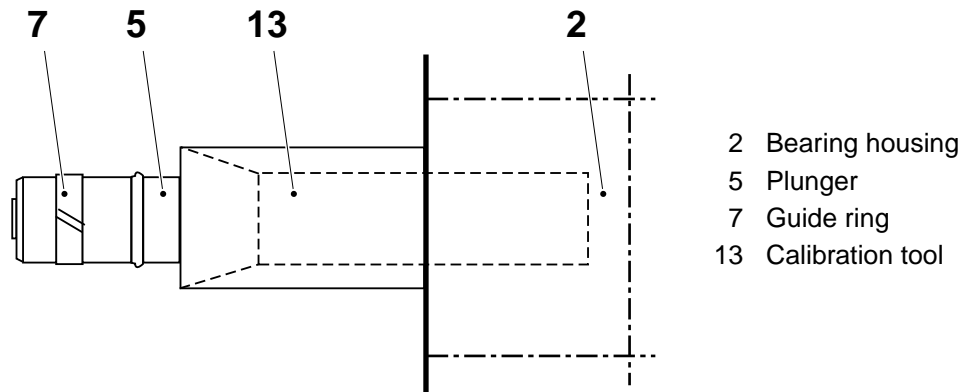
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j) Fit the guide rings (7) in their grooves.

Note! Shaping the guide rings will be easier if they are heated in boiling water.

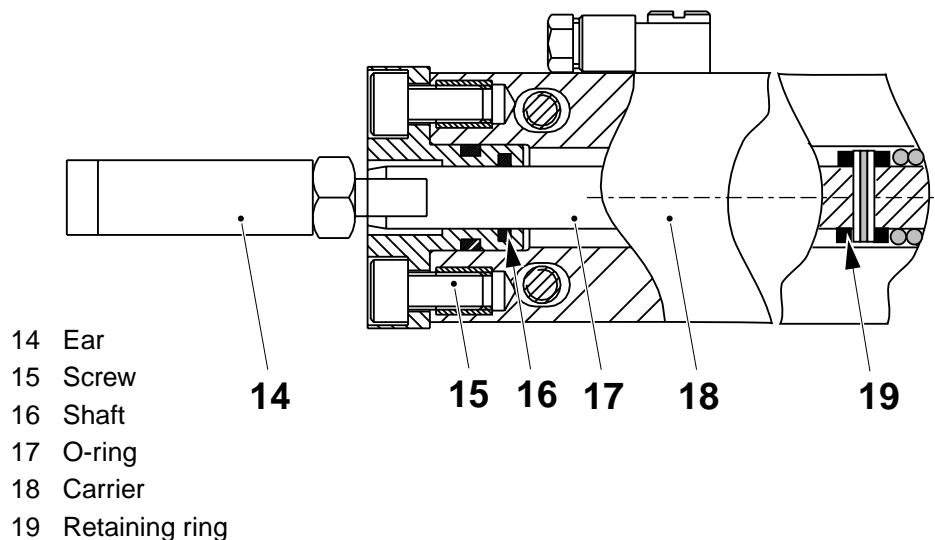
k) Calibrate the guide rings by forcing the plunger (5) through the calibration tool (13).

l) Insert the calibration tool into the bearing housing (2).
Put the plunger through the calibration tool and into the bearing housing.



m) Unscrew the screws (15) and pull out the shaft (17) together with the compression spring. Check and, if required, change the carrier (18).

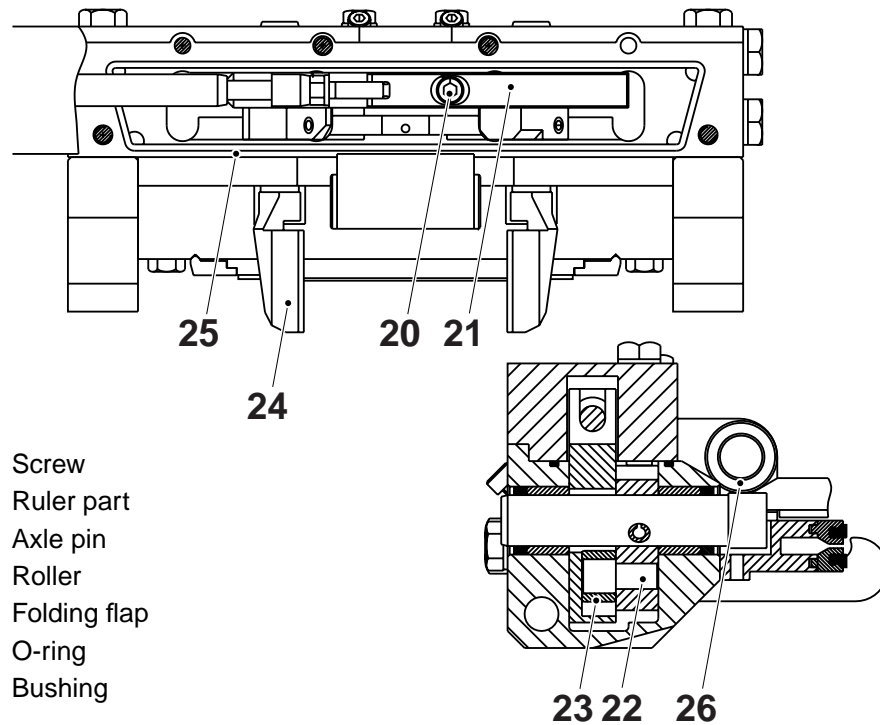
n) Change the compression spring, the washer and the O-ring (16).
If required, also change the shaft, the retaining ring (19), the bearing plate and the ear (14). Reassemble and fit back.



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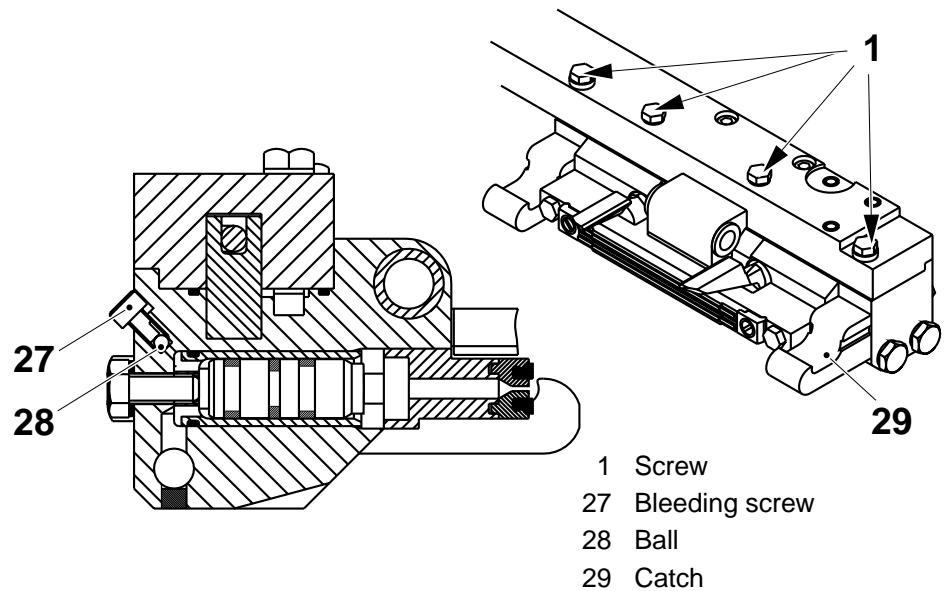
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- o) Unscrew the screws (20) and pull out the ruler part (21). If required, change the axle pin (22), the roller (23) and the two ruler parts.
- p) Remove the pins and pull out the folding flaps (24), the rollers and the seal rings. Change the seal rings and, if required the rollers and the folding flaps. Fit the folding flaps and new pins.
- q) Change the O-ring (25). Fit the new one with adhesive.
- r) If required, change the bushings (26).

*(Cont'd)*

(Cont'd)

- s) Change the screws (1) and the washers.
- t) Unscrew the bleeding screws (27) and change the balls (28). If required, change also the screws.
- u) If required, change the catches (29).



- v) Reassemble the bearing housing and the carrier.
- w) Assemble the cutting jaw and fit back. Follow the procedure in 4-2 *Jaw system - change pressure and cutting jaws*.
- x) Overhaul the volume flap, see 4.9 -1 *Volume flap - overhaul*, and fit it on the cutting jaw.
- y) Overhaul the shock absorber, see 4.8-1 *Shock absorber - overhaul*, and fit it on the cutting jaw.
- z) Set the folding flap parallelity. Follow the procedure in 4.1-1 *Cutting jaw - set folding flap parallelity*.

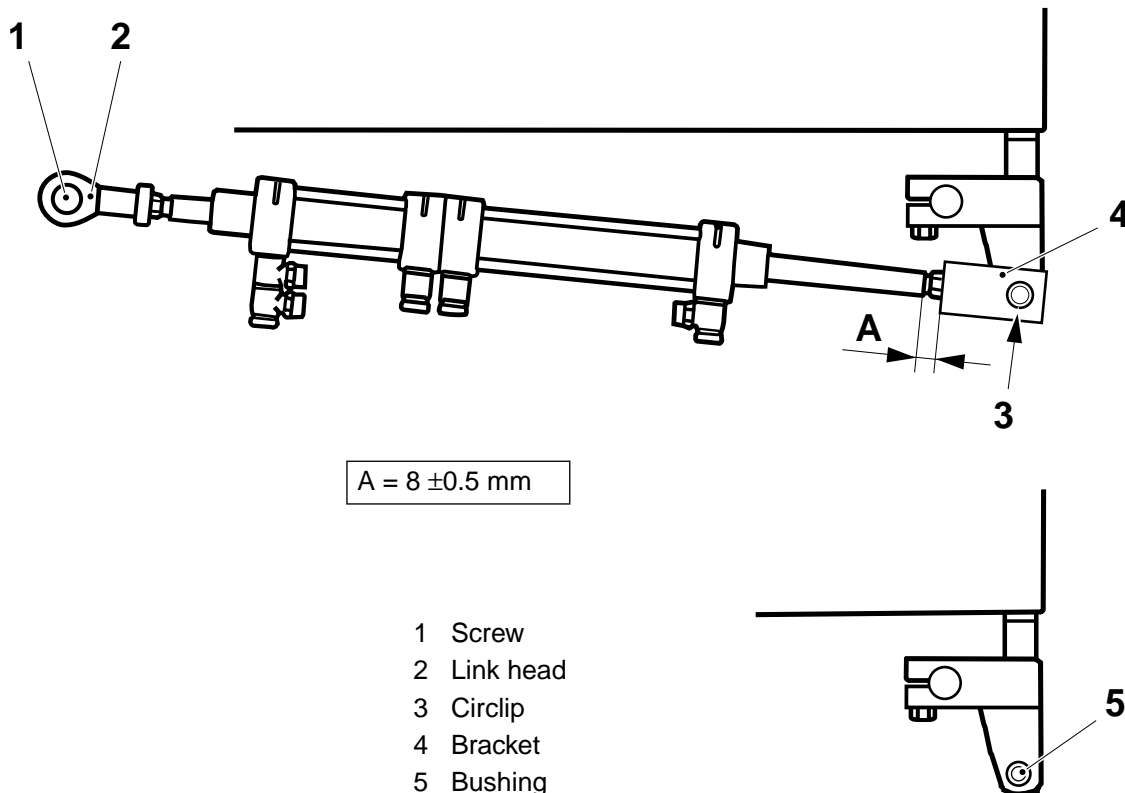
4.2 Design correction device

SPC reference	256206-030V 256207-030V
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4.2-1 Design correction device - change brackets and link heads

Tools - template	TP No. 75945
SPC reference	256206-030V 256207-030V

- a) Unscrew the screw (1) and lift off the link head.
- b) Change the link head (2).
- c) Remove the circlip (3) and lift off the cylinder.
- d) Change the bracket (4).
- e) Change the bushing (5) and the seal ring.
- f) Assemble in the reverse order.
- g) Set distance A between the bracket and the piston rod.

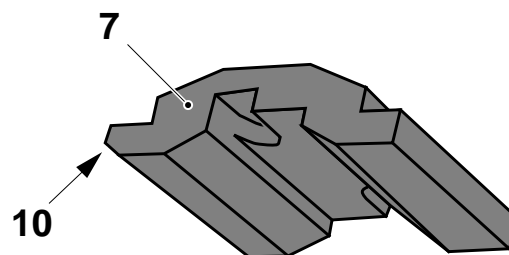
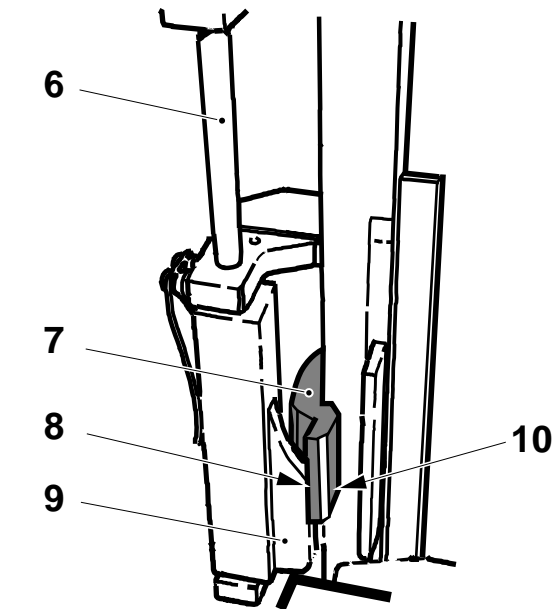


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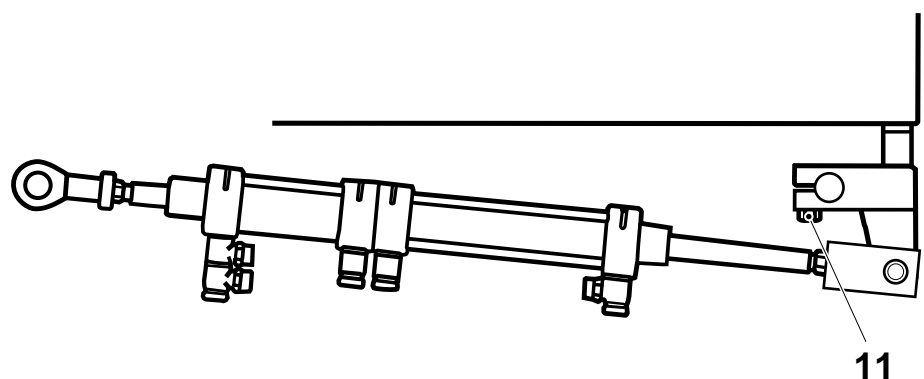
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- h) Place the template (7) with the chamfered corner (10) facing forwards.
- i) Loosen the screw (11) and turn the eccentric shaft (6) until the cam (9) bears against the template with its contact surface (8). Tighten the screw (11).

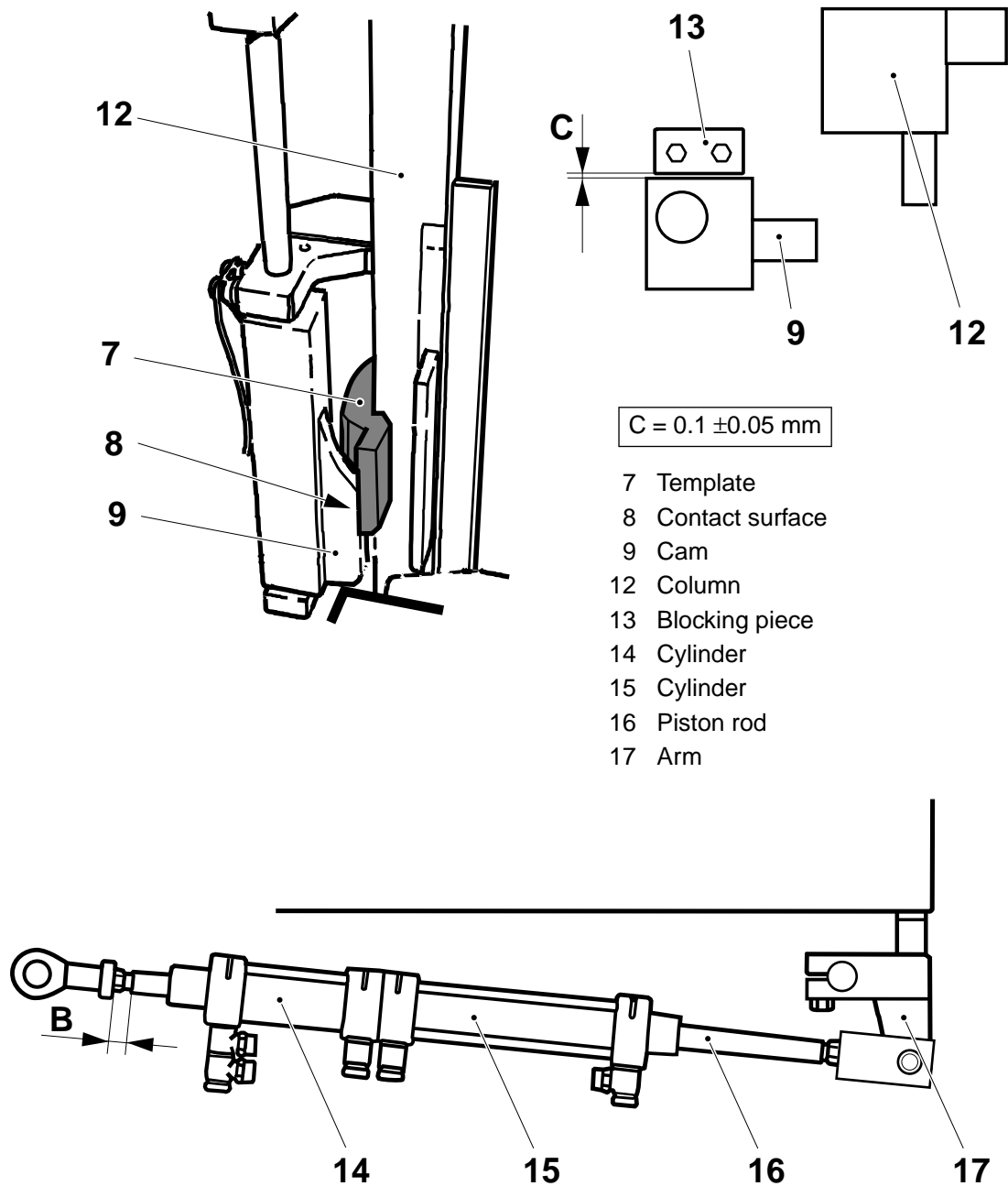


- 6 Eccentric shaft
- 7 Template
- 8 Contact surface
- 9 Cam
- 10 Chamfered corner
- 11 Screw

*(Cont'd)*

(Cont'd)

- j) Pull out the piston rod (16) and keep it pulled out. At the same time, move the cylinder combination (14) and (15) back to end position, so that the arm (17) pivots.
- k) Turn the template (7) 180° (the chamfered corner facing backwards). Adjust the distance B until the cam (9) bears against surface (8).
- l) Set distance C between the blocking piece (13) and the cam by moving the blocking piece.

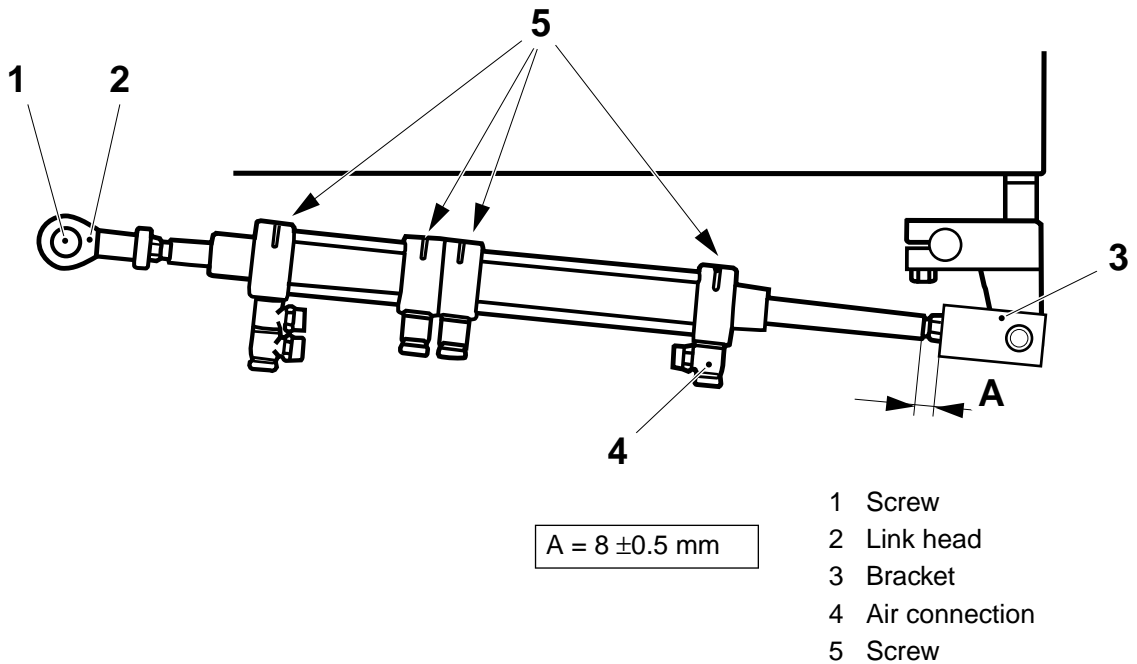


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4.2-2 Design correction device - change cylinders

SPC reference	256206-030V 256207-030V
---------------	----------------------------

- Unscrew the screw (1) and lift off the link head (2).
- Remove the circlip and lift off the bracket (3).
- Unscrew the bracket and the link head.
- Undo all the air connections (4) to the cylinder and change the cylinder.
- Assemble in the reverse order.
- Set distance A.
- Screw out the screws (5) of the end position dampers fully.
- Set the design correction mechanism. Follow the procedure in 4.2-1 *Design correction device - change brackets and link heads.*



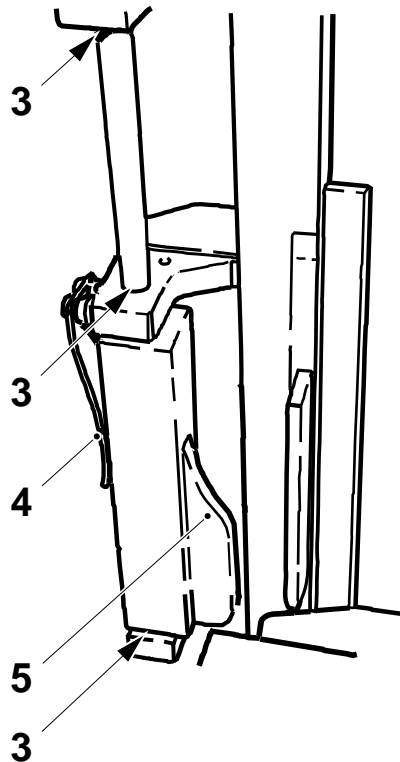
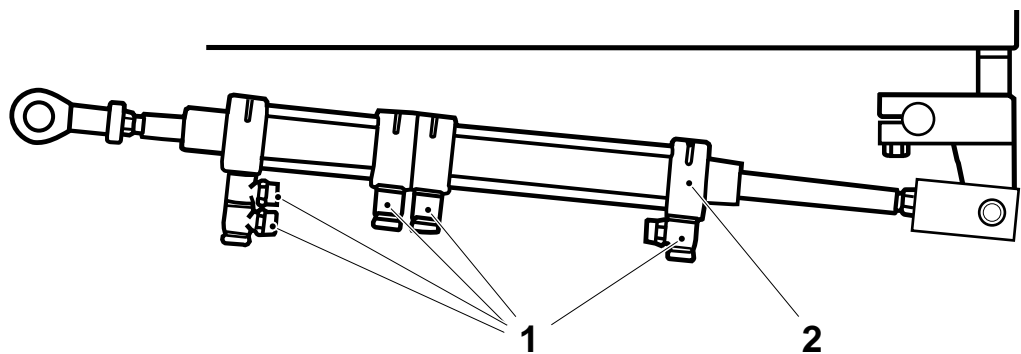
4.2-3 Design correction device - check condition

SPC reference	256206-030V 256207-030V
---------------	----------------------------

Check the following details for wear and/or damage:

- the air connections (1); make sure that there is no air leakage
- the cylinder (2); make sure that it moves smoothly
- the bushings (3); check that there is no excessive play
- the leaf springs (4); the springs must bear against the back of the cam when the cam is in non-corrective position (full packaging material feed)
- the folding flap cam (5); especially the running surface

Change as required.



- 1 Air connection
- 2 Cylinder
- 3 Bushing
- 4 Leaf spring
- 5 Cam

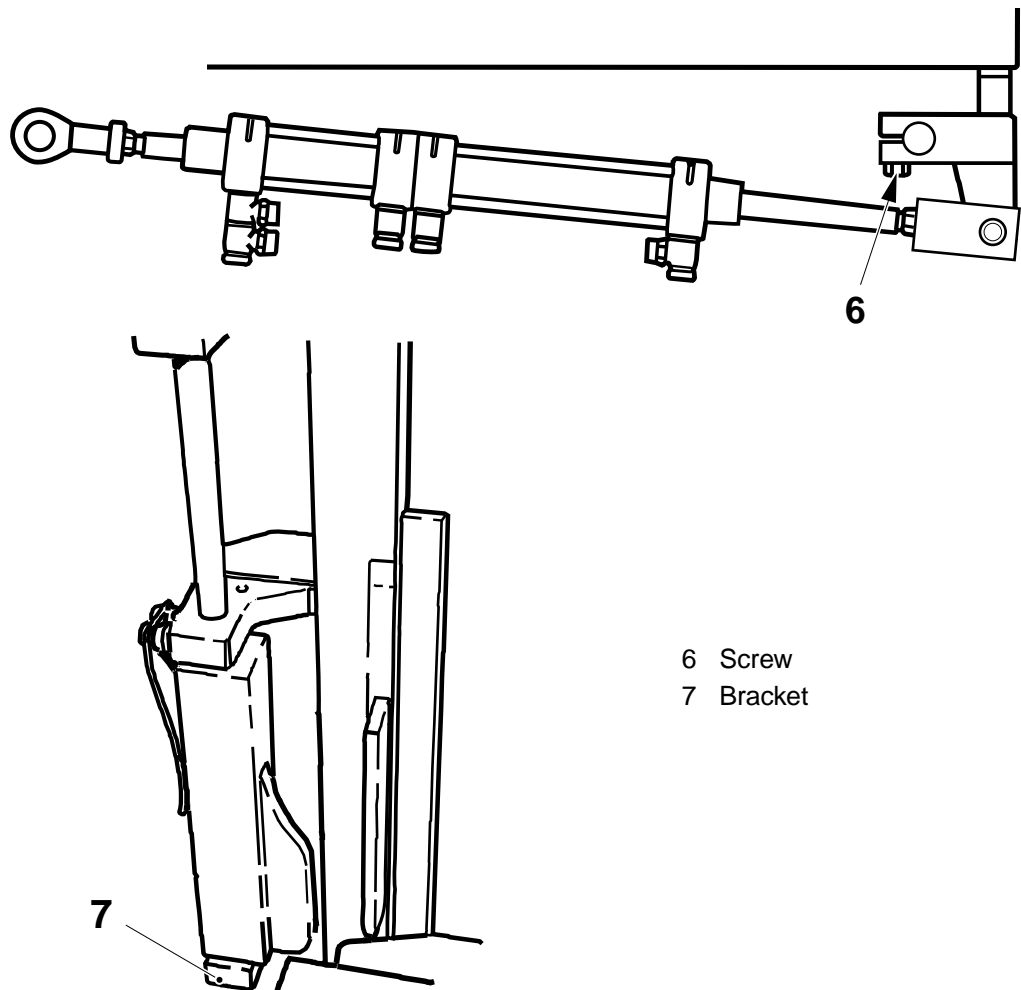
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Bushings and folding flap cam - change

- a) Loosen the screw (6) and remove the bracket (7).
- b) Remove the eccentric shaft and the folding flap cam.
- c) Change the bushings and/or the folding flap cam.
- d) Check and, if required, change the eccentric shaft.
- e) Reassemble.
- f) Set the design correction device. Follow the procedure in 4.2-1 *Design correction device - change brackets and link heads*.



4.2-4 Design correction device - lubricate

Consumables - oil	code A
SPC reference	256206-030V 256207-030V

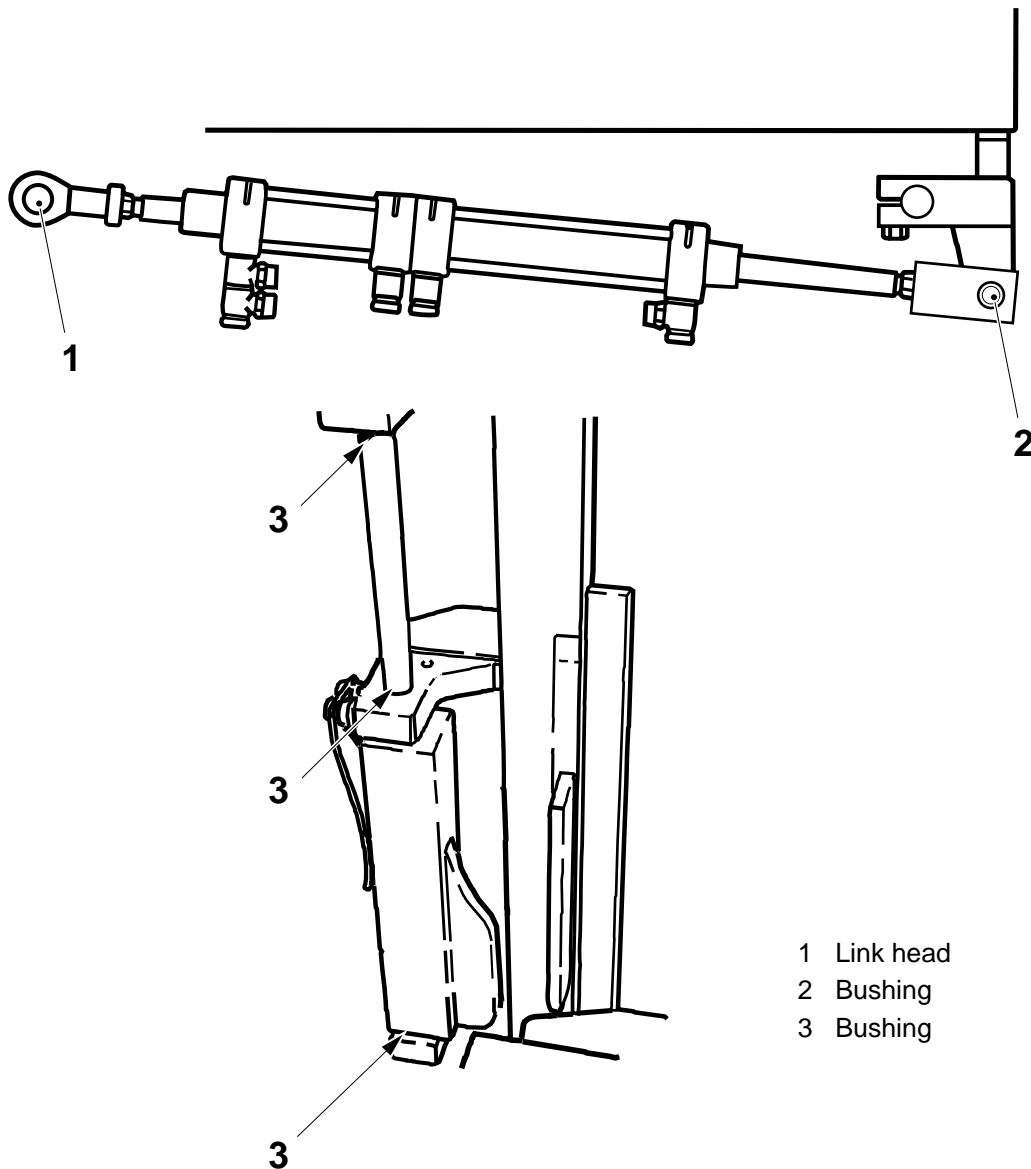


WARNING!

Chemical products!

Lubricant. Follow the *Safety precautions*.

Lubricate the link head (1) and the bushings (2) and (3) with oil code A, see *10.2 Lubricants*.



- 1 Link head
- 2 Bushing
- 3 Bushing

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4.3 Pressure jaw

SPC reference	256212-060V 256213-060V
---------------	----------------------------

4.3-1 Pressure jaw - lubricate pivot springs

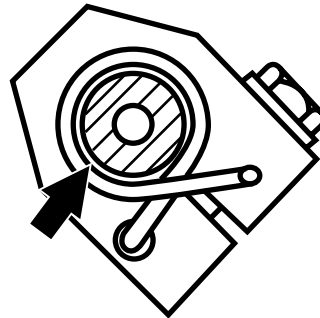
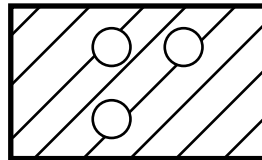
Consumable - grease	code F
SPC reference	256212-060V 256213-060V



Chemical products!

Lubricant. Follow the *Safety precautions*.

Lubricate the bushing with grease code F, see *10.2 Lubricants*.



4.3-2 Pressure jaw - overhaul

Tools - torque wrench	min 25 Nm
Consumable - grease	code F
SPC reference	256212-060V 256213-060V

- a) Remove the volume flap and the shock absorber from the pressure jaw.
- b) Unscrew the screws (1) and remove the catches (2). If required, change the catches and the screws.
- c) Unscrew the bleed screws (3) and change the balls (4). If required, change also the screws.

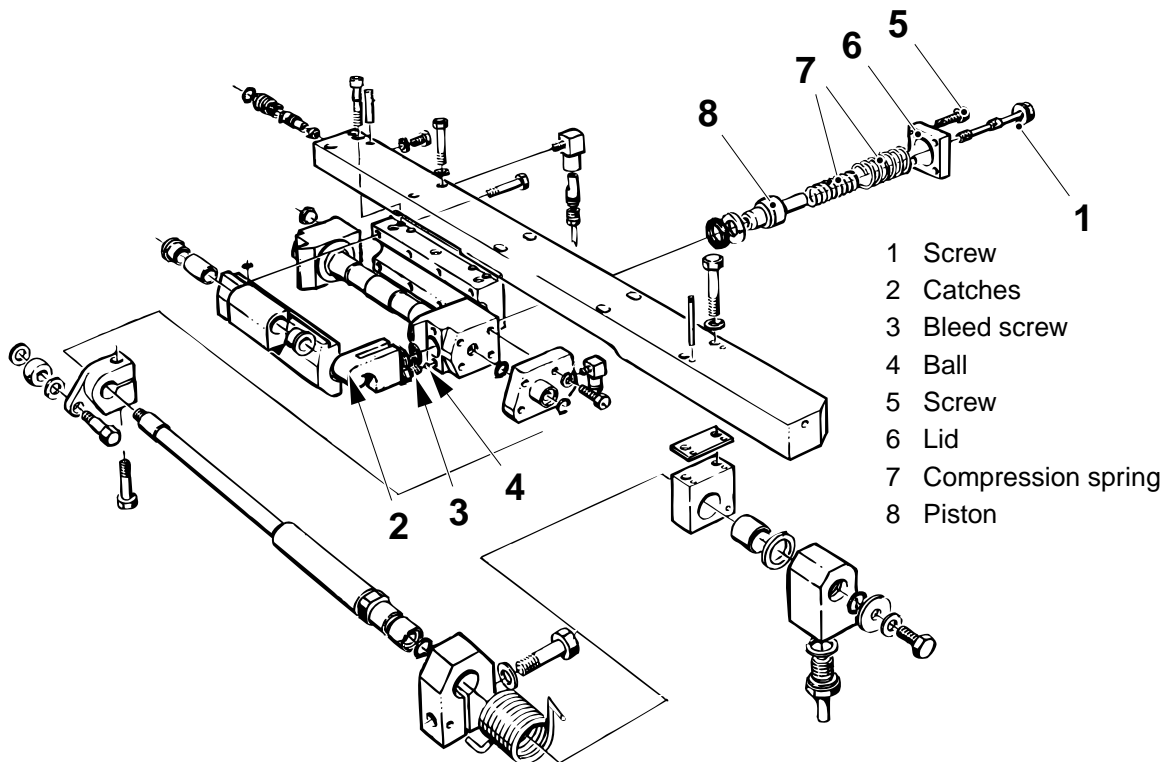


WARNING!

Risk of personal injury!

Compressed springs! Take care when removing/assembling components.

- d) Unscrew the screws (5) and remove the lid (6), the compression springs (7), the piston (8), the seal and the ring.
- e) Change the rings and the springs. If required, change also the piston.

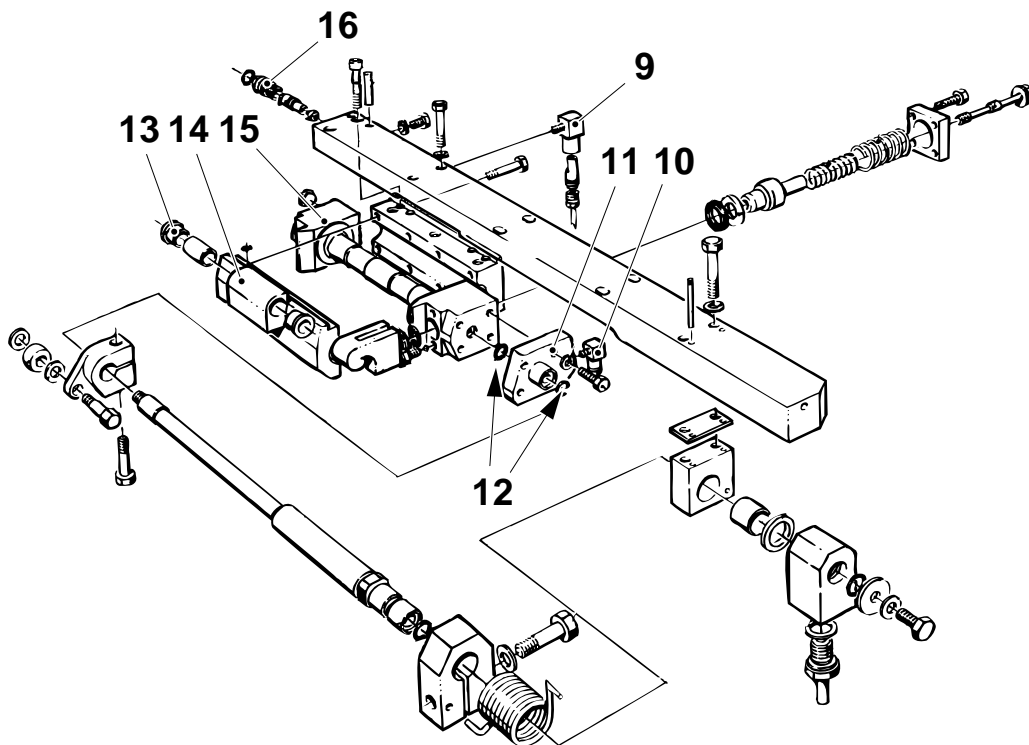


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- f) Remove and, if required, change the banjo connection (10). Unscrew the banjo connection (9) and change the valve and the hose. If required, change also the banjo connection.
- g) Remove and, if required, change the connections (11). Change the O-rings (12).
- h) Check and, if required, change the bushings (13), the bearing housing (14) and the cylinder (15).
- i) Unscrew the plug (16) and change the valve and the O-ring.
- j) Check and, if required, change the carrier.



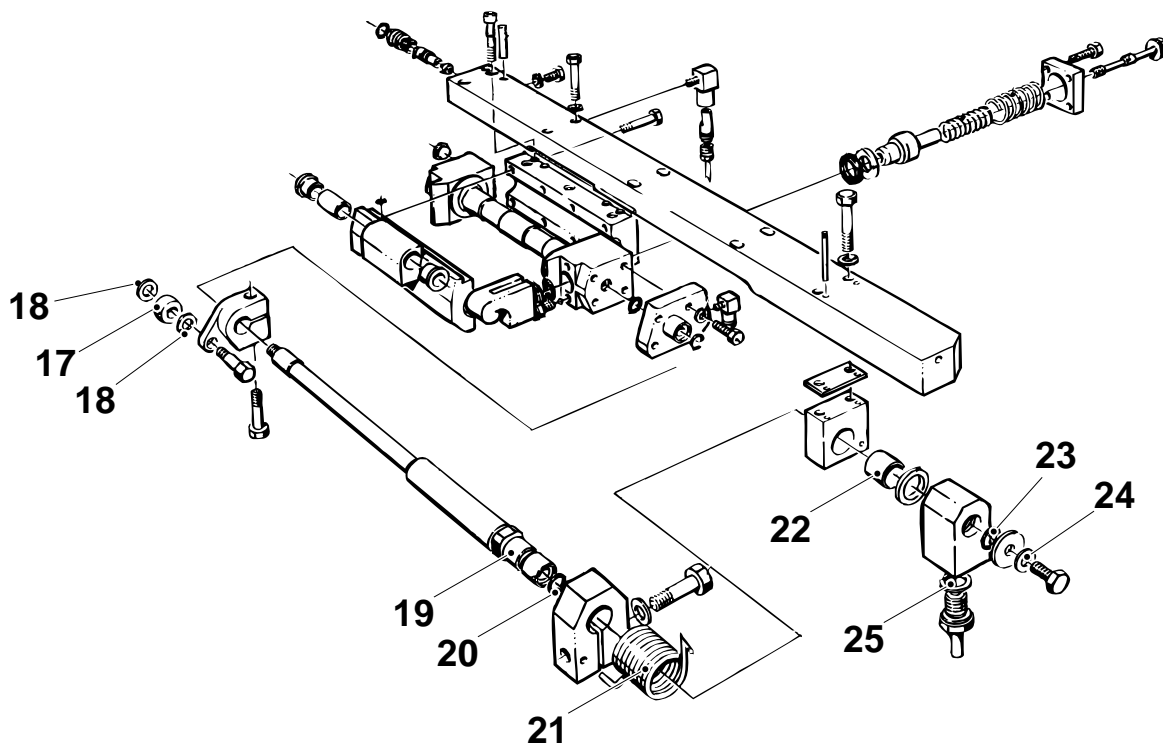
- 9 Banjo connection
- 10 Banjo connection
- 11 Connection
- 12 O-ring
- 13 Bushing
- 14 Bearing housing
- 15 Cylinder
- 16 Plug

(Cont'd)

(Cont'd)

k) Change the following details:

- the roll (17)
- the washer (18)
- the sleeve (19)
- the seal ring (20)
- the torsion spring (21)
- the bushing (22)
- the O-ring (23)
- the gaskets (24) and (25)



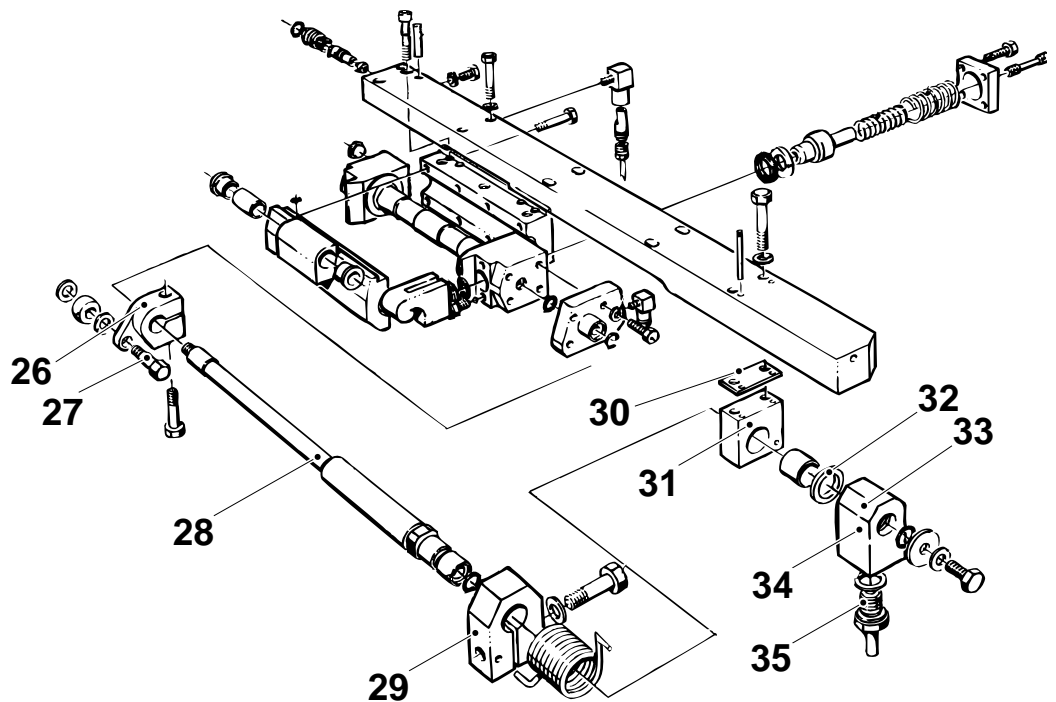
- 17 Roll
- 18 Washer
- 19 Sleeve
- 20 Seal ring
- 21 Torsion spring
- 22 Bushing
- 23 O-ring
- 24 Gasket
- 25 Gasket

(Cont'd)

(Cont'd)

1) Check and, if required, change:

- the clamp (26)
- the screw (27)
- the shaft (28)
- the hub (29)
- the lace (30)
- the bracket (31)
- the washers (32) and (33)
- the hub (34)
- the pipe connection (35)



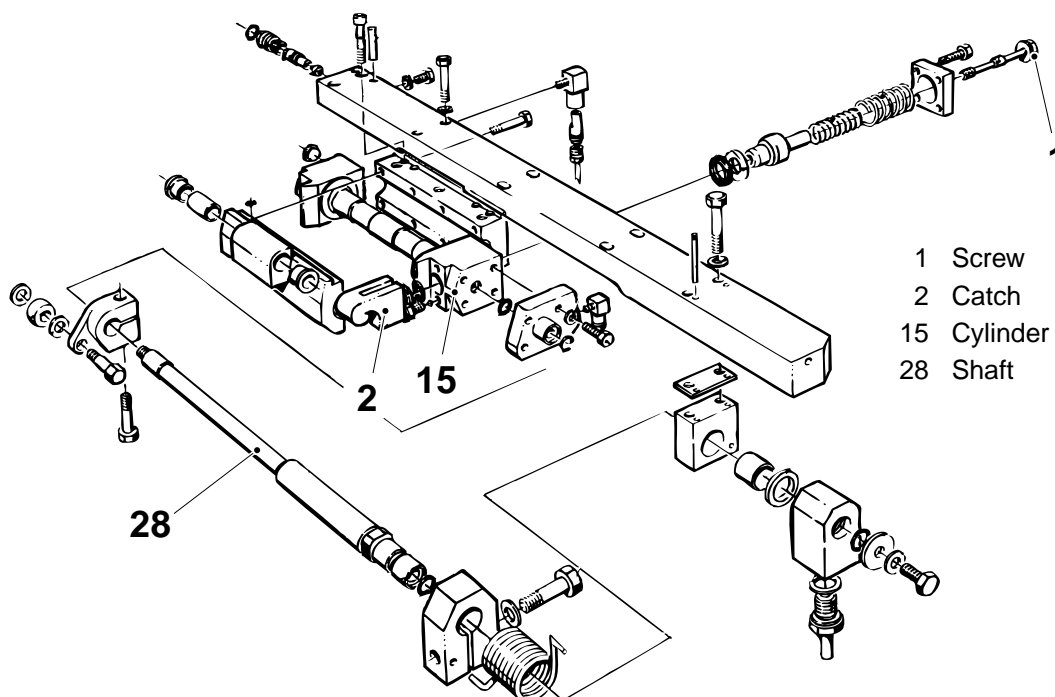
26	Clamp	31	Bracket
27	Screw	32	Washer
28	Shaft	33	Washer
29	Hub	34	Hub
30	Lace	35	Pipe connection

(Cont'd)

(Cont'd)

**Chemical products!**Lubricant. Follow the *Safety precautions*.

- m) Fill the cylinder (15) with grease and grease all parts in the catch assembly carefully before fitting. Use grease code F, see *10.2 Lubricants*.
- n) Refit the catches (2) and torque the screws (1) to 25 ± 2 Nm.
- o) Lift the catches (2) by hand and check if the shaft (28) turns freely.



- 1 Screw
- 2 Catch
- 15 Cylinder
- 28 Shaft

- p) Reassemble the pressure jaw and fit back. Follow the procedure in *4-2 Jaw system - change pressure and cutting jaws*.
- q) Overhaul and fit back
 - the volume flap, see *4.9 -1 Volume flap - overhaul*
 - the shock absorber, see *4.8-1 Shock absorber - overhaul*
 - the pressure rail, see *4.10 -1 Pressure rail - overhaul*
- r) Bleed the catches, see *4-3 Jaw system - bleed pressure and cutting jaws*.
- s) Set the volume flap alignment, see *4.7-14 Volume flap - alignment*.

4.3-3 Pressure jaw - set catch pivot spring

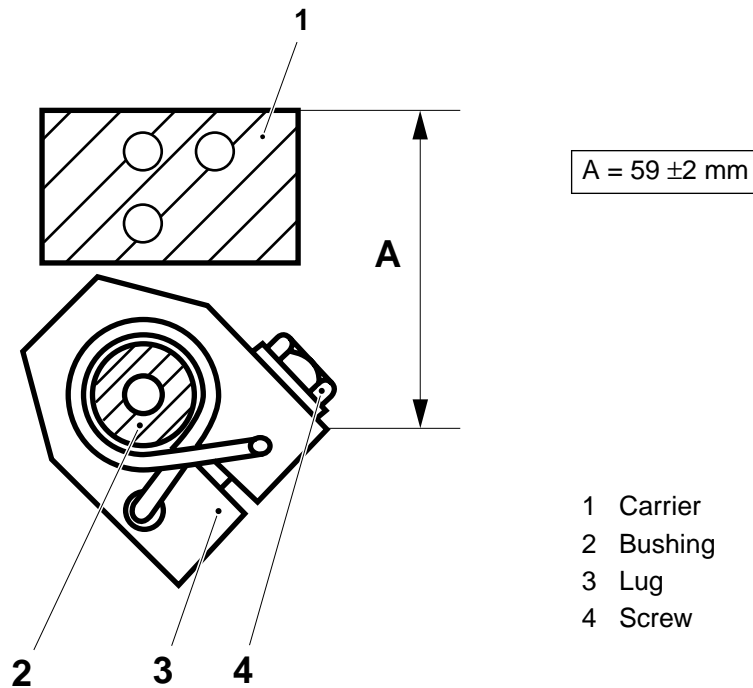
Consumables - grease	code F
SPC reference	256212-060V 256213-060V



Chemical products!

Lubricant. Follow the *Safety precautions*.

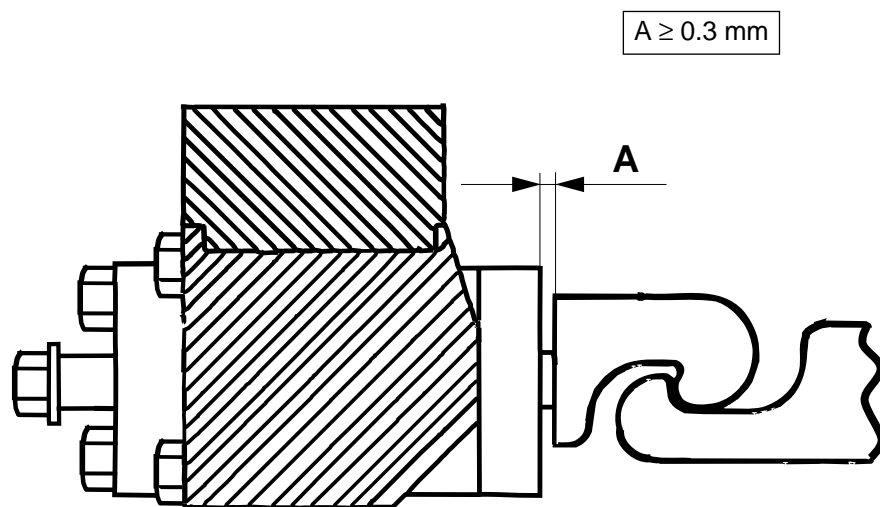
- Lubricate the bushing (2) with grease code F, see *10.2 Lubricants*.
- Crank until the catches are engaged.
- Set distance A, between the corner of the lug (3) and the top side of the carrier (1), by loosen the screw (4) and turn the lug (3).
- Make sure that the lug (3) moves sideways freely before tightening the screw (4).



4.3-4 Pressure jaw - check catches and catch clearance

Machine status	Power On Water On Service switch On
SPC reference	256212-060V 256213-060V

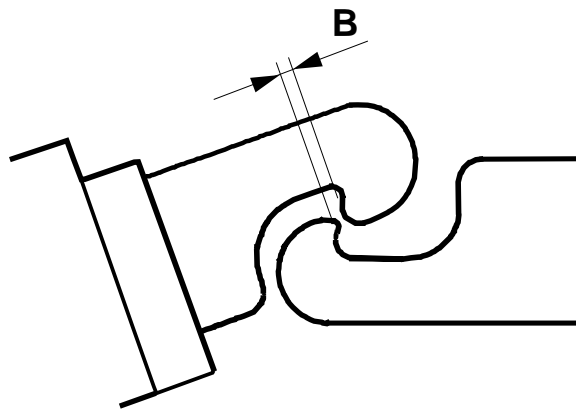
- Check that the engagements of the catches are not worn. Change catches as required.
- Put a piece of a double packaging material (0.7 - 0.8 mm) with the same width as the TS between the inductor and the dollies. Cut the packaging material so that the folding flaps pass by.
- Crank to 180°, and check distance A on LH side pressure jaw.
- Crank to 0°, and check distance A on RH side pressure jaw.
- If distance A is less than 0.3 mm, check and, if required, change/overhaul the pressure jaws, the dollies and the catches.
- Check that the catches do not leak any hydraulic oil. If required, overhaul the catches. Follow the procedure in 4.3-2 *Pressure jaw - overhaul*.



(Cont'd)

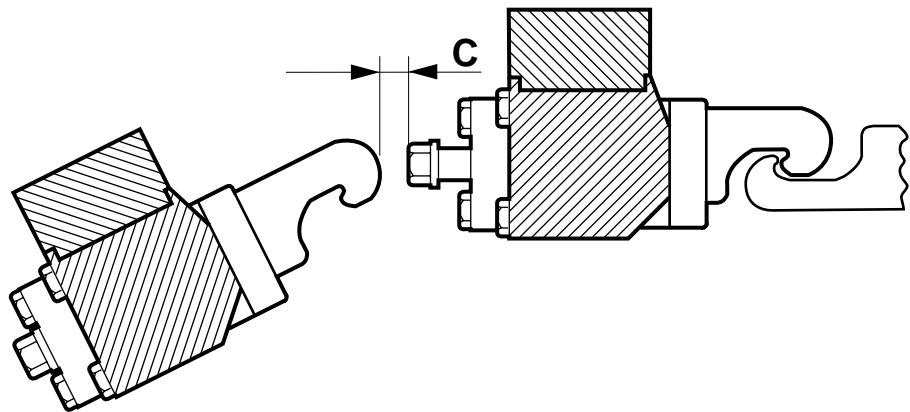
(Cont'd)

- g) Crank and check the distance B between the catches on the disengagement movement.
- h) If distance B is **too small**, see 4.7-19 *Catch lifter cams and rollers - set* and 4.3-3 *Pressure jaw - set catch pivot spring*.
- i) Crank to D°, see table below, and check distance C.
- j) Crank to E° and check distance C for the other jaw pair.



Package	D°	E°
100 B	5	185
125 S	5	185
160 S	352	172
180 B	5	185
200 B	355	175
200 M	355	175
200 S	5	185
236 B	5	185
250 B	5	185
250 S	355	175
284 B	5	185
300 S	5	185
330 S	355	175

B ≥ 0.7 mm
C ≥ 4 mm



4.4 Yoke

SPC reference	256951-050V 256952-050V
---------------	----------------------------

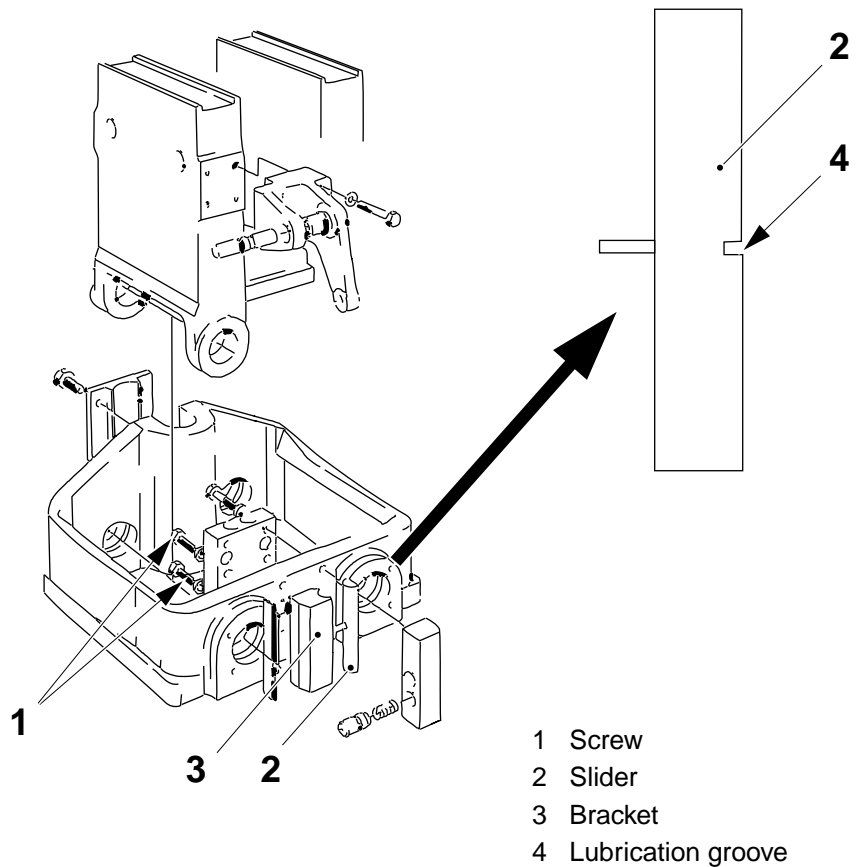
4.4-1 Yoke - check sliders

SPC reference	256951-050V 256952-050V
---------------	----------------------------

- Crank until one of the jaw pairs are open.
- Unscrew the screws (1) and remove the bracket (3). Note the shim behind the bracket.
- Pull out the slider (2).
- Check the sliders. Change the slider if there is no lubrication groove (4) left.
- Assemble in the reverse order.

Caution! Do not forget to fit the shim behind the bracket.

- Set the yoke symmetry, see 4.7-12 *Yoke symmetry - set*.

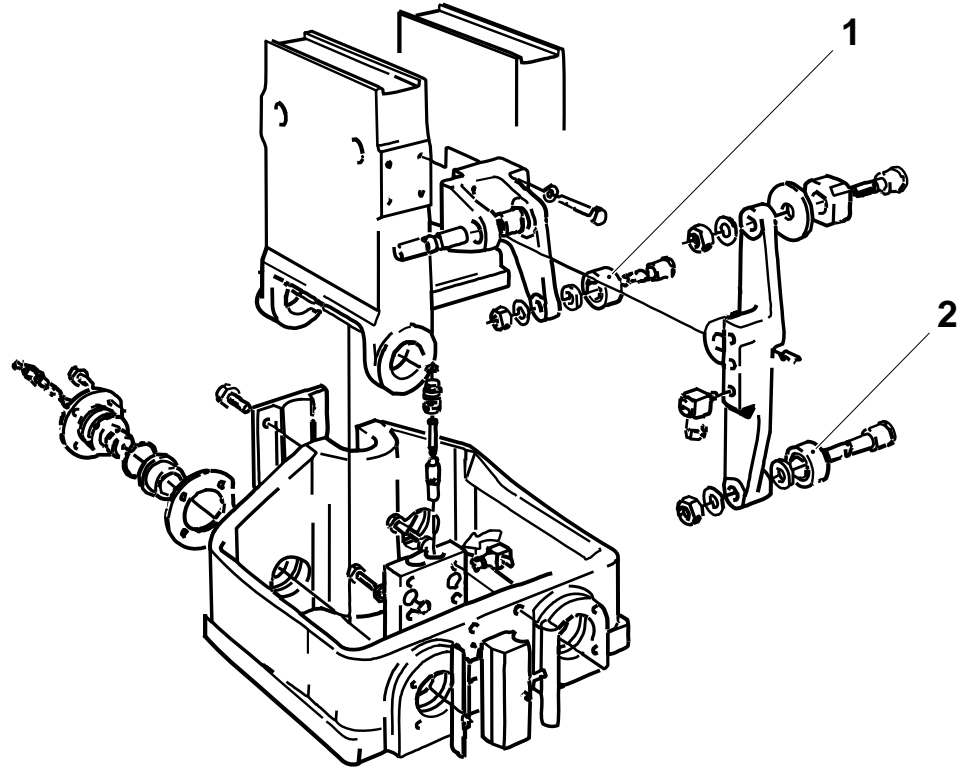


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4.4-2 Yoke - check curve rollers

SPC reference	256951-050V 256952-050V
---------------	----------------------------

- a) Check the curve rollers (1) and (2) for wear, change if required.

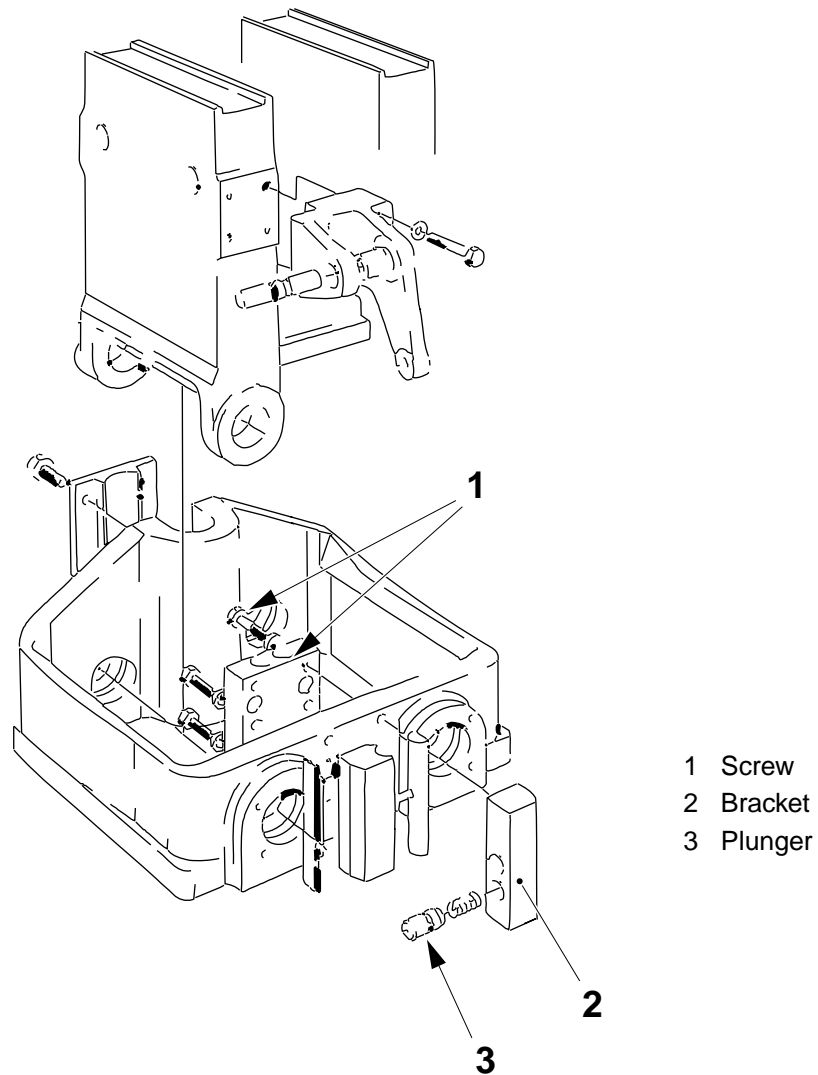


1 Curve roller

4.4-3 Yoke - change plungers

SPC reference	256951-050V 256952-050V
---------------	----------------------------

- a) Crank until one of the jaw pairs the are open.
- b) Unscrew the screws (1) and remove the bracket (2). Note the O-rings behind the brackets.
- c) Remove and change the plungers (3).
- d) Assemble in the reverse order.



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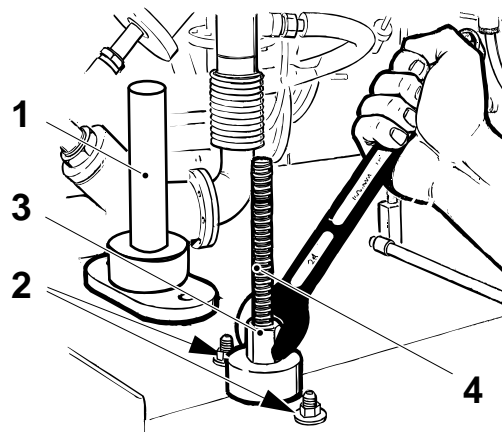
4.4-4 Yoke - overhaul

Consumable - lock fluid	TP No. 90157-16
SPC reference	256951-050V 256952-050V

- a) Remove the covers over the yokes.
- b) Remove the cover (1) and unscrew the nuts (2).

Caution! Risk of damage to the equipment! The nut (3) **must not** be completely unscrewed and removed from the threaded pin (4).

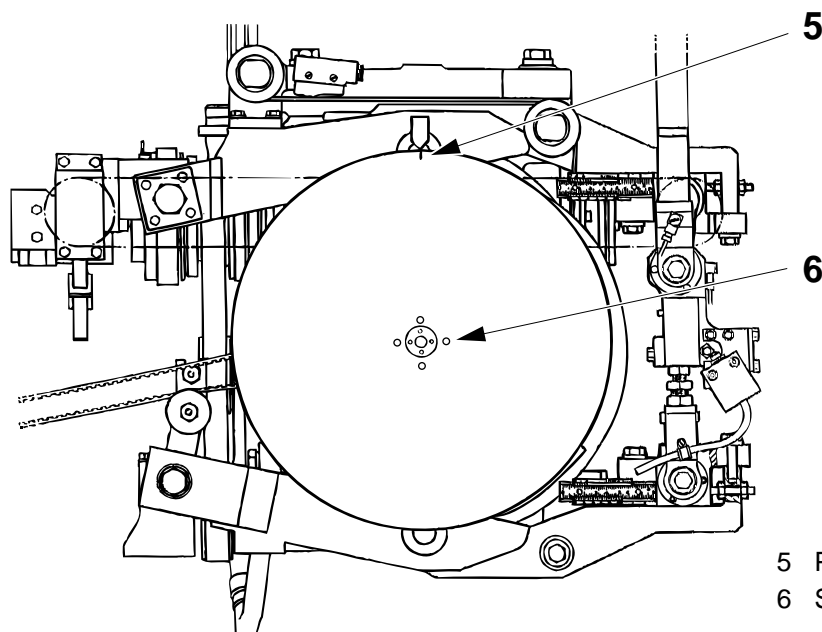
- c) Screw out the nut (3) until the top of it is in level with the top of the screw.
- d) Unhook the timing belts from the hold down device.



- 1 Cover
- 2 Nut
- 3 Nut
- 4 Threaded pin

Caution! Take care not to alter the setting of the pointer (5) when removing the degree scale.

- e) Unscrew the four screws (6) and remove the degree scale.

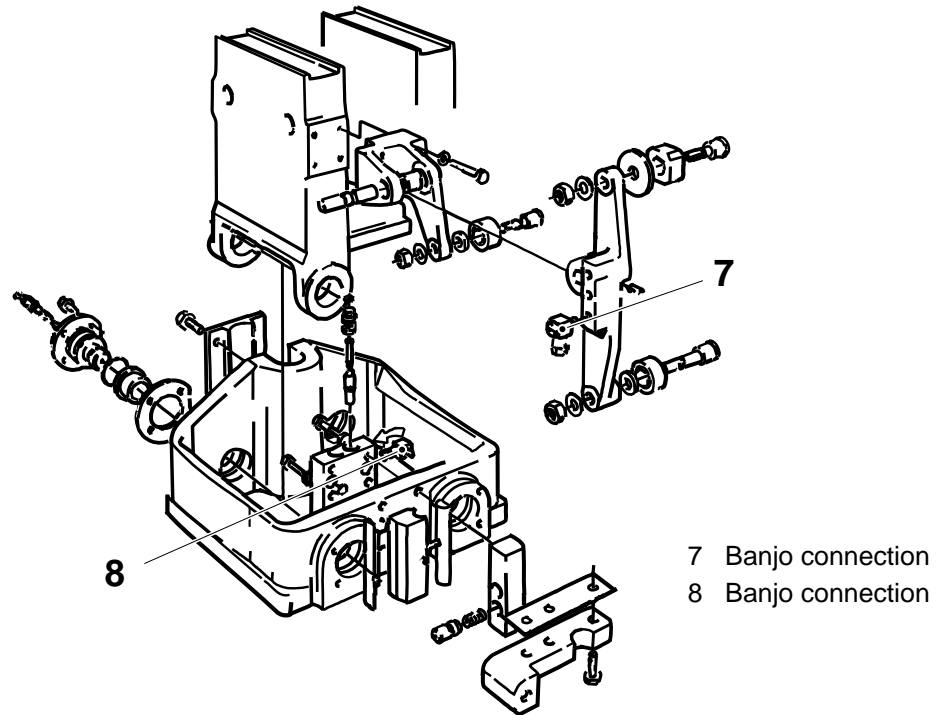


- 5 Pointer
- 6 Screw

(Cont'd)

(Cont'd)

- f) Unscrew the banjo connections (7) and (8).



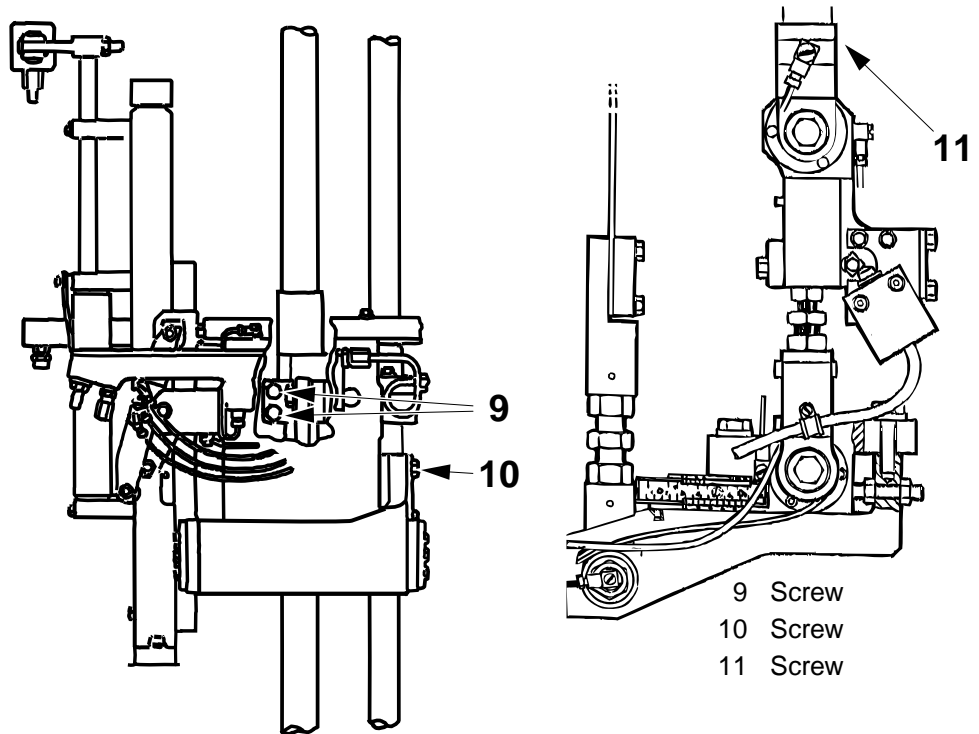
- g) Remove the cutting jaw, see 4.1-1 *Cutting jaw - change*.
h) Remove the pressure jaw, see 4.3-2 *Pressure jaw - change*.
i) Place wooden blocks underneath the yokes.

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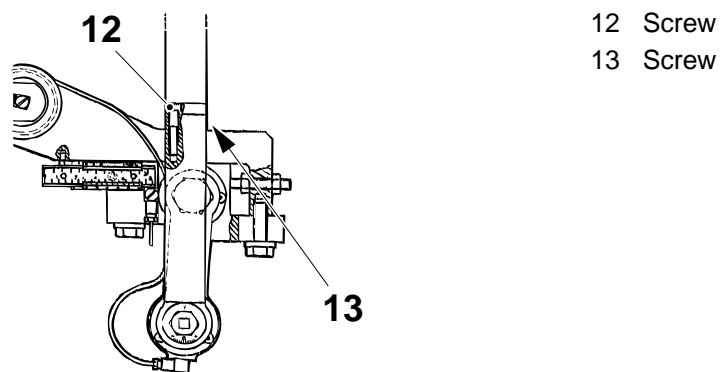


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- j) Unscrew the screws (9) and (10) and carefully lower the yoke.
- k) Unscrew the screws (11) under the outer guides and lower the link arm down on to the bottom plate.



- l) Undo the four screws (12) on the plate under the inner guides. Unscrew the two screws (13) under the guides and remove the plate.
- m) Push up the inner guides and remove the yoke.



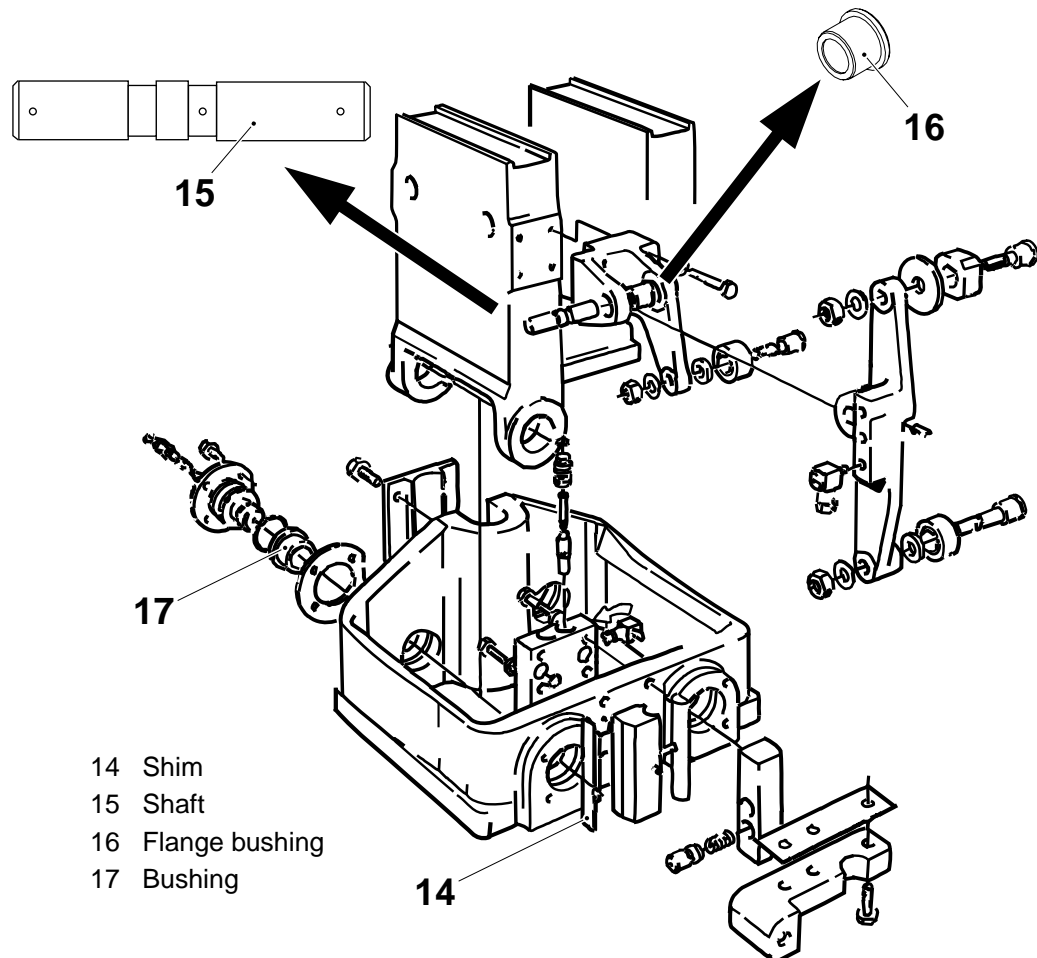
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- n) Change the shafts (15) and the flanges bushing (16).
- o) When assemble, make sure that the shafts (15) and the flanges (16) are fitted correctly.
Do not lose the shims (14).
- p) Change the bushings (17).

Note! When assembling, put locking fluid on the screws of the guides.

- q) Assemble in the reverse order.



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4.5 Volume curve piece

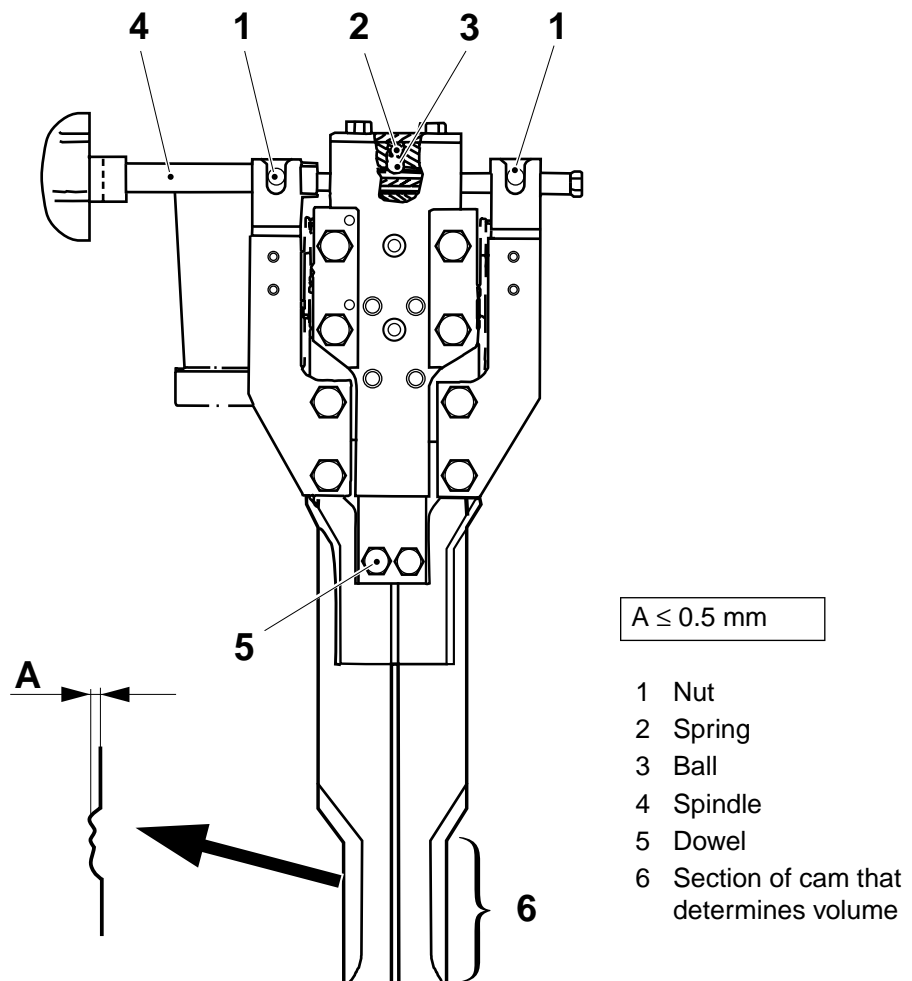
SPC reference	256222-030V
---------------	-------------

4.5-1 Volume curve piece - check

Tools - template	TP No. 75469-201
SPC reference	256222-030V'

a) Check the following details for wear and/or damage:

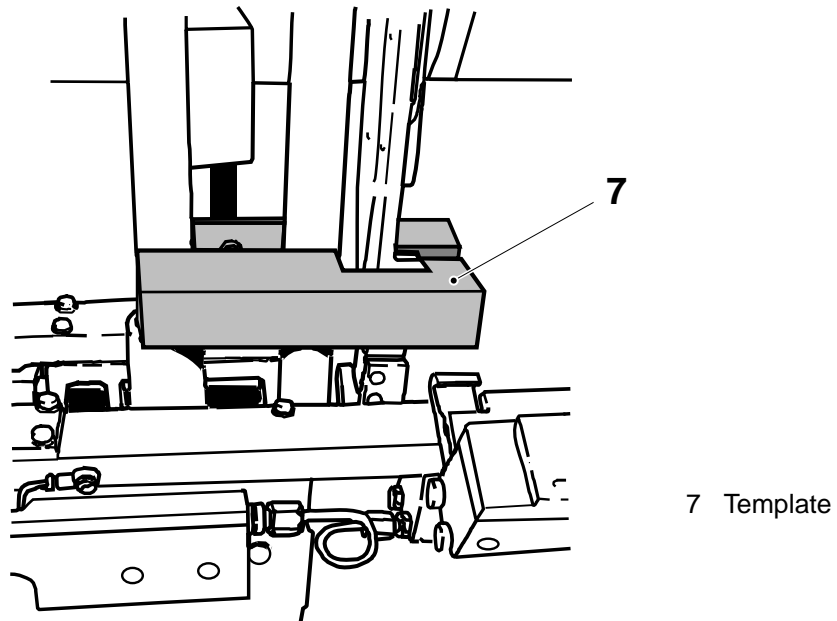
- the nuts (1)
- the spring (2)
- and the ball (3)
- the spindle (4)
- the dowels (5)
- the volume cams; especially the section that determines the volume (6). Max. allowed wear is distance A.



(Cont'd)

(Cont'd)

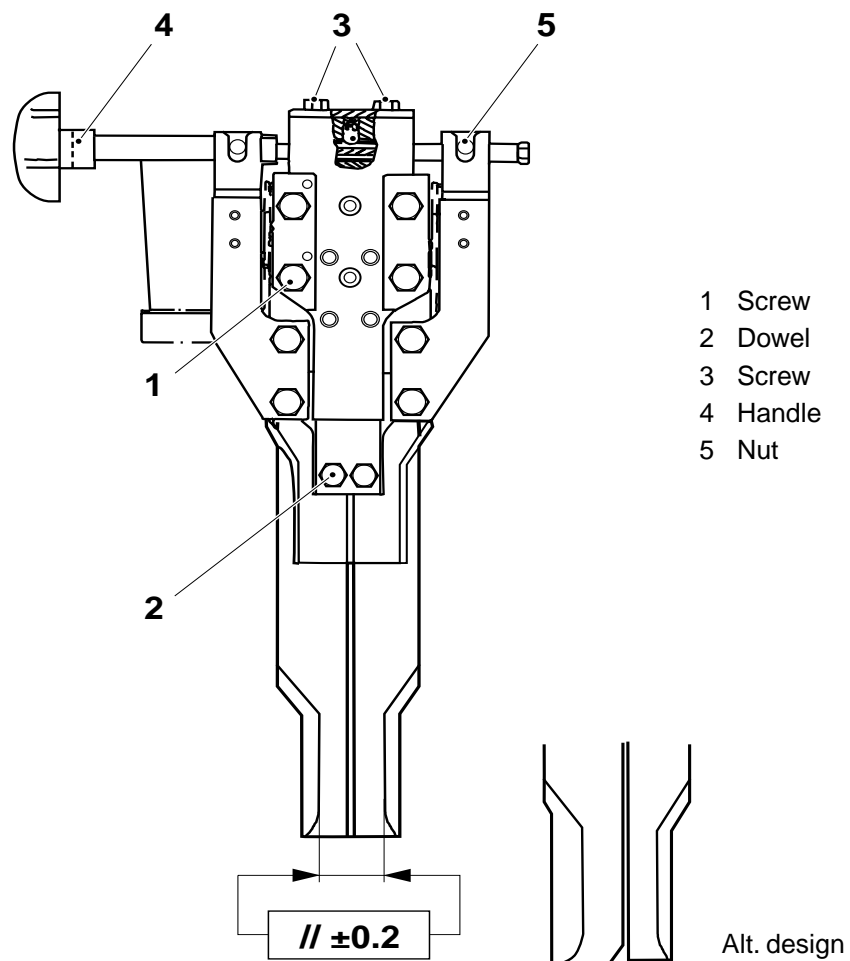
- b) Change as required, see 4.5-2 *Volume curve piece - change spindle and nuts* and 4.5-3 *Volume curve piece - change volume cams*.
- c) Fit the template (7) and make sure that the volume cams are parallel to the template within ± 0.2 mm. Set the volume curve piece as required. Follow the procedure in 4.5-2 *Volume curve piece - change spindle and nuts*.



4.5-2 Volume curve piece - change spindle and nuts

Tools - template	TP No. 75469-201
SPC reference	256222-030V

- a) Remove the tube support rollers.
- b) Unscrew the four screws (1) and remove the volume curve piece.
- c) Unscrew the dowels (2) and remove the volume cam sections.
- d) Unscrew the screws (3). Remove the spring and the ball.
- e) Unscrew the spindle by means of the handle (4). Remove the nuts (5) and the spindle. Remove the pin and pull off the handle.
- f) Change the spindle and the nuts.
- g) Assemble and set the volume curve piece, see next page. Make sure that the volume cams are parallel.
- h) Fit the tube support rollers and set them, see 4.7-15 *Tube support rollers - set*.

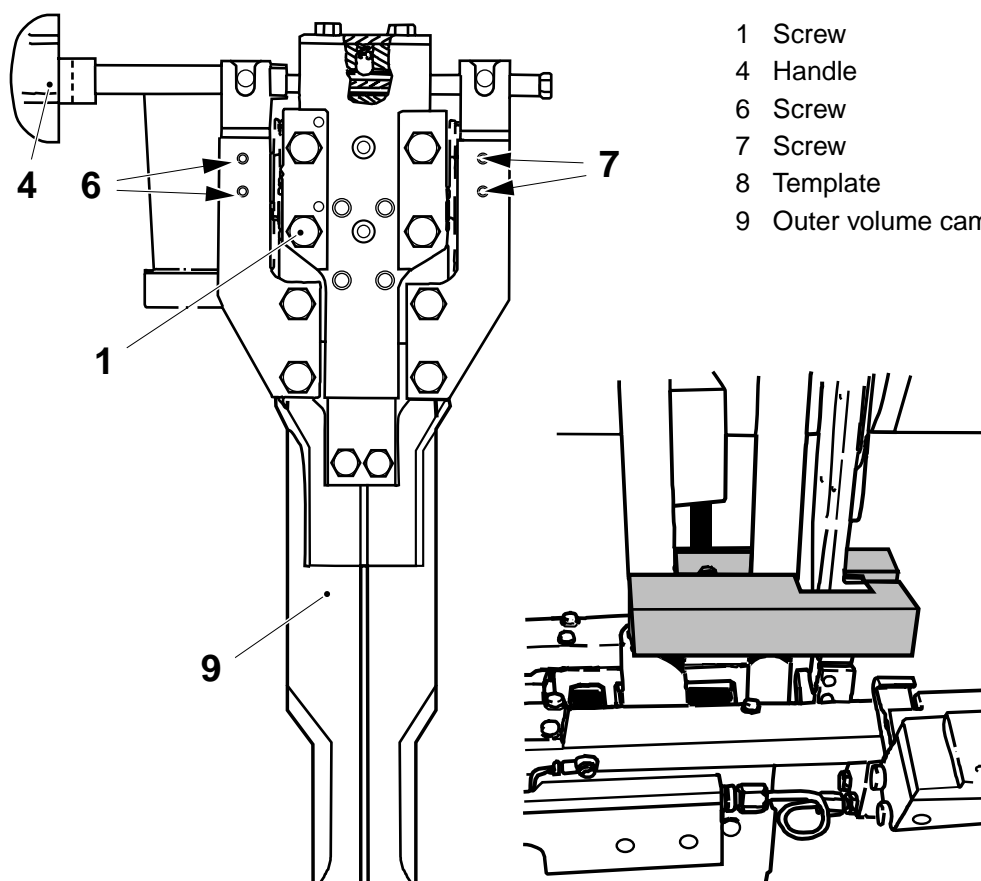


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Volume curve piece - set

- a) On the LH volume curve piece, loosen the screws (6) and (7).
- b) Turn the handle (4) fully in and then out **2 - 3** turns (in order to make sure that there is a gap between the volume cams when the handle is turned fully in).
- c) Crank to 180°.
- d) Fit the volume curve piece and the template (8).
- e) Press the outer volume cam (9) against the template and tighten the screws (6).
- f) Unscrew the four screws (1) and remove the volume curve piece from the machine.

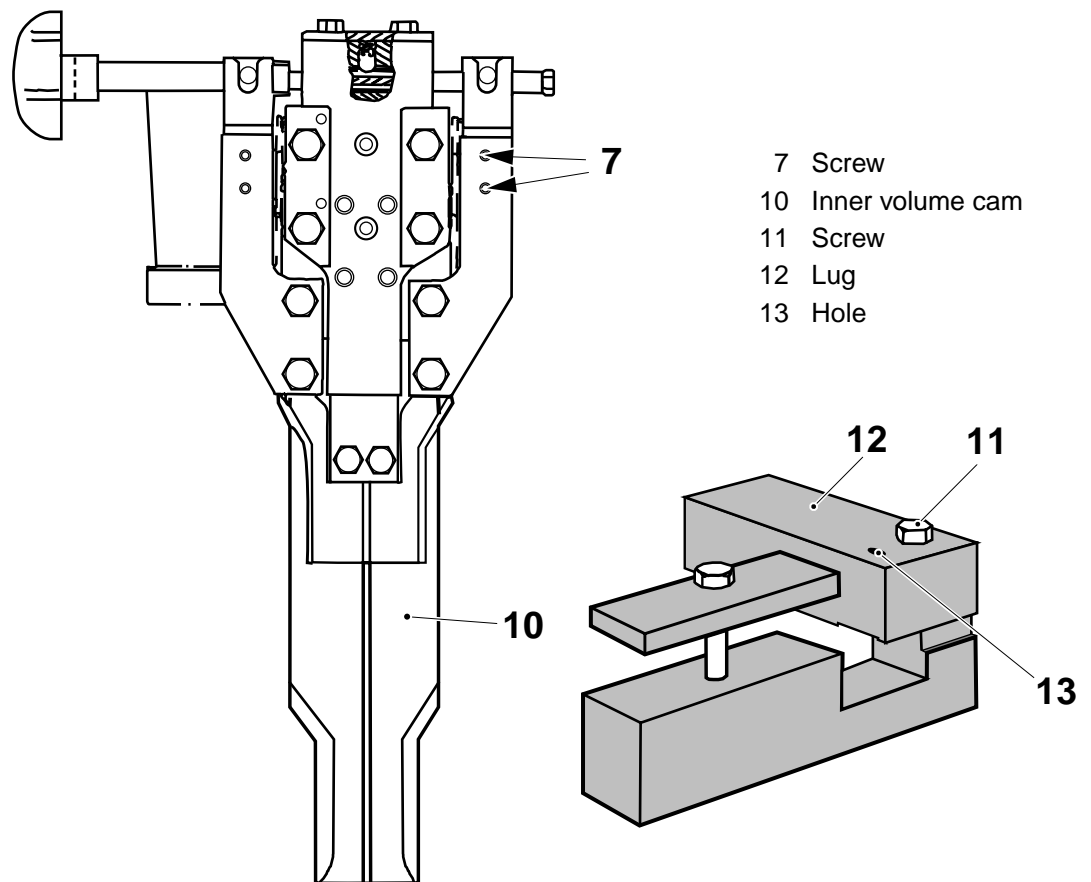


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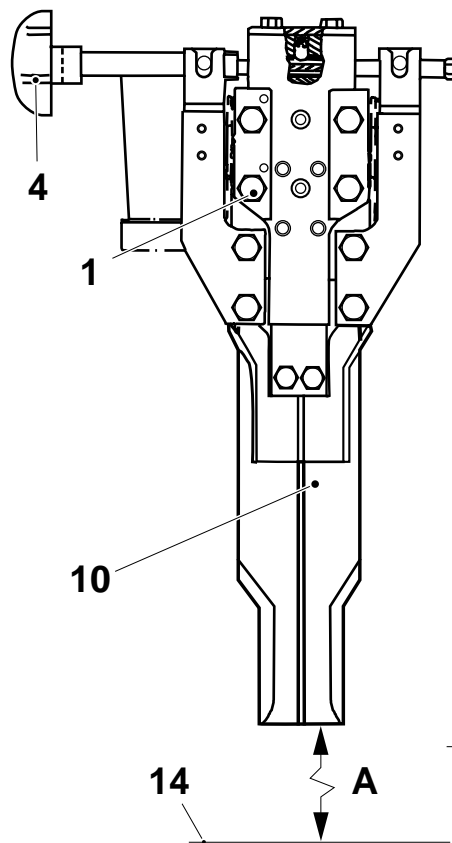
- g) Put the template between the volume cams.
- h) Press the inner volume cam (10) against the template and tighten the screws (7).
- i) Fit the volume curve piece.
- j) Fit the template and check that the volume cams are parallel.
- k) Remove the template.
- l) Unscrew the screw (11) and shift the lug (12). Fit the screw in the hole (13).
- m) Crank to 0°. Repeat items *a) - k)* on the RH volume curve piece.



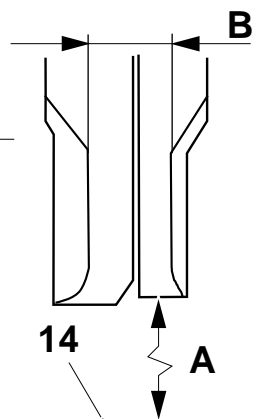
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- n) Set distance B (basic setting) by means of the handle (4).
- o) Loosen the screws (1) and set distance A, between the inner volume cam (10) and the plate (14), see table below.



Package	A ±1 (mm)	B (mm)
100 B	357.0	34.0
125 S	369.0	34.0
160 S	361.0	34.0
180 B	361.5	34.0
200 B	369.0	34.0
200 M	363.0	34.0
200 S	357.5	34.0
236 B	363.0	34.0
250 B	362.5	33.5
250 S	351.5	34.0
284 B	362.5	33.5
300 S	362.5	34.0
330 S	348.5	34.0



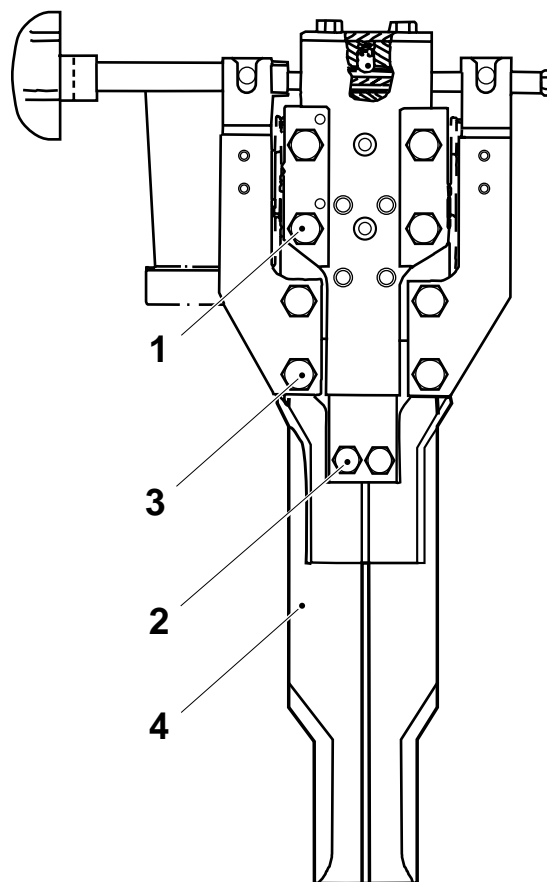
- 1 Screw
- 4 Handle
- 10 Inner volume cam
- 14 Plate

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4.5-3 Volume curve piece - change volume cams

SPC reference	256222-030V
---------------	-------------

- a) Remove the tube support rollers.
- a) Unscrew the four screws (1) and remove the volume curve piece.
- b) Unscrew the dowel (2) and remove the volume cam section.
- c) Unscrew the screws (3) and remove the volume cams (4).
- d) Change the volume cams and fit the screws (3).
- e) Fit the volume cam section by means of the dowel (2).
- f) Set the volume cams, see 4.5-2 *Volume curve piece - change spindle and nuts* and the tube support rollers, see 4.7-15 *Tube support rollers - set*.



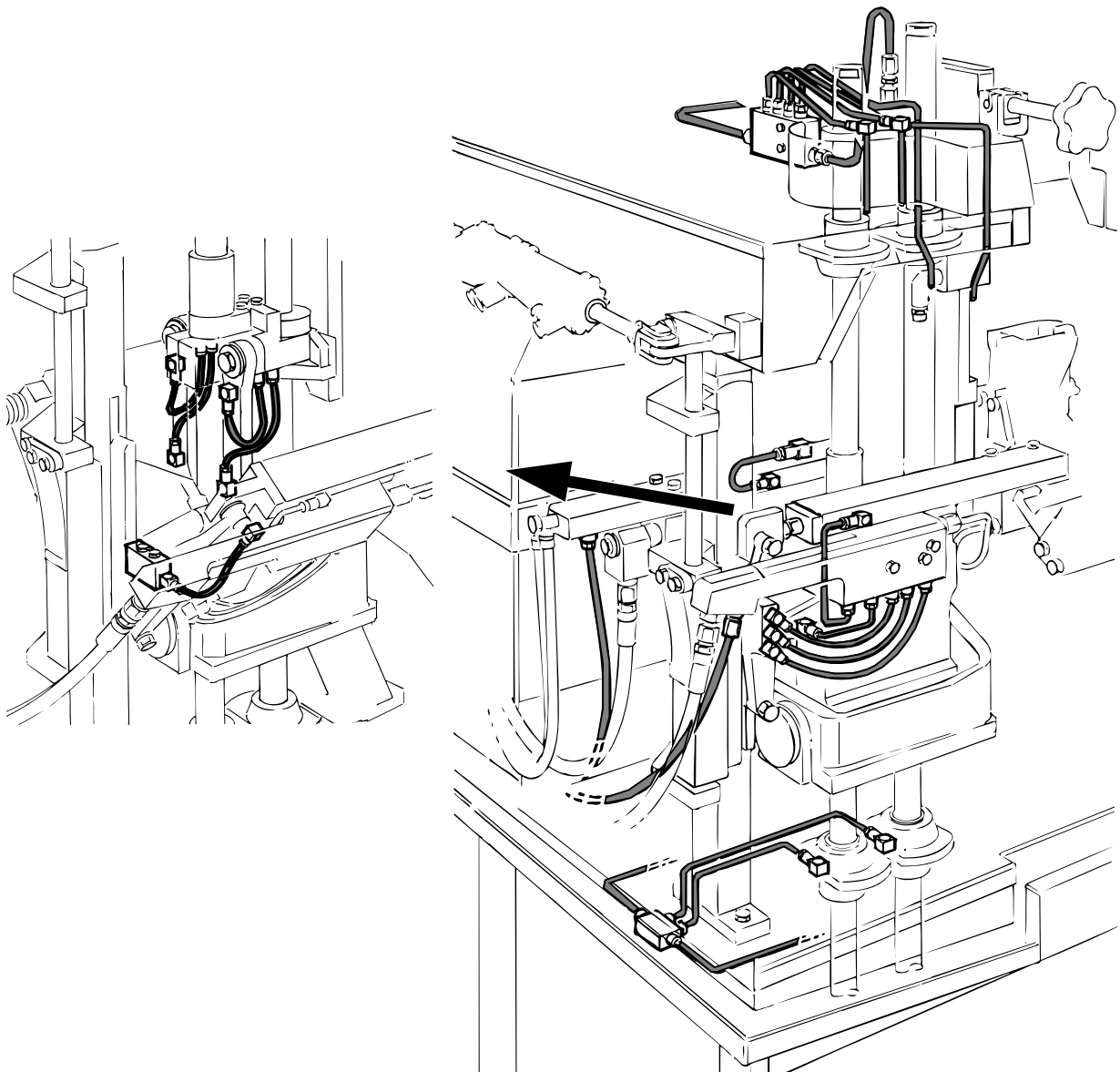
- 1 Screw
- 2 Dowel
- 3 Screw
- 4 Volume cam

4.6 Central lubrication

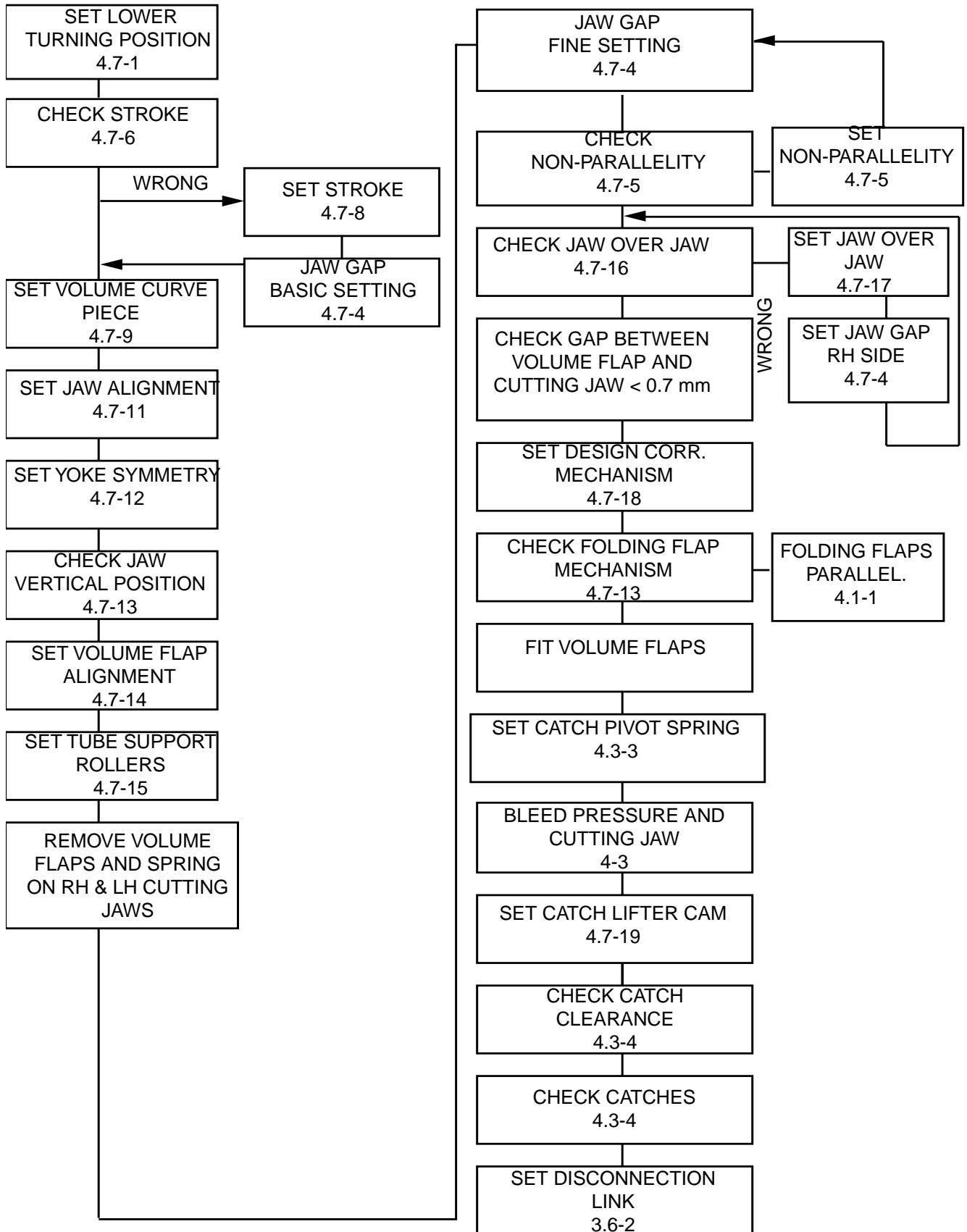
4.6-1 Central lubrication - check oil distribution

Machine status	Power On Air On Water On
----------------	--------------------------------

Push the **Manual lubrication** button and make sure that lubrication oil is distributed to all lubrication points.



4.7 Basic jaw system setting



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4.7-1 Yoke - set turning position

Tools - template	see table pag.333
---------------------	----------------------

Note! This setting has to be performed using the nominal length value and only when the cam pack is replaced.

a) Set the nominal stroke.

Volume	Nominal stroke (mm)
100B	157.8
125S	174.0
160B	-
160S	192.8
180B	-
200B	177.3
200M	208.8
200S	227.3
236B	-
250B	211.2
250S	238.5
284B	231.9
300S	231.9
330S	244.4

(Cont'd)

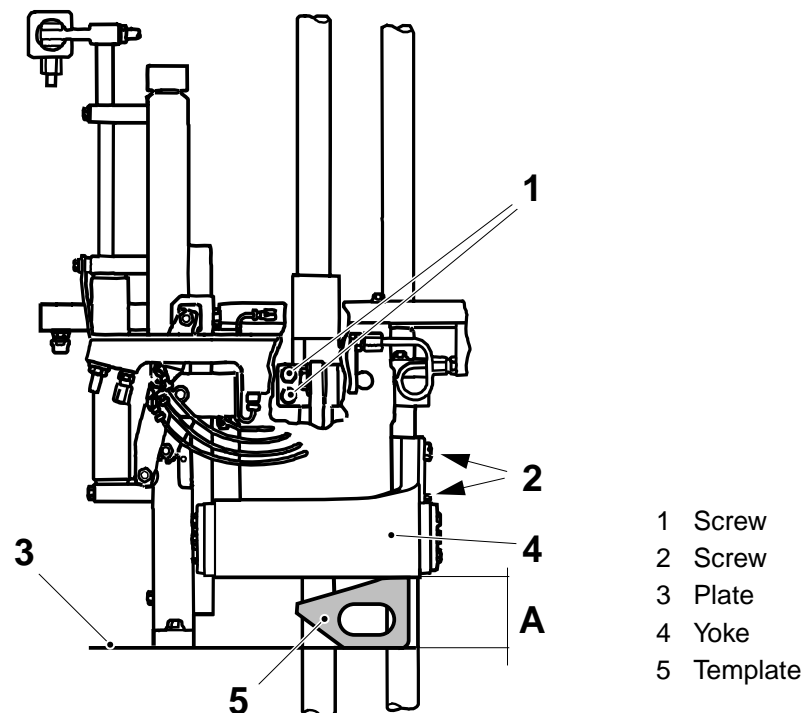
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b) Crank until the LH yoke is in its lower turning position, see table below.

Package	Lower Turning position LH yoke (°)	Template TP No.	A ± 0.2 (mm)
100 B	328	75931-9	48.4
125 S	322	75931-9	48.4
160 S	316	75931-8	47.4
180 B	-	-	-
200 B	322	75931-11	47.9
200 M	322	75931-5	46.0
200 S	324	75931-10	40.1
236 B	-	-	-
250 B	322	75931-5	46.0
250 S	320	75931-10	40.1
284 B	324	75931-12	41.8
300 S	324	75931-12	41.8
330 S	320	75931-14	38.1

c) Loosen the two screws (1) and the six screws (2).

d) Place the template (5), see table below, on the plate (3). Let the yoke (4) rest against the template.



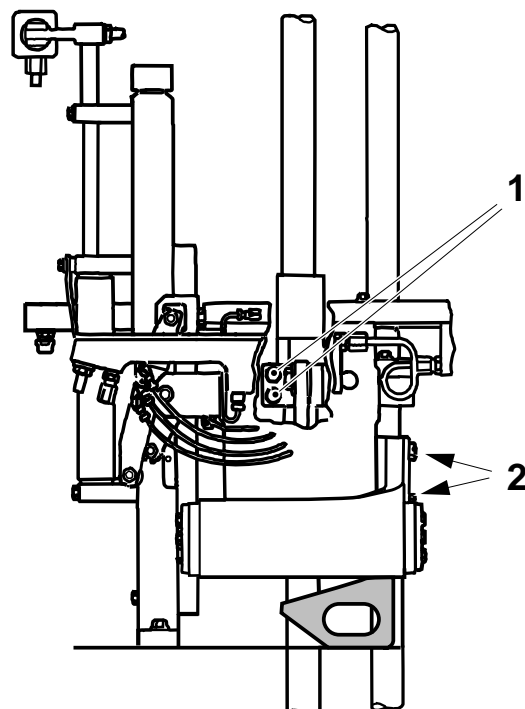
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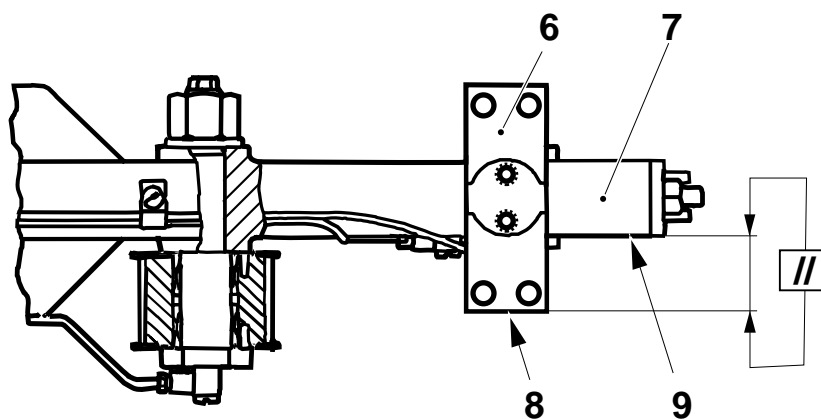
- e) Set surface (8) on the bracket (6) parallel to surface (9) on the yoke lifter arm (7).

Note! When tightening the screws (1) and (2), make sure not to twist the uniballs!

- f) Tighten the six screws (2) cross-wise and remove the template.
- g) Crank until the LH yoke is in its upper turning position. Follow the cranking by hand to avoid parts in collision.
- h) Tighten the screws (1).
- i) Set the stroke according to the volume requirement.



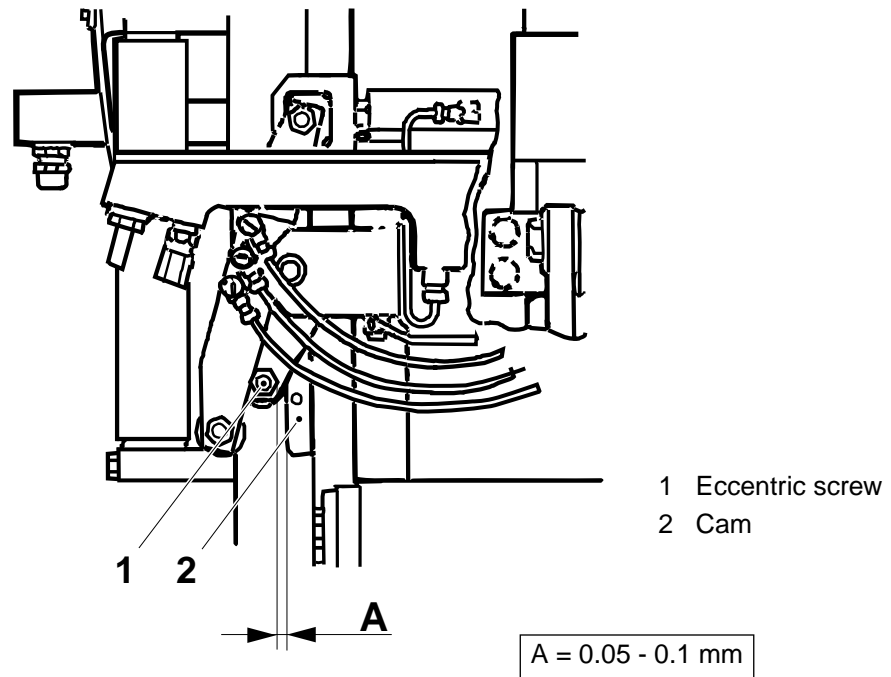
- 1 Screw
- 2 Screw
- 6 Bracket
- 7 Yoke lifter arm
- 8 Surface
- 9 Surface



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4.7-2 Cam and support rollers - set

On both sides, set distance A between the support roller and the cam (2), by means of the eccentric screw (1).

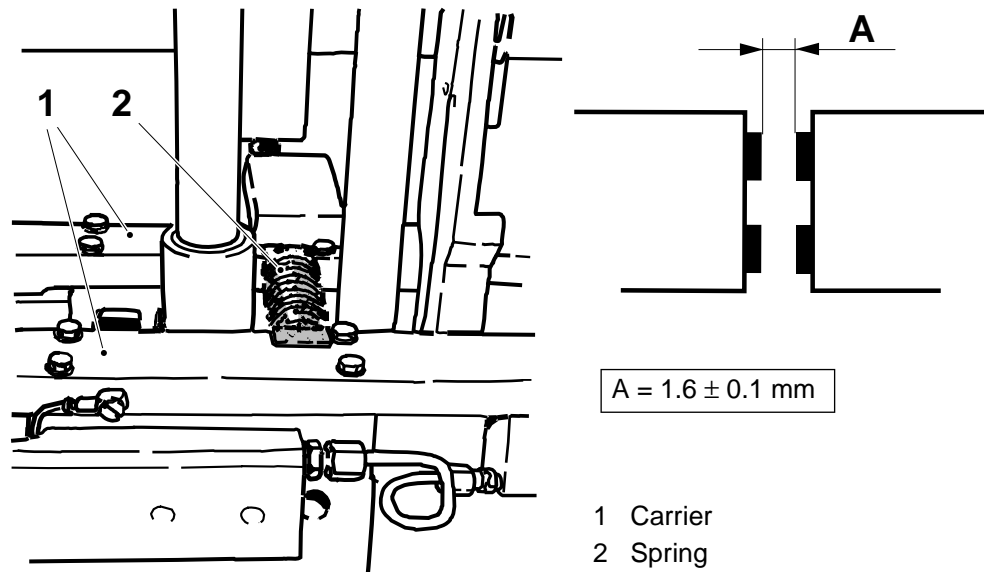


4.7-3 Jaw gap - check

Tools - spring	TP No. 76304-101
-------------------	------------------

Note! Make sure that the dollies are new before performing this check.

- a) Place the spring (2) between the carriers (1).
- b) Crank to 80°.
- c) With a feeler gauge, measure from above the jaw gap A between the pressure and cutting jaws.



- d) Crank to 260 ° and repeat item c) on the other side.

If the measured jaw gaps are out of tolerance, set the jaw gap, see 4.7-4 *Jaw gap - set*.

4.7-4 Jaw gap - set

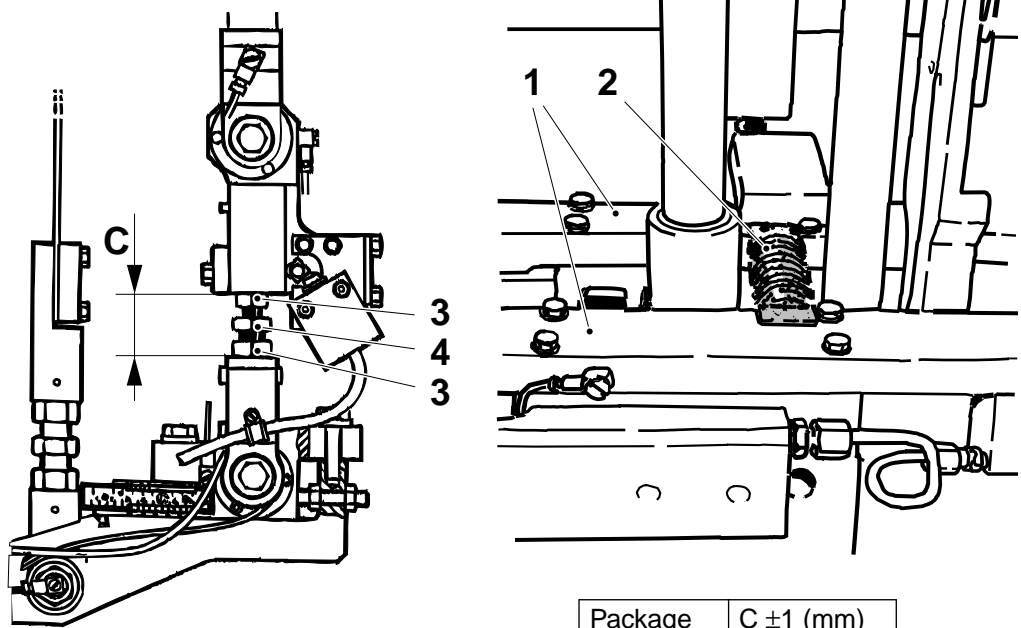
Tools - spring	TP No. 76304-101
-------------------	------------------

Place the spring (2) between the carriers (1).

Basic setting

- a) Loosen the lock nuts (3). Set distances C, according with the table below, by means of the screw (4) on both sides.

Note! Make sure that the screw (4) is positioned approximately in the middle.



- 1 Carrier
- 2 Spring
- 3 Lock nut
- 4 Screw

Package	C ±1 (mm)
100 B	44
125 S	44
160 S	39
180 B	44
200 B	44
200 M	39
200 S	39
236 B	44
250 B	44
250 S	39
284 B	44
300 S	44
330 S	44

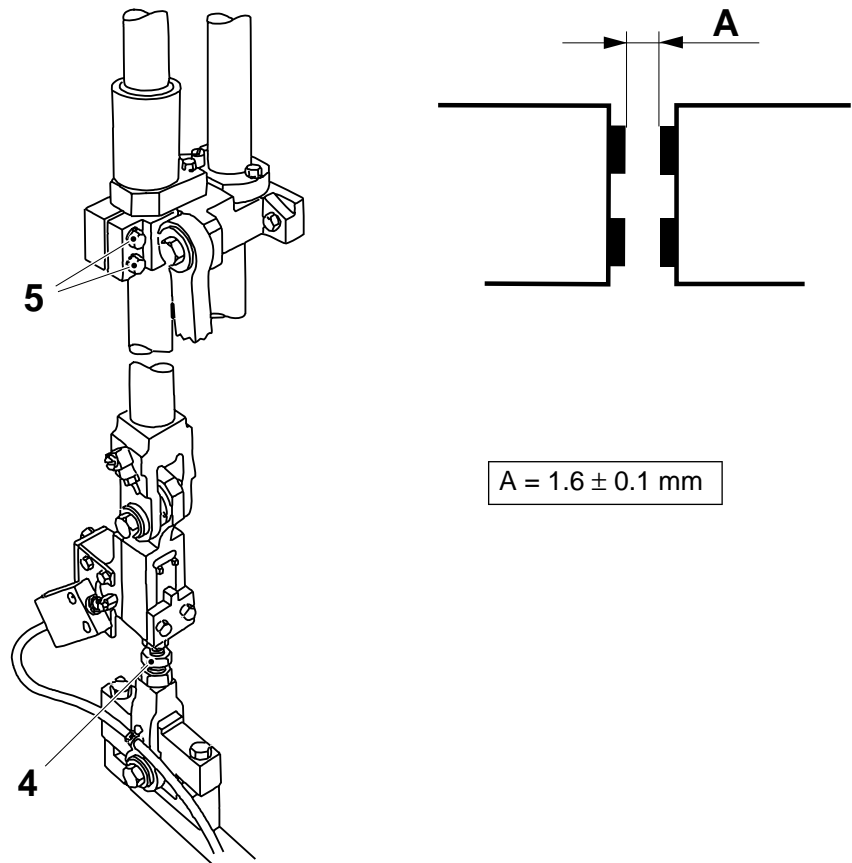
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- b) Crank to 80 ° the LH yoke.
- c) Measure the jaw gap (distance A) between the pressure jaw and the cutting jaw.
- d) If the jaw gap (distance A) exceeds 2 mm or is less than 0.05 mm, loosen the screw (5) and adjust until a jaw gap of 0.5 - 1.0 mm is obtained.
- e) Tighten the screws.
- f) Crank to 260° the RH yoke and repeat items from c) to e).

Fine setting

- g) Set the jaw gap (distance A) by means of the screw (4). Increasing the distance C (see previous page), increases the jaw gap A.
- h) Tighten the lock nuts and re-check the jaw gap.



4.7-5 Non-parallelity in movement - check

Tools - spring	TP No. 76304-101
-------------------	------------------

Note! Before carrying out the non-parallelity, the jaw gap must be set according to 4.7-4 Jaw gap - set.

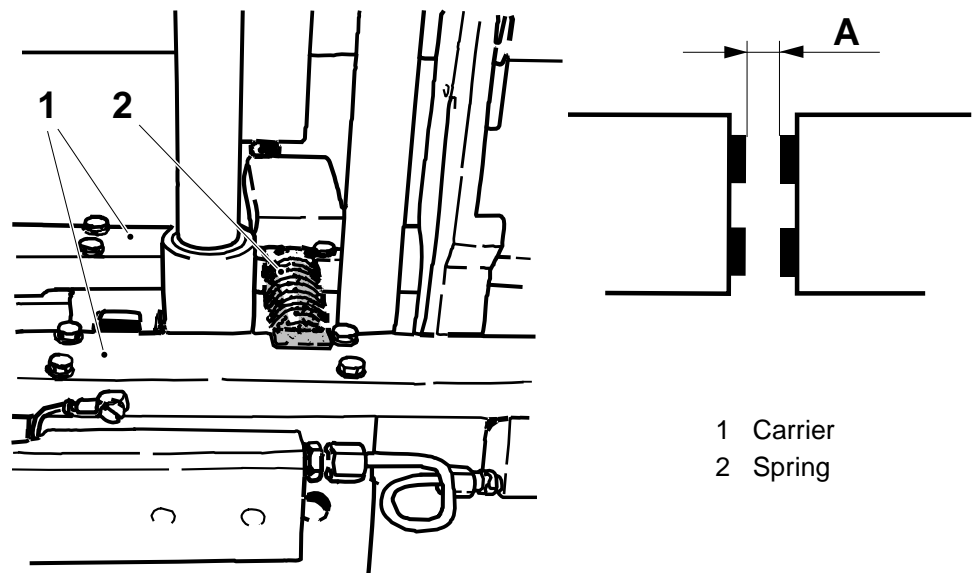
- a) Place the spring (2) between the carriers (1).

LH side

- b) Crank to 190° .
c) Measure the jaw gap (distance A) from above and record the value.
d) Crank to 280°. Measure the jaw gap from underneath and record the value.

RH side

- e) Crank to 10°. Measure the jaw gap from above and record the value.
f) Crank to 100°. Measure the jaw gap from underneath and record the value.



(Cont'd)

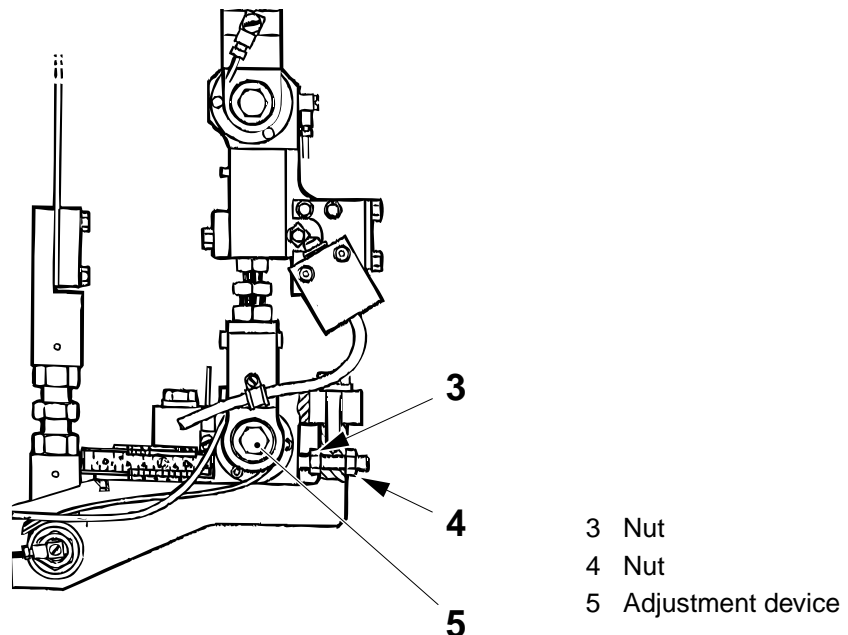
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If any of the jaw gaps are **wider** than 1.8 mm, proceed as follows:

- Loosen the nut (3).
- shift the adjustment device (5) on the link arm **towards** the final folder turning approx 1/2 turn of the nut (4). Tighten the nut (3).

If any of the jaw gaps are **smaller** than 0.4 mm, proceed as follows:

- Loosen the nut (3).
 - shift the adjustment device **away from** the final folder turning approx 1/2 turn of the nut (4). Tighten the nut (3).
- g) Re-set the jaw gap according to 4.7-4 *Jaw gap - set* and then repeat the measure from a) to f).



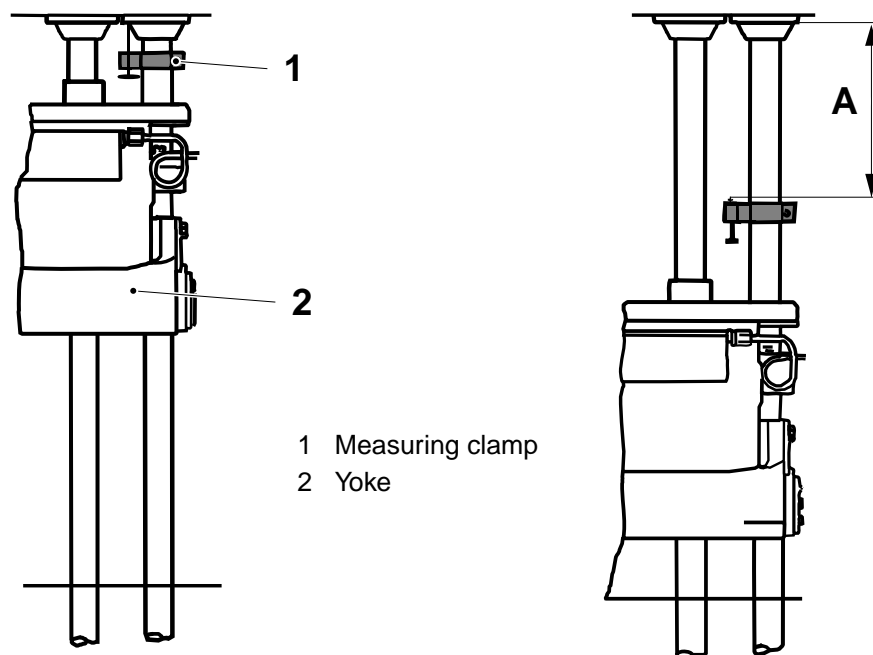
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4.7-6 Stroke - check

Tools - measuring clamp - internal micrometer	TP No. 76416-101
-----------------------------------------------------	------------------

- Crank to X° and fit the measuring clamp (1), on the LH yoke.
- Crank until the yoke (2) reaches its lower turning position, see table below.
- Measure the stroke (distance A) with an internal micrometer and record the result.

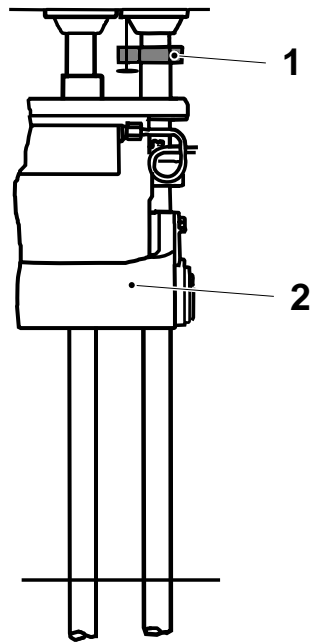
Package	X°	Lower turning position	
		LH yoke	RH yoke
100 B	25	328°	148°
125 S	35	322°	142°
160 S	35	316°	136°
180 B	35	-	-
200 B	35	322°	142°
200 M	35	322°	142°
200 S	30	324°	144°
236 B	35	-	-
250 B	35	322°	142°
250 S	35	320°	140°
284 B	35	324°	144°
300 S	35	324°	144°
330 S	35	320°	140°



(Cont'd)

(Cont'd)

- d) Remove the measuring clamp (1).
- e) Crank to Y° and fit the point measuring clamp on the RH yoke guide.
- f) Repeat items *b) - d)*.
- g) If the difference between the measured strokes on the two sides exceeds 0.2 mm, set the stroke, see 4.7-8 *Stroke - set*.



Package	Y°
100 B	205
125 S	215
160 S	215
180 B	215
200 B	215
200 M	215
200 S	210
236 B	215
250 B	215
250 S	215
284 B	215
300 S	215
330 S	215

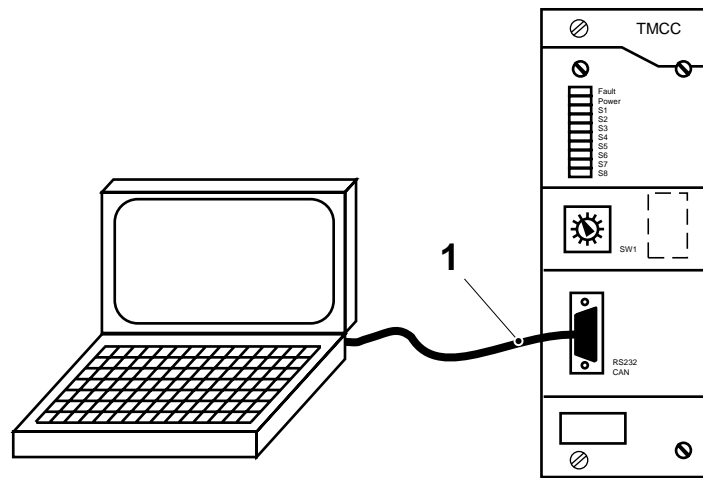
- 1 Measuring clamp
- 2 Yoke

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4.7-7 Stroke - check during production

Machine status	Production
Tools: - communication cable - AT compatible PC	

- Connect the communication cable(1) between PC and TMCC card connector.
- Check that the output signal value is 145 ± 40 . If the value is over 185 increase the stroke length; if the value is below 105 decrease the stroke length.



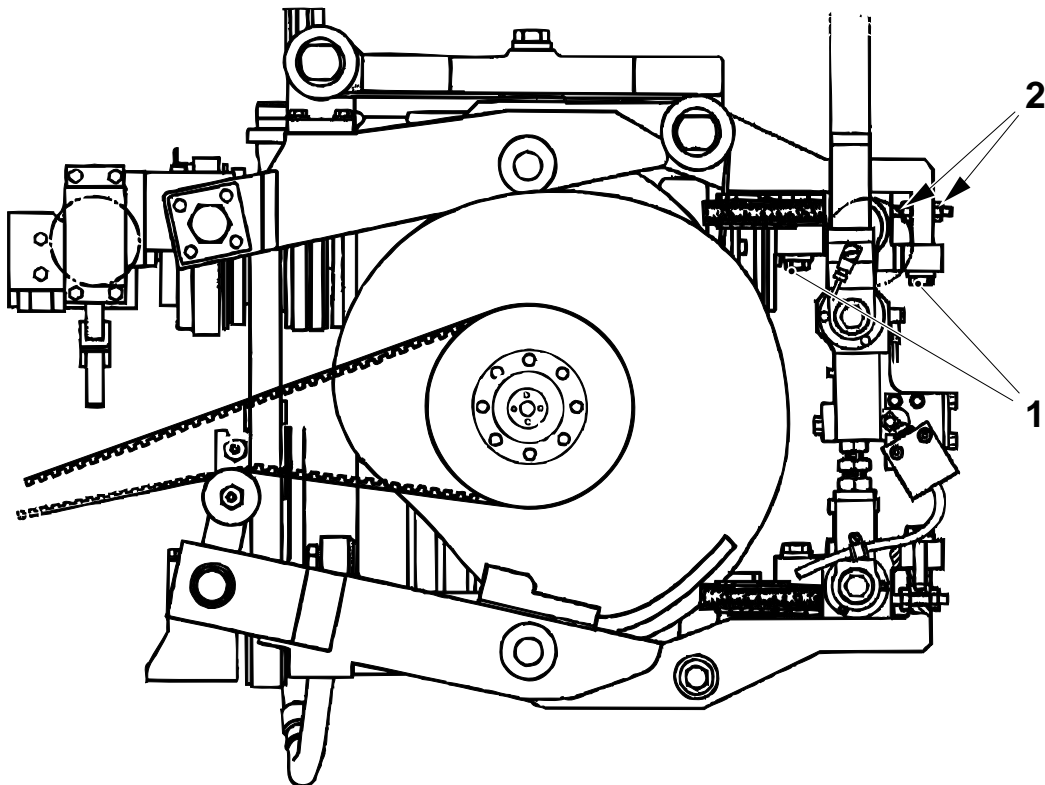
1 Communication cable

4.7-8 Stroke - set

- a) Loosen the screws (1).

Note! Make the same adjustment on both scales.

- b) Alter the stroke by means of the nuts (2). To increase the stroke, shift the scale towards the final folder. Tighten the screws (1).



- 1 Screw
- 2 Nut

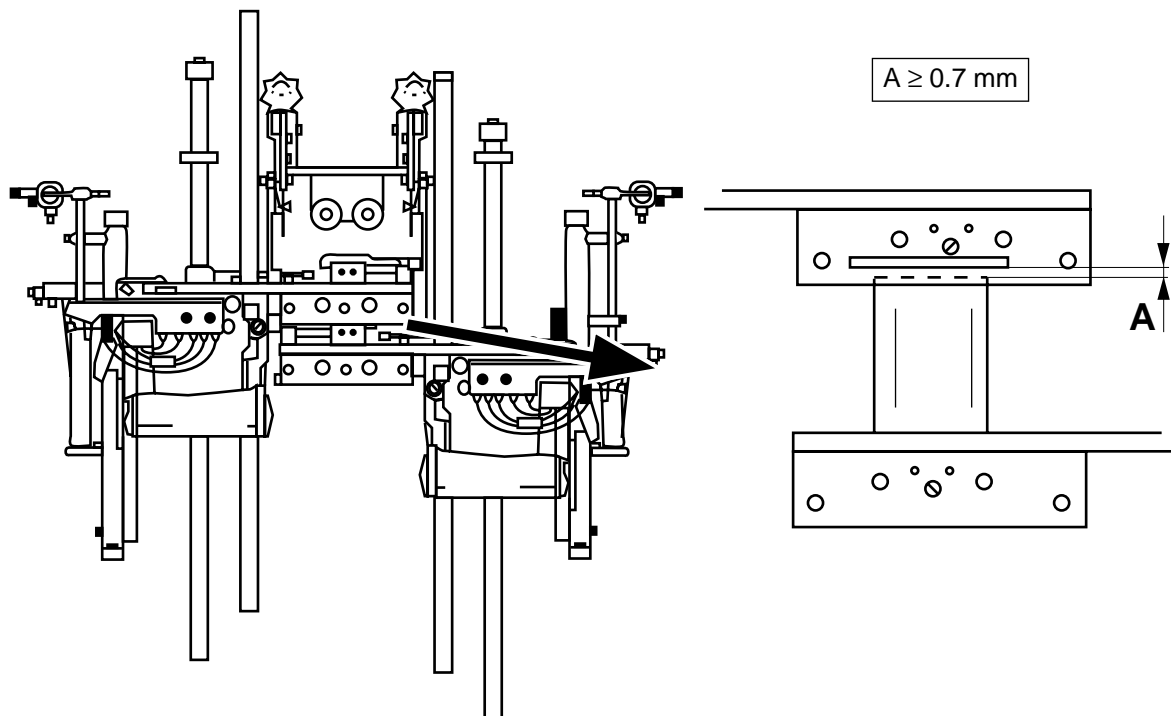
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- c) Crank to 90° and check the distance between the volume flap and the cutting jaw (T-gap), distance A.
- d) Crank to 270° and check distance A on the other side.
- e) Set the jaw gap, see 4.7-4 Jaw gap - set.

Basic setting

Package	Stroke length (mm)
100 B	159.1
125 S	174.0
160 S	192.8
180 B	-
200 B	177.3
200 M	207.2
200 S	227.3
236 B	-
250 B	211.2
250 S	236.5
284 B	231.4
300 S	231.4
330 S	244.4

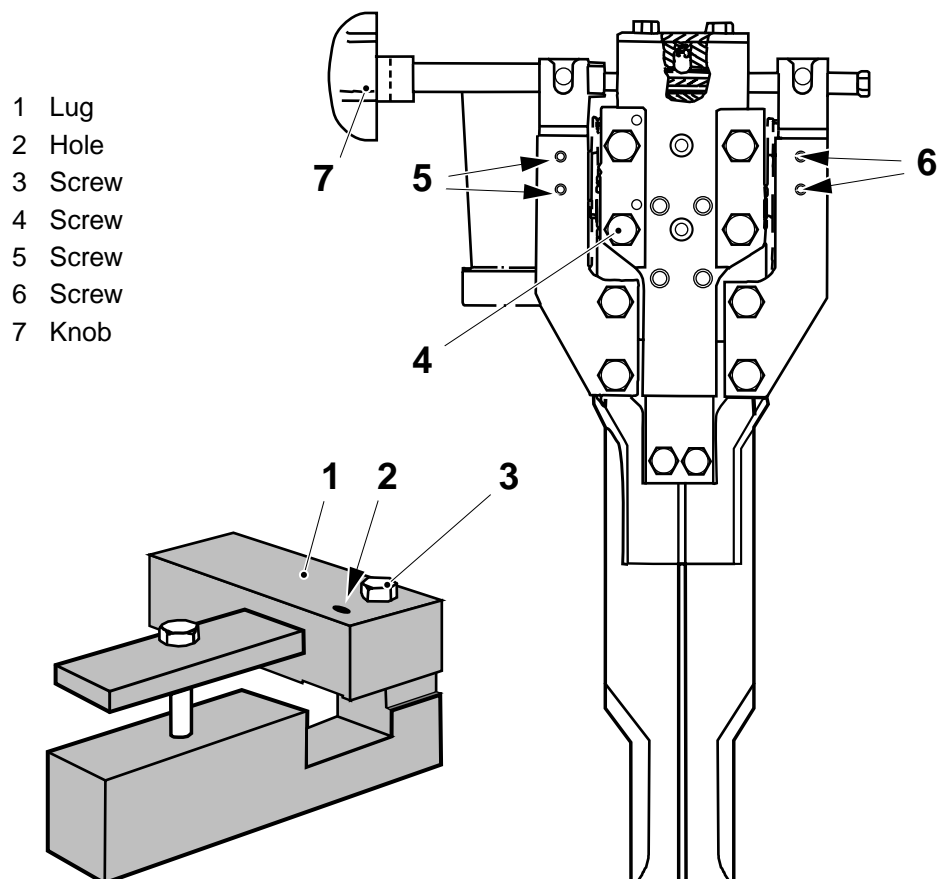


4.7-9 Volume curve piece - set

Tools - template	TP No. 75469-201
SPC reference	

Note! Change the template to fit the LH volume curve piece. To change the performance, unscrew the screw (3), shift the lug (1), and fit the screw in the hole (2).

- Remove the tube support rollers.
- Unscrew the four screws (4) and remove the LH volume curve piece from the machine.
- Loosen the screws (5) and (6).
- Turn the handle (7) fully in and then out two to three turns (in order to make sure that there is a gap between the volume cams when the handle is turned fully in).

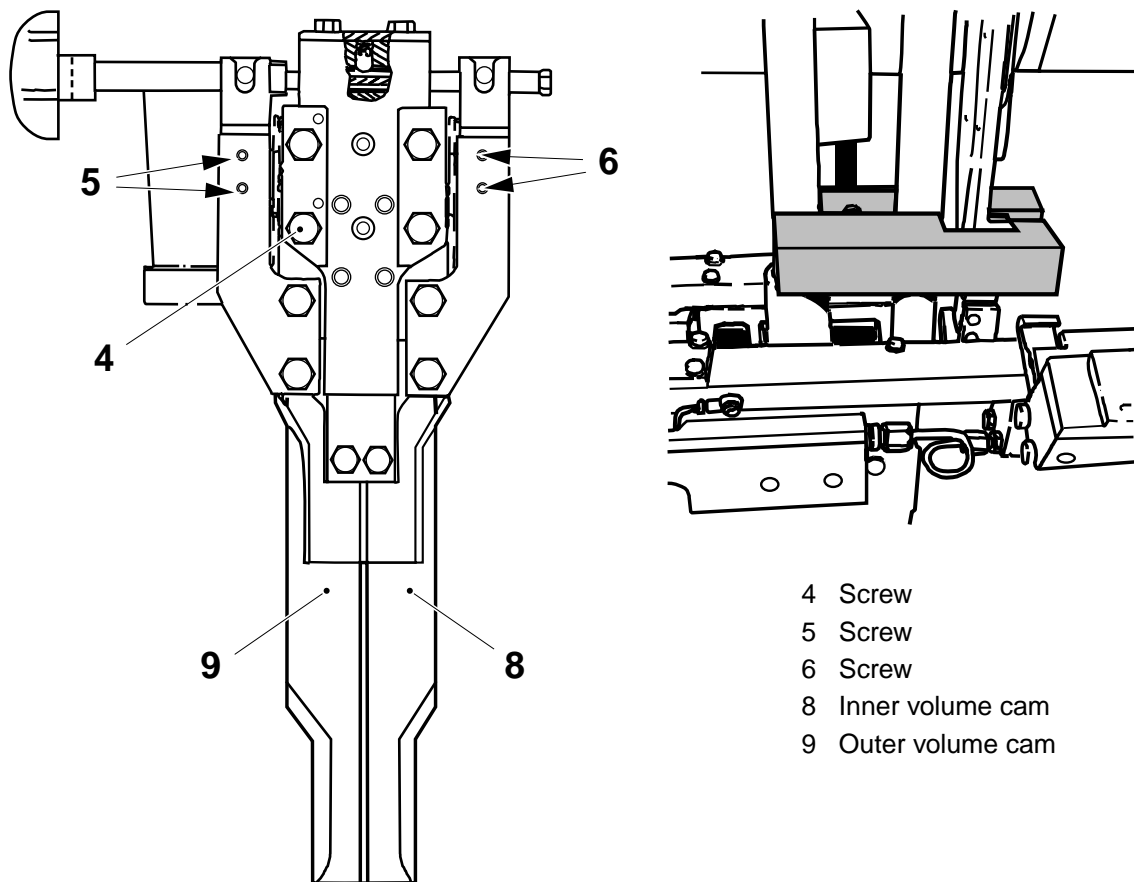


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(Cont'd)

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- e) Crank to 180°.
- f) Fit the volume curve piece and tighten the screws (4).
- g) Fit the template.
- h) Press the outer volume cam (9) against the template and tighten the screws (5).
- i) Unscrew the four screws (4) and remove the volume curve piece.
- j) Put the template between the volume cams.
- k) Press the inner volume cam (8) against the template and tighten the screws (6).

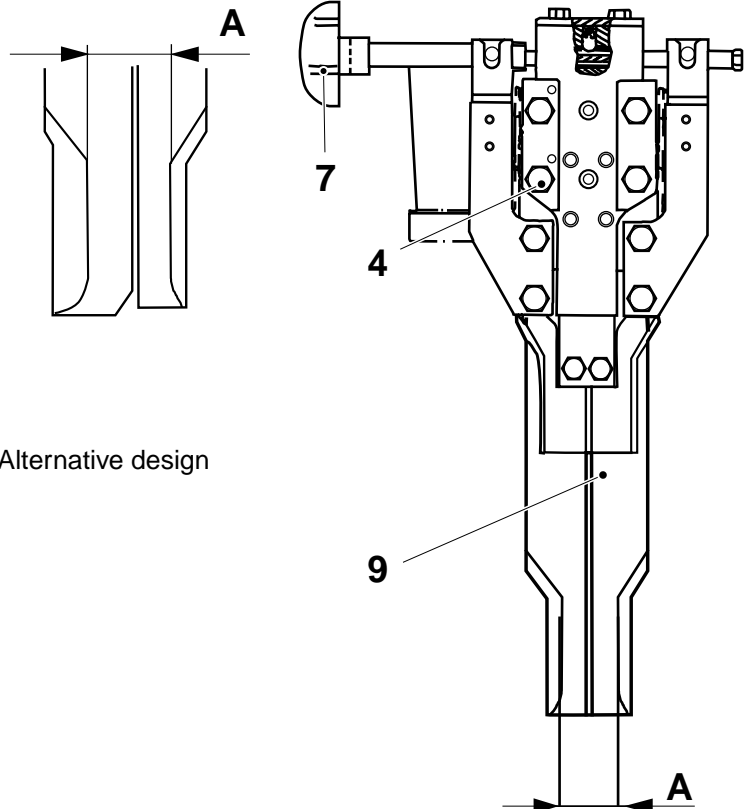


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- l) Fit the volume curve piece.
- m) Fit the template and check that the volume cams are parallel.
- n) Tighten the screws (4).
- o) Remove the template.
- p) Crank to 0 ° and repeat items b) - o) for the RH volume curve piece.
- q) Set distance A (basic setting) by means of the handle (7).

- 4 Screw
- 7 Handle
- 9 Inner volume cam



Alternative design

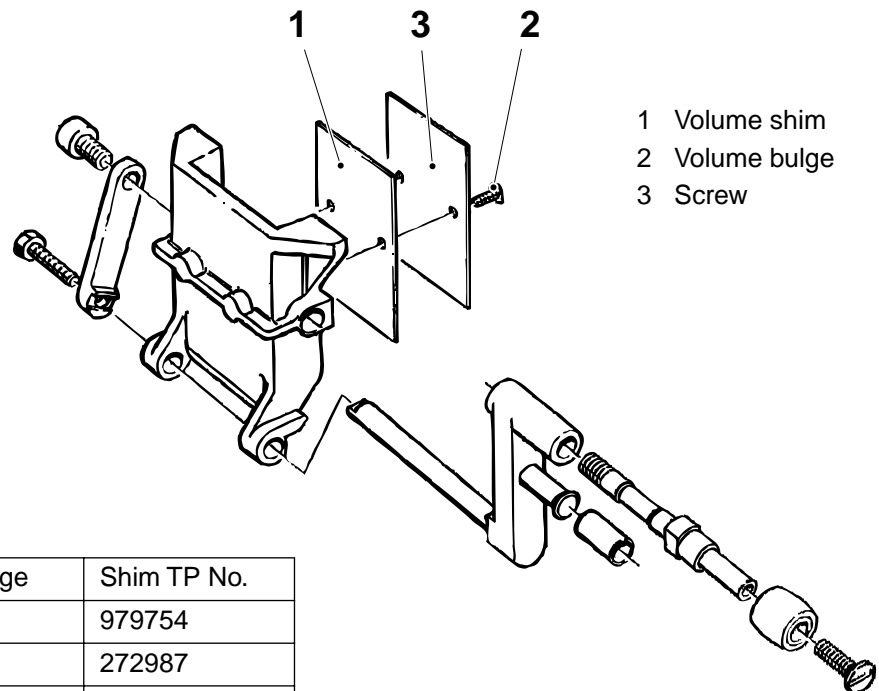
Package	A (mm)
100 B	34.0
125 S	34.0
160 S	34.0
180 B	34.0
200 B	34.0
200 M	34.0
200 S	34.0
236 B	34.0
250 B	33.5
250 S	34.0
284 B	33.5
300 S	33.5
330 S	34.0

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4.7-10 Volume flap - set package weight

SPC reference	256209-040V 256210-040V
---------------	----------------------------

- Basic set the package weight by means of the volume shims (1), see table below.
- The number of volume shims used should be approx. the same on both the cutting jaw side and the pressure jaw side.
- To adjust, unscrew the screws (2) and remove the volume bulge (3).
- Fit the volume shims and reassemble.
- Final set by means of the handles on the volume curve pieces.



- Volume shim
- Volume bulge
- Screw

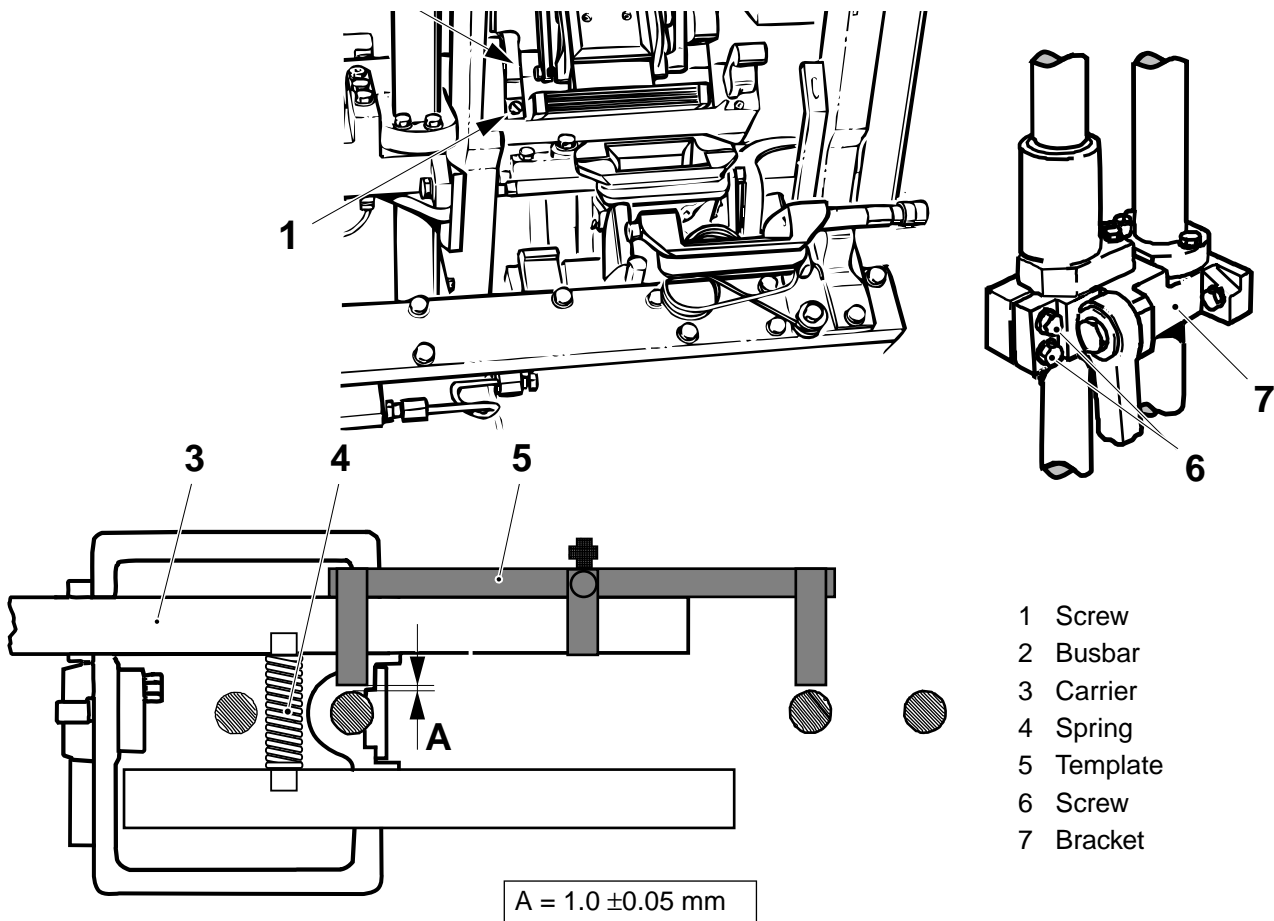
Package	Shim TP No.
100 B	979754
125 S	272987
160 S	577212
180 B	272986-4
200 B	272986-3
200 M	979861
200 S	272991
236 B	272986-2
250 B	272986-1
250 S	574366
284 B	272986-5
300 S	272986-3
330 S	272986-6

4.7-11 Cutting jaw and pressure jaw alignment - set

Tools	
- spring	TP No. 76304-101
- template	TP No. 76301-101

LH Yoke

- Unscrew the screw (1) and lift off the busbar (2).
- Crank to 175° (for **330 S** to 173°).
- Place the spring (4) between the carriers.
- Place the template (5) on the carrier (3) on the pressure jaw side.
- Set distance A by loosening the screws (6) and shifting the bracket (7) up or down.
- Tighten the screws (5).



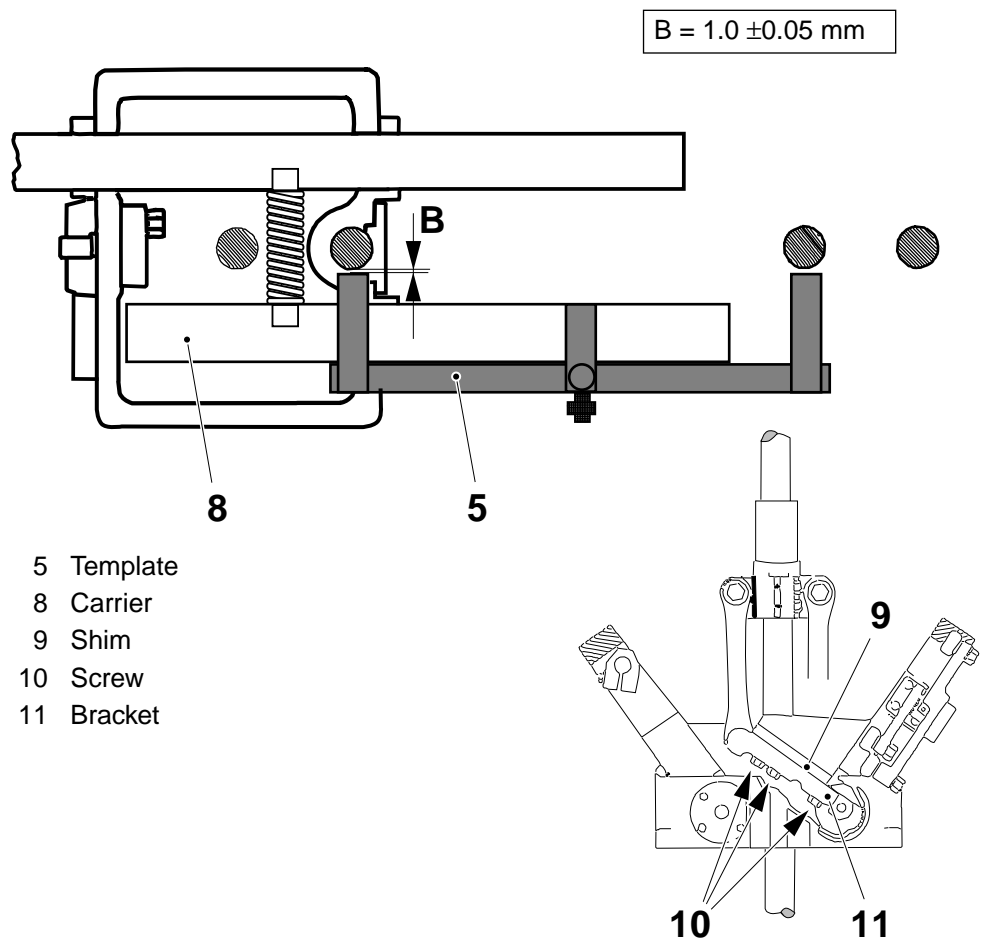
- Screw
- Busbar
- Carrier
- Spring
- Template
- Screw
- Bracket

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(Cont'd)

(Cont'd)

- g) Place the template (5) on to the carrier (8) on the cutting jaw side.
- h) Set the distance B by means of shims (10). Remove the screws (11) and the bracket (12) and put in or remove shims. Adding shims increases the distance (altering the shim thickness by 0.1 mm, changes the distance B approx 0.15 mm).
- i) Remove the template (5) and the spring.
- j) Fit the busbar, the banjo connections, and the two bleeding screws.



RH Yoke

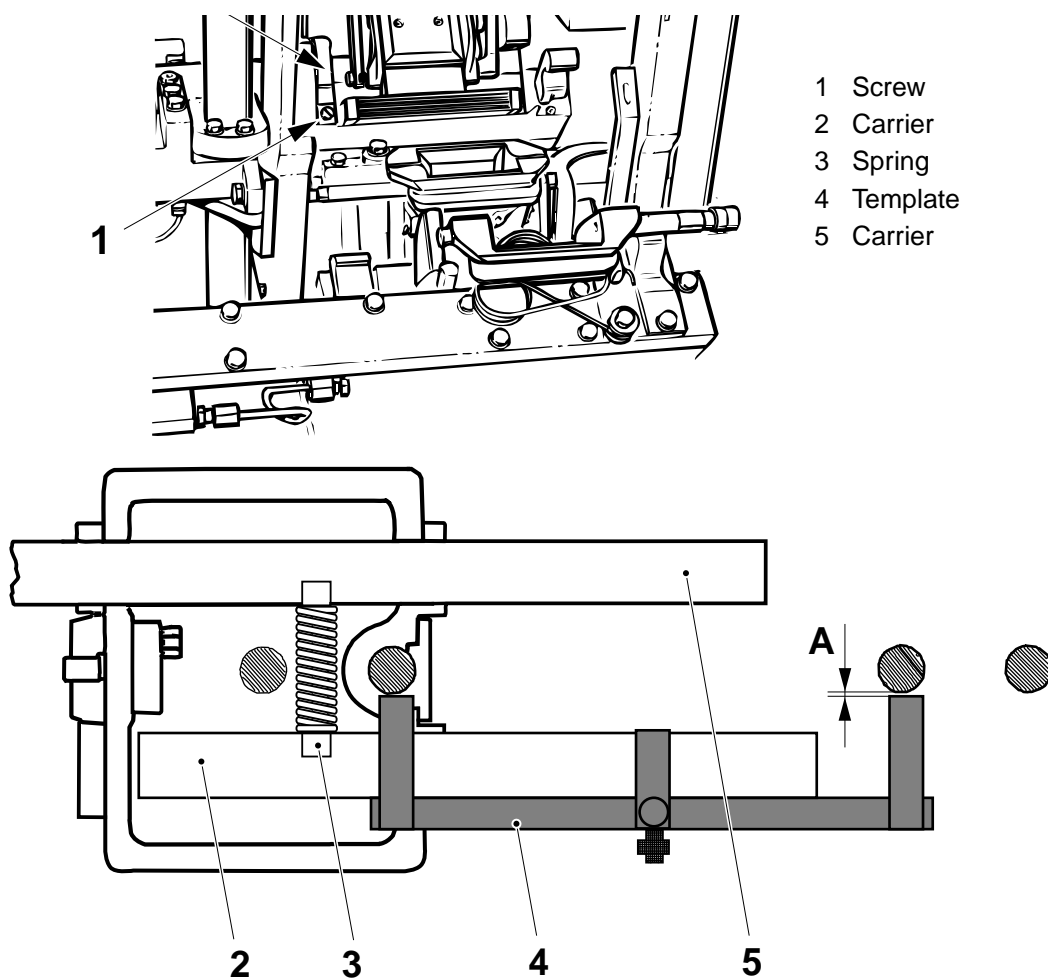
- a) Remove the coaxial cable, the cover, the rail and the banjo connections. Unscrew the two bleeding screws on the carrier.
- b) Crank to 355° (for **330 S** to 353°).
- c) Repeat items c) - j) from the LH yoke.

4.7-12 Yoke symmetry - set

Tools	
- spring	TP No.76304-101
- template	TP No. 76301-101

LH Yoke

- Unscrew the screw (1) and lift off the busbar.
- Crank to 175° (for **330 S** to 173°).
- Place the spring (3) between the carriers.
- Fit the template (4) on the carrier (2) on the cutting side.
- Measure distance **A** between the template and the guide; record the result.



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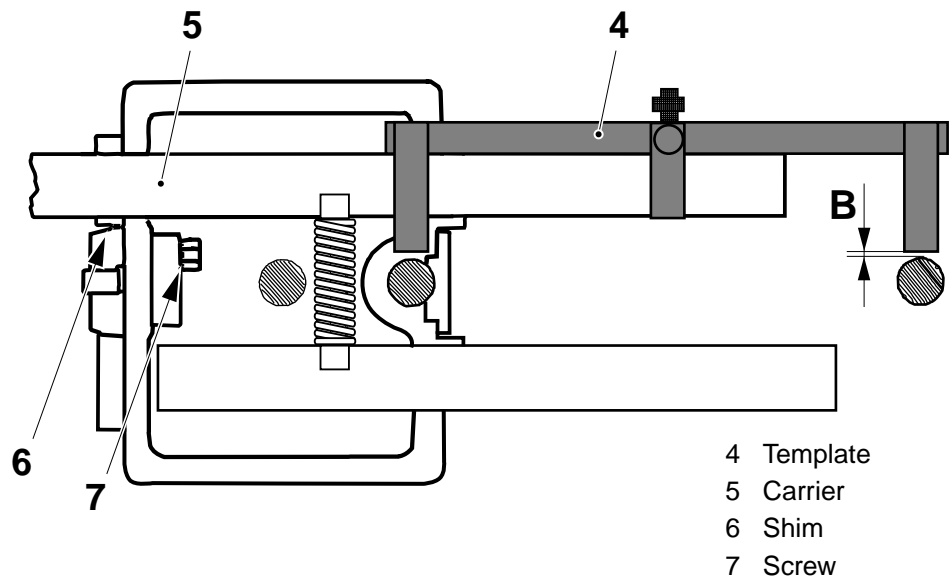
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- f) Shift the template (4) to the carrier (5) on the pressure jaw side.
- g) Measure distance **B** and record the result.

Note! Distances **A** and **B** are to be **the same within 0.1 mm**. If not, adjust by loosening the upper and lower screws (7), and adding or removing shims (6). (Altering the shimming by 0.1 mm, changes the symmetry distances **A** and **B** by approx 0.15 mm).

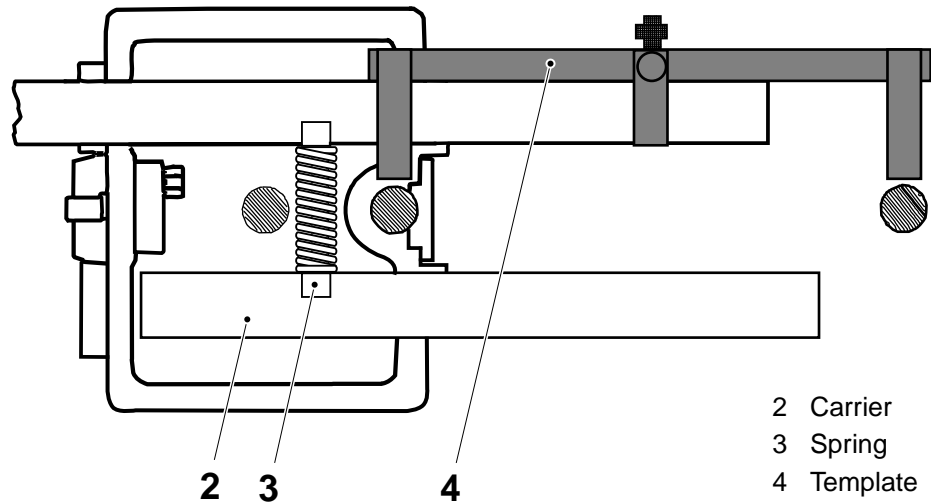
- h) Tighten the screws (7) and re-check the distances **A** and **B**.
- i) Fit the busbar.



(Cont'd)

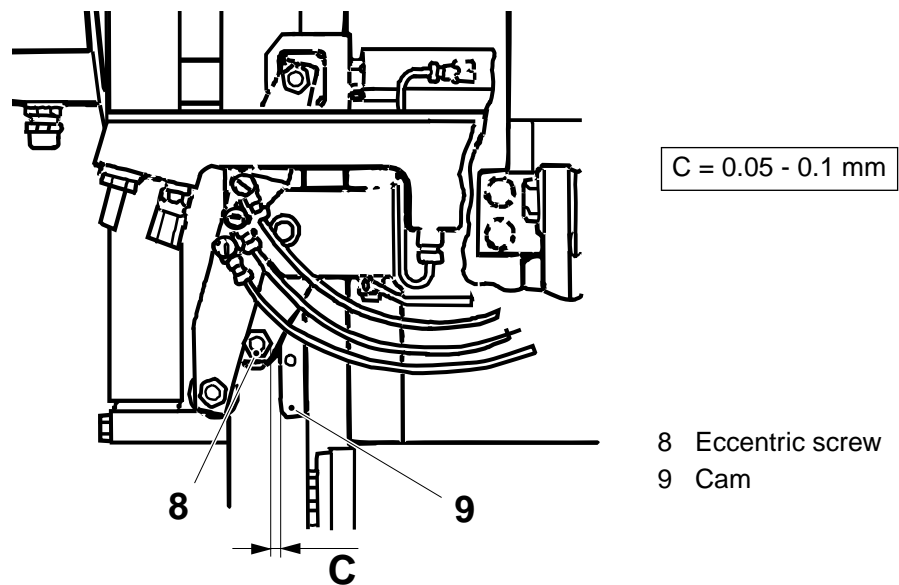
(Cont'd)

- j) Crank to 355° (for **330 S** to 353°). Place the spring (3) between the carriers.
- k) Fit the template (4) on the carrier (2) on the cutting jaw side.
- l) Repeat items *e*) - *i*).



On both sides

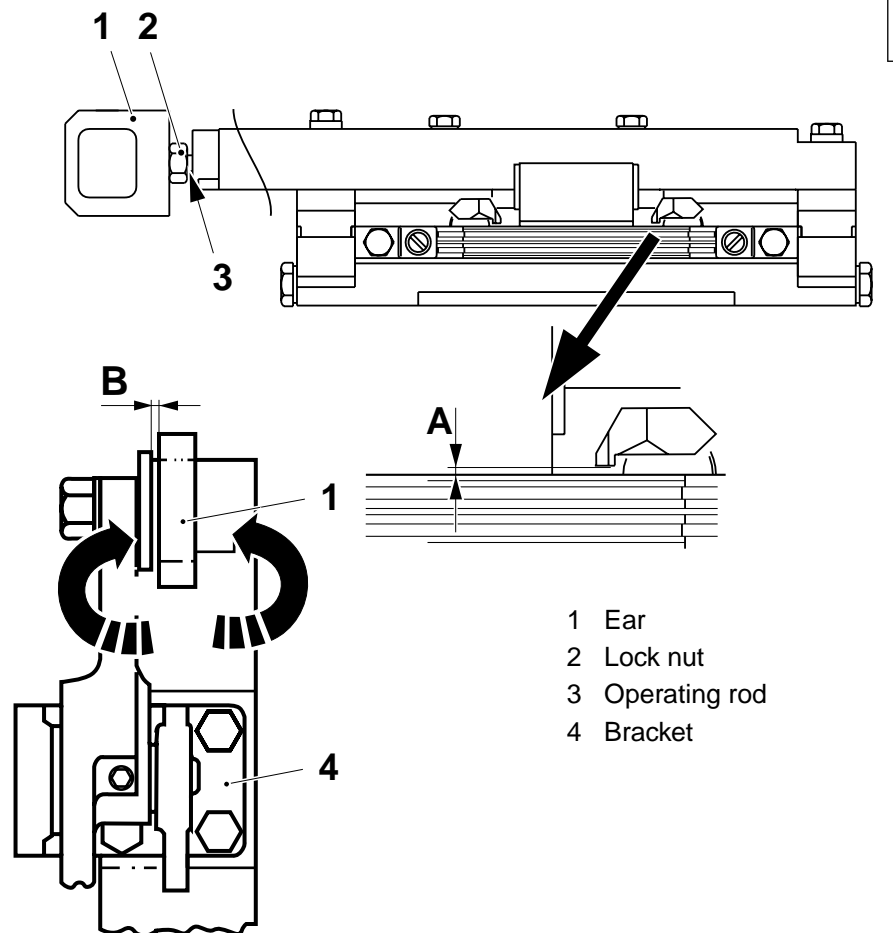
Set distance C between the support roller and cam (10) with the eccentric screw (9).



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4.7-13 Folding flap mechanism - check

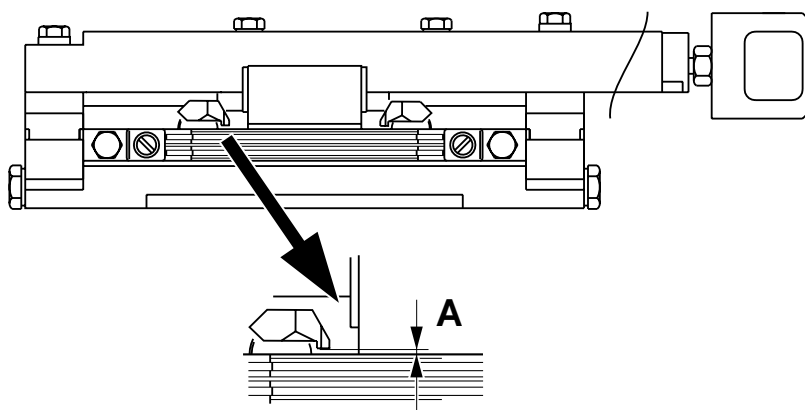
- Check distance B; it should be possible to twist the ears (1) slightly sideways. If required, adjust by shifting the brackets (4).
- Remove the volume flaps on the cutting jaw side.
- Crank to 0°.
- Place a feeler gauge, thickness 0.7 mm, under the folding flaps.
- Move the design correction cylinder into non-corrective position (full packaging material feed).
- Loosen the lock nut (2) and turn the operating rod (3) to obtain distance A.



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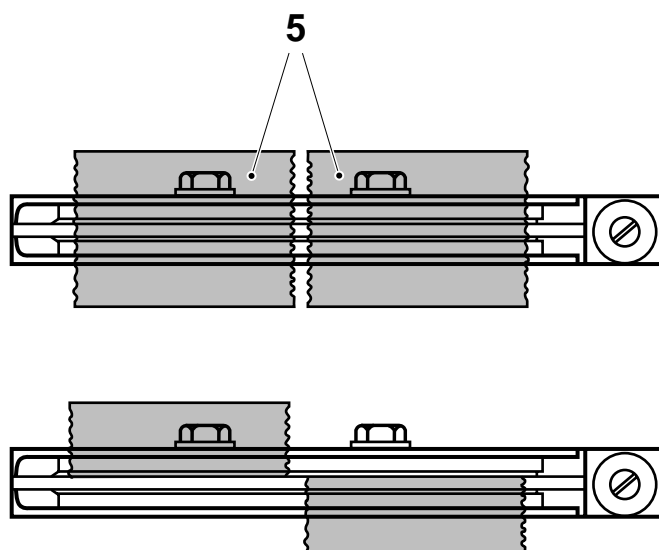
- g) Check distance A along the whole folding flap (cutting side and inductor side) and at the top and bottom parts of the folding flap cam.
- h) If the distance A differs on the cutting side and the inductor side, adjust by adding or removing of shims underneath the carrier on the cutting side.
- i) Crank to 180 ° and repeat items d) - h) on the other side.



If actions according to item h) have been carried out, proceed as follows:

Jaw vertical position

- a) Crank to 30° (RH side)/ 210° (LH side).
- b) Stick two pieces of adhesive tape (5) to each inductor.
- c) Crank to 79° (RH side)/ 259° (LH side).

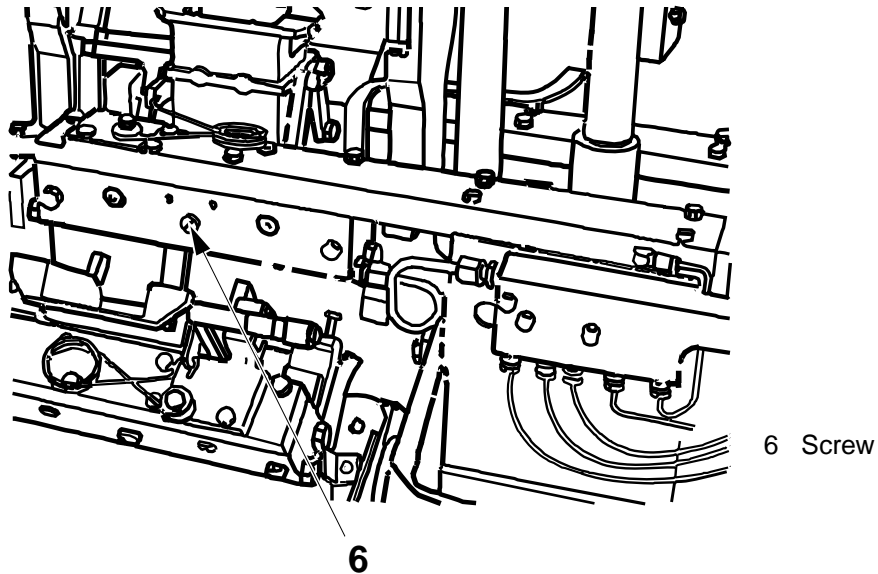


5 Adhesive tape

(Cont'd)

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- d) Tap the head of the knife screw (6) lightly so that the knife cuts through the tape.
- e) Crank the jaws open. Remove the upper RH and lower LH pieces of tape.
- f) Check the vertical position. The knife must **not** hit edge of the groove.
- g) Remove or add shims underneath the carrier on the cutting side as required.

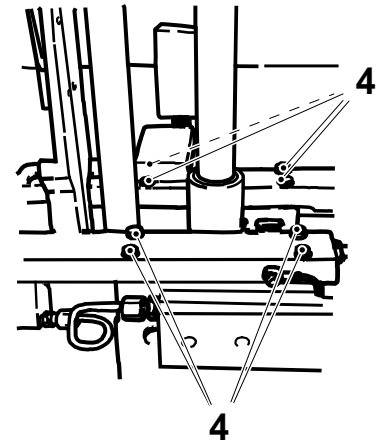
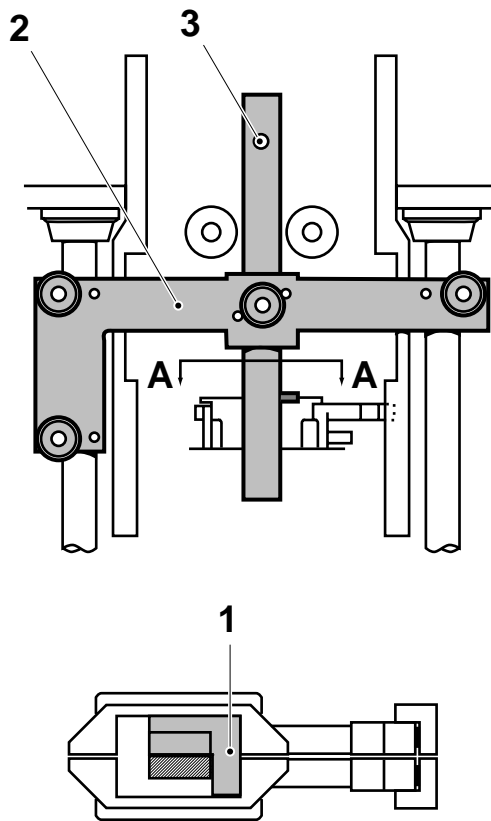


4.7-14 Volume flap - alignment

Tools	
- template	TP No. see table below
- yoke	TP No. 76291-101
- ruler	TP No. 76298

- a) On **100 B** and **125 S** machines, remove the bracket of the tube support rollers.
- b) Crank to X° , RH volume flap.
- c) Fit the yoke (2) and the ruler (3) (for **330 S**, fit the yoke from the back side).
- d) Loosen the screws (4). Apply the template (1), see table below, to the ruler (3).

Note! If required, open the volume curve pieces by means of the handle.



- 1 Template
- 2 Yoke
- 3 Ruler
- 4 Screw

Package	Template TP No.	X°
100 B	75943	10
125 S	75943	5
160 S	75944	5
180 B	75939	5
200 B	75939	5
200 M	574455	15
200 S	75944	0
236 B	75939	5
250 B	75939	5
250 S	574455	15
284 B	75939	5
300 S	75939	5
330 S	75939	8

(Cont'd)

(Cont'd)

- e) Shift the carrier sideways until the template moves easily in the volume flaps from either side of the ruler (3).

Note! Make sure that any axial play in the volume flap is placed symmetrically.

- f) Tighten the screws.
 g) Remove the ruler, the yoke and the template.
 h) Crank to Y° and repeat the setting procedure with the LH volume flap.

Package	Y°
100 B	190
125 S	185
160 S	185
180 B	185
200 B	185
200 M	195
200 S	185
236 B	185
250 B	185
250 S	195
284 B	185
300 S	185
330 S	195

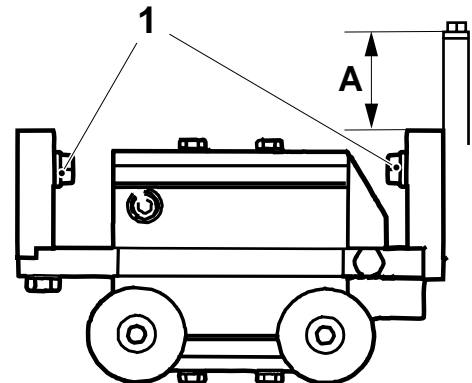
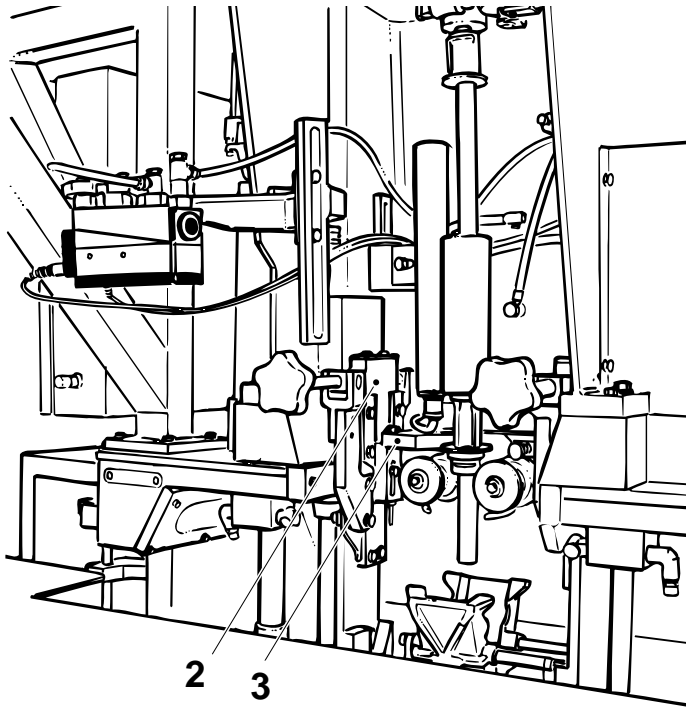
- i) Set the folding flaps, see 4.7-13 *Folding flap mechanism - check*.

4.7-15 Tube support rollers - set

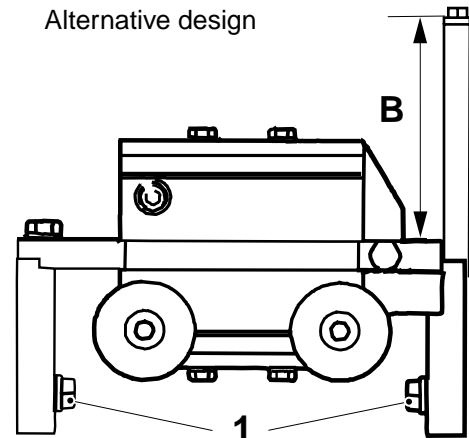
Tools	
- template	see below
- yoke	TP No. 76291-101
- ruler	TP No. 76298

Alignment and vertical position - basic setting

- Loosen the screws (1) and set distance A, between the bracket (2) and the bracket (3), see table below.
- Crank to 5° or 185°.



Alternative design



Package	A ±1 (mm)	B ±1 (mm)
100 B	84	-
125 S	84.0	-
160 S	70.0	-
180 B	62.0	-
200 B	66.0	-
200 M	-	77.0
200 S	47.5	-
236 B	-	-
250 B	56.0	-
250 S	-	77.0
284 B	47.5	-
300 S	47.5	-
330 S	75.0	75.0

- 1 Screw
- 2 Bracket
- 3 Bracket

(Cont'd)

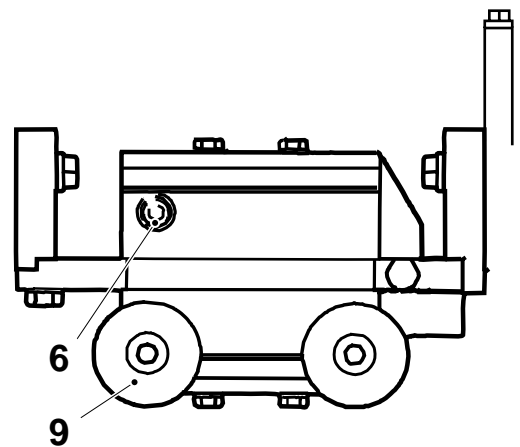
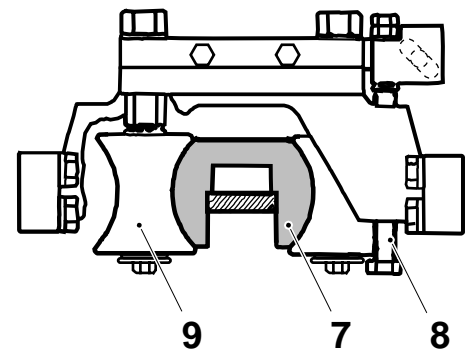
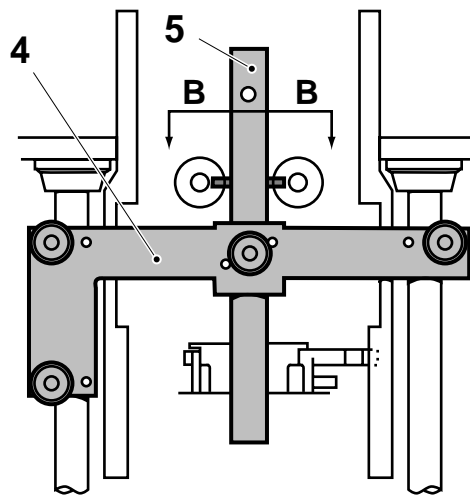
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- c) Fit the yoke (4) and the ruler (5).
- d) Unscrew the locking screw (6). Apply the template (7), see table below, to the yoke (4).
- e) Turn the adjustment screw (8) until the LH tube support roller (9) bears against the template.

Note! For **100 B** and **125 S**, there should be 0.5 mm between the template and the roller.

- f) Tighten the locking screw (6).



Package	Template, TP No.
100 B	75937
125 S	75937
160 S	76176
180 B	75936
200 B	75936
200 M	574454
200 S	76176
236 B	75936
250 B	75936
250 S	574454
284 B	75936
300 S	75936
330 S	75936

- 4 Yoke
- 5 Ruler
- 6 Locking screw
- 7 Template
- 8 Alignment screw
- 9 Tube support roller, LH

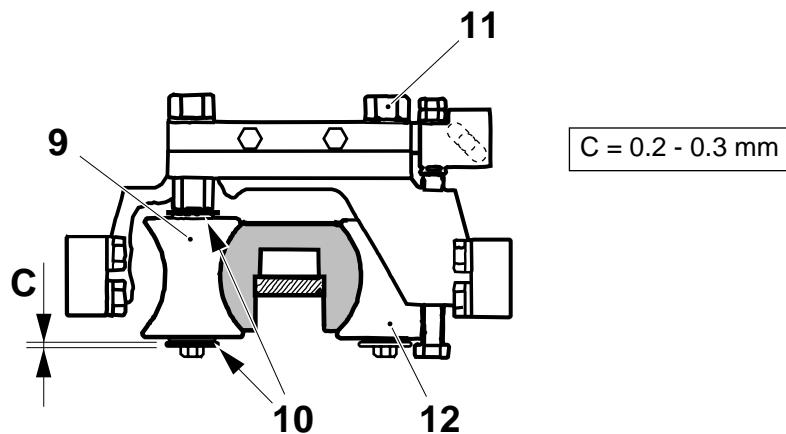
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- g) Set the LH tube support roller (9) so that it bears evenly against the template by means of the shims (10). After setting, check that the roller rotates freely, distance C.
- h) Loosen the nut (11) and slide the RH tube support roller (12) against the template.

Note! For **100 B** and **125 S**, there should be 0.5 mm between the template and the roller.

- i) Tighten the nut (11) and repeat item g) on the RH roller.

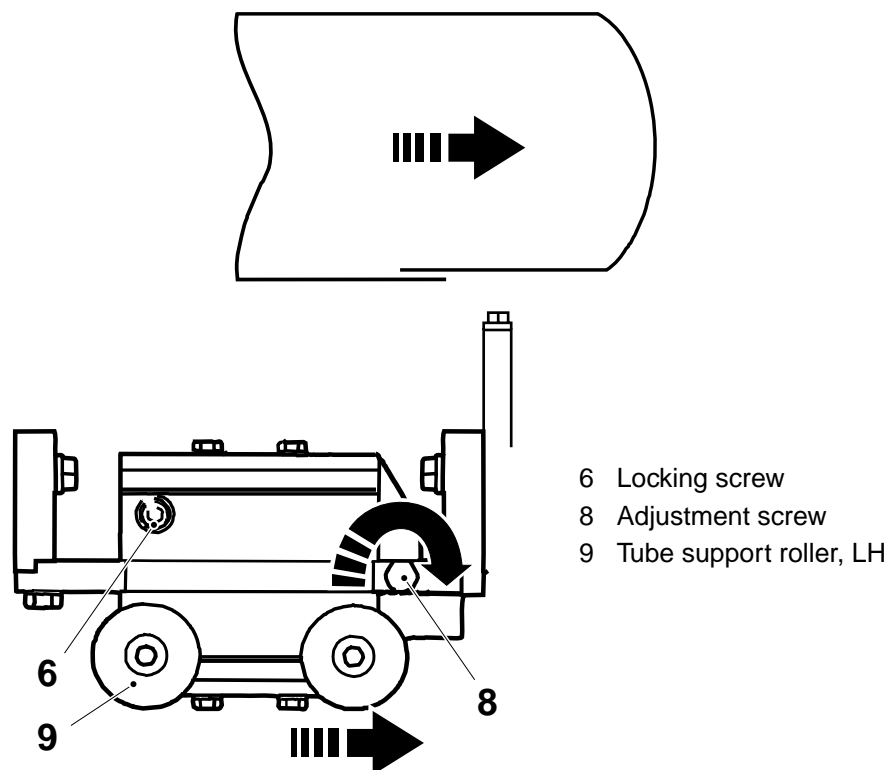


- 9 Tube support roller, LH
- 10 Shim
- 11 Nut
- 12 Tube support roller, RH

(Cont'd)

*(Cont'd)***Final setting of centering and vertical position**

- a) In step **Production**, push out the drop chute. Pick two consecutive semi-finished packages and check that the short sides are indentially shaped.
- b) The picture below shows a section through a semi-finished package, seen from above. Shift the support rollers in the direction of the arrow.
- c) To adjust, make a **Short stop**, loosen the locking screw (6) and adjust by means of the adjustment screw (8). Turning the screw (8) clockwise moves the tube support roller to the right.



- 6 Locking screw
- 8 Adjustment screw
- 9 Tube support roller, LH

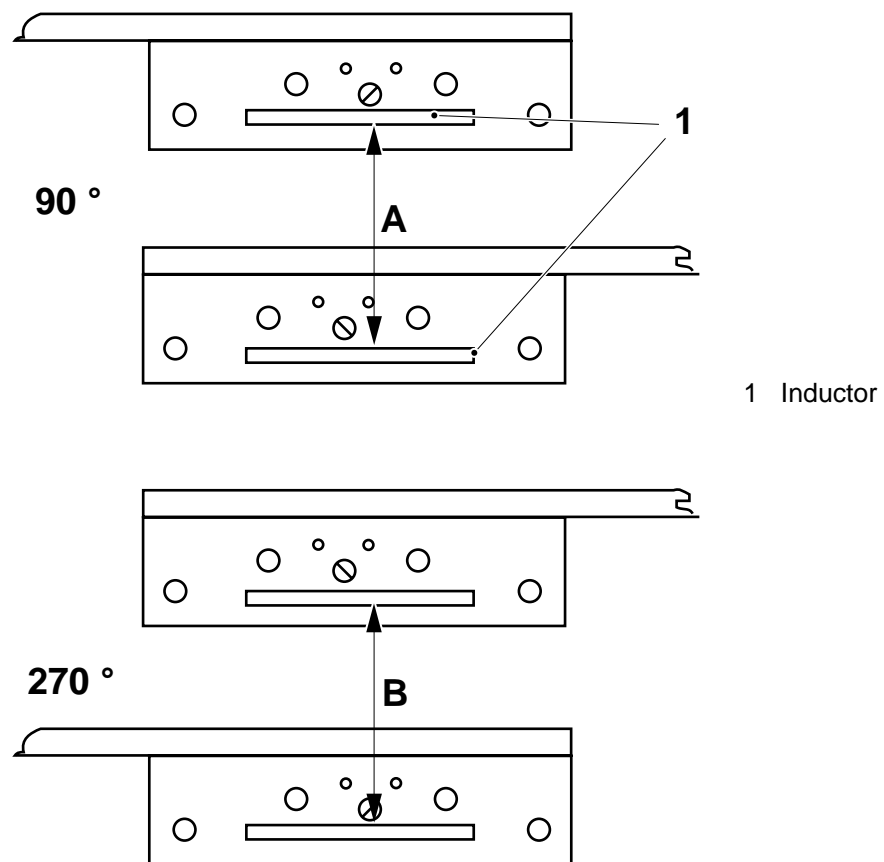
4.7-16 Jaw over jaw - check

Tools - internal micrometer	
--------------------------------	--

- Remove the volume flaps on both cutting jaws.
- Crank to 90°.
- Measure and record distance A (jaw over jaw) between the inductors (1) with the aid of an internal micrometer.
- Crank to 270° and measure distance B.

Note! Measure distance A and B in the **same position** on the inductors .

- The difference between the two distances must not exceed 0.1 mm.
Set as required, see 4.7-17 *Jaw over jaw - set*.



4.7-17 Jaw over jaw - set

Tools - template	TP No. see table below
---------------------	------------------------

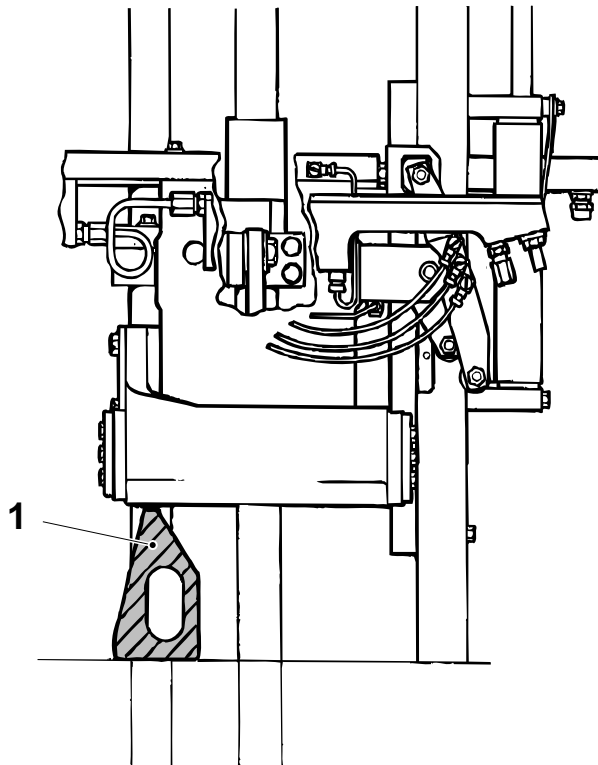
Coarse setting

If the difference between the two distances measured in 4.7-16 *Jaw over jaw* - *check exceeds* 1.0 mm, see below.

If the difference is less than 1.0 mm, see *Fine setting* on page 363.

To reduce distance

- a) Place the template (1), see table, and a feeler gauge with a thickness equal to the required adjustment, underneath the RH yoke.



Package	Template TP No.
100 B	75931-9
125 S	75931-9
160 B	75931-8
180 B	75931-8
200 B	75931-11
200 M	75931-5
200 S	75931-10
236 B	75931-6
250 B	75931-5
250 S	75931-10
284 B	75931-12
300 S	75931-12
330 S	75931-14

1 Template

(Cont'd)

(Cont'd)

Note! Adjust on the **RH yoke** and only **half the difference**.

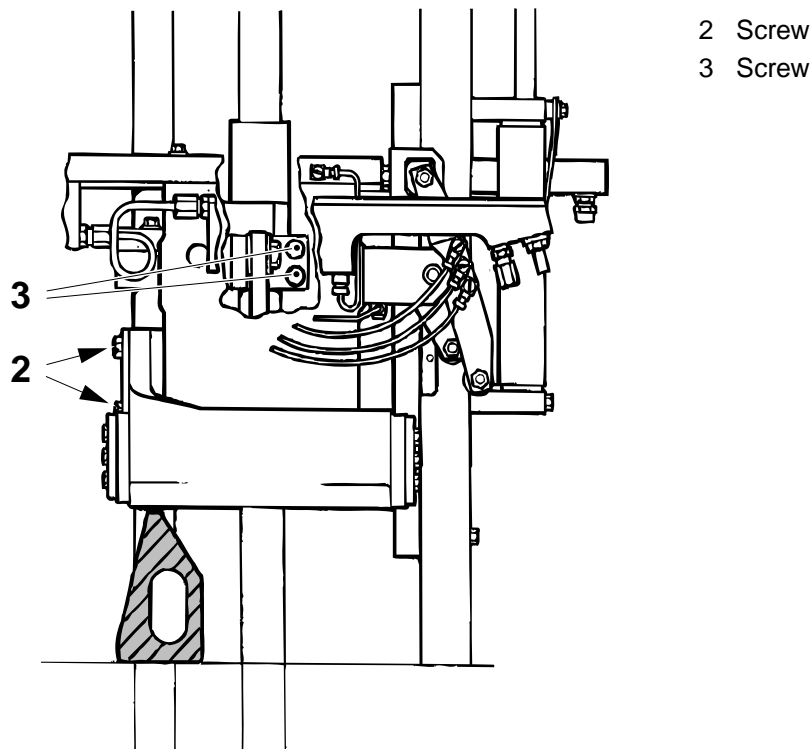
- b) Crank until the yoke rests against the template and the feeler gauge.
- c) Loosen the two screws (3) and the six screws (2).
- d) Remove the feeler gauge and lower the yoke against the template.
- e) Tighten the screws (2).
- f) Set the jaw gap, see 4.7-4 *Jaw gap - set*.

Caution! The jaw system must be **forcibly guided by hand** when the machine is cranked.

- g) Check the jaw over jaw distance, see 4.7-16 *Jaw over jaw - check*.

To increase distance

- a) Place the template underneath the RH yoke.
- b) Crank so that the yoke rests against the template.
- c) Loosen the two screws (3) and the six screws (2).
- d) Lift the yoke and place a feeler gauge, with thickness equal to the required, adjustment, between the template and the yoke.
- e) Tighten the screws (2).



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f) Set the jaw gap, see 4.7-4 *Jaw gap - set*.

Caution! The jaw system must be **forcibly guided by hand** when the machine is cranked.

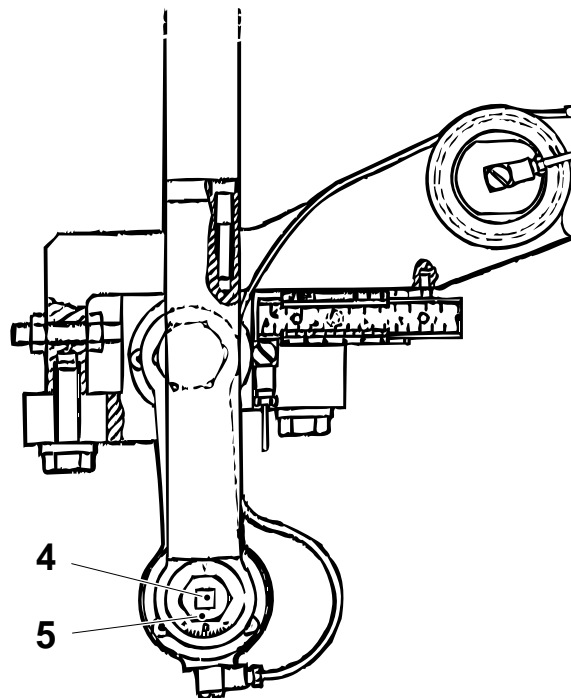
g) Check the jaw over jaw distance, see 4.7-16 *Jaw over jaw - check*.

Fine setting

If the difference between the jaw over jaw distances is **less than 1.0 mm**, adjust as follows:

Note! Adjust on the **RH yoke** and only **half the difference**.

- a) Loosen the lock nut (5) on the RH yoke lifter arm and shift the eccentric axle pin (4); one scale division = 0.1 mm.
- b) Check the jaw gap, see 4.7-3 *Jaw gap - check*. If required, repeat the setting of the jaw over jaw distance and the jaw gap until both are within the tolerances.

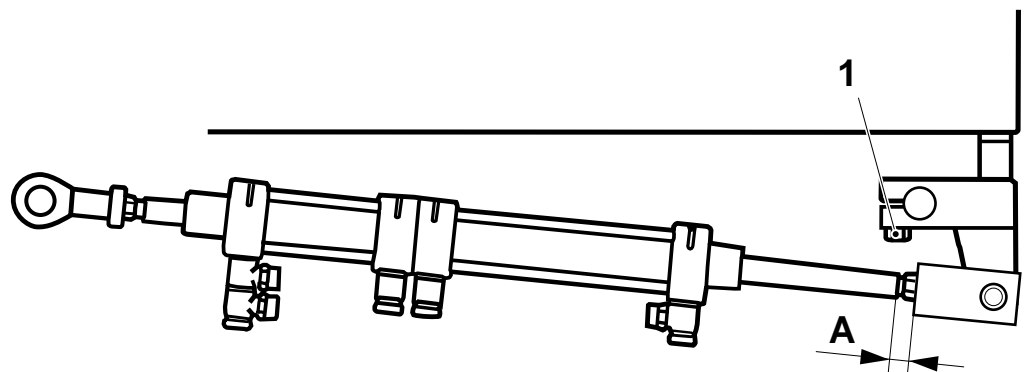


- 4 Axle pin
- 5 Lock nut

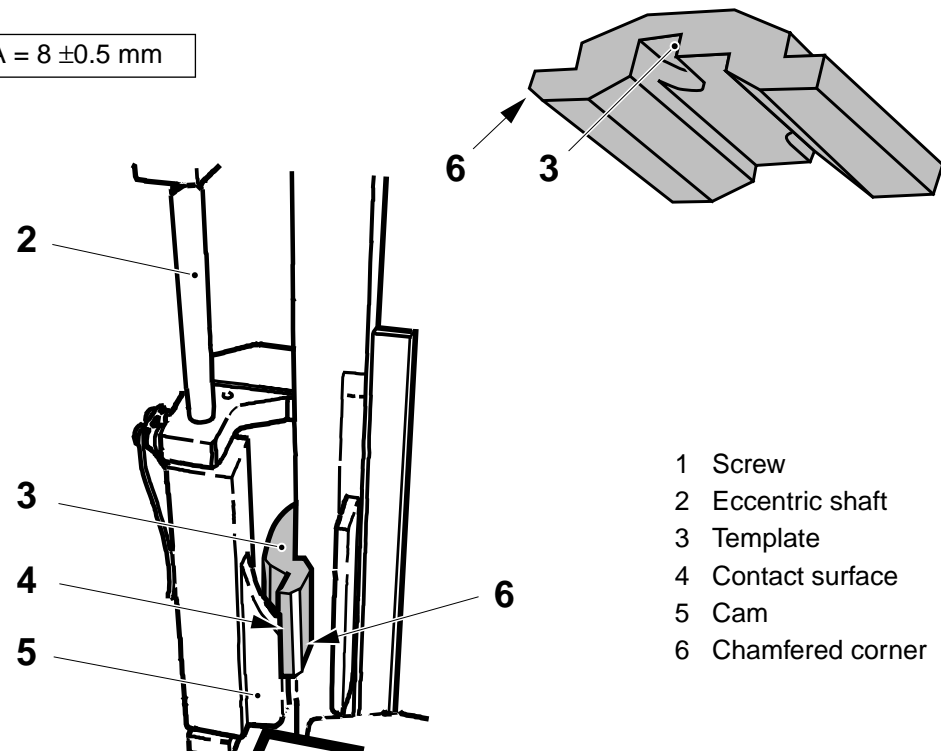
4.7-18 Design correction mechanism - set

Tools - template	TP No. 75945
---------------------	--------------

- Crank to approx 10° (LH side)/190° (RH side).
- Set distance A between the bracket and the piston rod.
- Place the template (3) with the chamfered corner (6) facing forwards.
- Loosen the screw (1) and turn the eccentric shaft (2) until the cam (5) bears against the template with its contact surface (4). Tighten the screw (1).



$$A = 8 \pm 0.5 \text{ mm}$$

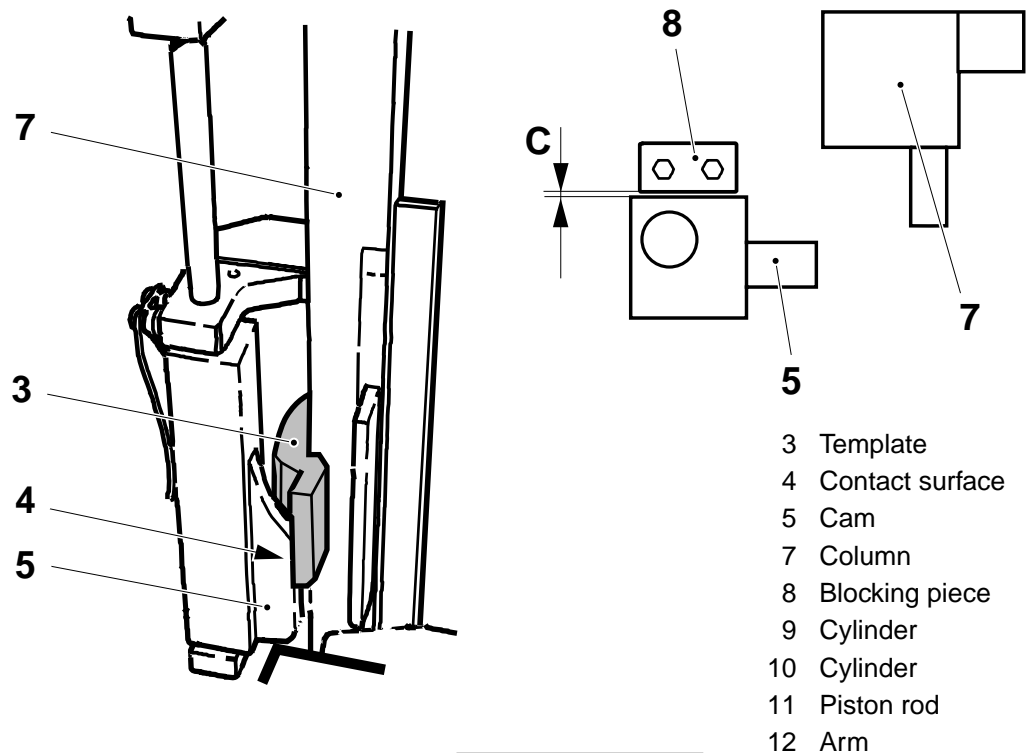


- Screw
- Eccentric shaft
- Template
- Contact surface
- Cam
- Chamfered corner

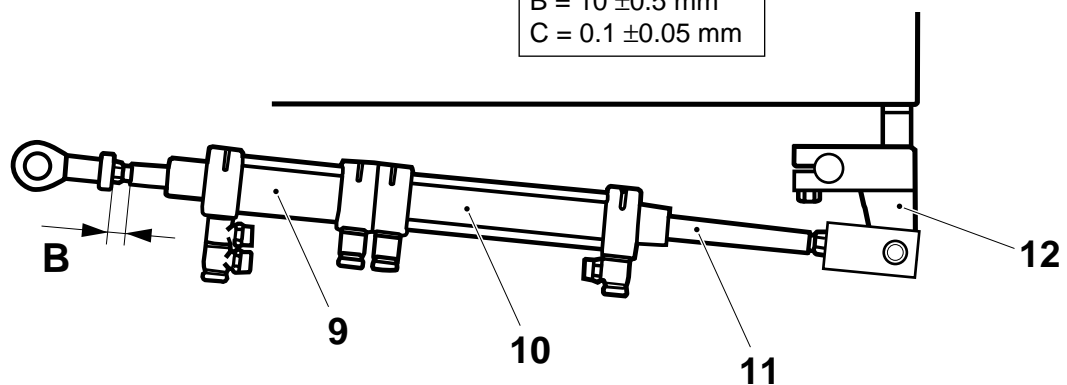
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- e) Pull out the piston rod (11) and keep it pulled out. At the same time, move the cylinder combination (9) and (10) back to end position, so that the arm (12) pivots.
- f) Turn the template (3) 180° (the chamfered corner facing backwards). Check that the cam (5) bears against the surface (4). If required, adjust distance B on the piston head.
- g) Set distance C between the blocking piece (8) and the cam with the piston rod (11) fully extended. If required, move the blocking piece.



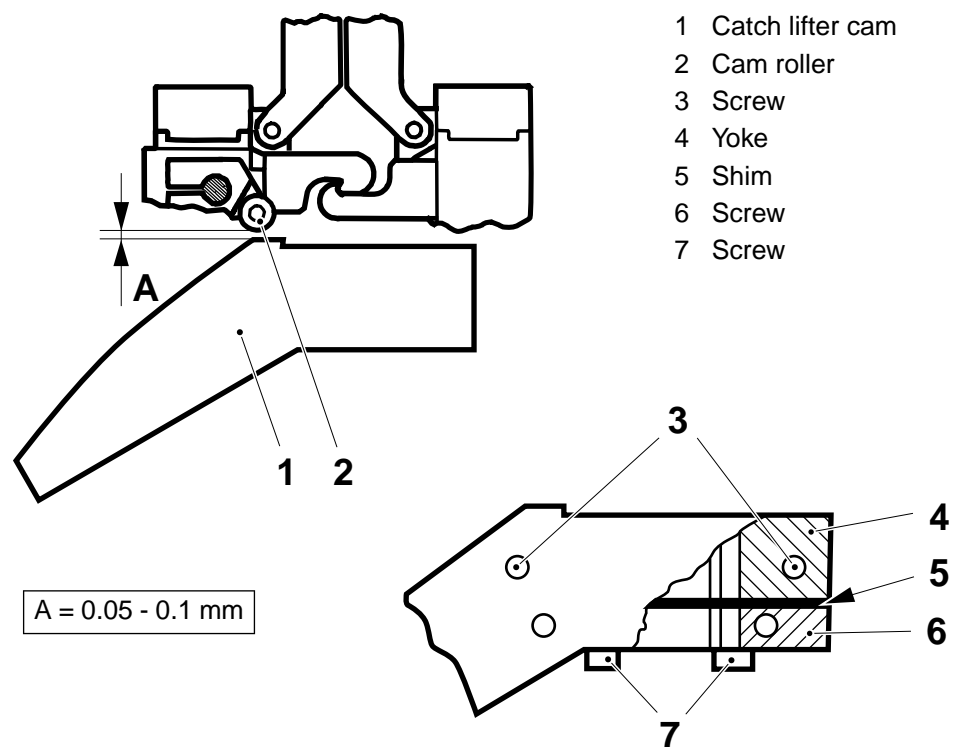
$B = 10 \pm 0.5 \text{ mm}$
 $C = 0.1 \pm 0.05 \text{ mm}$



4.7-19 Catch lifter cams and rollers - set

Machine status	Power On Water On Service switch On
----------------	-------------------------------------------

- Place a piece of double packaging material between the inductor and the dollies on the LH side.
- Crank to 180°.
- Unscrew the screws (3) and (7).
- Set distance A between the cam (1) and the cam roller (2) by adding or removing shims (5) between the bracket (6) and the yoke (4).
- Fit the cam and yoke edge-to-edge in order to always obtain the **same** initial position. On assembly, first tighten the screws (7).



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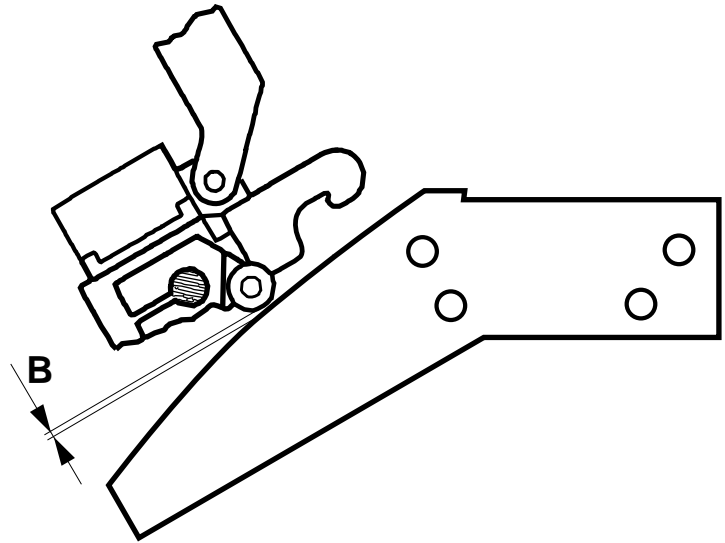
(Cont'd)



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Movable machine parts. Be careful.

- f) Crank and lift the catches manually. Make sure that distance B can be obtained between the cam and the cam roller at the highest point of the cam.
- a) Place a piece of double packaging material between the inductor and the dollies on the RH side.
- b) Crank to 0° and repeat items c) - f).



4.8 Shock absorber

SPC reference	725671-010V 725672-010V
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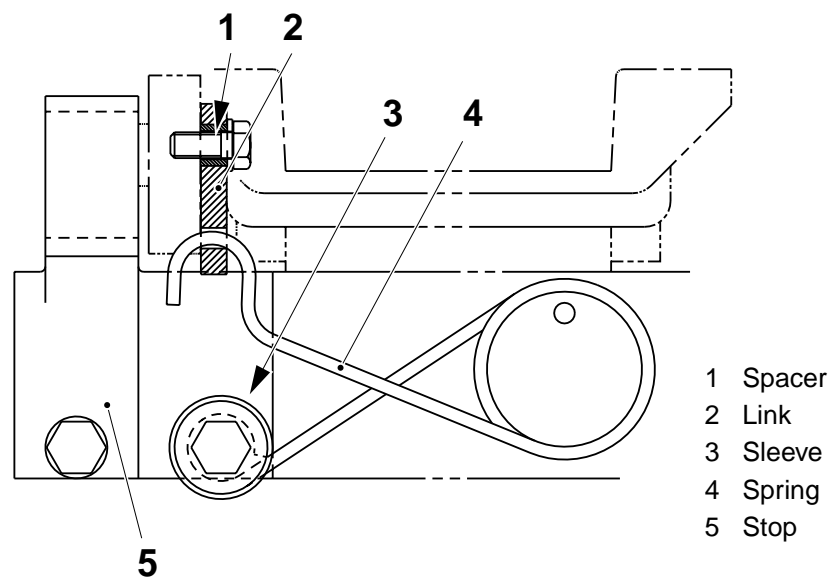
4.8-1 Shock absorber - overhaul

SPC reference	725671-010V 725672-010V
---------------	----------------------------

Check and change, if required, the following details on the shock absorbers:

- the spacer (1)
- the link (2)
- the sleeve (3), the spacer and the washer
- the spring (4)
- the stop (5)

Assemble in the reverse order.



4.9 Volume flap

SPC reference	256209-040V 256210-040V
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4.9 -1 Volume flap - overhaul

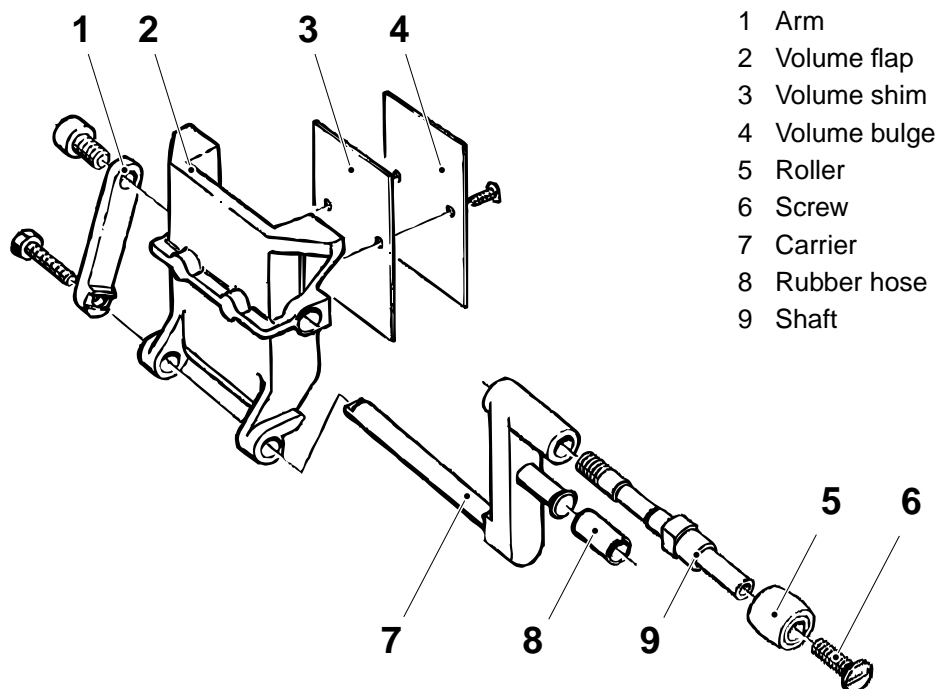
SPC reference	256209-040V 256210-040V
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Change the roller (5) and the rubber hose (8).

Check the following details for wear and/or damage:

- the arm (1)
- the volume flap (2)
- the volume shim (3)
- the volume bulge (4)
- the screw (6)
- the carrier (7)
- the shaft (9)

Change as required.



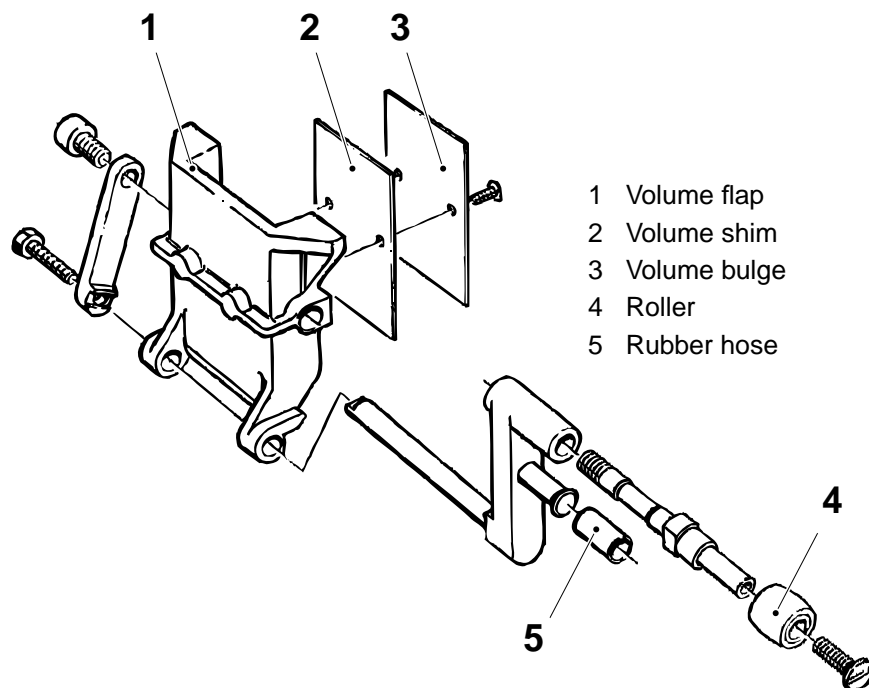
4.9-2 Volume flap - check

SPC reference	256209-040V 256210-040V
---------------	----------------------------

Check the following details for wear and/or damage:

- the volume flap (1)
- the volume shim (2)
- the volume bulge (3)
- the roller (4)
- the rubber hose (5)

Change as required.



4.10 Pressure rail

SPC reference	256214-040V
---------------	-------------

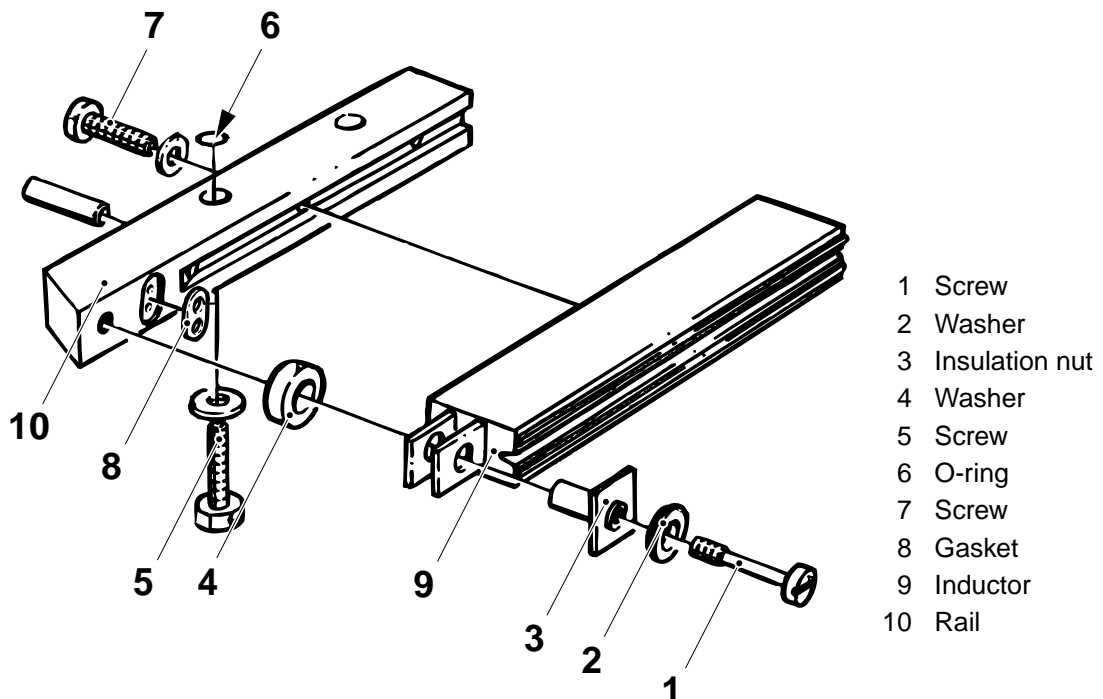
4.10 -1 Pressure rail - overhaul

SPC reference	256214-040V
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- Unscrew the screw (1) and remove the washer (2), the insulation nut (3) and the washer (4).
- Unscrew the screws (5) and remove the O-rings (6) and the pressure rail from the machine.
- Unscrew the three screws (7) and remove the inductor from the rail.

Note! Take care not to lose the gasket (8).

- Change the following details:
 - the nut (3)
 - the washer (4)
 - the O-rings (6)
 - the gasket (8)
 - the inductor (9)
- Check and, if required, change the screw (1), the washer (2) and the rail (10).
- Assemble in the reverse order. Make sure to fit the gasket and the O-rings in the correct positions.



- 1 Screw
- 2 Washer
- 3 Insulation nut
- 4 Washer
- 5 Screw
- 6 O-ring
- 7 Screw
- 8 Gasket
- 9 Inductor
- 10 Rail

4.11 Knife holder

SPC reference	256208-040V 978763-010V
---------------	----------------------------

4.11 -1 Knife holder - overhaul

Consumables	
- adhesive	TP No. 90153-54
- adhesive activator	TP No. 90153-55
- oil free acetone	
Tools	
- hot air gun	
SPC reference	256208-040V 978763-010V



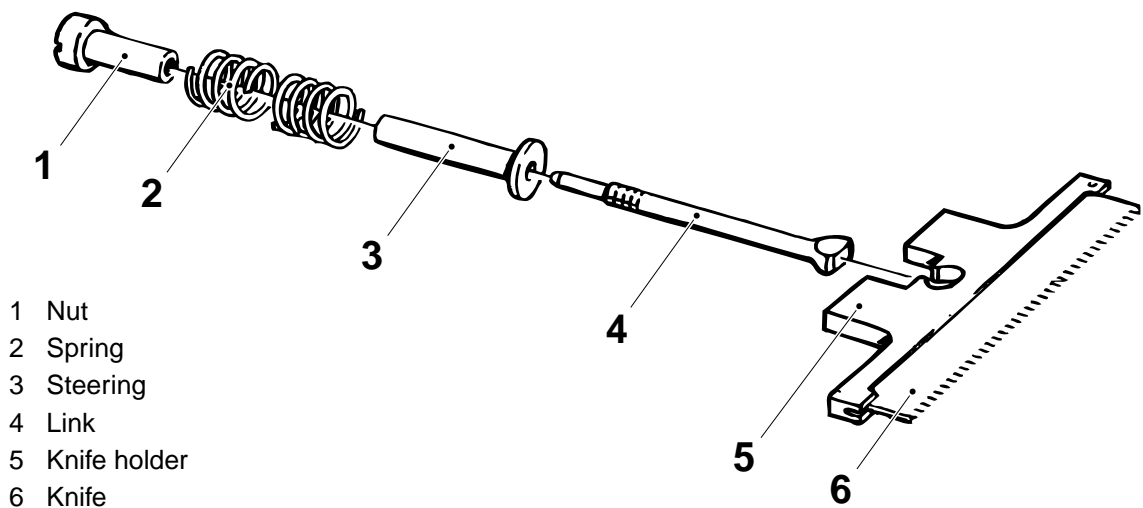
- Unscrew the nut (1) and pull out the knife holder (5) and the link (4).
- Remove the spring (2) and the steering (3) from the cutting jaw.
- Heat the knife holder to approx. 120°C with the aid of the hot air gun.
- Pull out the knife (6) from the knife holder.



Chemical products!

Cleaning compound. Follow the *Safety precautions*.

- Clean the knife holder with oil-free acetone.



- Nut
- Spring
- Steering
- Link
- Knife holder
- Knife

(Cont'd)

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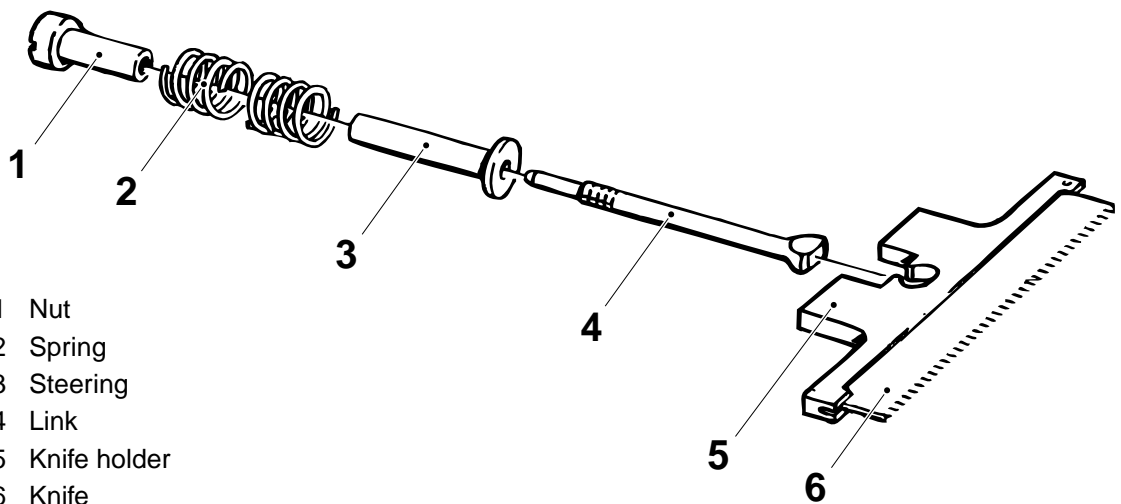
- f) Change the following details
- the knife (6)
 - the spring (2)
 - the link (4)
- g) Check and, if required, change the knife holder (5), the steering (3) and the nut (1).



Chemical products!

Cleaning compound. Follow the *Safety precautions*.

- h) Buff the surface of the knife and clean it with oil-free acetone.
- i) Apply the adhesive to the knife holder and the adhesive activator to the knife.
- j) Fit the knife on to the knife holder and let dry.
- k) Reassemble.

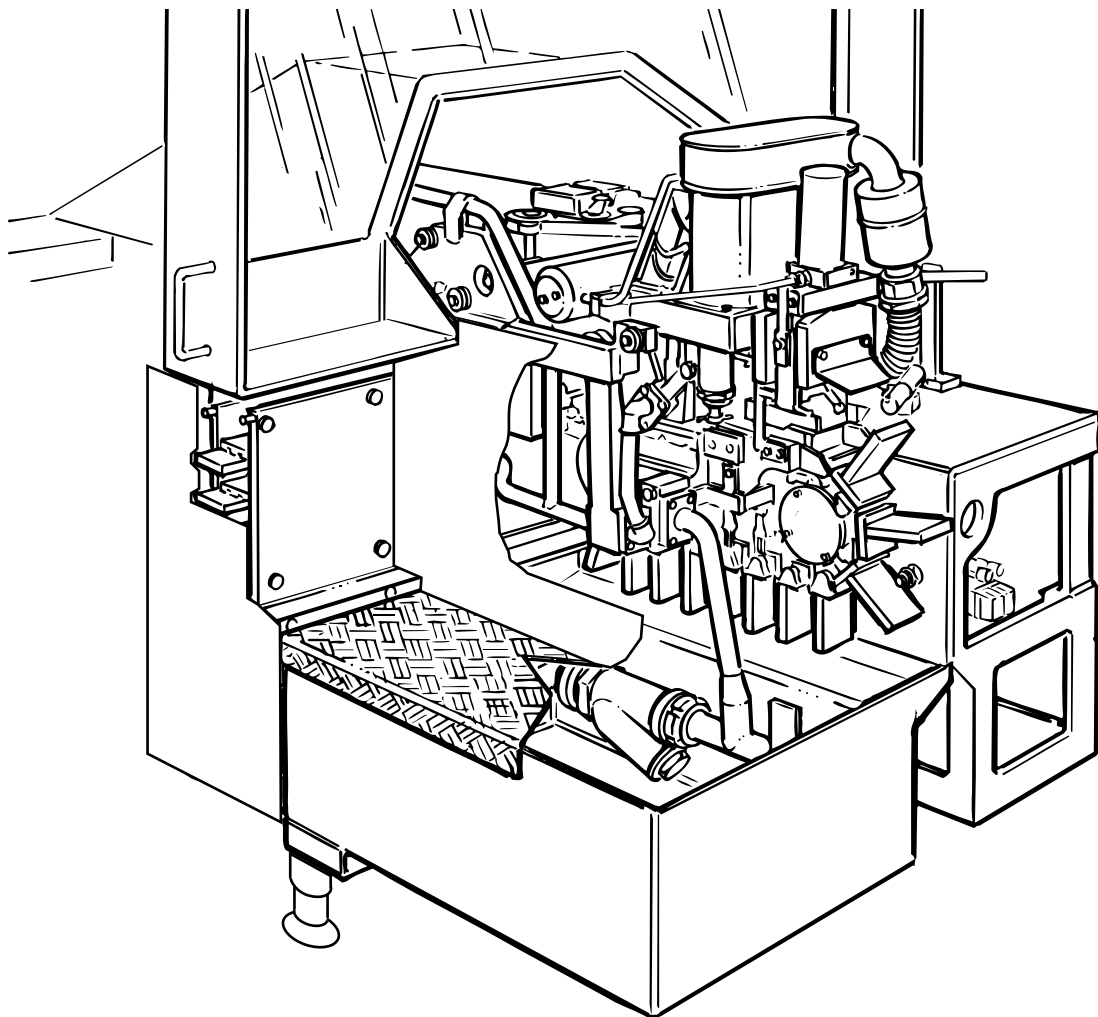


- 1 Nut
2 Spring
3 Steering
4 Link
5 Knife holder
6 Knife

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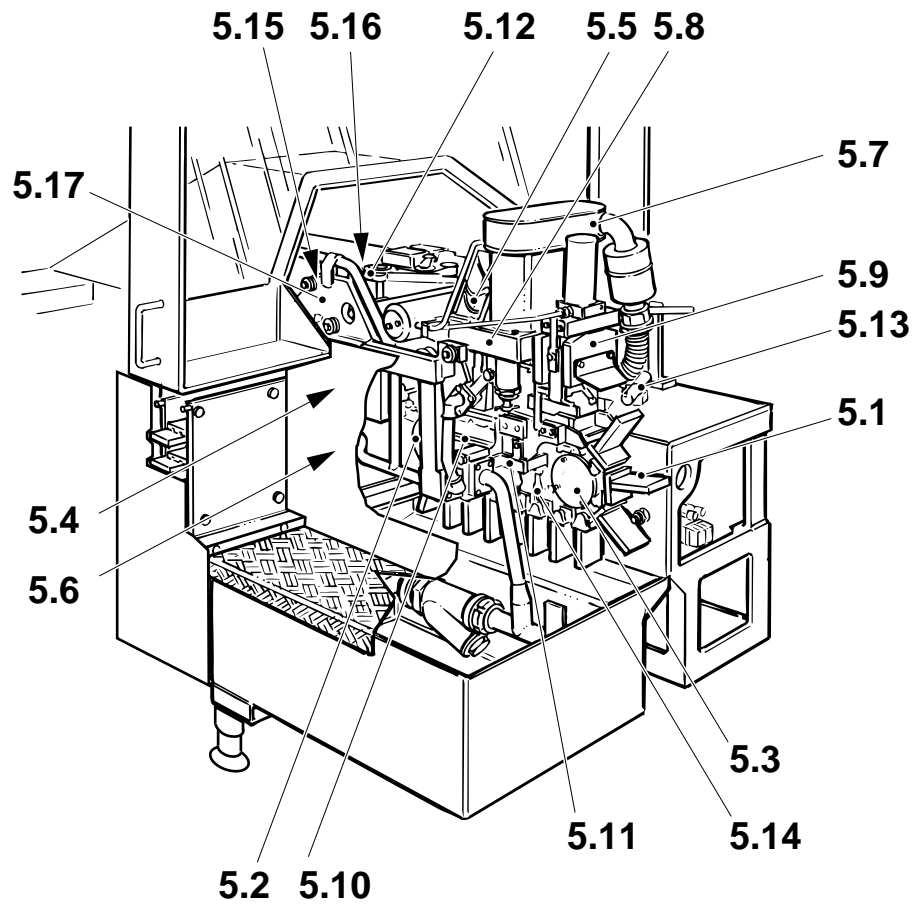
5 Final folder



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5-1 Final folder - description

SPC reference 648105-110V



- | | |
|----------------------|--------------------------|
| 5.1 Station chain | 5.10 Guide |
| 5.2 Drive wheel | 5.11 Cantilever |
| 5.3 Tension sprocket | 5.12 Discharger |
| 5.4 Indexing unit | 5.13 Cleaning system |
| 5.5 Pressure device | 5.14 Central lubrication |
| 5.6 Worm gear | 5.15 Side feeder |
| 5.7 Element | 5.16 Discharge chute |
| 5.8 Frame | 5.17 Covering panel |
| 5.9 Pull-down device | |

5-2 Final folder - check oil levels

Consumable - oil - oil	code B code H
SPC reference	256410-070V 256438-030V 578703-010V

Indexing unit

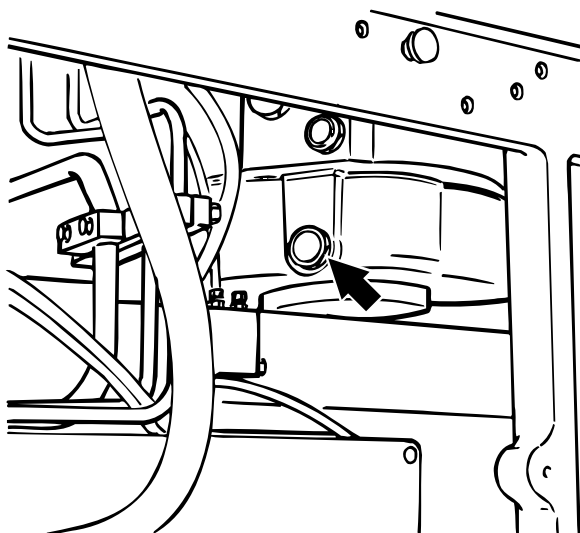
- a) Check the oil level in the level glass.



Chemical products!

Lubricant. Follow the *Safety precautions*.

- b) If required, remove filler plug and top up with oil to the correct level in the level glass. Oil code B, see *10.2 Lubricants*.
- c) Fit the filler plug.



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Worm gear

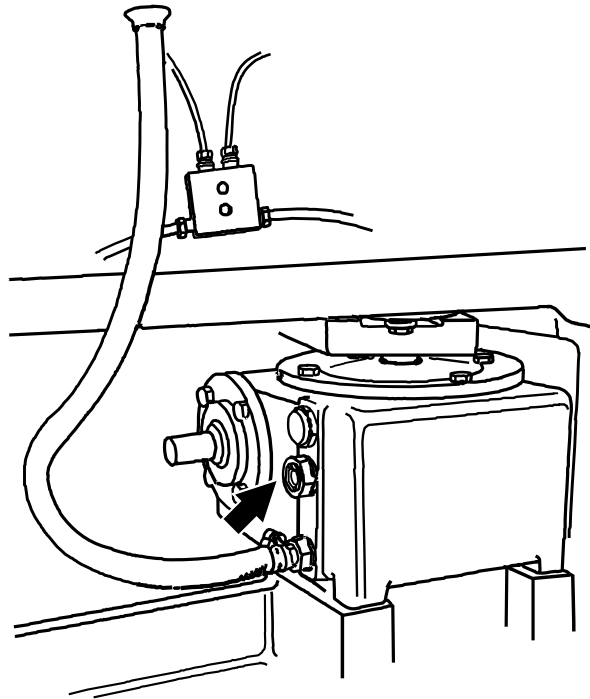
- a) Check the oil level in the level glass.



Chemical products!

Lubricant. Follow the *Safety precautions*.

- b) If required, remove the hose plug and top up with oil through the hose to correct level in the level glass. Oil code B, see *10.2 Lubricants*.
- c) Fit the hose plug and fit the hose in its clip.



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Discharger

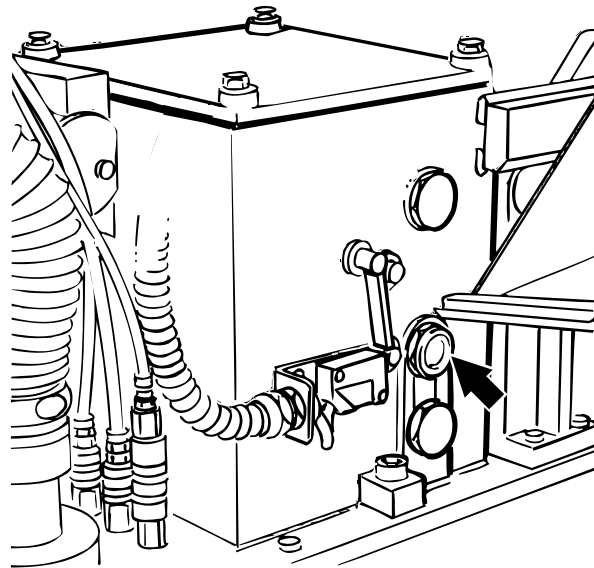
- a) Check the oil level in the level glass.



Chemical products!

Lubricant. Follow the *Safety precautions*.

- b) If required, remove the lid and top up with oil to the correct level in the level glass. Oil code H, see *10.2 Lubricants*.
- c) Fit the lid.

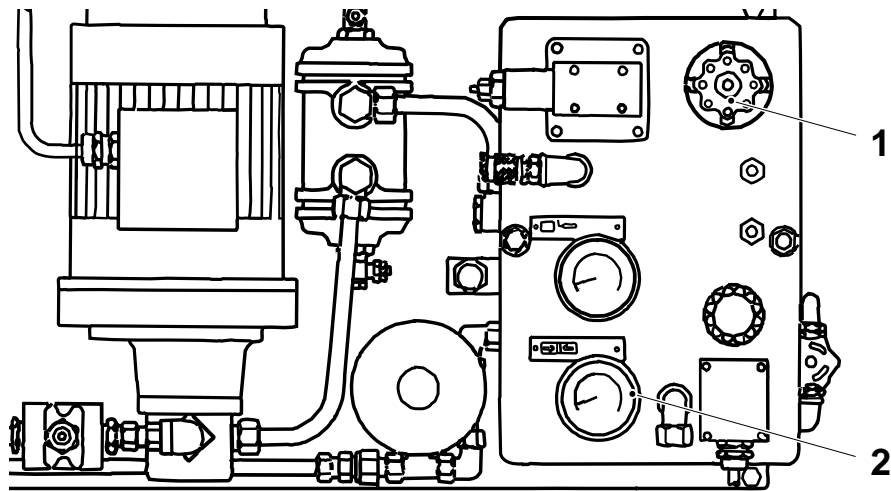


5-3 Final folder - bleed pressure and pull-down device

Machine status	Water On Power On Service switch On
Tool - locking clamp	TP No. 76167
SPC reference	256436-070V 256712-050V

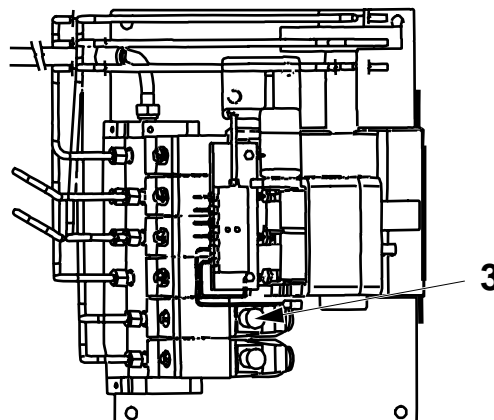
Pressure device

- a) Crank until the station chain stops indexing.
- b) Reduce the hydraulic pressure (jaw pressure) to approx. 4 MPa by means of the overflow valve (1). Read the pressure on the pressure gauge (2).



1 Valve
2 Pressure gauge

- c) Actuate hydraulic valve **Y42** (3) for the pressure device with the aid of the locking clamp.



3 Valve Y42

(Cont'd)

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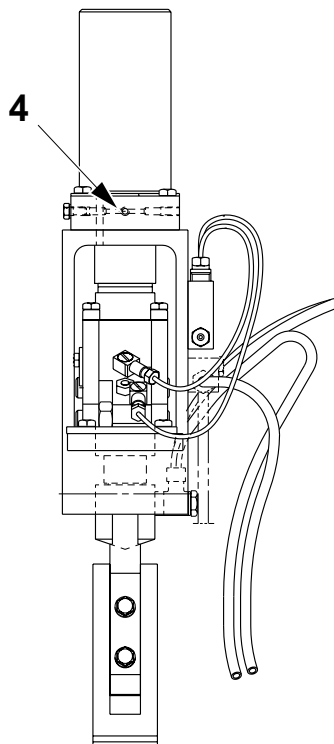


(Cont'd)

Chemical products!

Lubricant. Follow the *Safety precautions*.

- d) Loosen the screw (4) and bleed the pressure device.
- e) Tighten the screw.



4 Screw

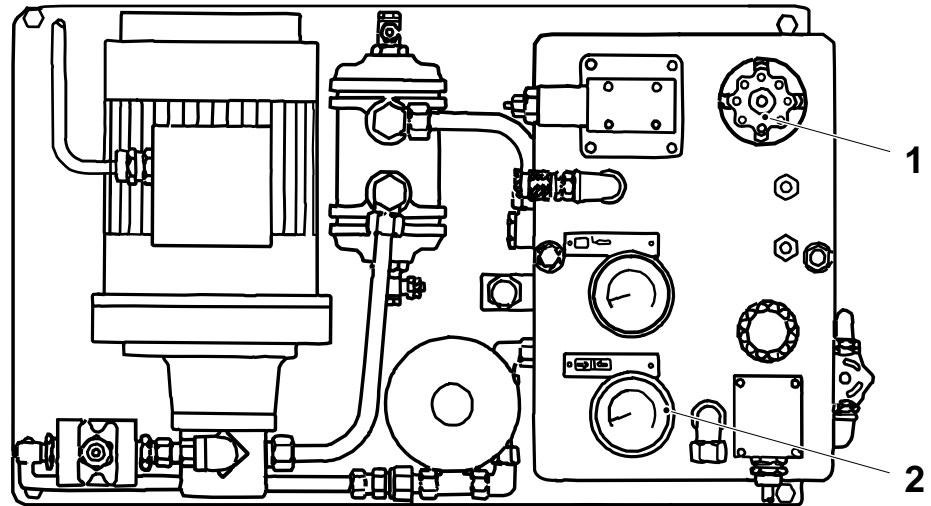
- f) Set the correct hydraulic pressure, see *10.1 Technical data*.
- g) Set the service switch to position **Off**. Turn **Off** cooling water and switch **Off** power.
- h) Remove the locking clamp.

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(Cont'd)

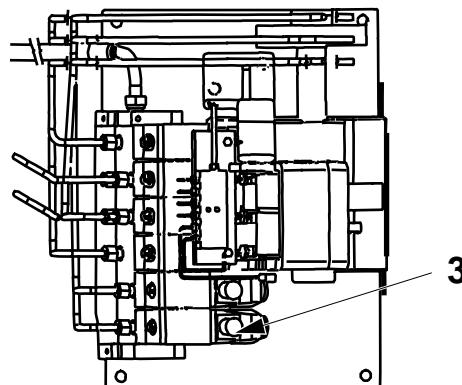
Pull-down device

- a) Crank until the station chain stops indexing.
- b) Reduce the hydraulic pressure (jaw pressure) to approx 4 MPa by means of the overflow valve (1). Read the pressure on the pressure gauge (2).



- 1 Valve
2 Pressure gauge

- c) Actuate hydraulic valve **Y41** (3) for the pull-down device with the aid of the locking clamp.



- 3 Valve Y41

(Cont'd)

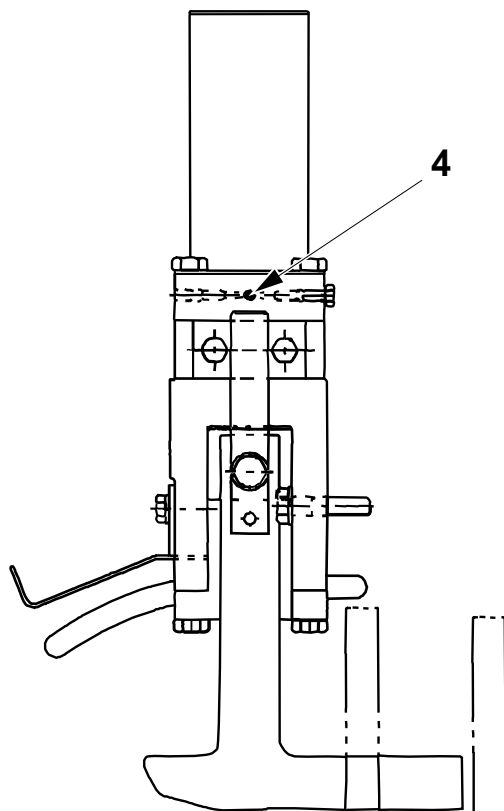


(Cont'd)

Risk of personal injury!

Watch out for oil splashing.

- d) Loosen the screw (4) and bleed the pull-down device.
- e) Tighten the screw.



4 Screw

- f) Set the correct hydraulic pressure, see *10.2 Lubricants*.
- g) Set the service switch to position **Off**. Turn **Off** cooling water and switch **Off** power.
- h) Remove the locking clamp.

5.1 Station chain

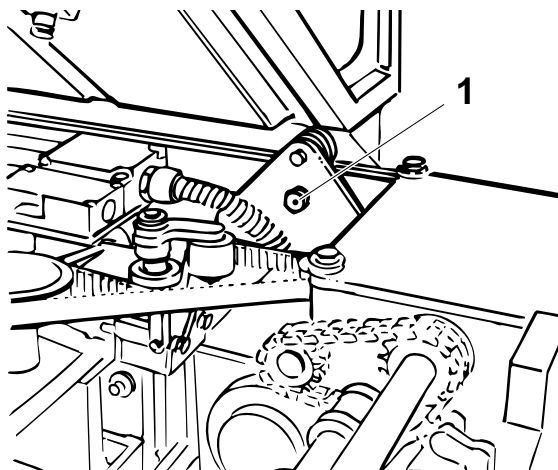
SPC reference	491225-010V
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5.1-1 Station chain - change

Machine status	Power On
Tools - angle gauge or - template - torque wrench	TP No. 76128 min 30 Nm
SPC reference	491225-010V

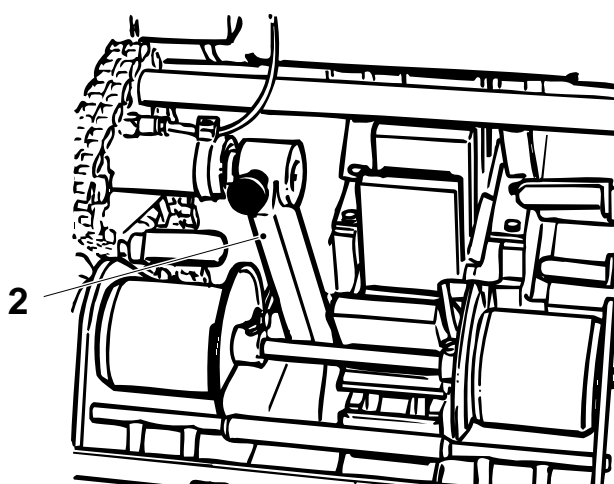
Removal

- a) Unscrew the stop (1) and remove the final folder cover.
Remove the LH and RH side plates.



1 Stop

- b) Remove the pusher (2).

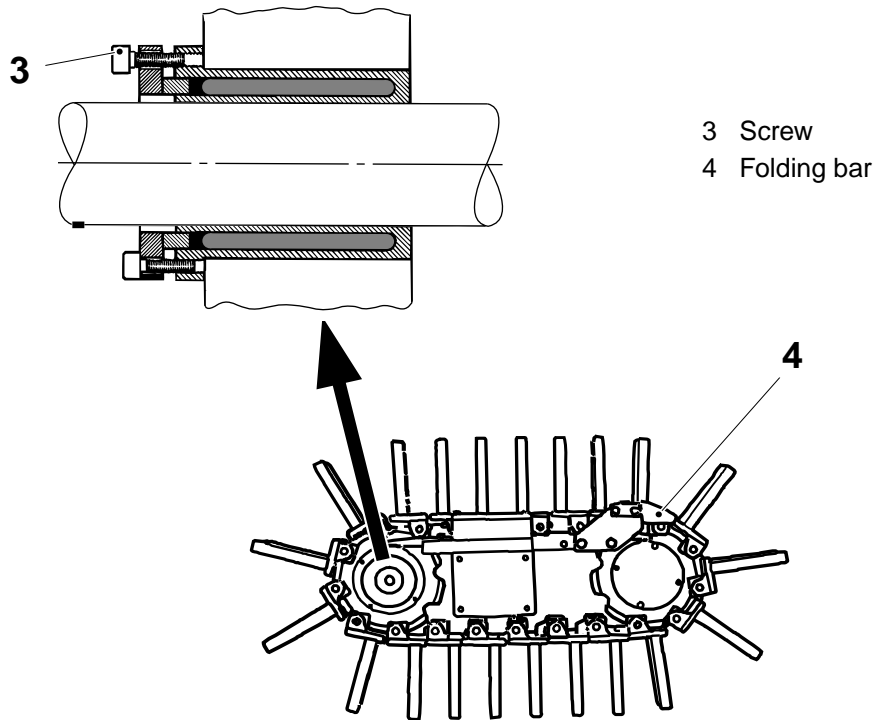


2 Pusher

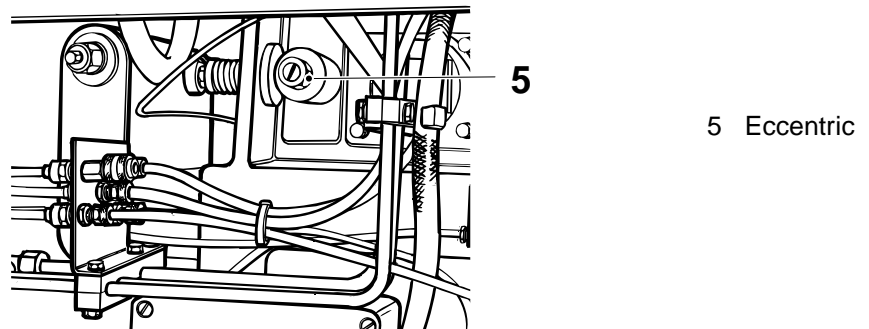
(Cont'd)

(Cont'd)

- c) Remove the lid of the drive wheel. Unscrew the screws (3) **in sequence** around the flange, half a turn at a time. If required, use long screws as pullers to get the clamp bushing loose.
- d) Move the chain around until a shaft with a threaded hole in the shaft end is opposite the folding bars (4).



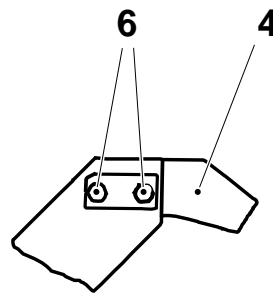
- e) Turn the eccentric (5) to release the tension of the station chain.



(Cont'd)

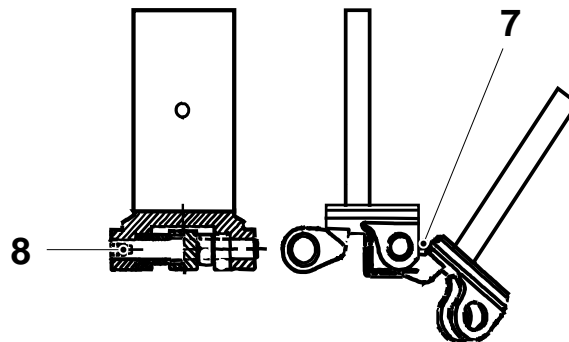
(Cont'd)

- f) Unscrew the screws (6) and remove the folding bars (4).



- 4 Folding bar
6 Screw

- g) Unscrew the screw (7) and fit a long screw in the shaft end (8).
Pull out the shaft and remove the sliders and the bushings.



- 7 Screw
8 Shaft end

- h) **Valid for 330 S:**

- Remove the pivot frame assembly. Follow the procedure in 5.8-1 *Frame - change pivot frame assembly*.
- Remove the drop chute, see 2.3-1 *Drop chute - remove*.

Note! To make removal easier, the chain may be split in two more parts.

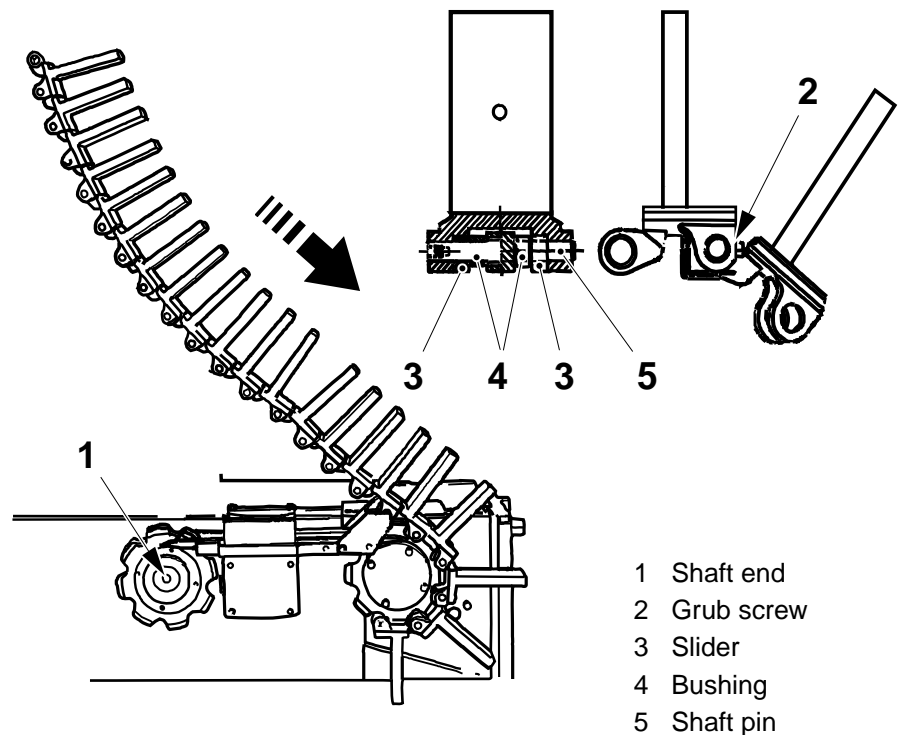
- i) Pull out the rear end of the chain through the opening left free by the folding bars. Pull out the station chain.

(Cont'd)

(Cont'd)

Assembly

- a) Crank until the indexing unit shaft end (1) stops indexing.
- b) Insert the new station chain (or chain parts) in the direction indicated (arrow).
- c) Move the chain around until the chain ends meet.
- d) Fit the bushings (4), the sliders (3) and the shaft pin (5). Fit the grub screw (2).
- e) **Valid for 330 S:**
 - Fit the pivot frame assembly. Follow the procedure in 5.8-1 *Frame - change pivot frame assembly*.
 - Fit the drop chute, see 2.3-1 *Drop chute - remove*.

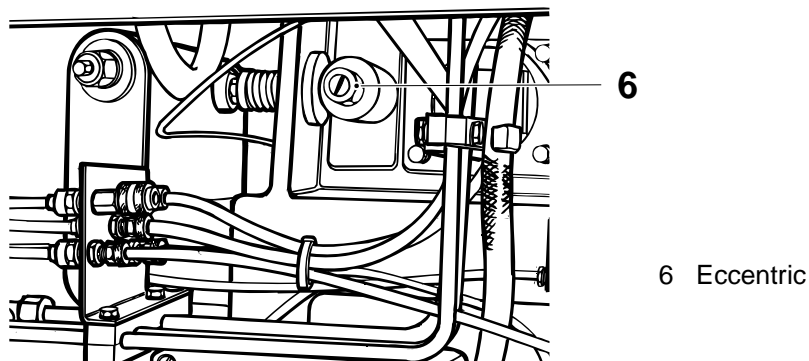


- 1 Shaft end
- 2 Grub screw
- 3 Slider
- 4 Bushing
- 5 Shaft pin

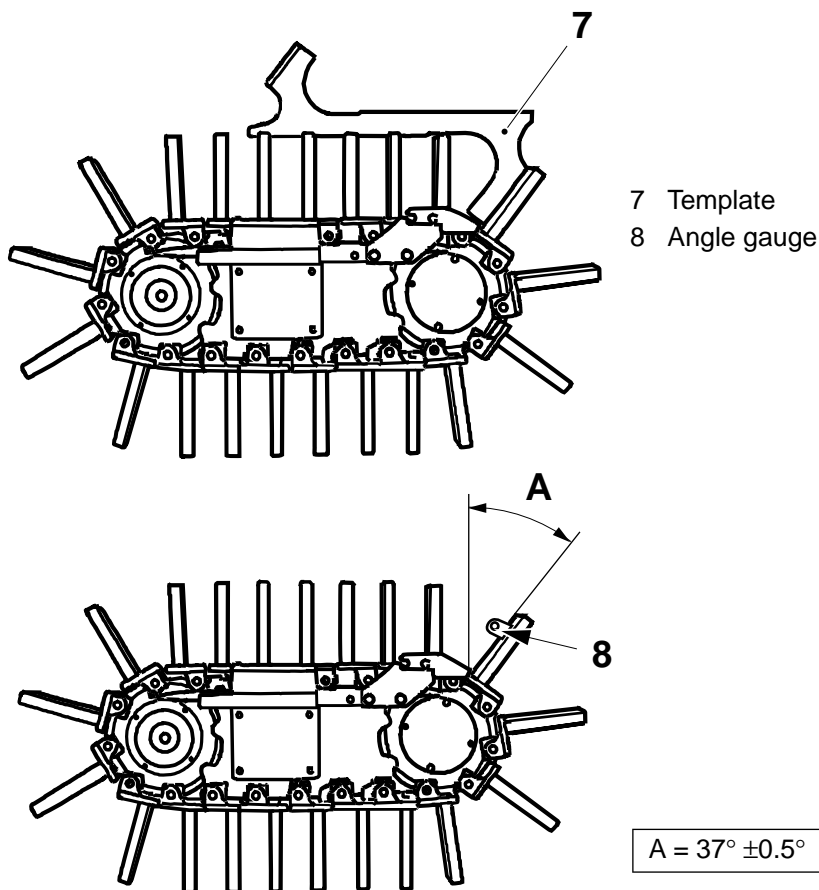
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- f) Turn the eccentric (6) to apply tension on the station chain.



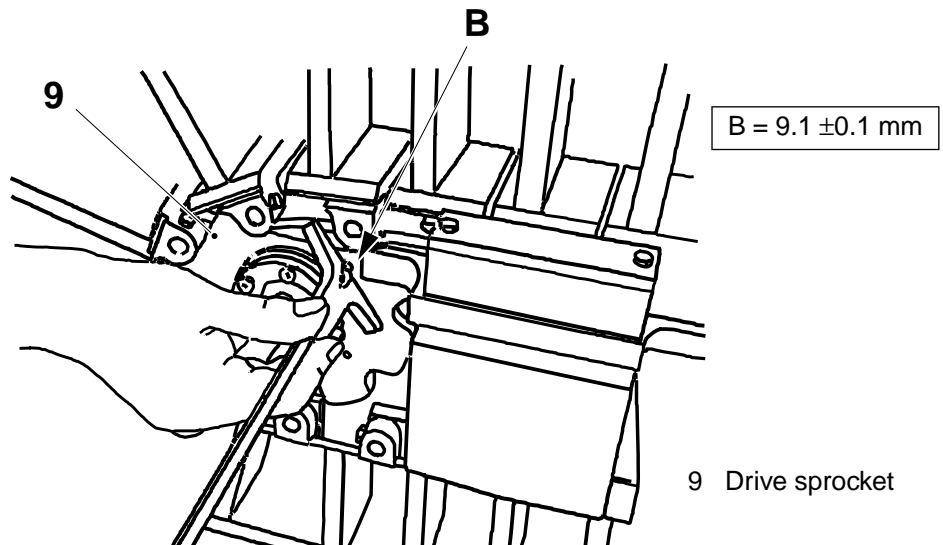
- g) If the template (7) is available, place it in the station chain at the drop chute side. Turn the chain until it touches the template. If no template is available, place an angle gauge (8) on the station chain and move the chain to angle A.



(Cont'd)

(Cont'd)

- h) Set distance B between the side of the slide rail and the side of the drive sprocket (9).



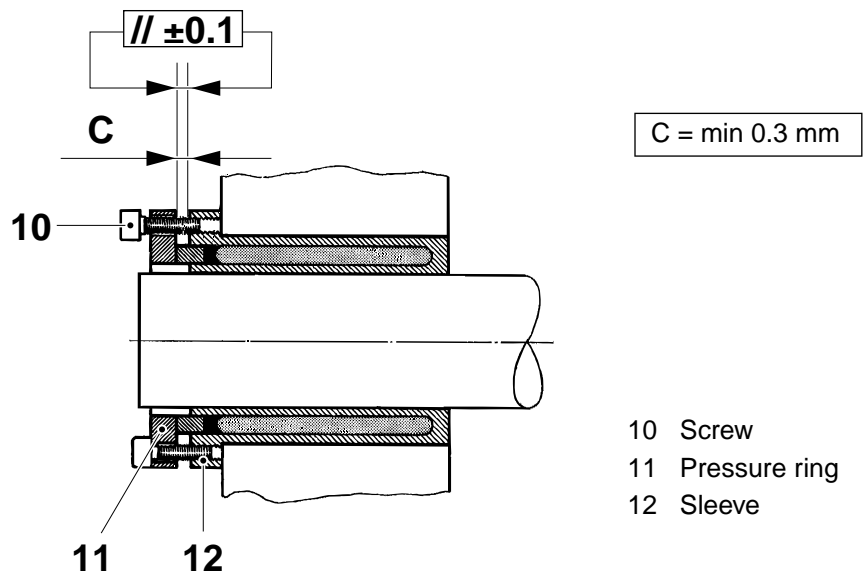
Risk of serious damage!

Never adjust the tightening torque afterwards by screwing out the screws. The result may be that the screws shake loose.

- i) Tighten the screws (10) in sequence around the flange, **half a turn at a time**. Torque the screws to 13.0 ± 1.0 Nm.

Caution!

Do **not tighten** the pressure ring (11) and sleeve (12) against one another. There must be distance C between the ring and the sleeve.

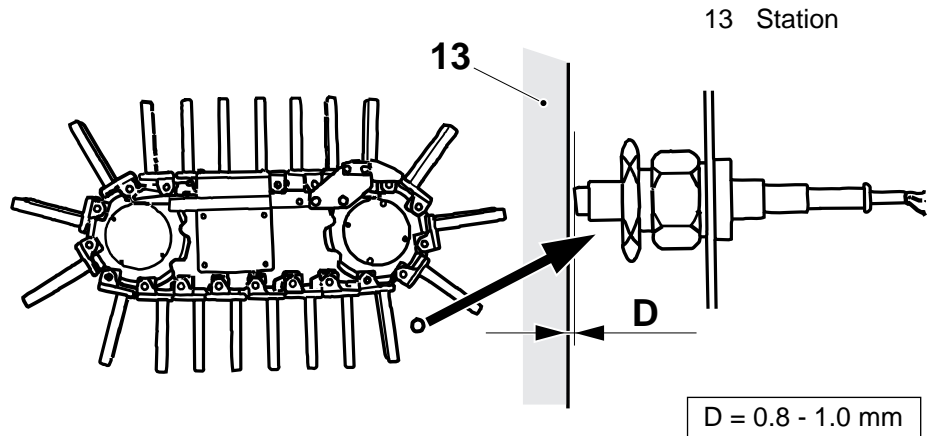


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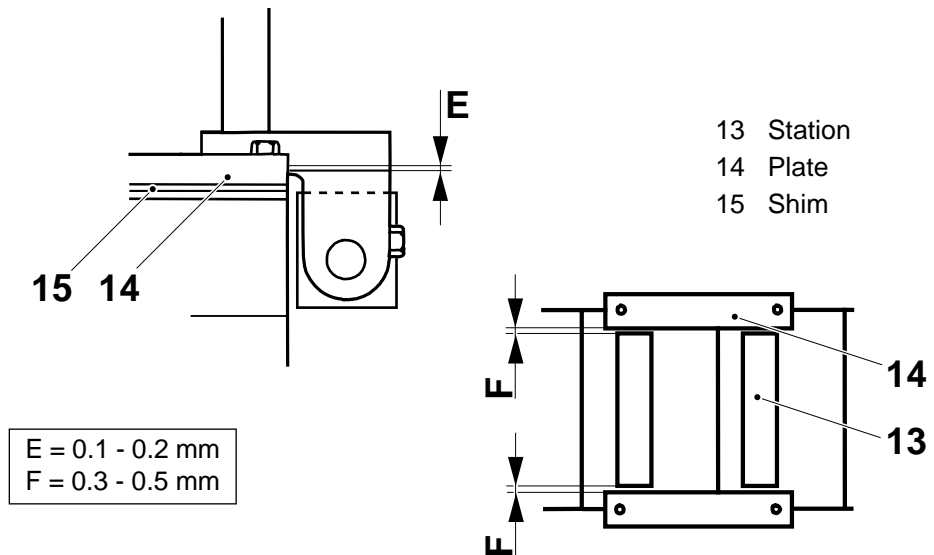
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(Cont'd)

- j) Make sure that angle A and distance B are still correct.
- k) Check that the drive sprocket is centered by turning the station chain slide lugs on both sides of the sprocket to make sure they move clear. If correct, fit the lid on the drive wheel.
- l) Set distance D between the station (13) and the sensor.



- m) Check distance E between the station chain and the plate (14).
- n) If required, remove the plates and adjust by means of the shims (15). Fit the plates (with the bevelling direction inwards and downwards) and set distance F between the plates (14) and the stations (13) on both sides.



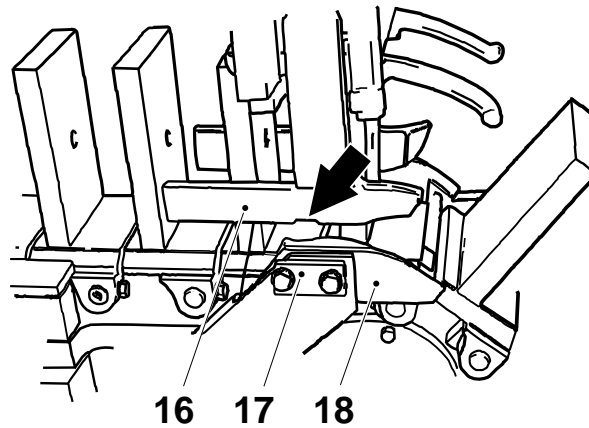
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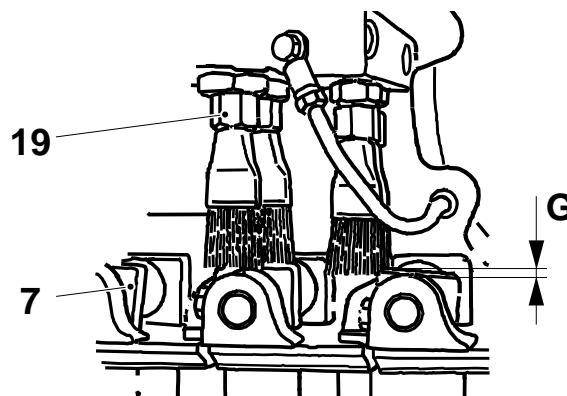
- o) Fit the folding bar (18) with the plates (17).
- p) Lower the pivot frame and set the folding bars sideways so that the cut-out (or the scribed lines) on the pull-down arms (16) are opposite the cut-outs in the folding bars.

Make sure that the folding bars bear against the supporting arm.



- 16 Pull-down arm
- 17 Plate
- 18 Folding bar

- q) Set the oil brushes so that they touch the sliders (7) lightly, distance G below the sliders. To set, loosen the lock nut and adjust on the nut (19).



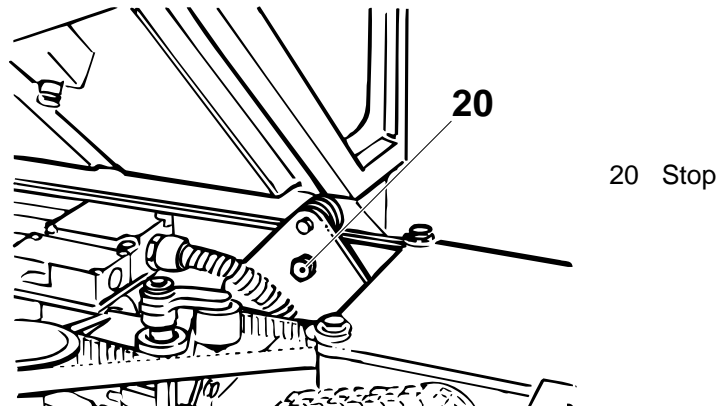
G = 2 - 3 mm

- 7 Slider
- 19 Nut

(Cont'd)

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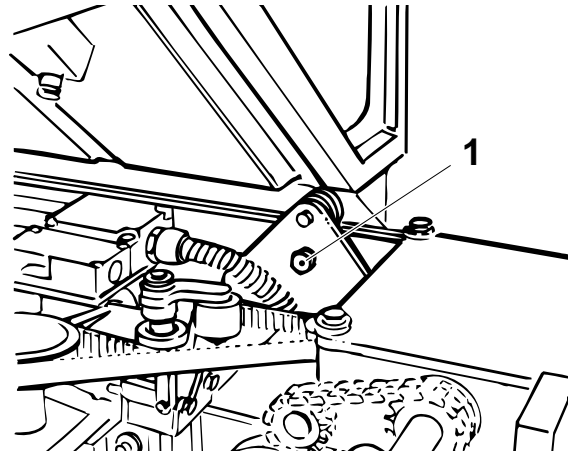
- r) Fit the pusher and the side plates.
Fit the final folder cover and the stop (20).



5.1-2 Station chain - turn shafts

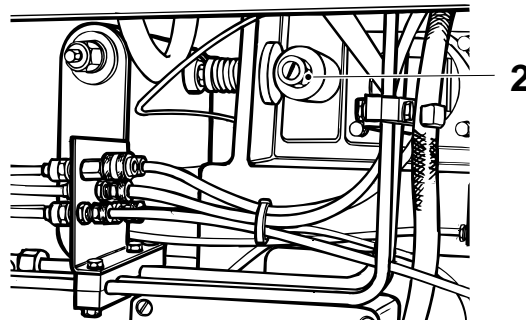
SPC reference	491225-010V
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- a) Unscrew the stop (1) and remove the final folder cover. Remove the LH and RH side plates.



1 Stop

- b) Turn the eccentric (2) to release the tension of the station chain.

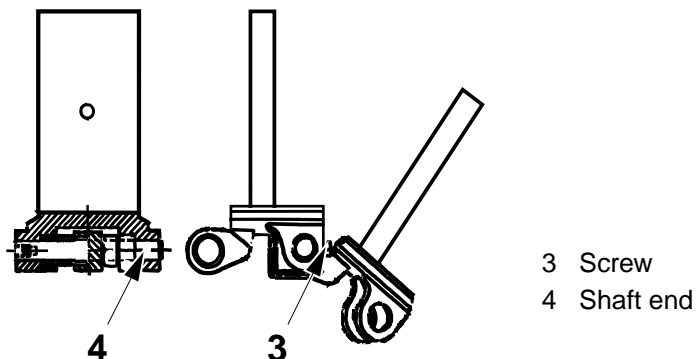


2 Eccentric

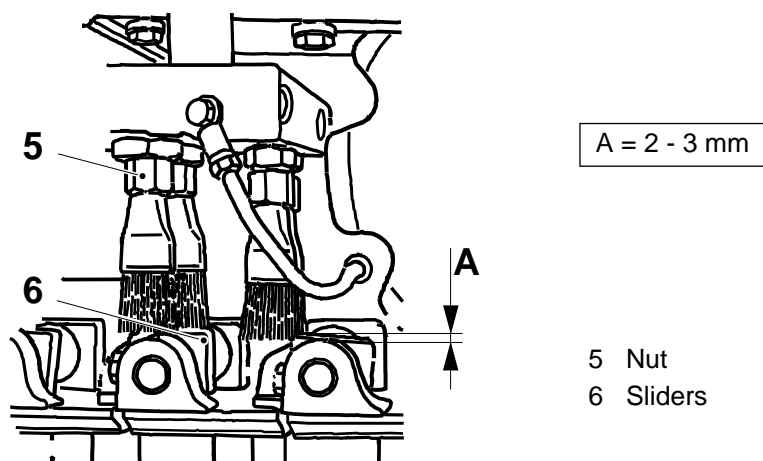
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- c) Unscrew the screw (3) and push out the shaft end (4).
- d) Turn the shaft 180°, push it back in position and fit the screw.



- e) Repeat item c) and d) for the other shafts.
- f) Turn the eccentric to apply tension on the station chain.
- g) Check and if required set the oil brushes so that they touch the sliders (6) lightly, distance A below the sliders. To set, loosen the lock nut and adjust on the nut (5).

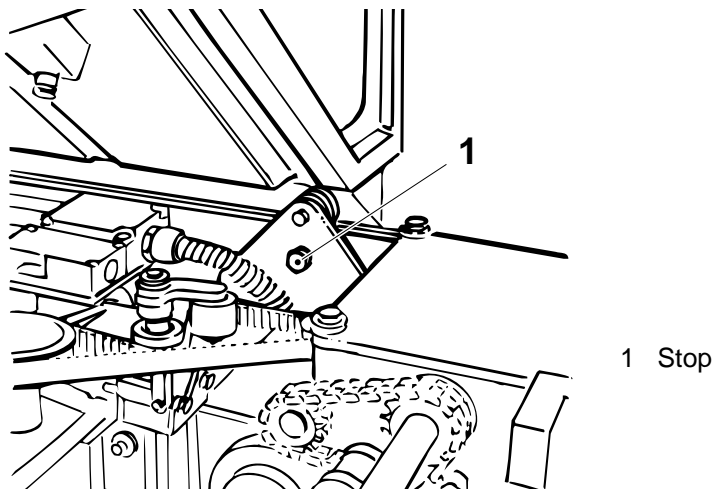


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(Cont'd)

(Cont'd)

h) Fit the side plates. Fit the final folder cover and the stop (1).



5.2 Drive wheel

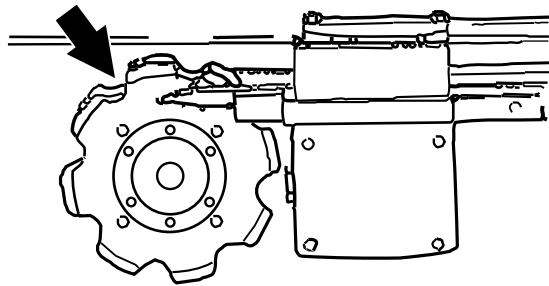
SPC reference	491850-010V
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5.2-1 Drive wheel - check sprocket surface

SPC reference	491850-010V
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Check the drive wheel sprocket surface for wear and/or damage.

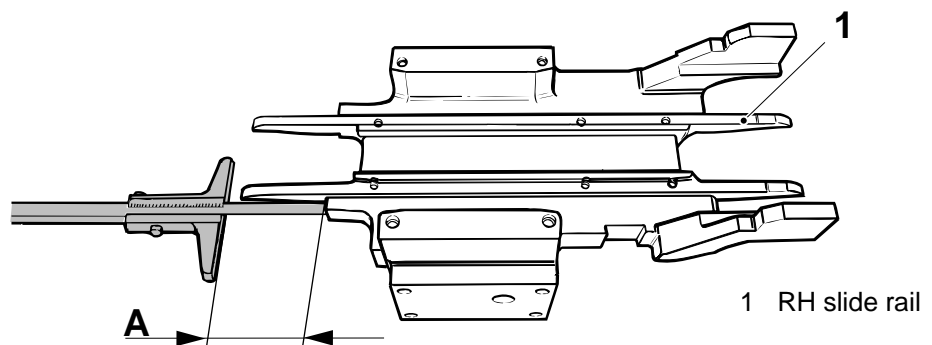
Change as required, see 5.2-2 *Drive wheel - change*.



5.2-2 Drive wheel - change

Consumables	
- solvent	
- lubricant	TP No. 92296-2
SPC reference	491850-010V

- a) Measure distance A between the RH slide rail (1) and the supporting arm very accurately. Record the result.

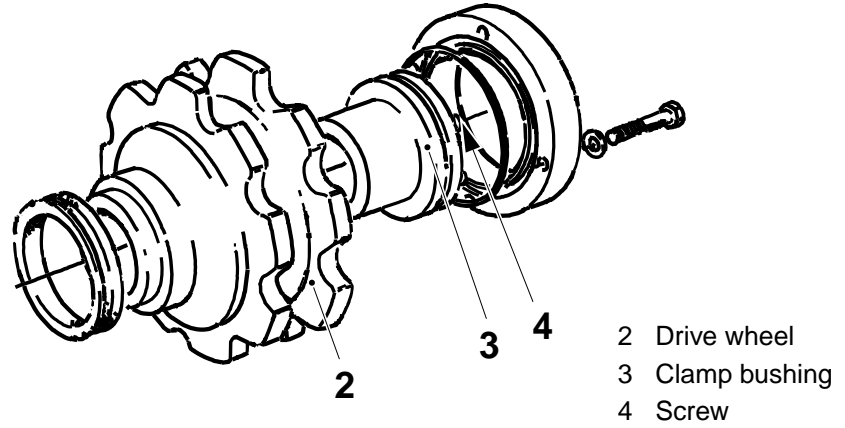


- b) Remove the RH slide rail.
- c) Remove and change the drive wheel assembly.

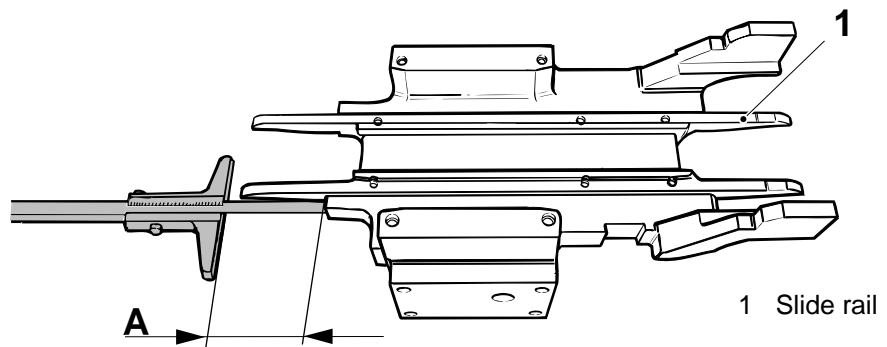
(Cont'd)

(Cont'd)

- d) Clean the axle end of the indexing unit, the new clamp bushing (3) and drive wheel (2) with white spirit. Lubricate the screws (4).



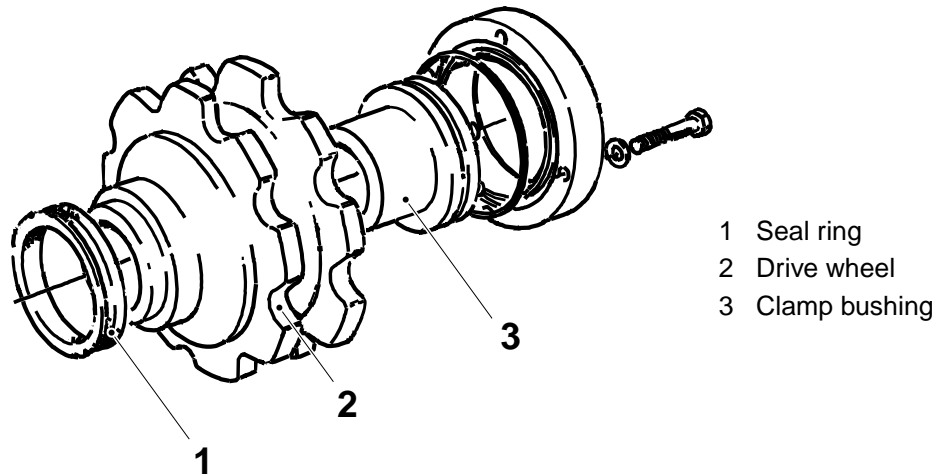
- e) Fit the drive wheel assembly.
f) Fit the slide rail.
g) Set distance A between the RH slide rail (1) and the supporting arm very accurately. Use the measure recorded above.



5.2-3 Drive wheel - overhaul

SPC reference	491850-010V
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- a) Remove the clamp bushing (3) and the seal ring (1) from the drive wheel (2).
- b) Change the drive wheel, the seal ring and the O-ring.
- c) Check and, if required, change other worn and/or damaged parts.
- d) Assemble.



5.3 Tension sprocket

SPC reference	491846-020V
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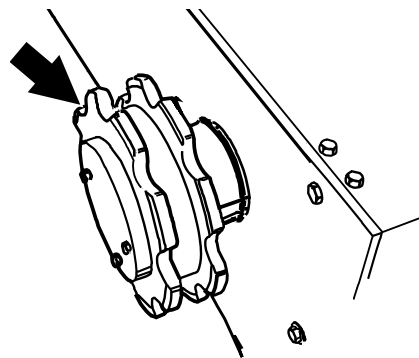
5.3-1 Tension sprocket - check sprocket surface and bearing

SPC reference	491846-020V
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Check the surface of the tension sprocket for wear and/or damage.

Turn the tension sprocket and make sure that it turns freely.

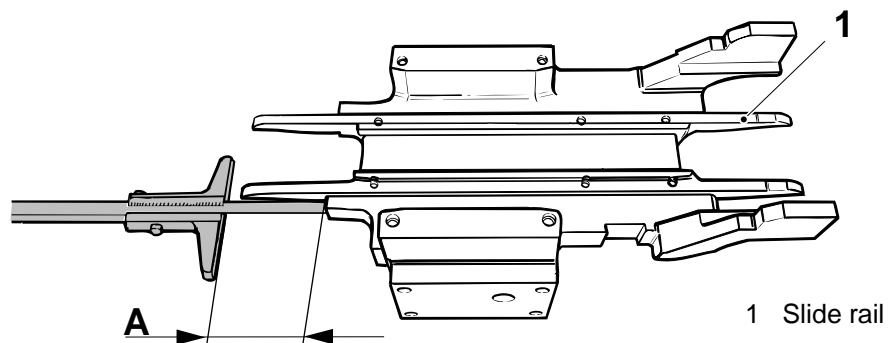
Change the tension sprocket as required, see 5.3-2 *Tension sprocket - change*.



5.3-2 Tension sprocket - change

Tools	
- torque wrench	min 145 Nm
- protection plate	TP No. 79003
SPC reference	491846-020V

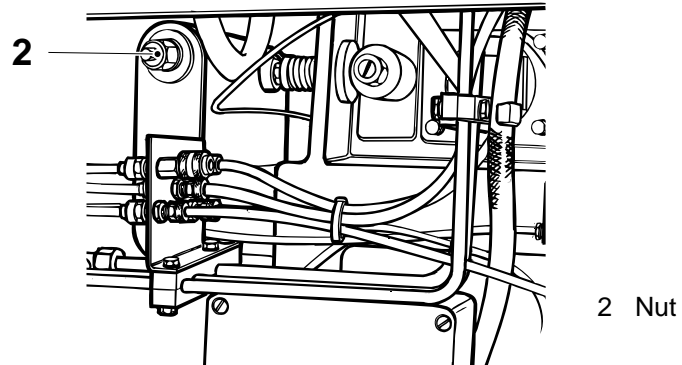
- a) Measure distance A between the RH slide rail (1) and the supporting arm very accurately. Record the result.



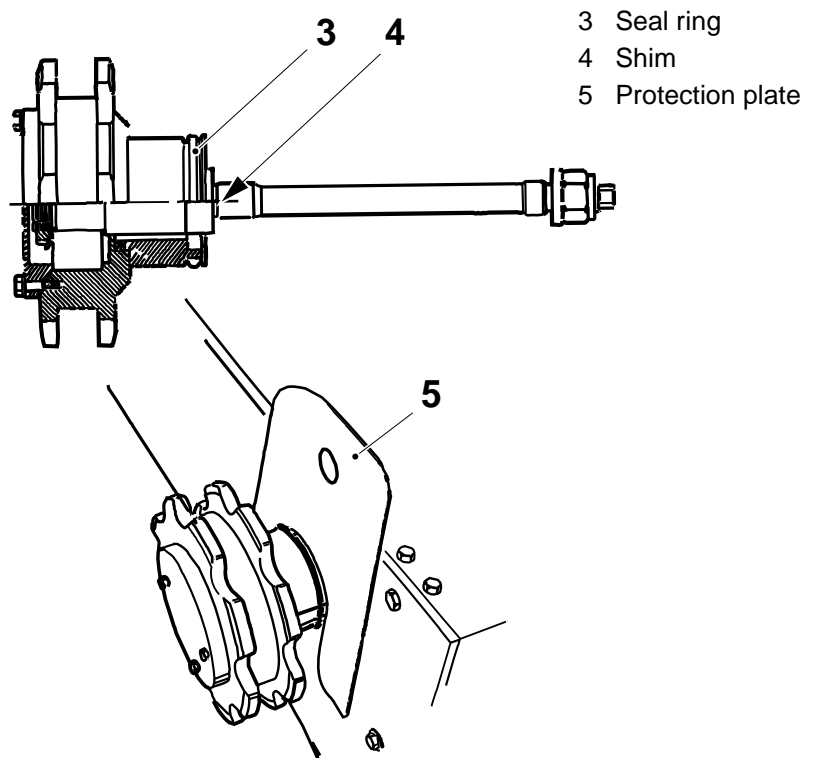
(Cont'd)

(Cont'd)

- b) Remove the RH slide rail.
- c) Unscrew the nut (2) and remove the tension sprocket assembly and the shims.



- d) Change the tension sprocket assembly.
- e) Fit the shims (4) on the tension sprocket assembly and fit the assembly on the final folder. Take care not to damage the seal ring (3). Use the protection plate (5) during fitting.

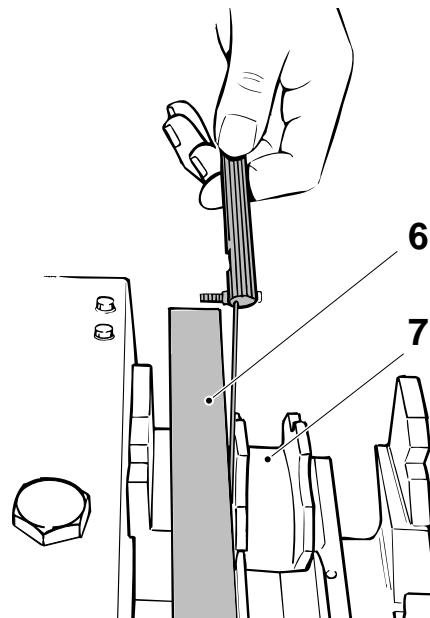


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(Cont'd)

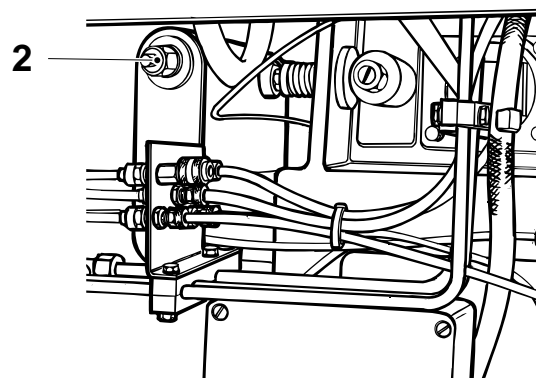
(Cont'd)

- f) Fit the RH slide rail.
- g) Place a ruler (6) with the edge on the LH side of the supporting arm and measure the distance between the ruler and the side of the tensioner sprocket (7).



- 6 Ruler
- 7 Tension sprocket

- h) Repeat item g) on the RH side of the supporting arm. The distances must be **the same** within 0.2 mm.
- i) In case of incorrect setting, remove the RH slide rail and the tensioner sprocket assembly and adjust by means of the shims.
- j) Fit back the tensioner sprocket assembly and the slide rail, and repeat items g) - j) until the setting is correct.
- k) Torque the nut (2) to 140 ± 5 Nm.

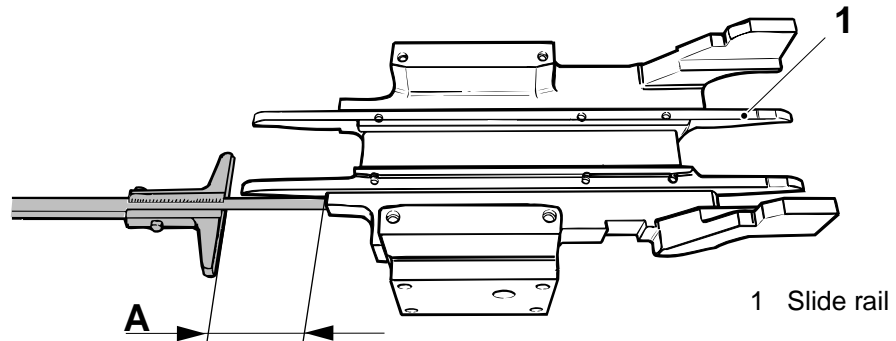


- 2 Nut

(Cont'd)

(Cont'd)

- 1) Set distance A between the RH slide rail (1) and the supporting arm very accurately. Use the measure recorded above.



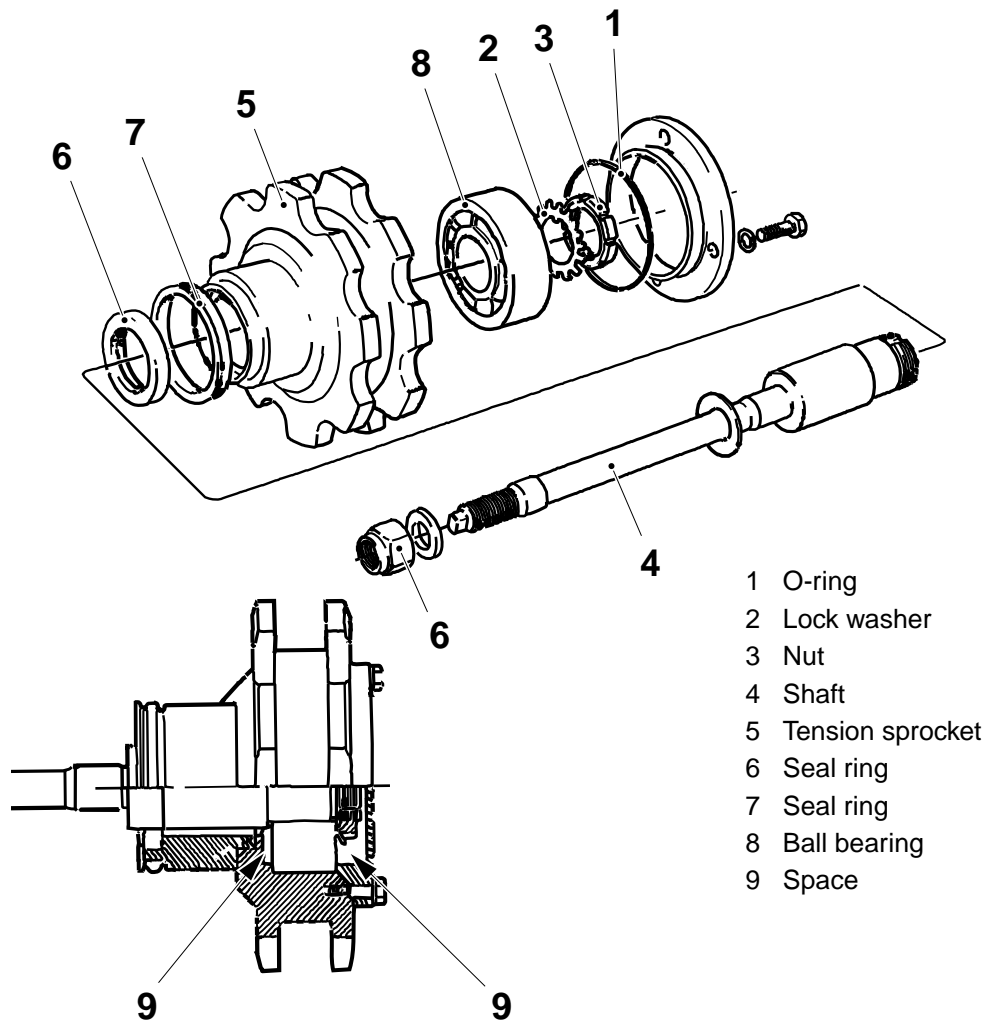
5.3-3 Tension sprocket - overhaul

Consumables - grease	code M
SPC reference	491846-020V

- a) Remove the lid and the O-ring (1).
- b) Unlock the lock washer (2) and unscrew the nut (3).
- c) Pull out the shaft (4) from the tension sprocket (5).
- d) Remove the seal rings (6) and (7), and the ball bearing (8).
- e) Change the tension sprocket (5), the ball bearing (8), the lock washer (2), the O-ring (1), and the seal rings (6) and (7).
- f) Check and, if required, change other worn and/or damaged parts.

Note! When assembling the tension sprocket, fill the spaces (9) with grease and lock the nut by means of the lock washer.

- g) Assemble in the reverse order.



5.4 Indexing unit

SPC reference	256410-070V
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5.4-1 Indexing unit - change oil

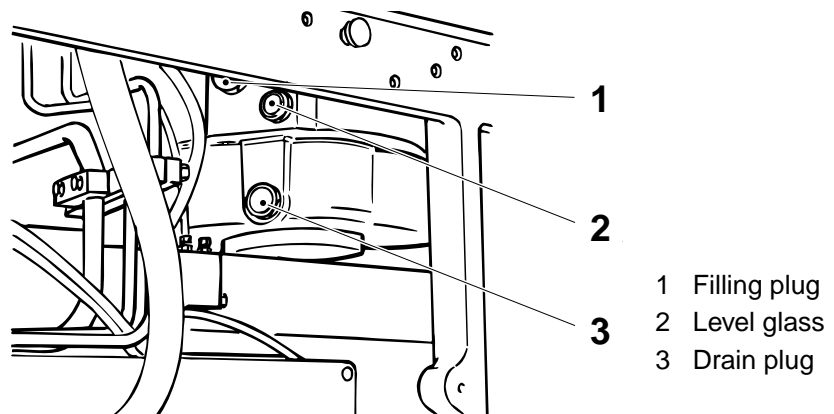
Consumables - oil	code B
SPC reference	256410-070V



Chemical products!

Lubricant. Follow the *Safety precautions*.

- a) Unscrew the filling plug (1).
- b) Unscrew the drain plug (3) and drain the oil
- c) When the oil is drained, fit the drain plug and top up with oil to correct level in the level glass (2). Oil code B, see *10.2 Lubricants*.
- d) Fit the filling plug.

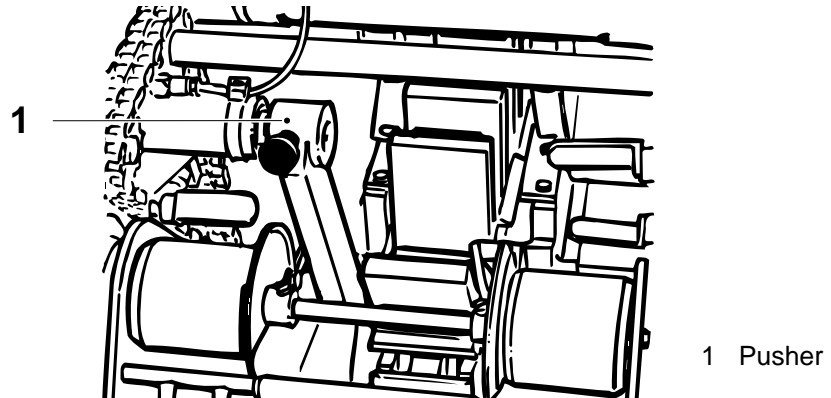


5.4-2 Indexing unit - check cut out torque

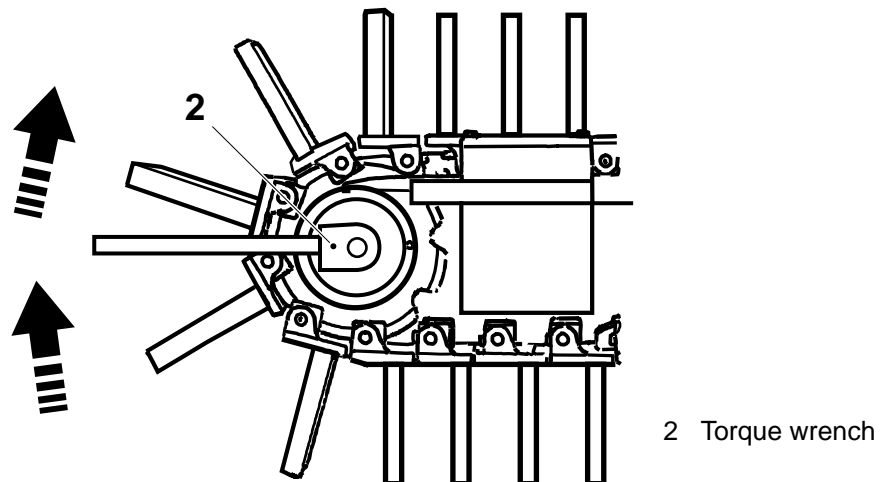
Machine status	Power On
Tools	
- torque wrench	min 90 Nm
- socket	18 mm
SPC reference	256410-070V

Drive wheel axle

- a) Crank until the pusher (1) runs clear of the station chain.



- b) Remove the lid and fit the socket on the nut. Turn the axle clockwise with the aid of the torque wrench (2).
The coupling should cut out at 85 ± 5 Nm.



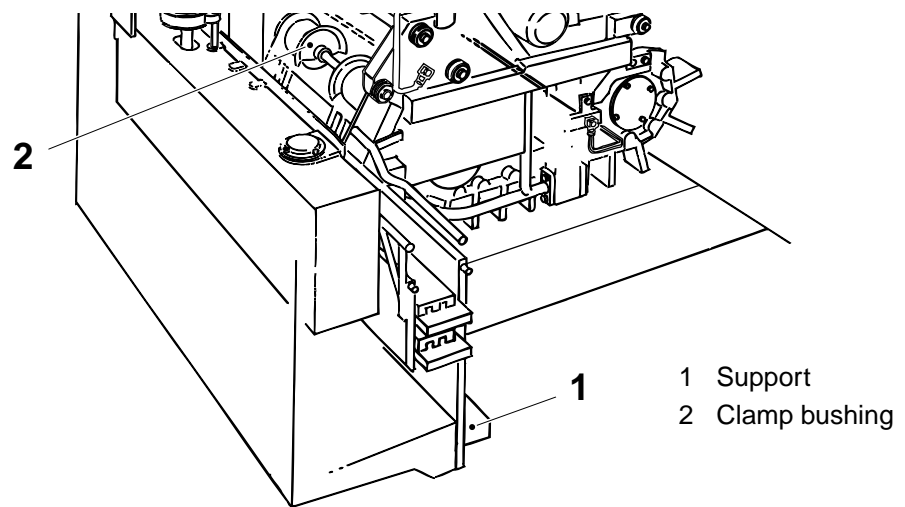
- c) Reset the coupling (turn the axle clockwise).
 d) Check the cut out torque at each coupling step (8 step/rev.).
Record the results.
 e) If incorrect torques, change the indexing unit, see 5.4-3 *Indexing unit - change*.
 f) Remove the wrench and fit the lid.

5.4-3 Indexing unit - change

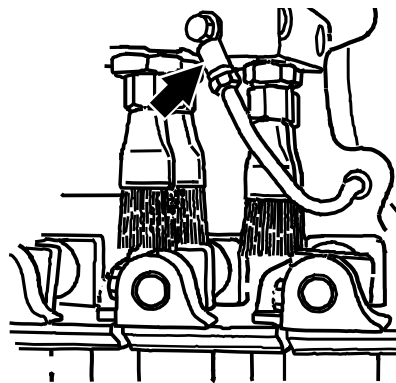
Tools - nut	
Consumable - oil - silicon	code B TP No. 90157-22
SPC reference	256410-070V

Removal

- Remove the discharger. Follow the procedure in 5.12-6 *Discharger - change bearings and bushings*.
- Remove the support (1).
- Unscrew the two screws and remove the discharge chute (2).



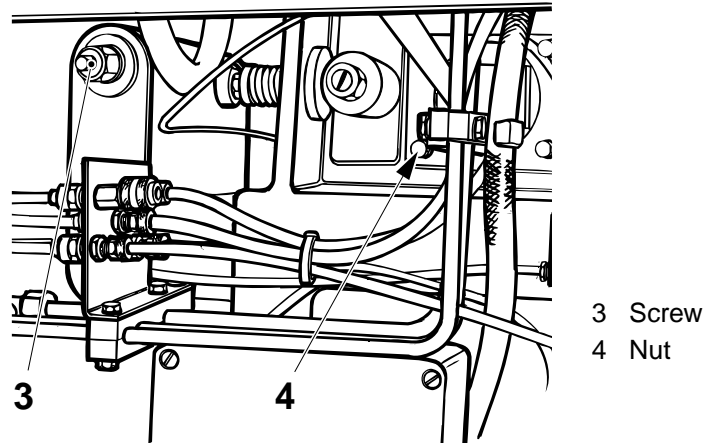
- Remove the station chain. Follow the procedure in 5.1-1 *Station chain - change*.
- Unscrew the banjo connection (arrow) to the lubrication brushes.



(Cont'd)

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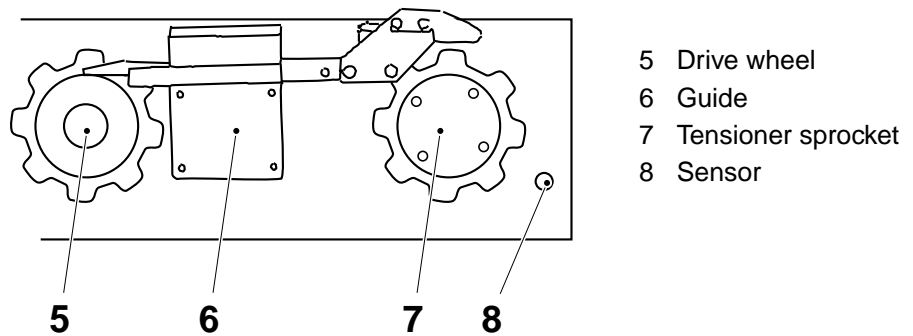
- f) Unscrew the two screws and remove the plate with the pipe. Make sure not to lose the two O-rings behind the pipes.
Unscrew the four screws (4).
- g) Unscrew the nut (3).



- h) Remove, together at the same time, the drive wheel (5), the guide (6) and the tensioner sprocket (7).

Note! Take care not to lose the shims behind the tensioner sprocket.

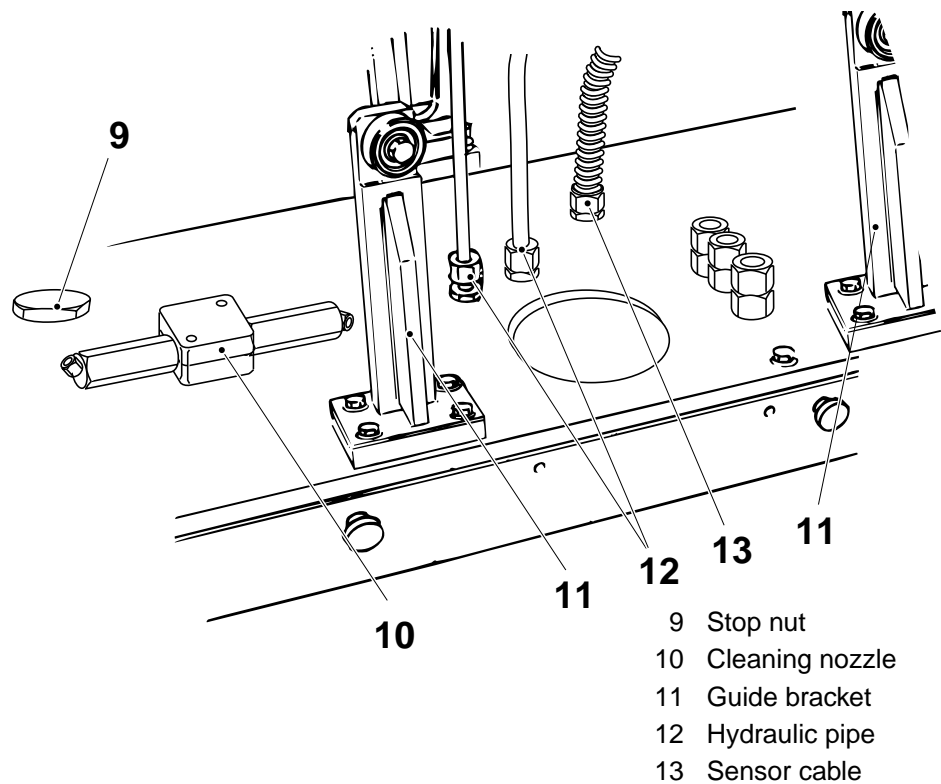
- i) Remove the sensor for the station chain (loosen the nut on the outside and screw the sensor off from the inside).



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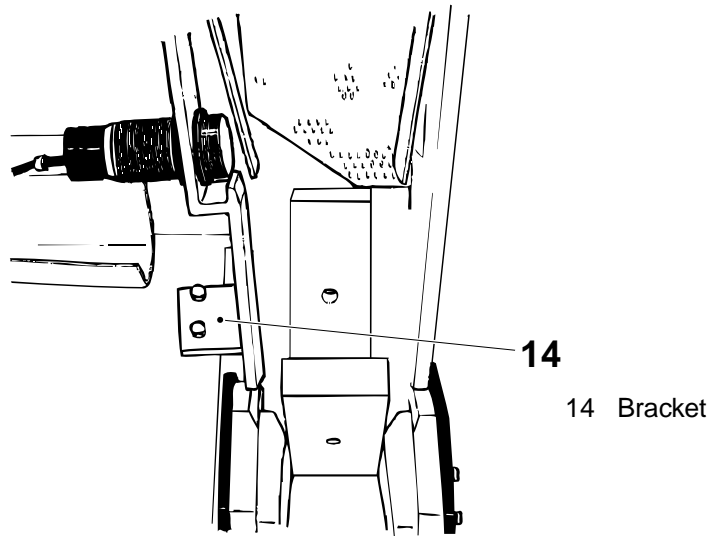
- j) From the cover plate:
- disconnect the hoses to all connections on the **underside** of the plate
 - unscrew the stop nut (9)
 - remove the cleaning rotor (10); follow the procedure in 5.13-1 *Cleaning system - check rotors and nozzles*
 - remove the two guide brackets (11)
 - remove the hydraulic pipes (12)
- k) Disconnect the discharger sensor cable (13) from the connection box.



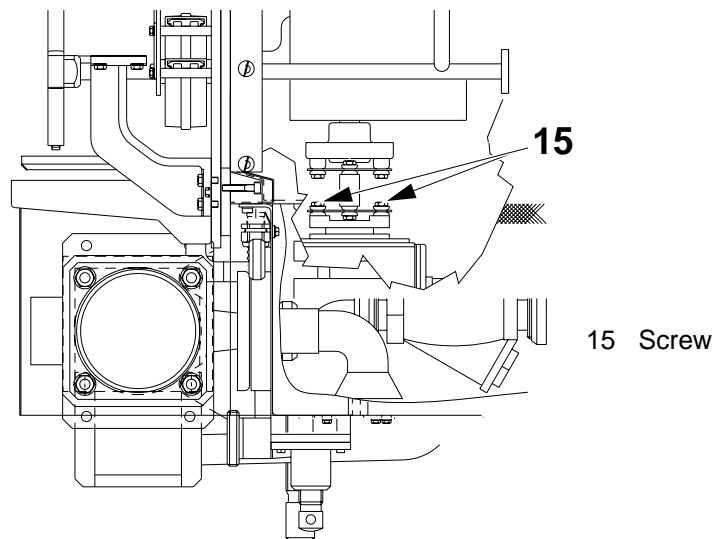
(Cont'd)

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- l) Remove the bracket (14) to the drop chute sensor



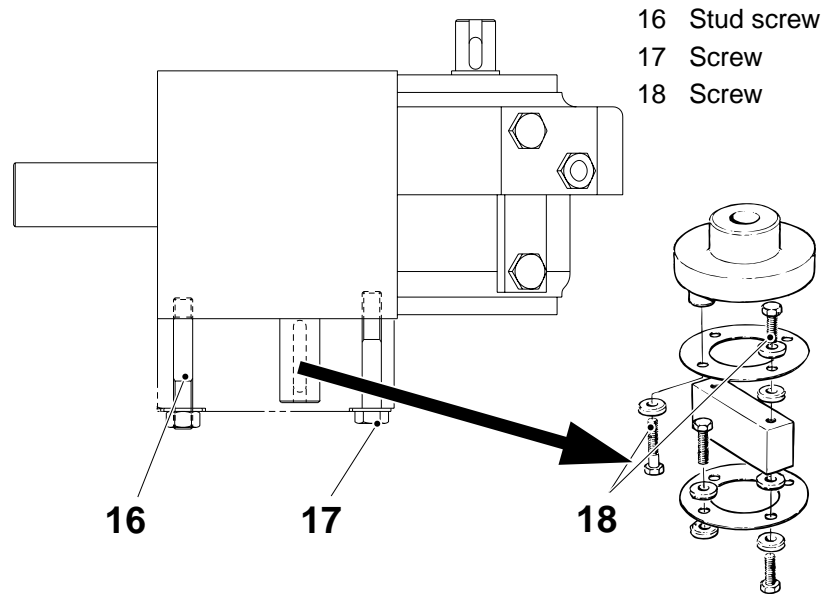
- m) Unscrew the two screws (15).



(Cont'd)

(Cont'd)

- n) Unscrew the two screws (17).
- o) Fit two nuts on the stud screws (16) and counter-tighten. Unscrew the stud screws and lift out the indexing unit (and the clutch).
- p) Unscrew the screws (18) and remove the clutch.

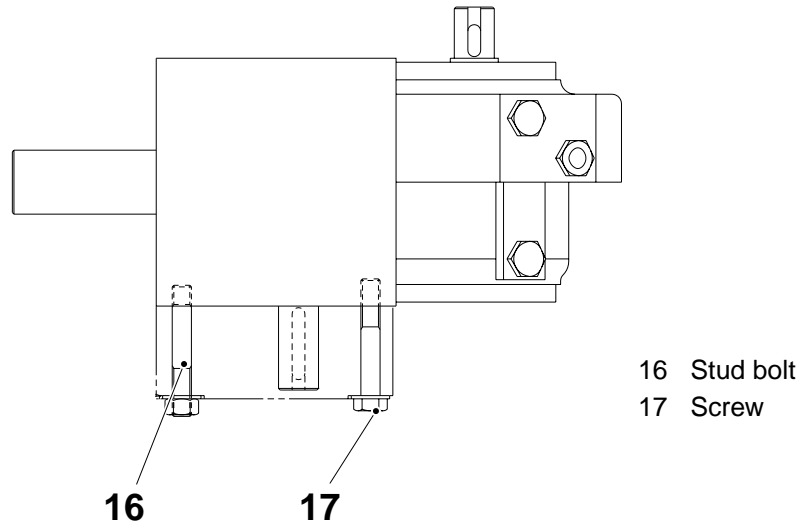


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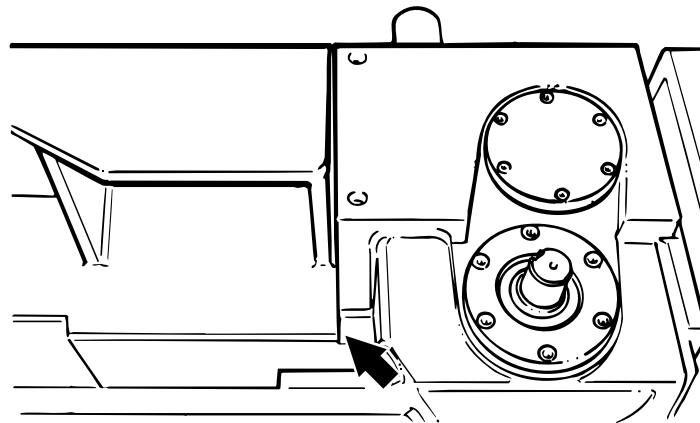
(Cont'd)

Assembly

- a) Fit the disc coupling on the new indexing unit.
- b) Fit the stud bolts (16). Screw them in so that there is space enough for two nuts. Fit one nut on each stud bolt and tighten lightly.
- c) Fit the screws (17) and tighten lightly.



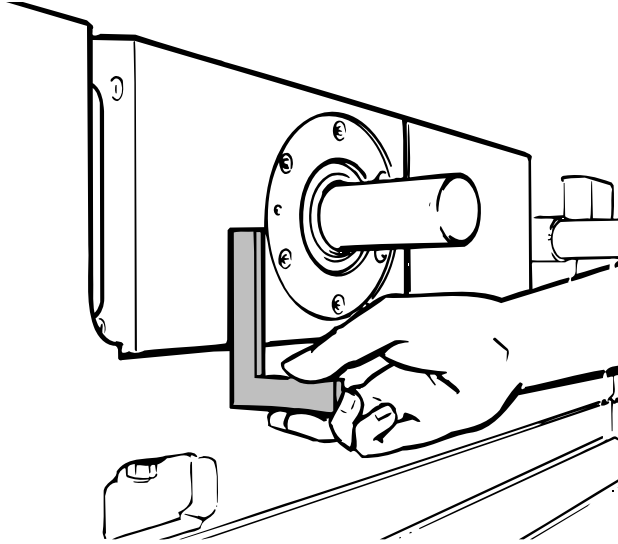
- d) Place the indexing unit in the machine. Place the unit so that it is in **close contact** with the frame (arrow), along the whole side.



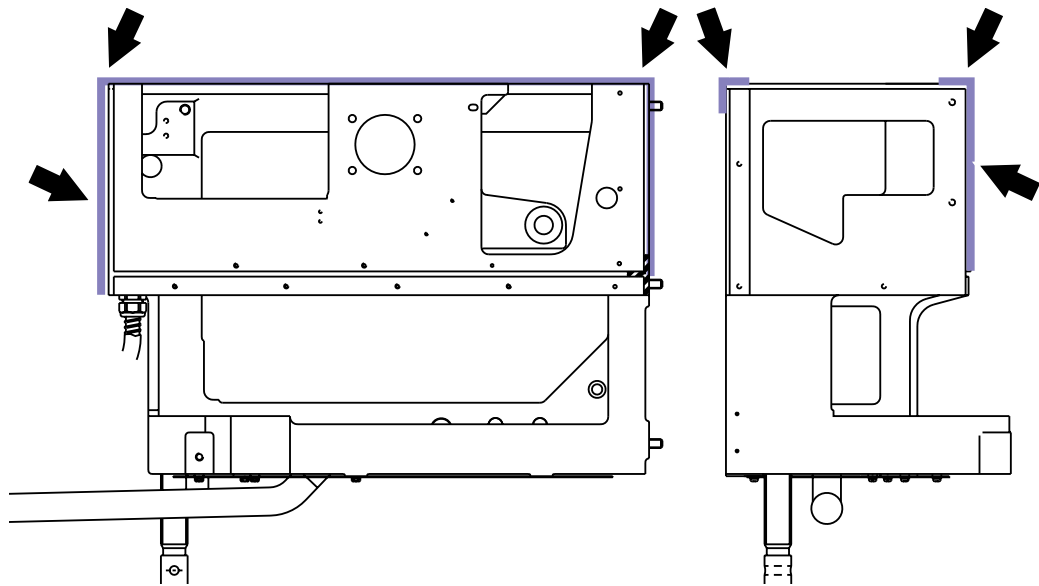
(Cont'd)

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- e) Make sure that the side of the indexing unit is **perfectly in line** with the frame.
- f) Tighten the nuts and the screws.



- g) Apply silicon on the edges of the frame (marked in fig.).

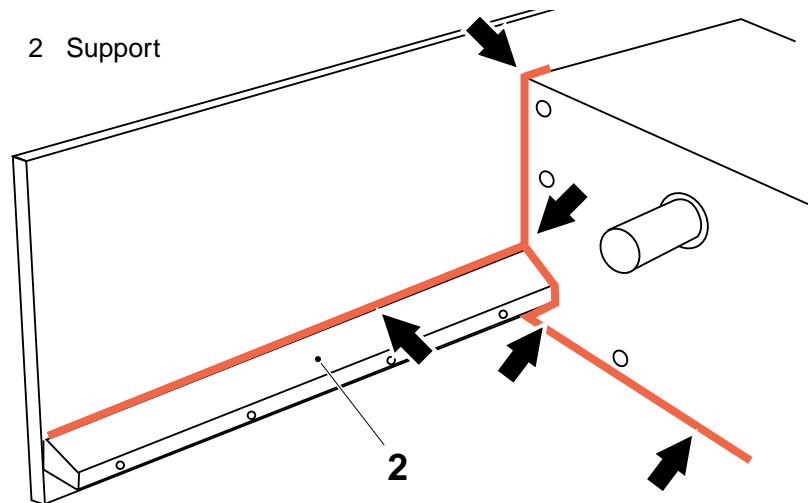


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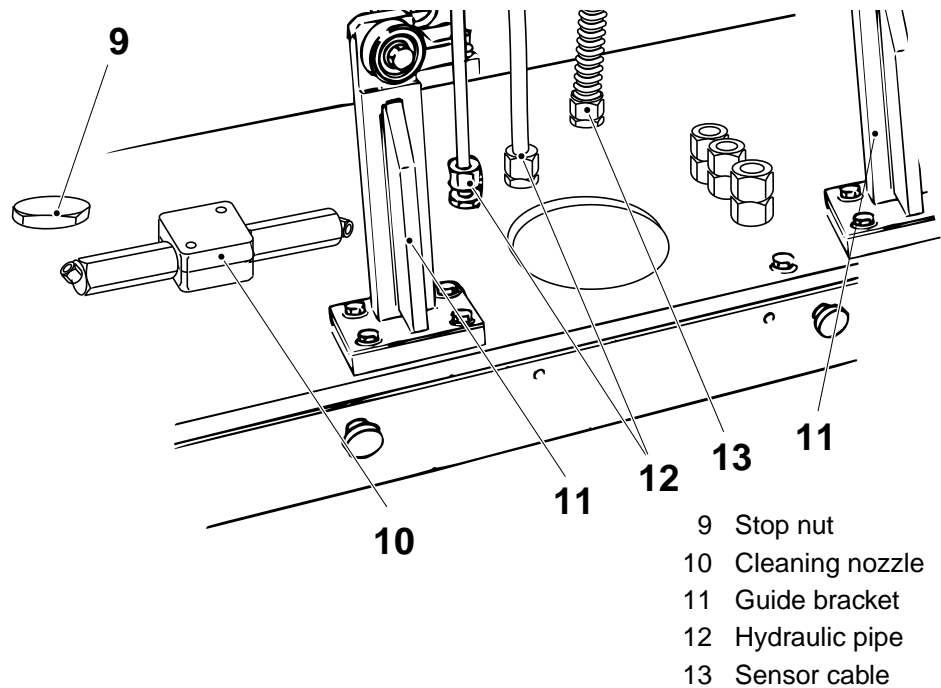
(Cont'd)

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- h) Fit the cover plate.
- i) Fit the support (2) and apply silicon as indicated.



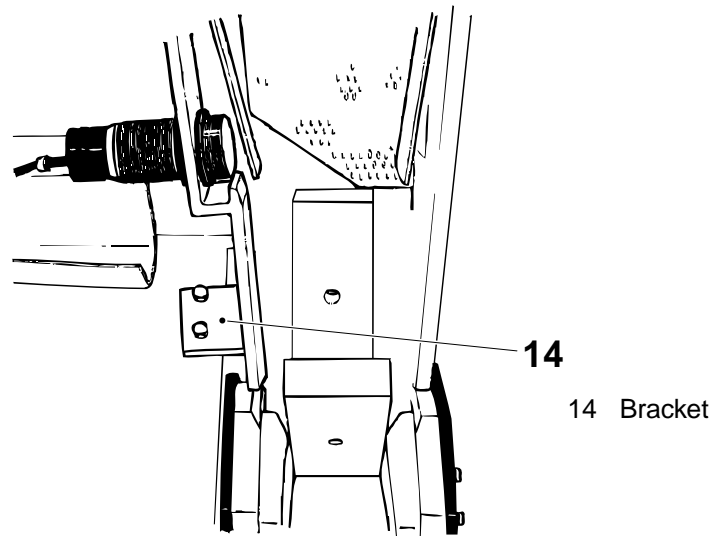
- j) On the cover plate, fit:
 - the hoses to all connections on the **underside** of the plate
 - the stop nut (9)
 - the cleaning rotor (10); follow the procedure in 5.13-1 *Cleaning system - check rotors and nozzles*
 - the two guide brackets (11)
 - the hydraulic pipes (12)
- k) Connect the discharger sensor cable (13) in the connection box.



(Cont'd)

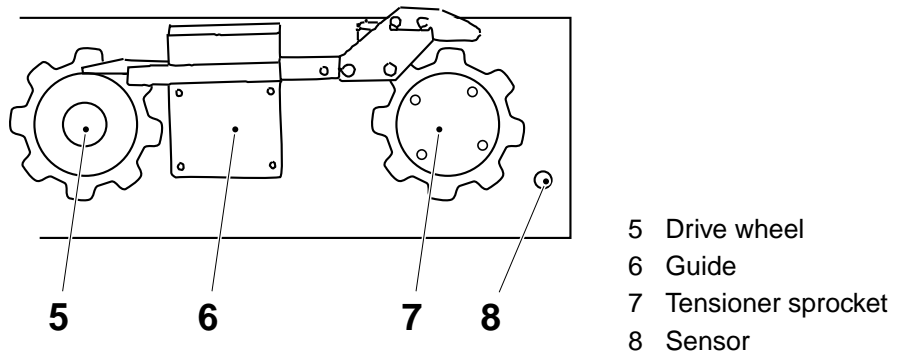
(Cont'd)

- l) Fit the bracket (14) to the drop chute sensor



Note! Make sure to fit the shims behind the tensioner sprocket.

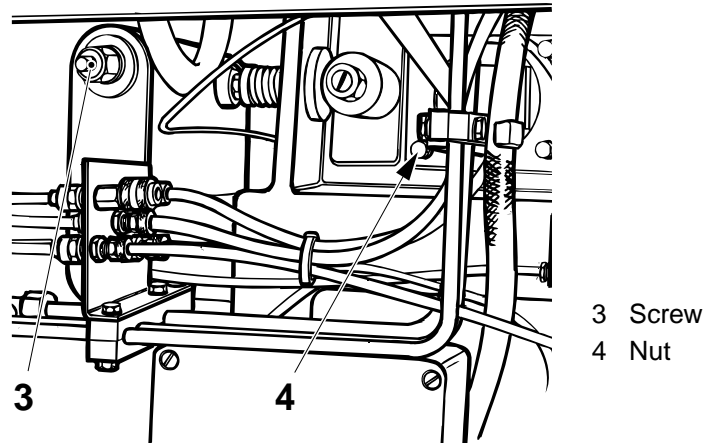
- m) Fit the drive wheel (5), the guide (6), and the tensioner sprocket (7).
- n) Fit the sensor (8) for the station chain.



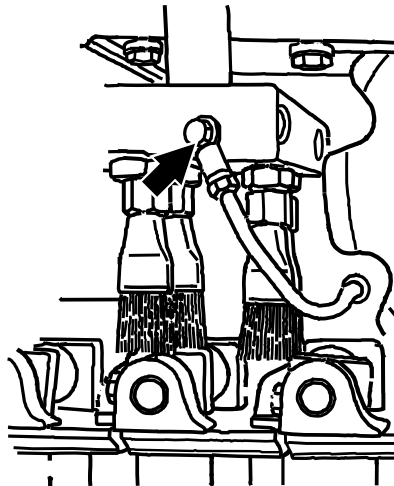
(Cont'd)

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- o) Tighten the nut (3).
- p) Fit the four screws (4). Fit the two O-rings and the plate with the pipes.



- q) Fit the banjo connection (arrow) to the lubrication brushes.



(Cont'd)

(Cont'd)

- r) Fit the station chain. Follow the procedure in *5.1-1 Station chain - change*.

Note! Do not fit back the final folder cover and the RH and LH side plates yet.

- s) Fit the discharger. Follow the procedure in *5.12-6 Discharger - change bearings and bushings*.



Chemical products!

Lubricant. Follow the *Safety precautions*.

- t) Fill up with oil in the indexing unit, see *5.4-1 Indexing unit - change oil*.
- u) Check and, if required, set the bracket to the drop chute sensor, see *2.3-2 Drop chute - set*
- v) Set the discharge chute, see *5.16-1 Discharge chute - set*.

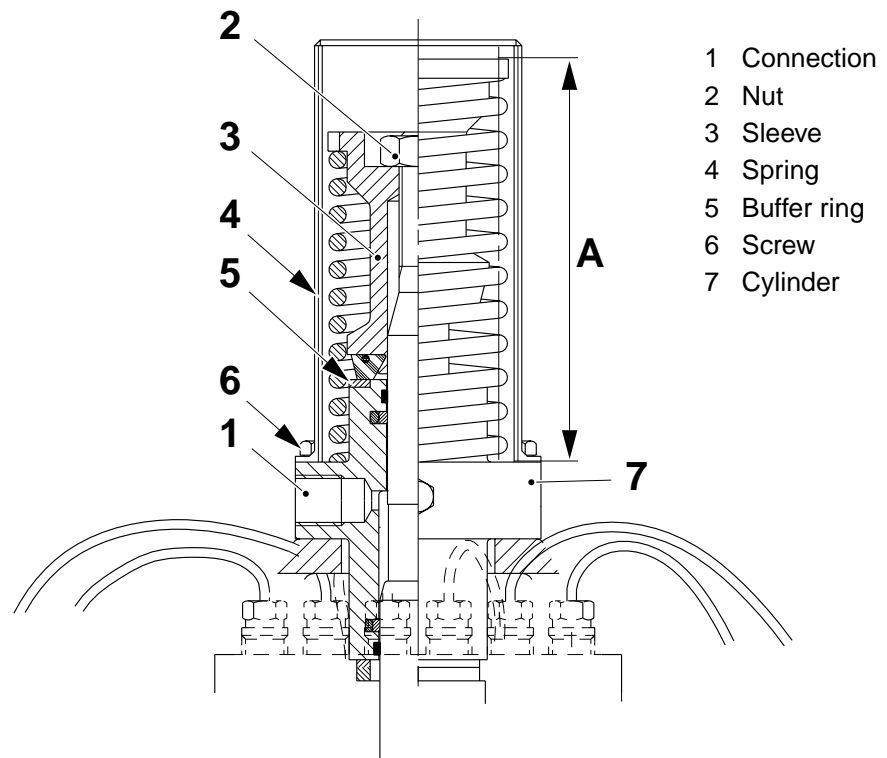
5.5 Pressure device

SPC reference	256436-070V
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5.5-1 Pressure device - overhaul hydraulics

Consumables - boiling water	
Tools - tool	TP No. 90243-146
SPC reference	256436-070V

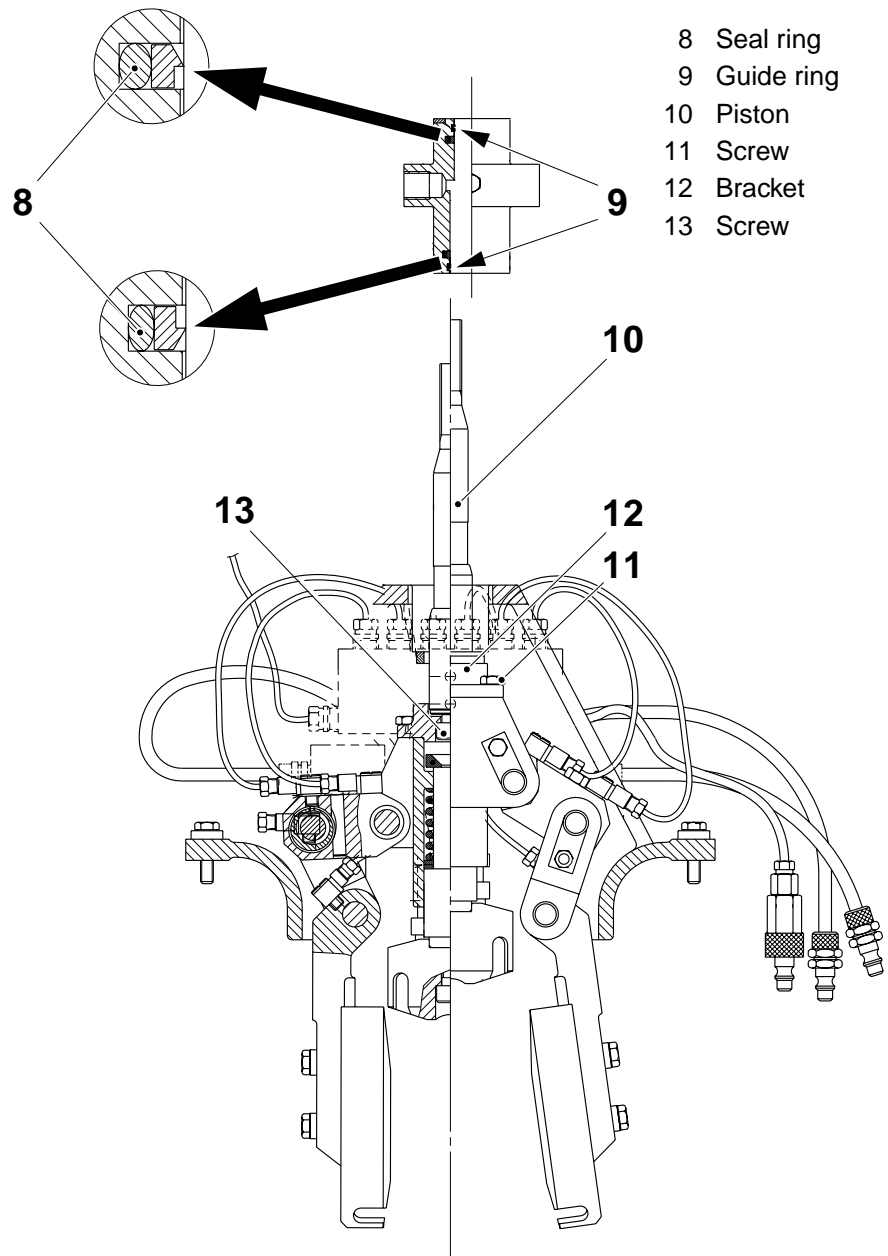
- Remove the cover. Measure and record distance A.
- Unscrew the hydraulic connection (1) and the nut (2).
- Remove the sleeve (3), the spring (4) and the buffer ring (5).
- Unscrew the screws (6) and lift off the cylinder (7).



(Cont'd)

(Cont'd)

- e) Change the seal rings (8) and the guide rings (9) with the aid of the tool. Fit the seal rings as illustrated. Shaping the rings will be easier if they are heated in boiling water.
- f) Check the piston (10) for wear and/or damages. Change as required.
- g) To change the piston, unscrew the screws (11), remove the bracket (12), unscrew the screw (13) and change the piston.

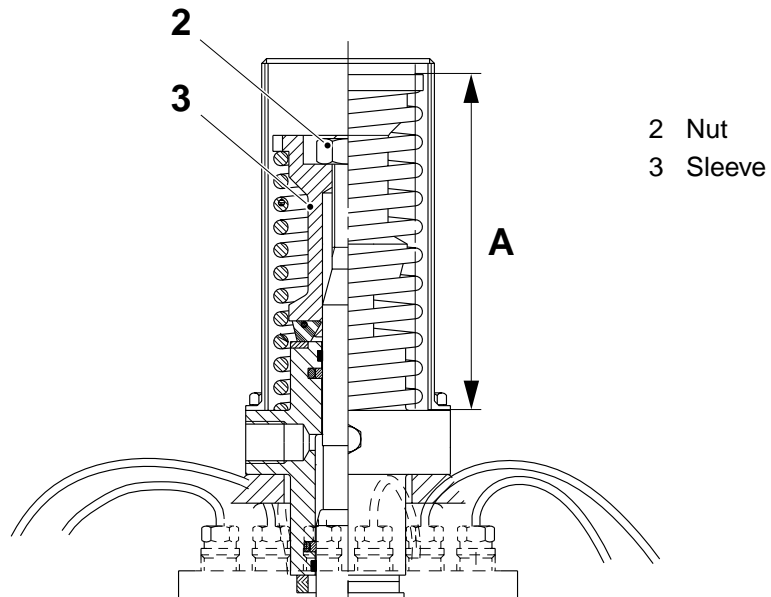


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(Cont'd)

(Cont'd)

- h) Assemble in the reverse order.
- i) Set distance A recorded above. Set by turning the sleeve (3). Tighten the nut (2) and fit the cover.
- j) Bleed the pressure device, see 5-3 *Final folder - bleed pressure and pull-down device*.



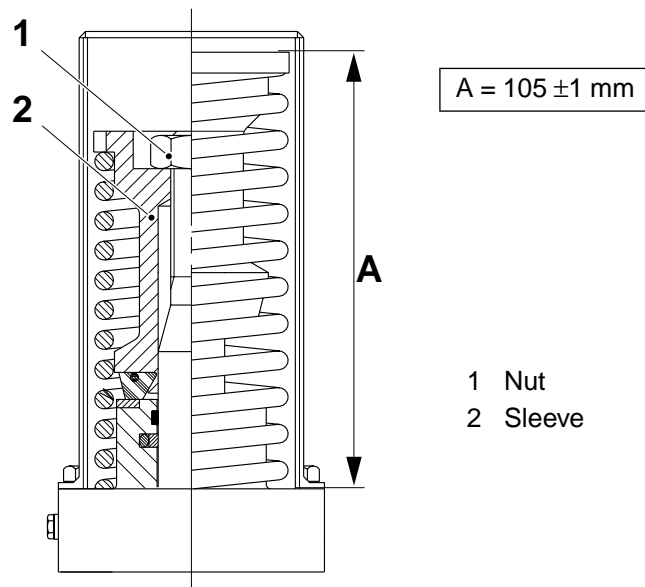
5.5-2 Pressure device - set

Vertical position

Machine status	Power On
Tool - locking clamp	TP No. 76167
SPC reference	256436-070V

Set distance A. To set, remove the cover, loosen the nut (1) and turn the threaded sleeve (2).

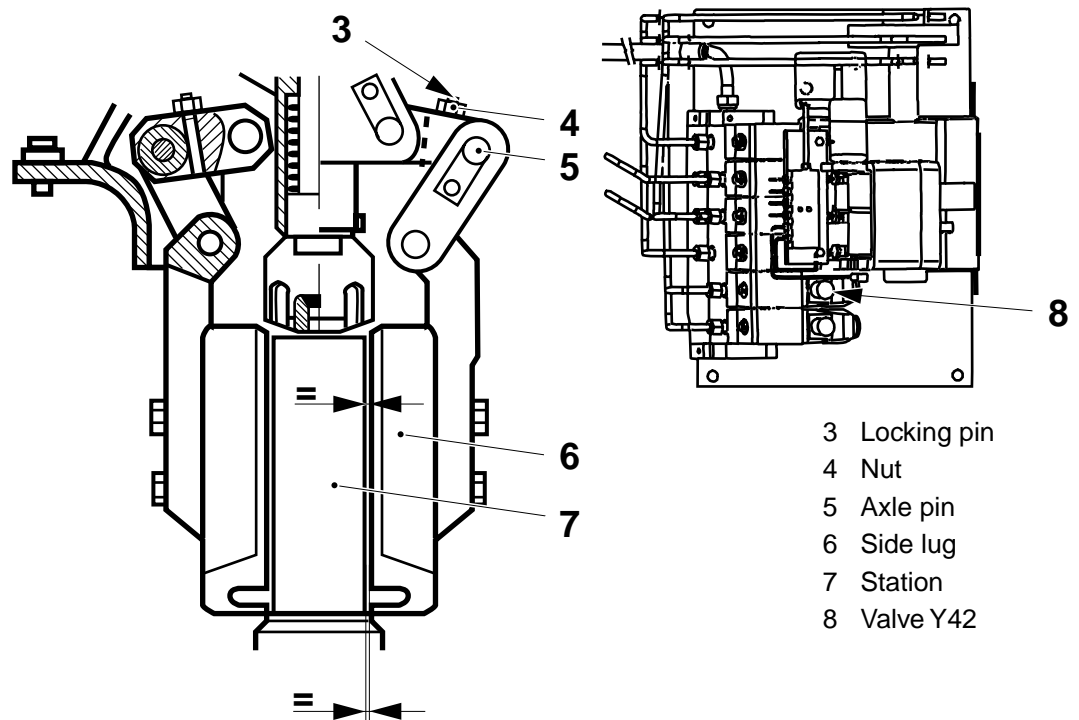
Fine setting may be done after examining the packages. Make sure that distance A stays within the tolerance.



(Cont'd)

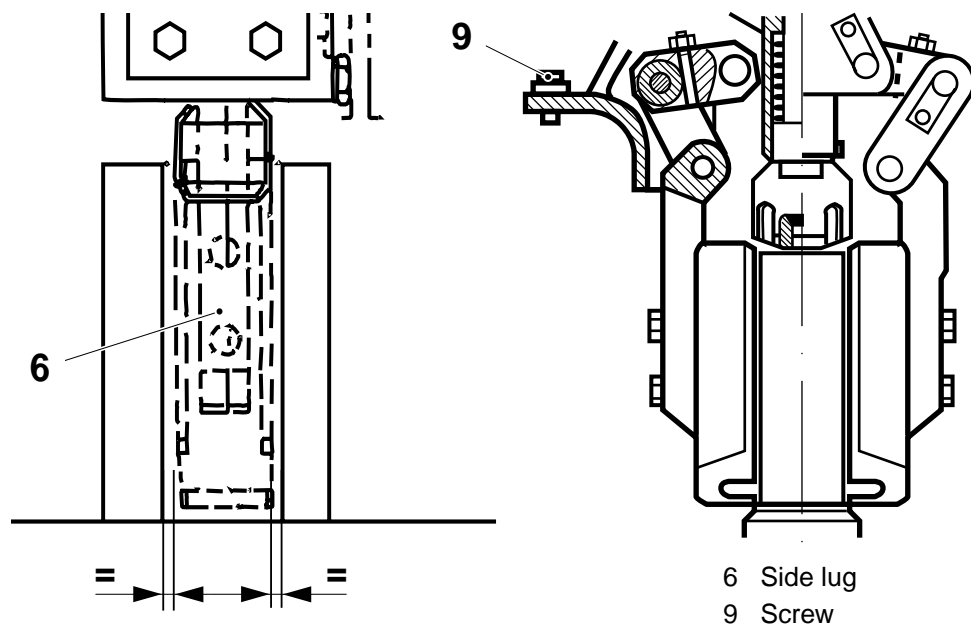
*(Cont'd)***Parallellity**Open water and turn the service switch **On**.

- a) Crank until the station chain stops indexing.
- b) Loosen the nuts (4) and set the side lugs (6) in their outer position (tap on the locking pin (3) to set the eccentric axle pin (5) free).
- c) Actuate hydraulic valve **Y42** (8) for the pressure device with the aid of the locking clamp.
- d) Set the side lugs parallel with the station (7) by means of the locking pin (3). Tighten the nuts (4).
- e) Set the cooling pipes as close to the side lugs (6) as possible.

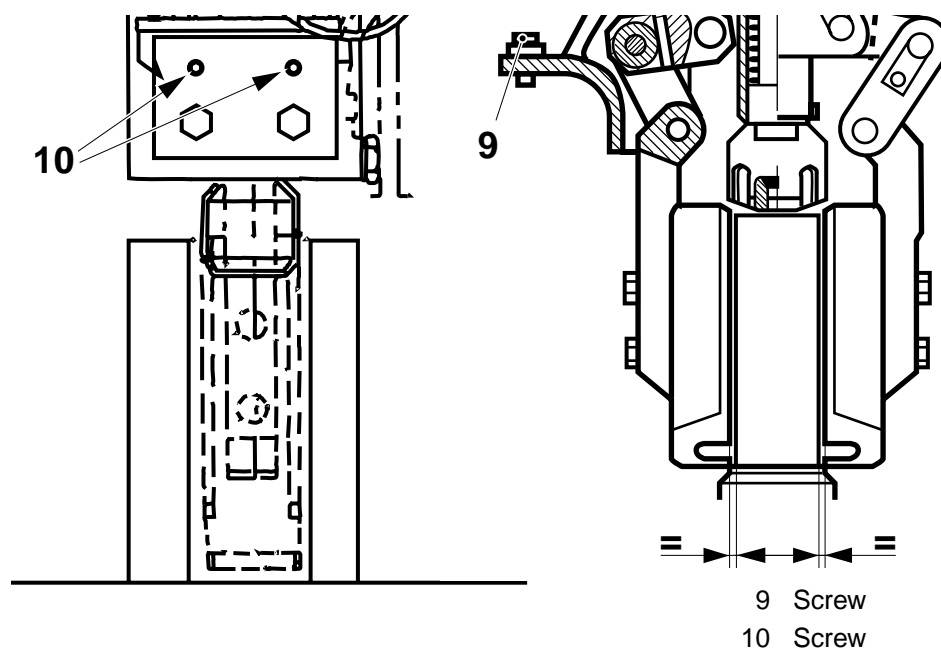
Note! Make sure that all cooling pipes go clear.*(Cont'd)*

(Cont'd)

- f) Loosen the screws (9). Set the side lugs (6) positioned symmetrically ± 0.2 mm between the stations by shifting the pressure unit lengthwise.



- g) Set the side lugs positioned symmetrically ± 0.2 mm between the stations with the aid of the allen screws (10). Tighten the screws (9).



- h) Set the service switch to position **Off**. Turn **Off** cooling water and switch **Off** power.
i) Remove the locking clamp.

5.6 Worm gear

SPC reference	256438-030V
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5.6-1 Worm gear - change oil

Consumable - oil	code B
SPC reference	256438-030V



Chemical products!

Lubricant. Follow the *Safety precautions*.

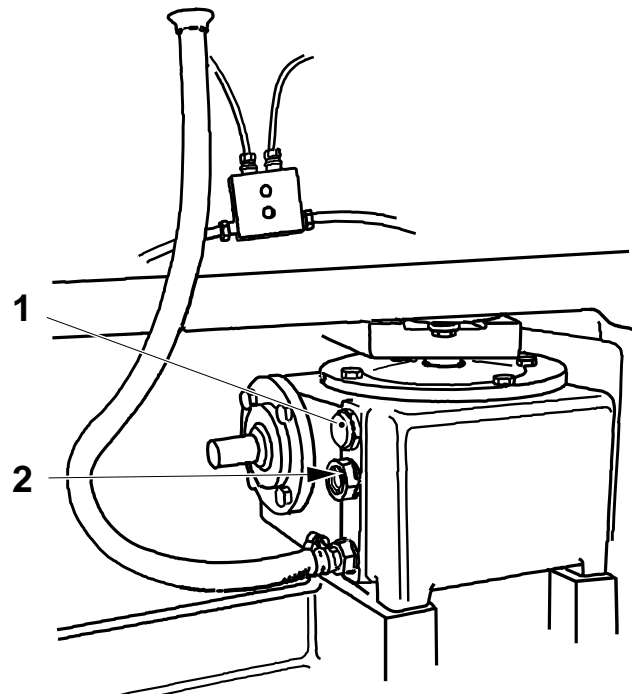
- Unscrew the filter plug (1).
- Remove the hose plug. Lower the hose and drain the oil.
- When the oil has been drained, top up with oil through the hose to correct level in the level glass (2). Oil code B, see *10.2 Lubricants*.
- Fit the hose plug and fit the hose in its clip.



Risk of eye injury!

Wear protective goggles.

- Check that the filter plug is not clogged. If required, clean with compressed air. Fit the filter plug.

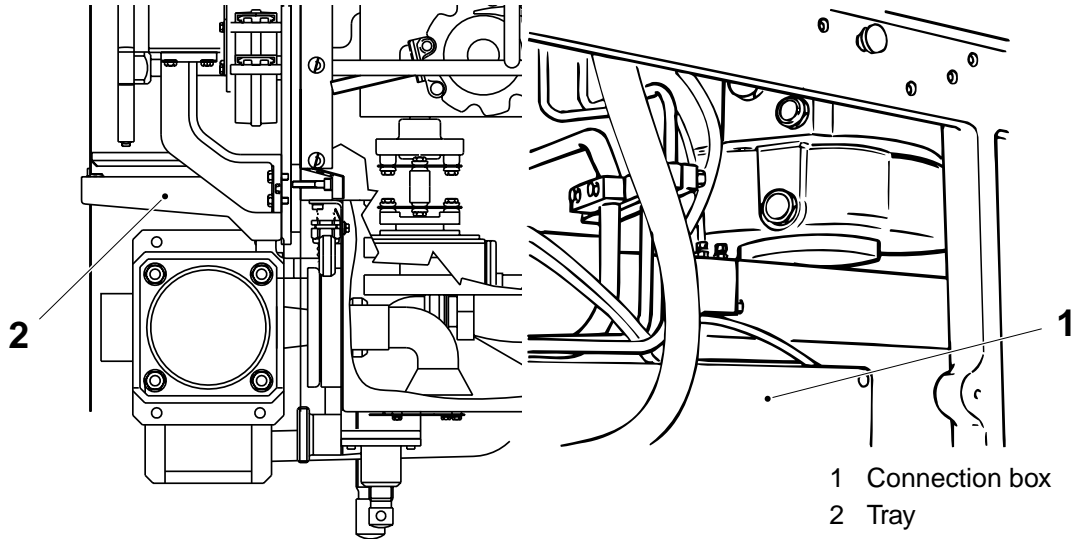


1 Filter plug
2 Level glass

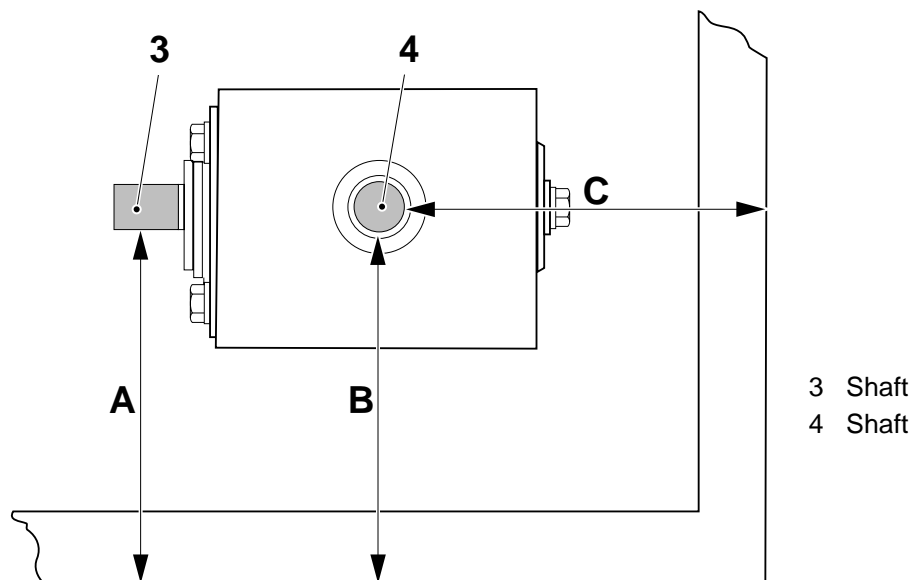
5.6-2 Worm gear - change

Consumable - oil	code B
SPC reference	256438-030V

a) Remove the LH side plate, the connection box (1) and the tray (2).



- b) Measure distance A between the frame and the shaft (3) of the worm gear. Record the result.
- c) Measure distance B between the frame and the shaft (4) of the worm gear. Record the result.
- d) Measure distance C between the frame and the shaft (4). Record the result.

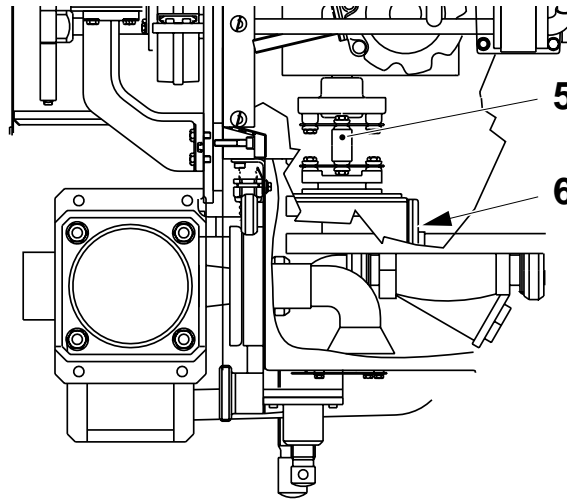


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- e) Remove the coupling (5) and the disc coupling (6).
- f) Change the worm gear.



- 5 Coupling
- 6 Disc coupling

- g) Set the new worm gear, very accurately, according to the measurements in *b) - d)*.



Chemical products!
Lubricant. Follow the *Safety precautions*.

- h) Top up with oil, code B, see *10.2 Lubricants*.

5.7 Element

SPC reference	256547-040V
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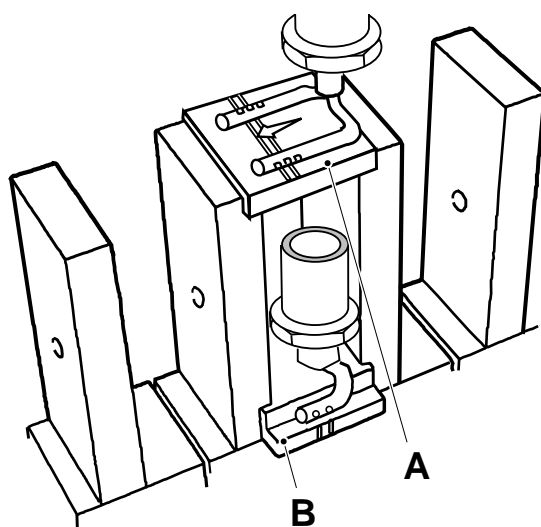
5.7-1 Element - set air nozzles

Machine status	Power On
Tools - template	see table below
SPC reference	256547-040V

Crank until the station chain stops indexing.

Put templates A and B, see table, on the stations. The arrows on the templates are to be in the running direction of the station chain.

Package	Template A, TP No.	Template B, TP No.
100 B	590223	590247
125 S	590223	590247
160 S	590245	590249
180 B	590224	590248
200 B	590224	590248
200 M	590246	590250
200 S	590245	590249
236 B	590224	590248
250 B	590224	590248
250 S	590246	590250
284 B	590224	590248
300 S	590224	590248
330 S	590224	590248



A Template
B Template

(Cont'd)

(Cont'd)

Vertically

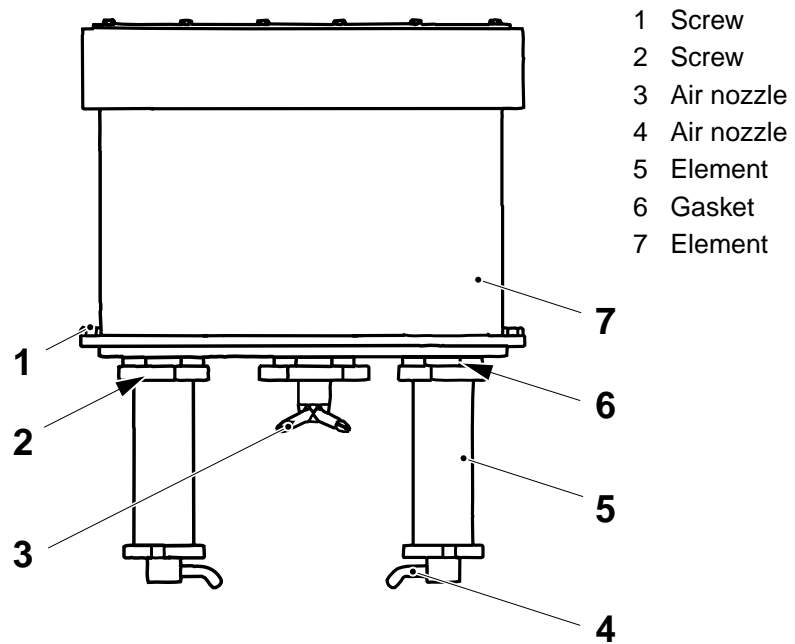
The nozzles are to touch the template. If required, unscrew the screws (2) and add/remove gaskets (6) under the element.

Horizontally

The air holes in the nozzles are to be in line with the marks on the templates.

Loosen the screws (1) and shift the element (7) to set the air nozzle (3).

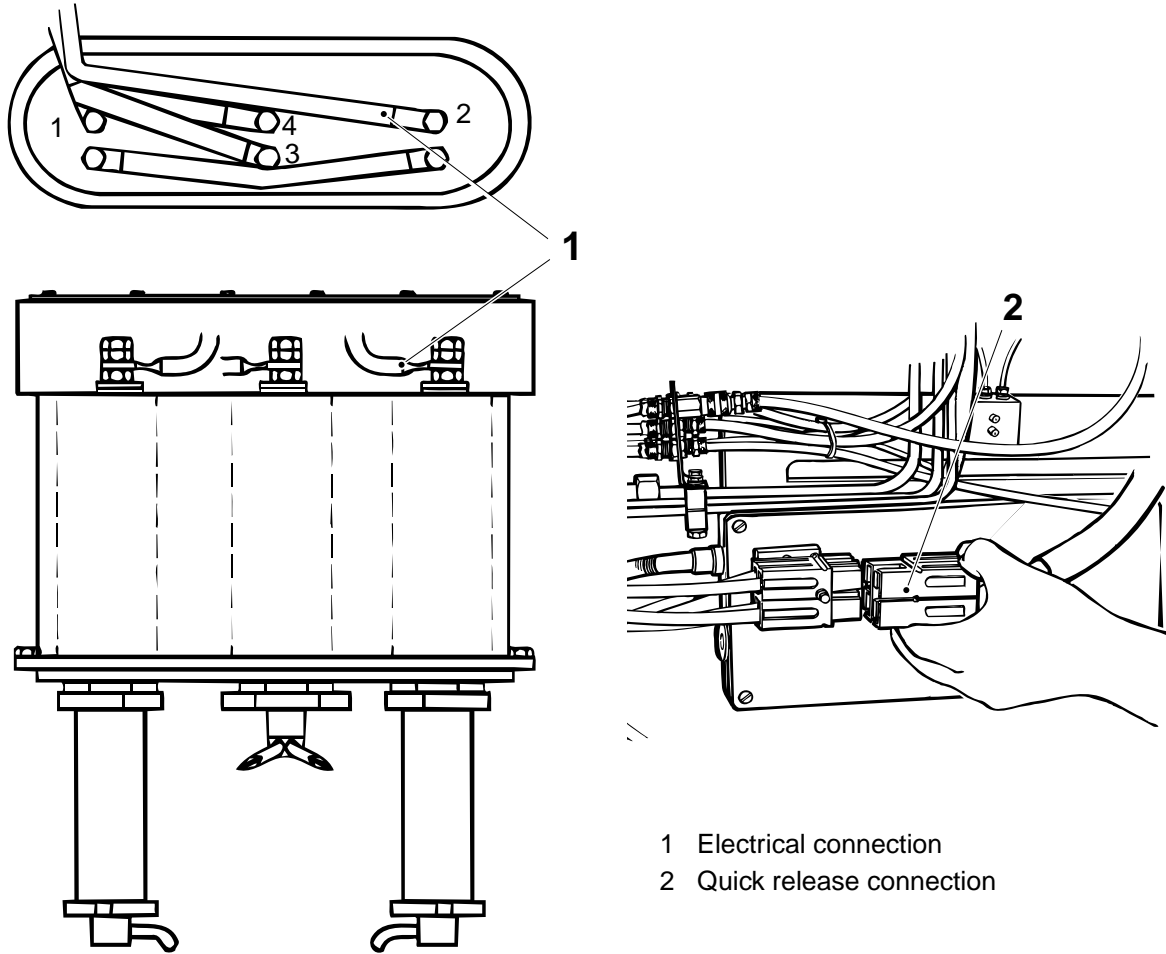
Loosen the screws (2) and shift the element (5) sideways to set the air nozzles (4).



5.7-2 Element - check connections

SPC reference	256547-040V
---------------	-------------

- Remove the lid and the flange seal.
- Check that the electrical connections (1) are not discolored or damaged.
- If required, mark and remove the electrical connections from the element units and the quick release connection (2).
- Change the connections and assemble in the reversed order.



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5.7-3 Element - change element units

SPC reference	256547-040V
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Follow the procedure in 5.8-2 *Frame - overhaul pivot frame assembly*.

5.8 Frame

SPC reference	295211-010V 256436-070V 256712-050V 256547-040V
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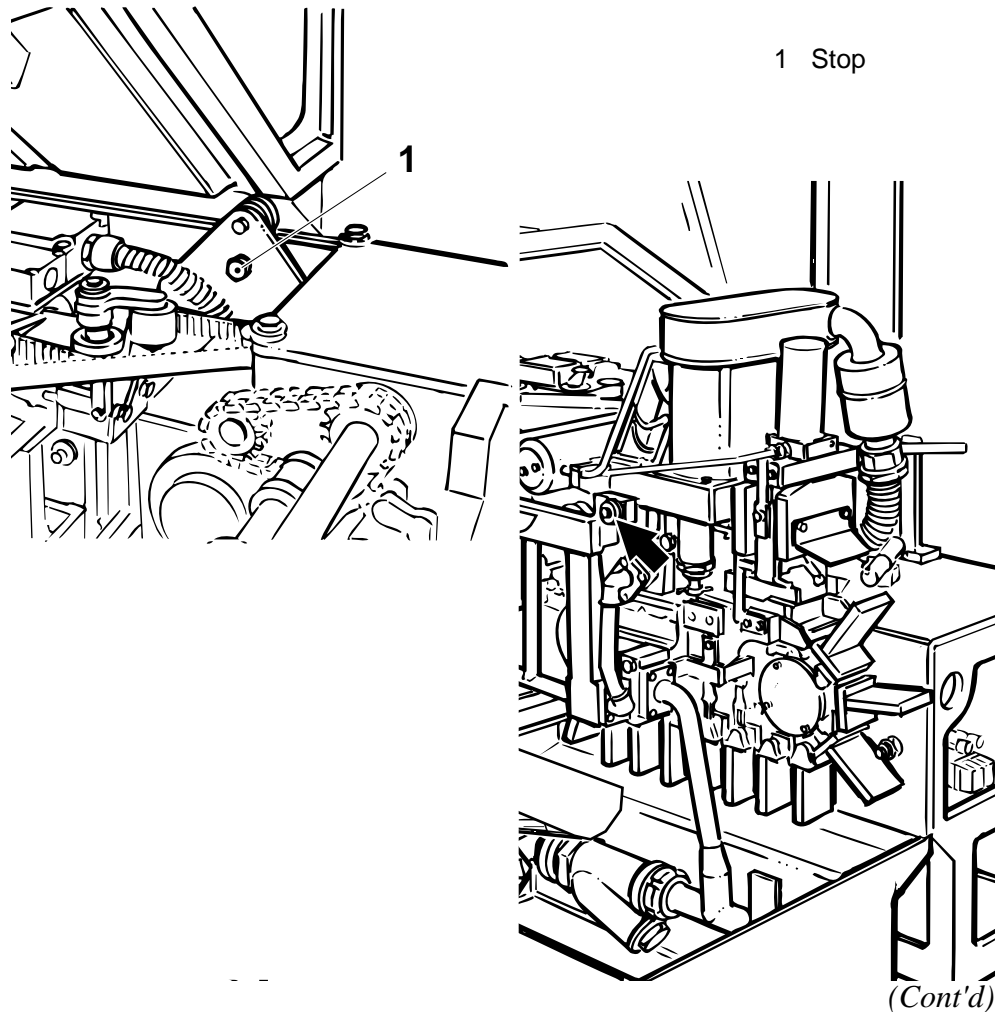
5.8-1 Frame - change pivot frame assembly

SPC reference	295211-010V 256436-070V 256712-050V 256547-040V
---------------	----------------------------------------------------------

Removal

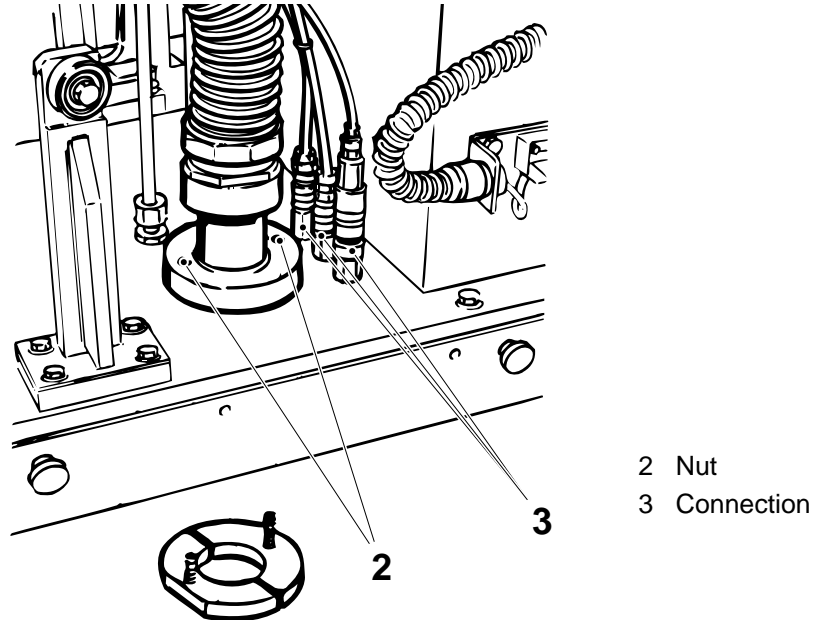
- a) Unscrew the stop (1) and remove the final folder cover and the LH side plate.

If required, remove also the roller (arrow).

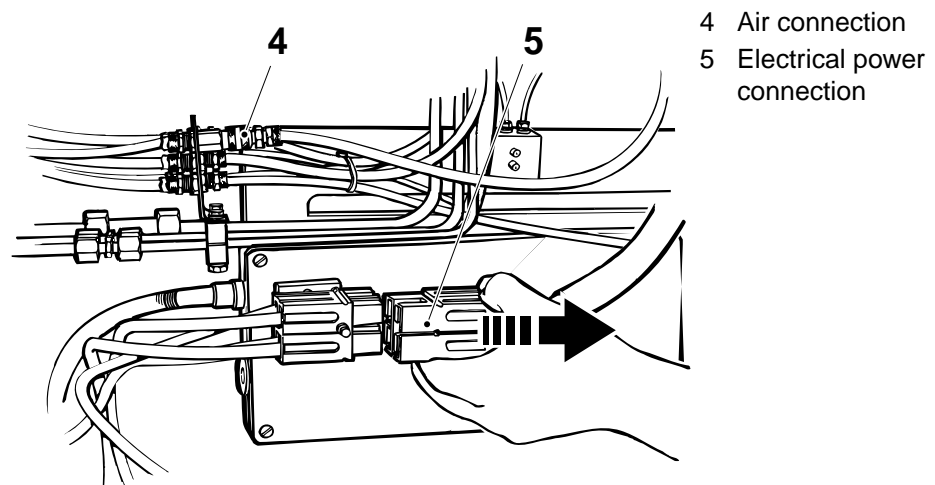


(Cont'd)

- b) Unscrew the nuts (2) and remove the cable lead-in and the flange fitted underneath it.
- c) Disconnect the quick release connections (3) for oil and water.



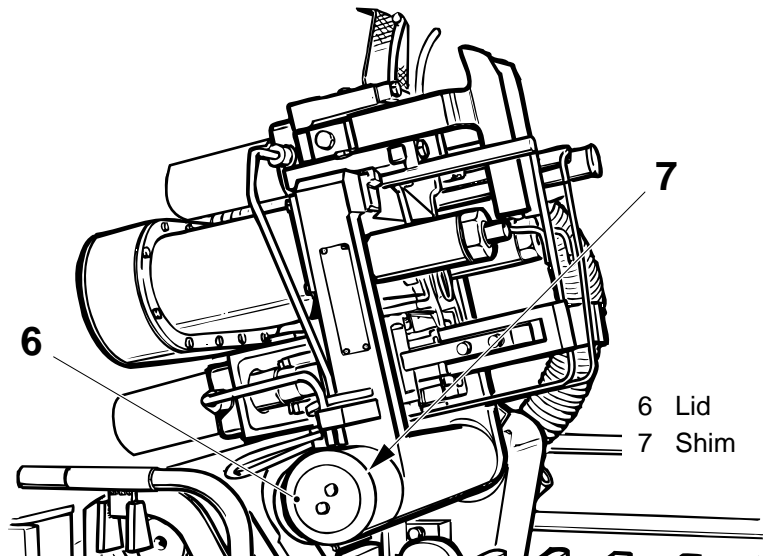
- d) Disconnect the air connection (4) and the electrical power connection (5).



(Cont'd)

(Cont'd)

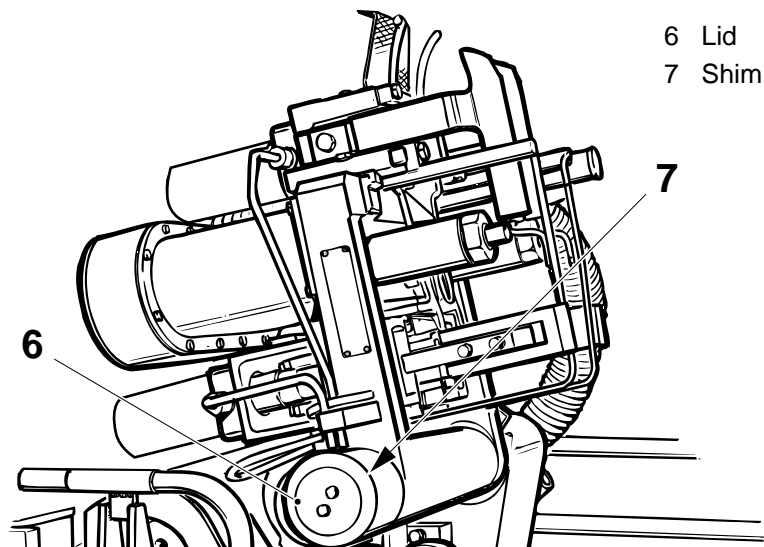
- e) Raise the pivot frame.
- f) Unscrew the screws and remove the lid (6) and the shims (7).



- g) Remove the pivot frame assembly.

Fitting

- a) Fit the pivot frame assembly on the shaft.
- b) Put shims (7) on the shaft and fit the lid (6). Make sure that the lid fits correctly and that there is no play in the frame. Add or remove shims (7) as required.

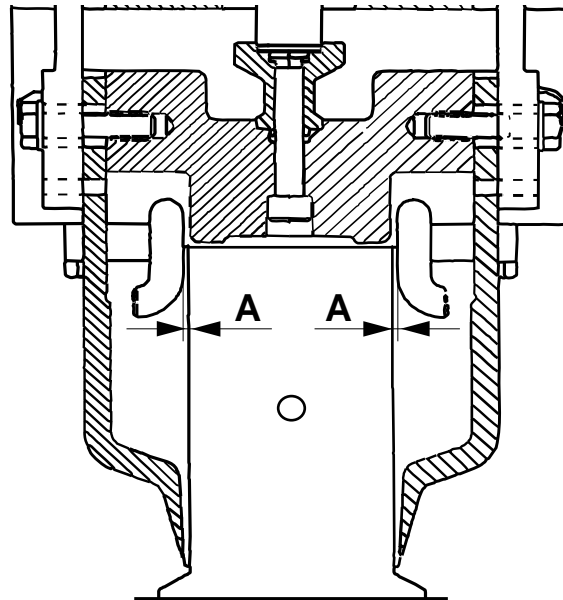


(Cont'd)

(Cont'd)

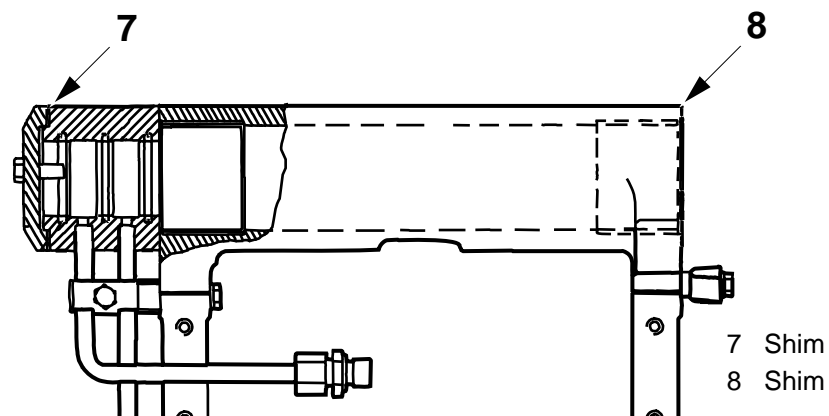
Caution! Make sure that the rails **run free from** the station chain.

- c) Lower the pivot frame carefully.
- d) Check the alignment of the rails over the stations. Distances A must be the same within 0.2 mm on both sides of the station.



- e) If required, remove the pivot frame assembly, see above, and add or remove shims (7) or (8) required to align the pivot frame assembly to the stations.

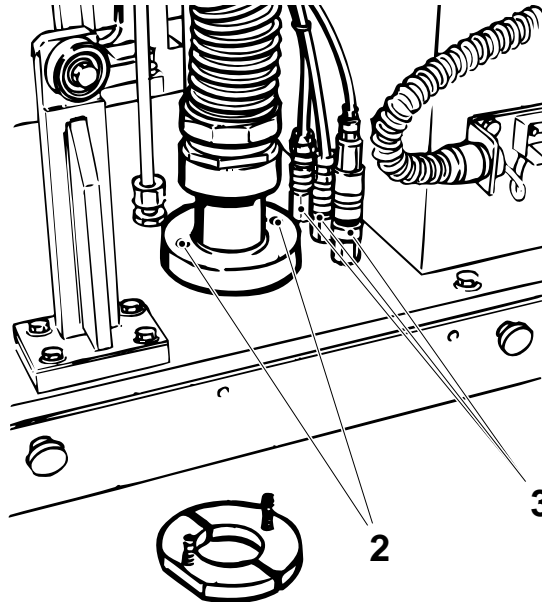
Note! If shims have to be added on one side, these are to be taken from the other side and vice versa.



(Cont'd)

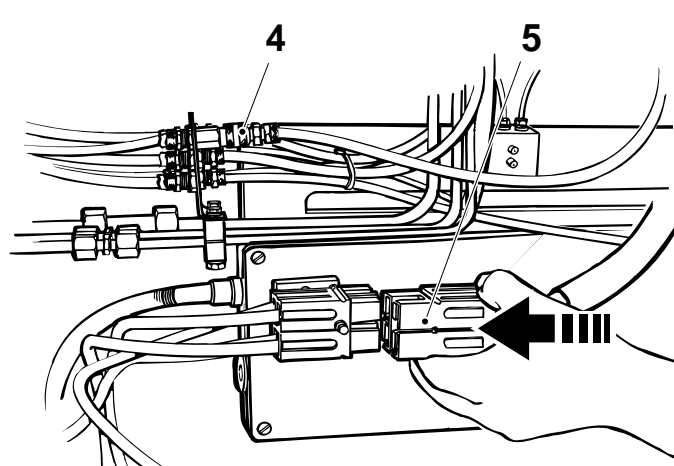
(Cont'd)

- f) Fit the cable lead-in and the flange (fitted from underneath). Tighten the nuts (2).
- g) Connect the quick release connections (3) for oil and water.



- 2 Flange
- 3 Connection

- h) Connect the air connection (4) and electrical power connection (5).

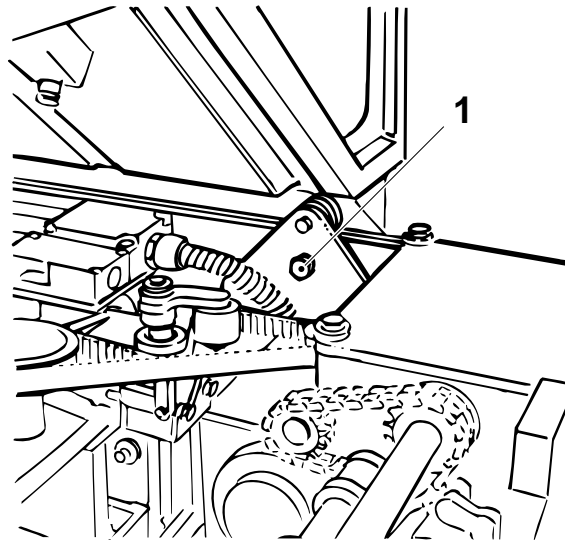


- 4 Air connection
- 5 Electrical power connection

(Cont'd)

(Cont'd)

- i) Bleed the pressure and pull-down device, see 5-3 *Final folder - bleed pressure and pull-down device*.
- j) Set the pull-down device, see 5.9-3 *Pull-down device - set blocking piece* and 5.9-4 *Pull-down device - set pull-down arms*.
- k) Set the pressure device, see 5.5-2 *Pressure device - set*.
- l) Set the air nozzles, see 5.7-1 *Element - set air nozzles*.
- m) Fit the roller, if removed. Fit the side plate, the final folder cover and the stop (1).

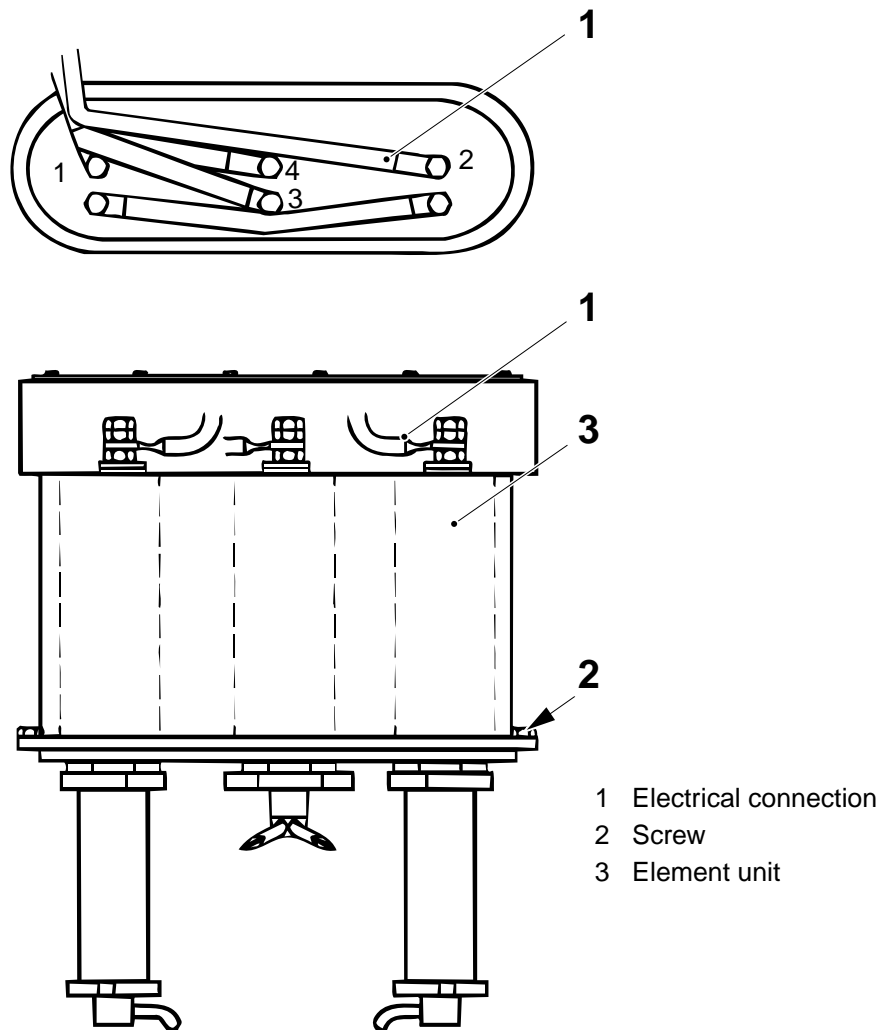


1 Stop

5.8-2 Frame - overhaul pivot frame assembly

Element units

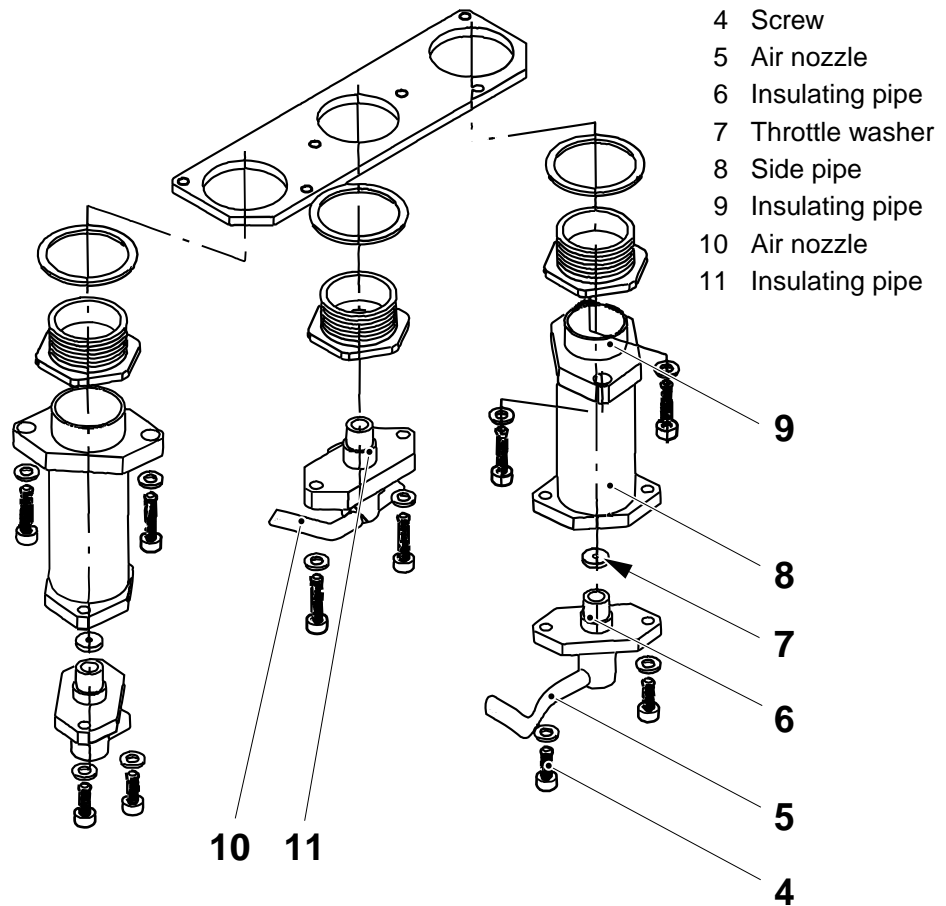
- Remove the lid and the flange seal.
- Mark and unscrew the electrical connections (1).
- Unscrew the screws (2) and remove the FS element. Remove the element units (3).



(Cont'd)

(Cont'd)

- d) Unscrew the screws (4) and remove the air nozzles (5), the insulating pipes (6) and the throttle washers (7).
- e) Unscrew the screws and remove the side pipes (8) and the insulating pipes (9).
- f) Unscrew the screws and remove the air nozzle (10) and the insulating pipe (11).

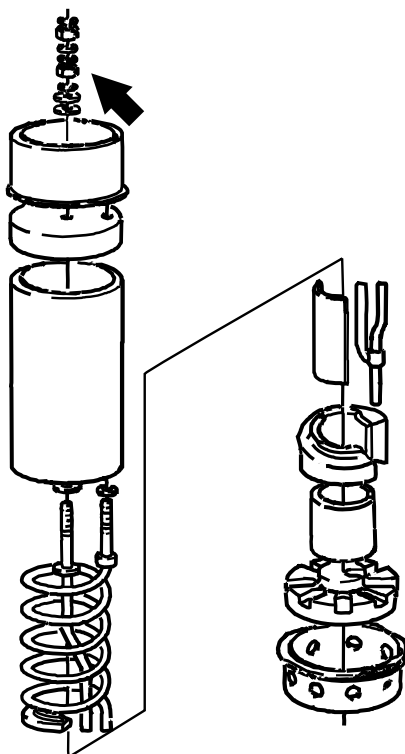


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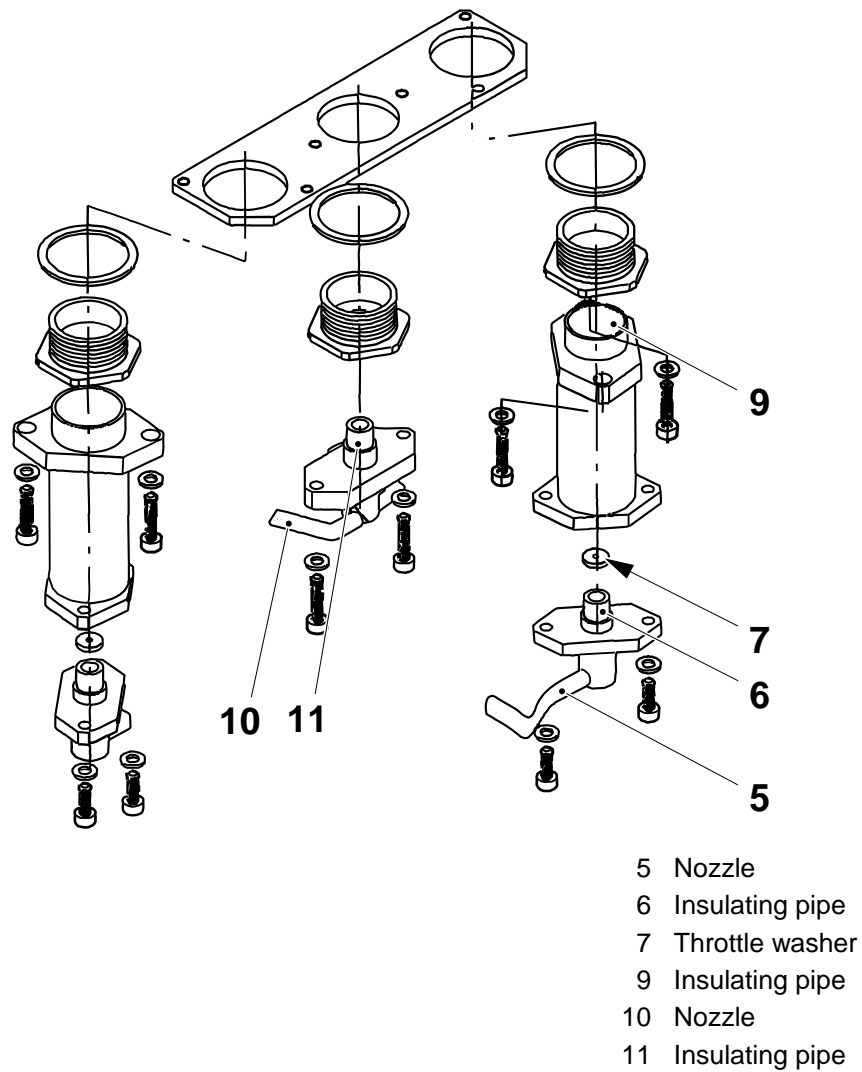
- g) Unscrew the nuts (arrow) and take the element units apart.



(Cont'd)

(Cont'd)

- h) Change the insulating pipes (6) and (11).
- i) Check that;
- the air holes in the nozzles (5) and (10) are open
 - the insulating pipes (9) are not discolored
 - the throttle washers (7) are not clogged.
 - the electrical connections are intact
- Clean or change as required.



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(Cont'd)

(Cont'd)

- j) Unscrew the screws (12) and remove the spacer pipe (13).
- k) Change the flange seals (14) and the stop plate (15).
- l) Unscrew the screws (16) and separate the cover.
- m) Change the O-ring, the cable glands (17) and the hose (18).



- n) Assemble in the reverse order.

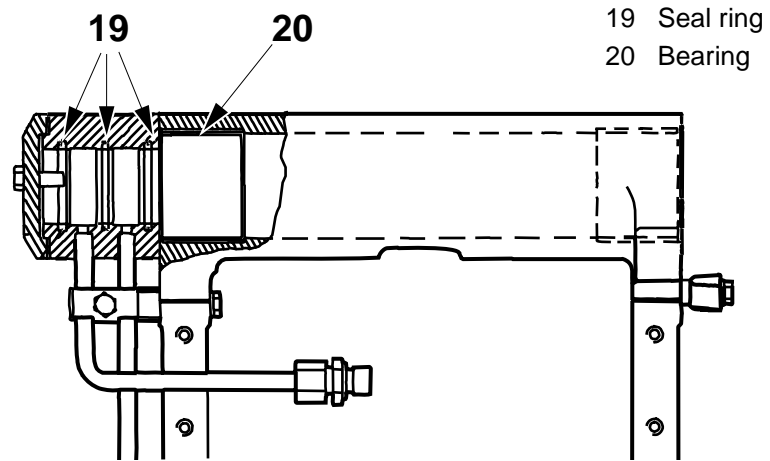
Note! Secure the element units so that they can not fall out if the element is turned upside down. Make sure that the throttle washers are placed correctly and that the electrical connections are fitted according to the marks.

(Cont'd)

(Cont'd)

Frame assembly

Change the three seal rings (19). Check and, if required, change the bearing (20).



(Cont'd)

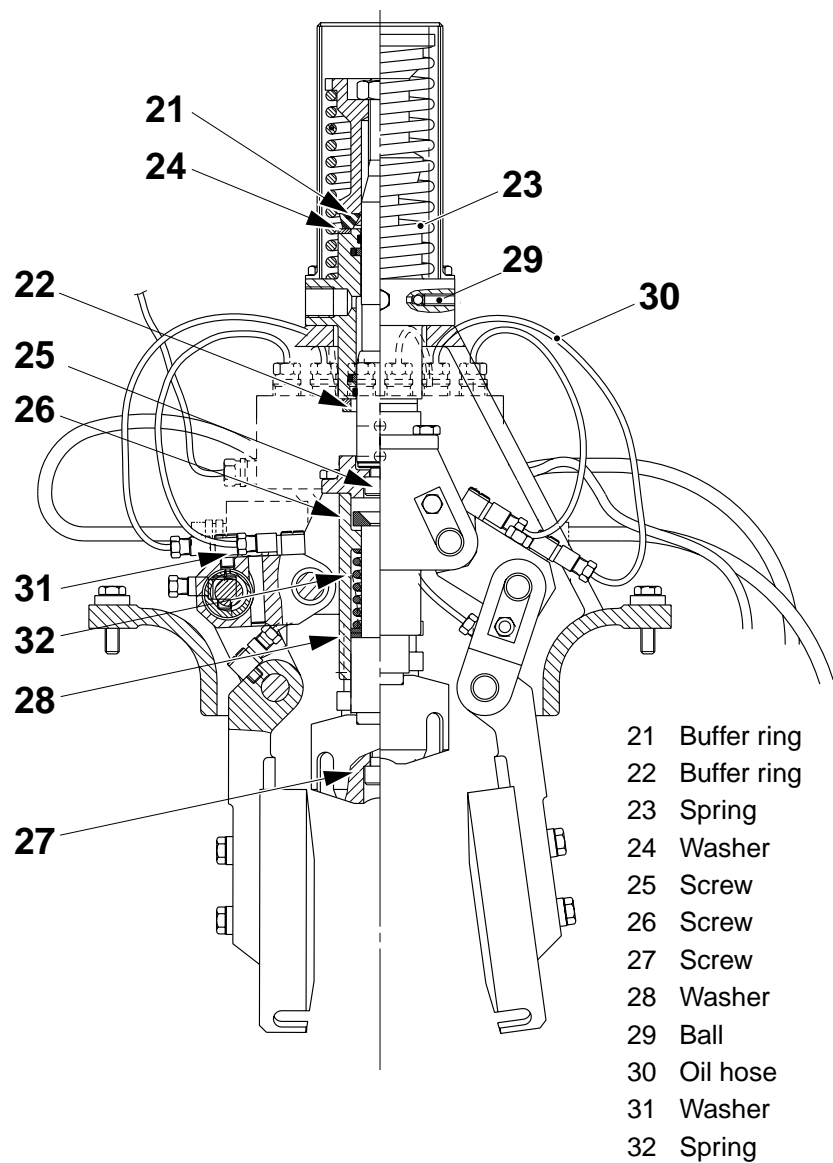
*(Cont'd)***Pressure device**

a) Overhaul the hydraulics in the pressure device, see 5.5-1 *Pressure device - overhaul hydraulics*. At the same time change;

- the buffer rings (21) and (22)
- the compression spring (23)
- the washer (24)
- the screws (25), (26) and (27)

Change the washers (28), if required.

b) Change the screw and the ball (29), the oil hoses (30), the banjo connection washers (31) and the spring (32).

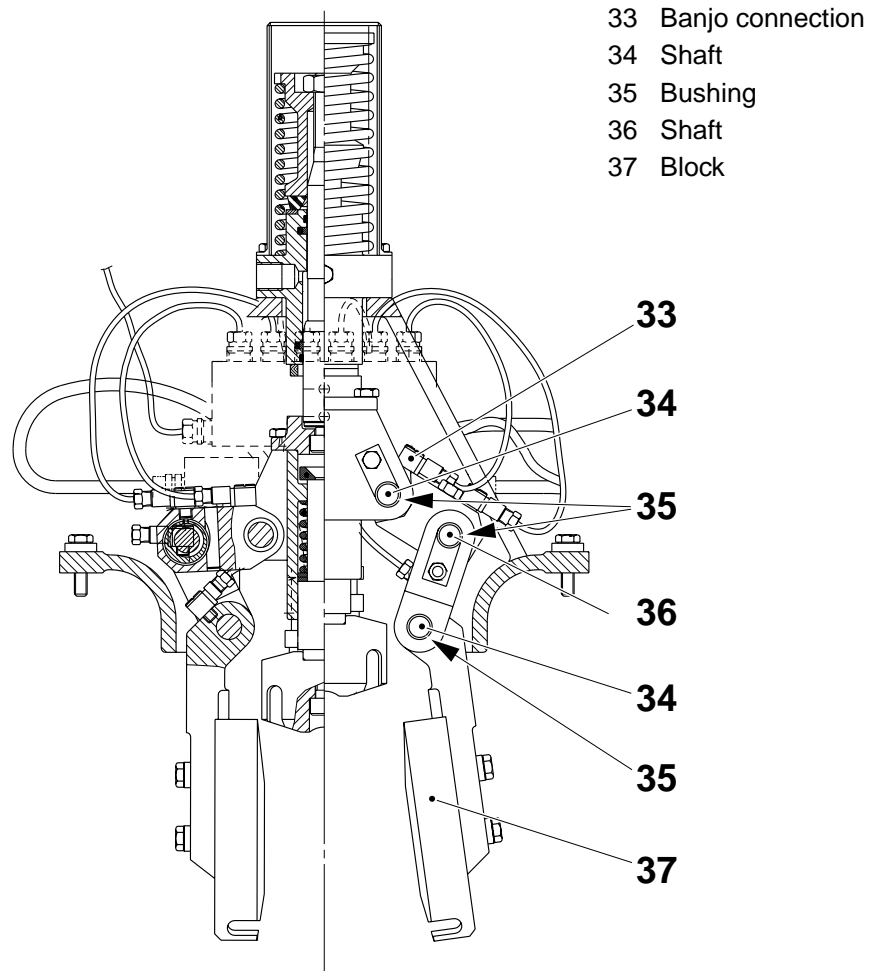
*(Cont'd)*

(Cont'd)

c) Check the following details for wear and/or damages;

- the banjo connections (33)
- the shafts (34) and (36)
- the bushings (35)
- the blocks (37)

Change as required.

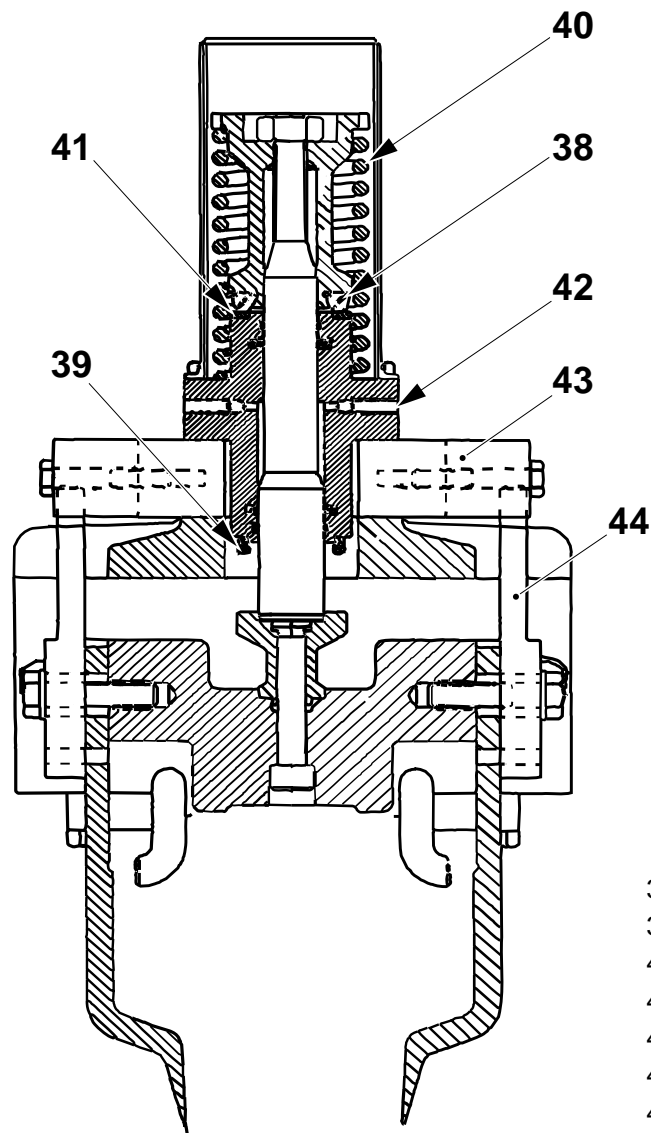


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(Cont'd)

*(Cont'd)***Pull-down device**

- a) Overhaul the hydraulics in the pull-down device, see 5.9-1 *Pull-down device - overhaul hydraulics*. At the same time change;
 - the buffer rings (38) and (39)
 - the compression spring (40)
 - the washer (41)
- b) Change the screw and the ball (42).
- c) Change the guide lug (43) and guide pin (44) if required.



- 38 Buffer ring
- 39 Buffer ring
- 40 Spring
- 41 Washer
- 42 Ball
- 43 Guide lug
- 44 Guide pin

(Cont'd)

(Cont'd)

Setting

- a) Set the air nozzles, see *5.7-1 Element - set air nozzles*.
- b) Set the rails, see *5.9-2 Pull-down device - set rails*.
- c) Set the blocking piece, see *5.9-3 Pull-down device - set blocking piece*.
- d) Set the pull-down arms, see *5.9-4 Pull-down device - set pull-down arms*.

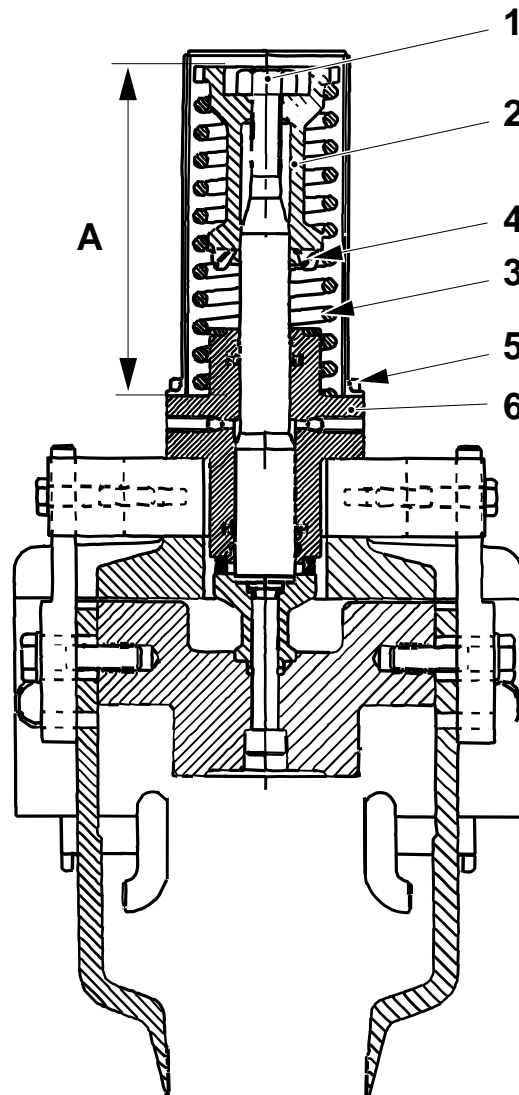
5.9 Pull-down device

SPC reference	256712-050V
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5.9-1 Pull-down device - overhaul hydraulics

Tools - tool	TP No. 90243-146
SPC reference	256712-050V

- Remove the cover. Measure and record distance A.
- Unscrew the hydraulic connection and the nut (1).
- Remove the sleeve (2), spring (3) and the buffer ring (4)
- Unscrew the screws (5) and lift up the cylinder (6).

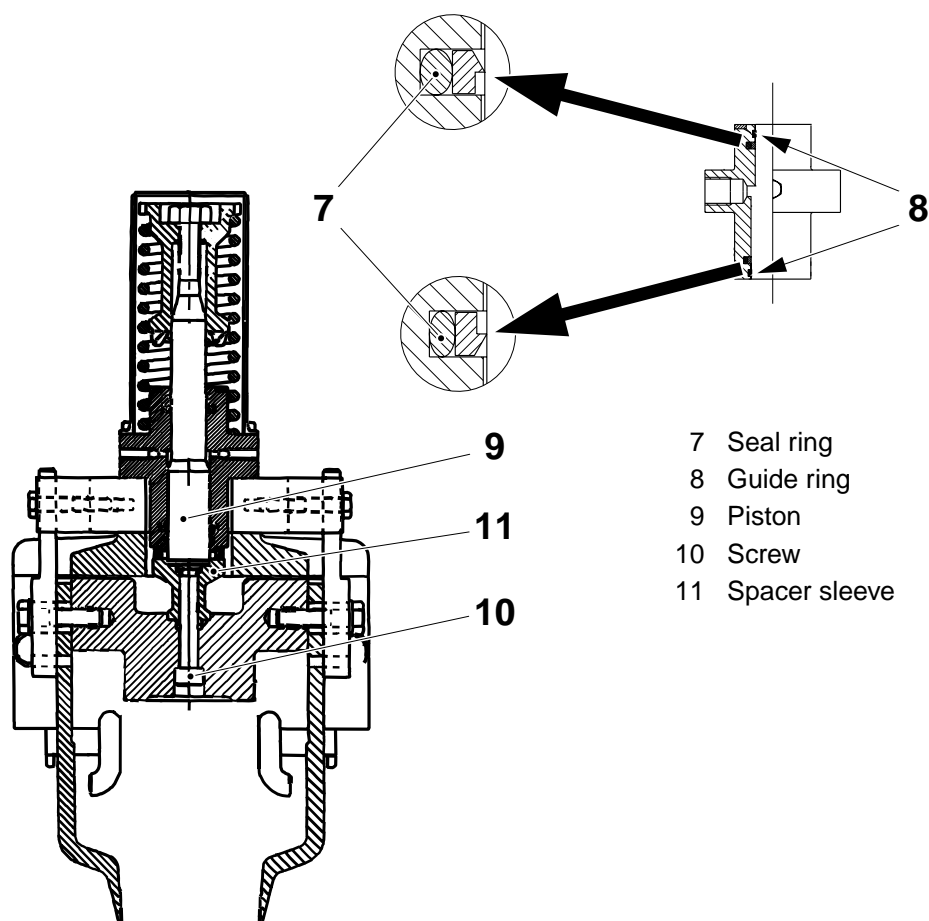


- Nut
- Sleeve
- Spring
- Buffer ring
- Screw
- Cylinder

(Cont'd)

(Cont'd)

- e) Change the seal rings (7) and the guide rings (8) with the aid of the tool. Fit the seal rings as illustrated. Shaping the rings will be easier if they are heated in boiling water.
- f) Check the piston (9) for wear and/or damages. Change as required.
- g) Unscrew the screw (10) to remove the piston. Make sure that the piston is correctly positioned in the slot on the spacer sleeve (11).



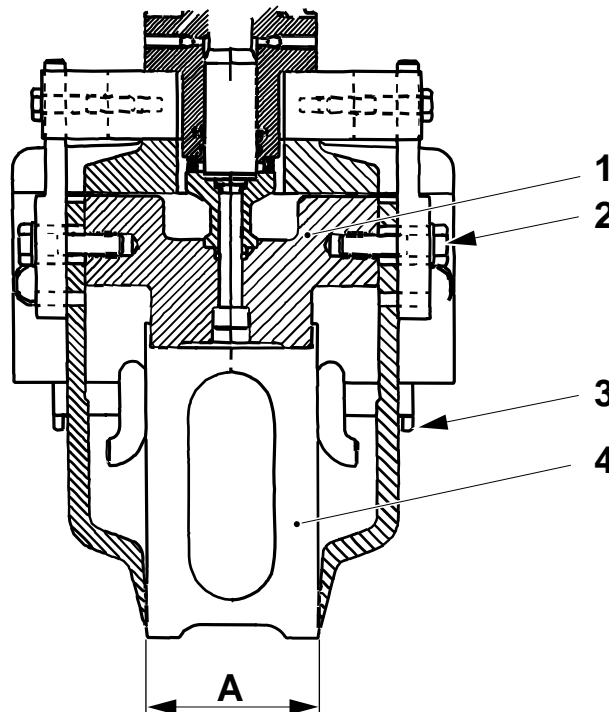
- h) Assemble in the reverse order.
- i) Set distance A recorded above.
- j) Bleed the pull-down device, see 5-3 *Final folder - bleed pressure and pull-down device*.

5.9-2 Pull-down device - set rails

Tools - template	see table below
SPC reference	256712-050V

- a) Raise the pivot frame and loosen the screws (3).
 b) Position the template (4), see table, against the blocking piece (1).

Package	Template, TP No.	A ± 0.2 mm
100 B	76307-11	48
125 S	76307-5	48
160 S	76307-6	48
180 B	76307-4	64
200 B	76307-3	64
200 M	76307-13	54
200 S	76307-6	48
236 B	76307-2	64
250 B	76307-1	64
250 S	76307-9	54
284 B	76307-8	64
300 S	76307-8	64
330 S	76307-12	64

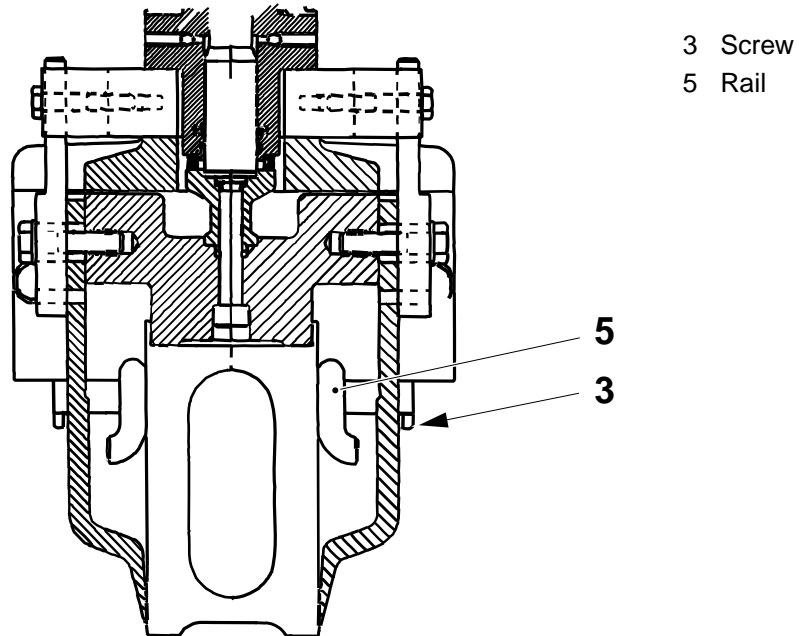


- 1 Blocking piece
- 2 Rail
- 3 Screw
- 4 Template

(Cont'd)

(Cont'd)

- c) Set the rails (5) so that they touch the template lightly. Move the template forward and backward on the blocking piece and make sure that the rails are parallel with the blocking piece. Tighten the screws (3).



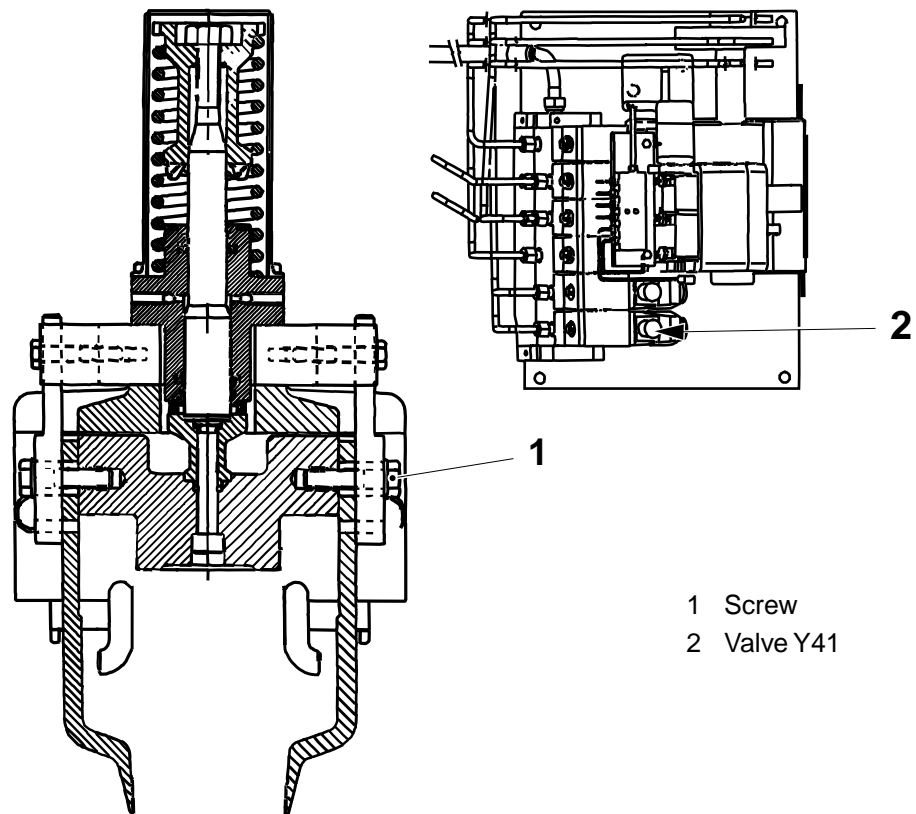
- d) Remove the template and lower the pivot frame.
e) If required, tighten the screws to the pull-down arms.
f) Set the pull-down arms vertical position, see 5.9-4 *Pull-down device - set pull-down arms*.

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5.9-3 Pull-down device - set blocking piece

Machine status	Water On Power On
Tools - locking clamp - template	<i>TP No. 76167</i> see table below
SPC reference	256712-050V

- a) Crank until the station chain stops indexing.
- b) Loosen the screws (1) and move up the pull-down arms as far as possible.
- c) Raise the pivot frame.
- d) Set the service switch in position **On**.
- e) Actuate hydraulic valve **Y41** (2) for the pull-down device with the aid of the locking clamp.



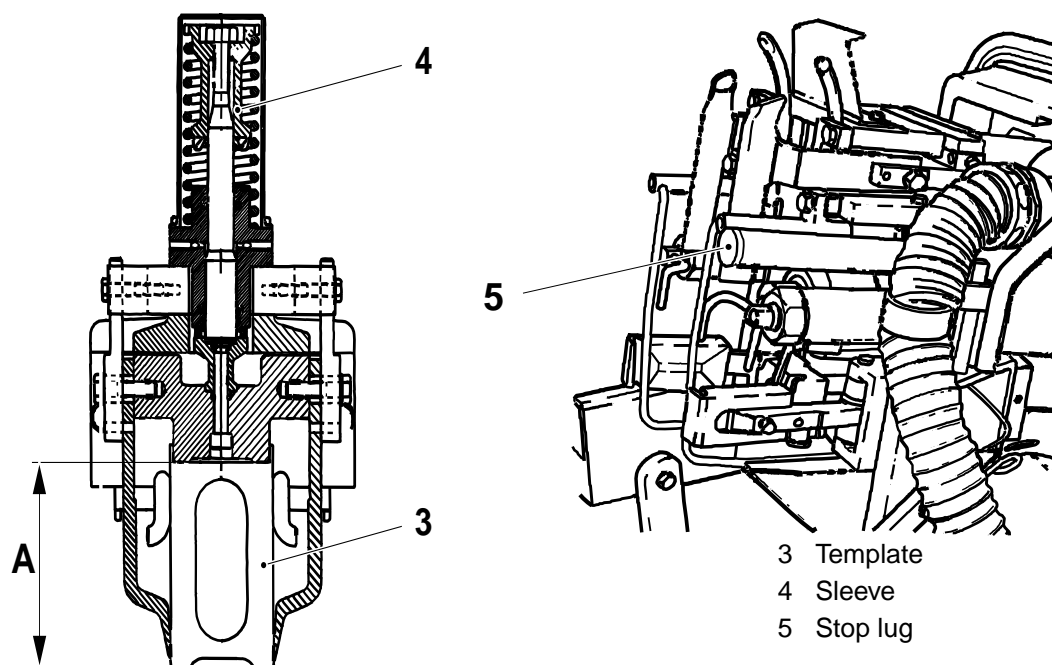
(Cont'd)

(Cont'd)

- f) Place the template (3), see table, in the station chain centered underneath the blocking piece.

Package	Template TP No.	A ± 0.2 mm
100 B	76307-11	69.8
125 S	76307-5	86.5
160 S	76307-6	95.0
180 B	76307-4	76.0
200 B	76307-3	83.5
200 M	76307-13	106.5
200 S	76307-6	119.8
236 B	76307-2	100.2
250 B	76307-1	106.8
250 S	76307-9	131.5
284 B	76307-8	120.2
300 B	76307-8	120.2
330 S	76307-12	136.8

- g) Carefully tilt back the pivot frame.
 h) Loosen the nut and turn the sleeve (4) until there is a play, 0.05 mm, under the stop lug (5).



- i) Tighten the nut and remove the template.
 j) Set the pull-down arms vertical position, see 5.9-4 Pull-down device - set pull-down arms.

5.9-4 Pull-down device - set pull-down arms

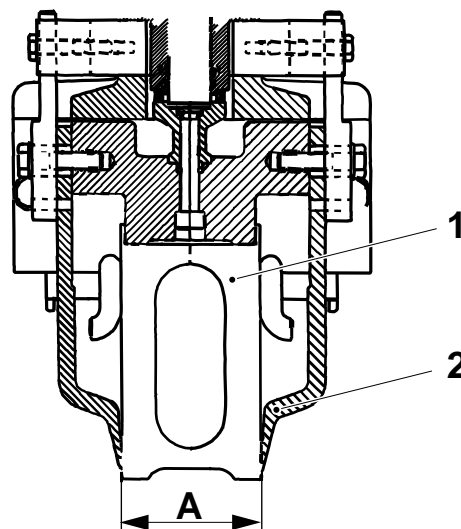
Sideways

Machine status	Power On
Tool - template	see table below
SPC reference	256712-050V

- a) Crank until the station chain stops indexing.
- b) Raise the pivot frame and place template (1), see table, in the station chain centered underneath the blocking piece.

Package	Template, TP No.	A ± 0.2 mm
100 B	76307-11	48
125 S	76307-5	48
160 S	76307-6	48
180 B	76307-4	64
200 B	76307-3	64
200 M	76307-13	54
200 S	76307-6	48
236 B	76307-2	64
250 B	76307-1	64
250 S	76307-9	54
284 B	76307-8	64
300 S	76307-8	64
330 S	76307-12	64

- c) Carefully tilt back the pivot frame.
- d) Set the pull-down arms (2) so that they lightly touch the template. To set, remove the arms and bend them.
- e) Remove the template and set the pull-down arms vertical position, see below.



- 1 Template
- 2 Pull-down arms

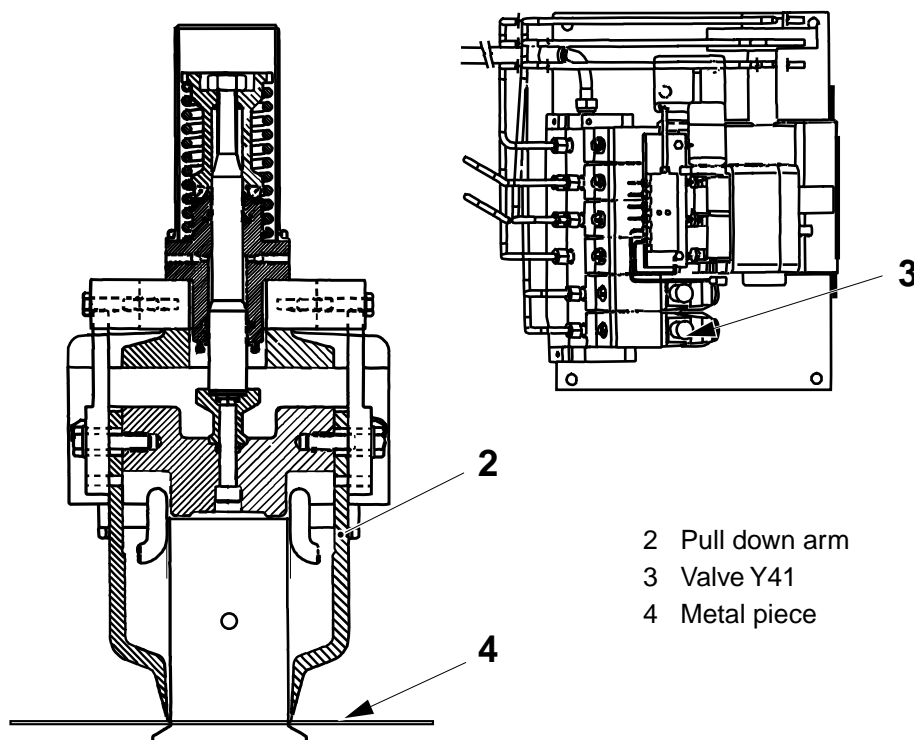
(Cont'd)

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Vertically

Machine status	Power On Water On Service switch On
Tools - locking clamp - metal piece	TP No 76167 1.25 mm thickness
SPC reference	256712-050V

- Actuate hydraulic valve **Y41** (3) with the aid of the locking clamp.
- Put a piece of metal (4), thickness 1.25 mm, in the station at the front edge of the pull-down arms.
- Loosen the screws and shift the pull-down arms (2) so that they lightly touch the piece of metal.
- Remove the piece of metal and the locking clamp. Set the service switch to position **Off**. Turn **Off** cooling water and switch **Off** power.



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5.10 Guide

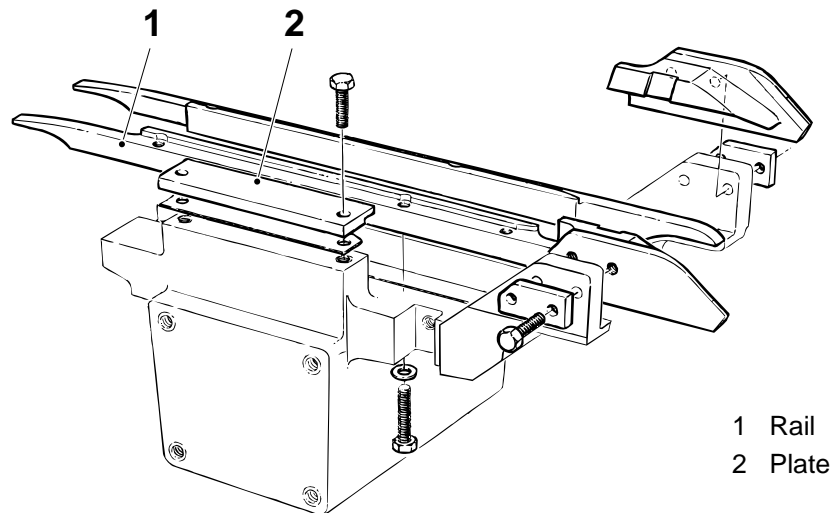
SPC reference	491259-020V
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5.10-1 Guide - check rails and plates

SPC reference	491259-020V
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Check the plates (2) and the rails (1) for wear and/or damages.

Change as required.

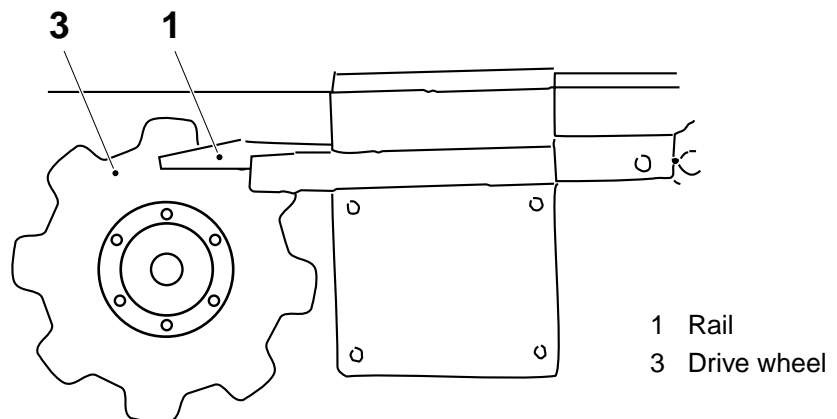


1 Rail
2 Plate

Change rails

Tools	
- torque wrench	min 145 Nm
- protection plate	TP No. 79003
SPC reference	491259-020V

- Unscrew the screws and remove the rails (1).
- Remove the drive wheel (3).



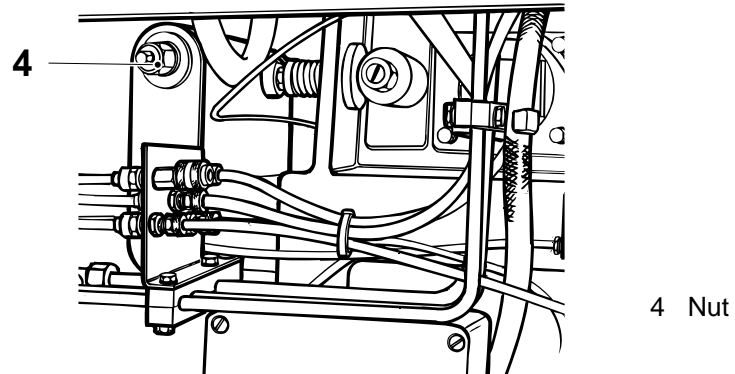
1 Rail
3 Drive wheel

(Cont'd)

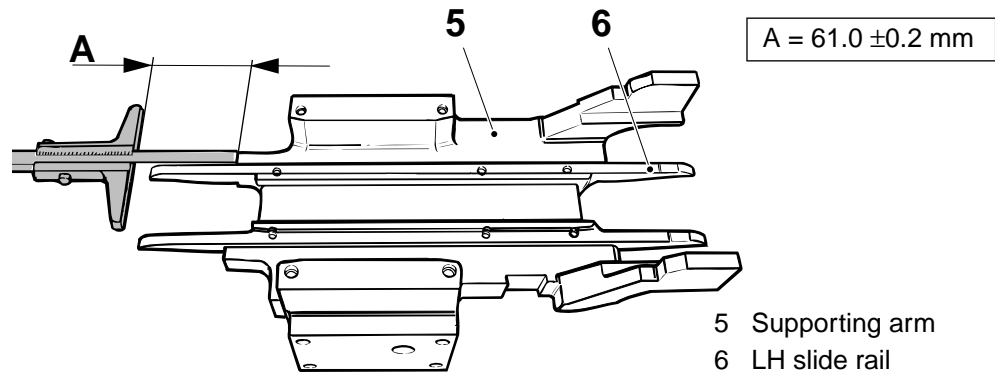
(Cont'd)

- c) Unscrew the nut (4) and remove the tension sprocket.

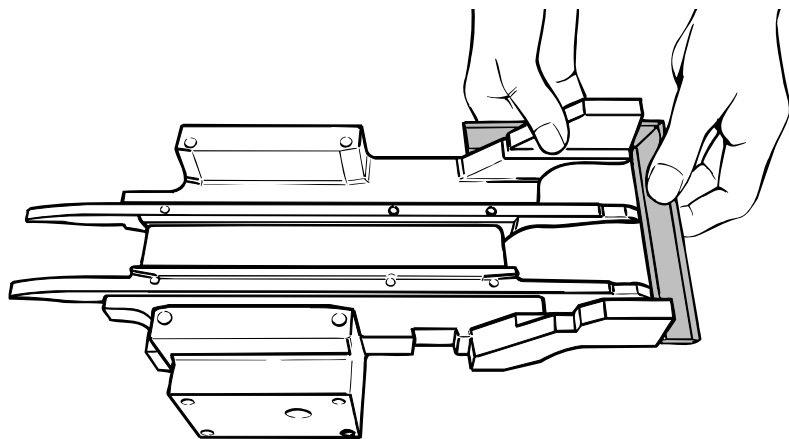
Note! Do not lose the shims.



- d) Fit the new LH slide rail (6) on the supporting arm (5) and set distance A.



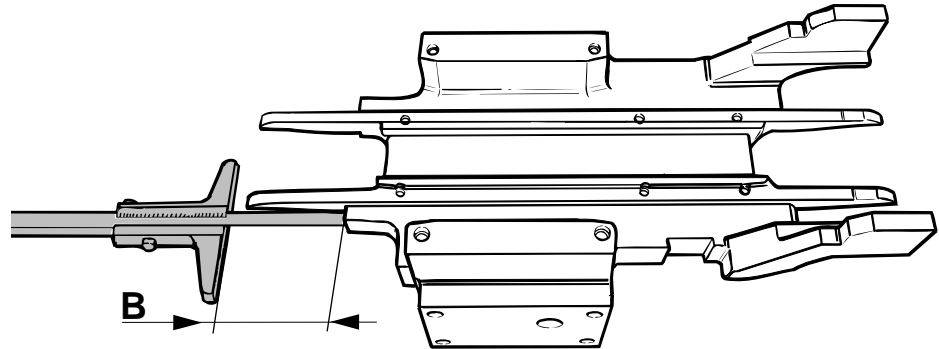
- e) Very accurately fit the new RH slide rail parallel with the LH slide rail with the aid of a set square.



(Cont'd)

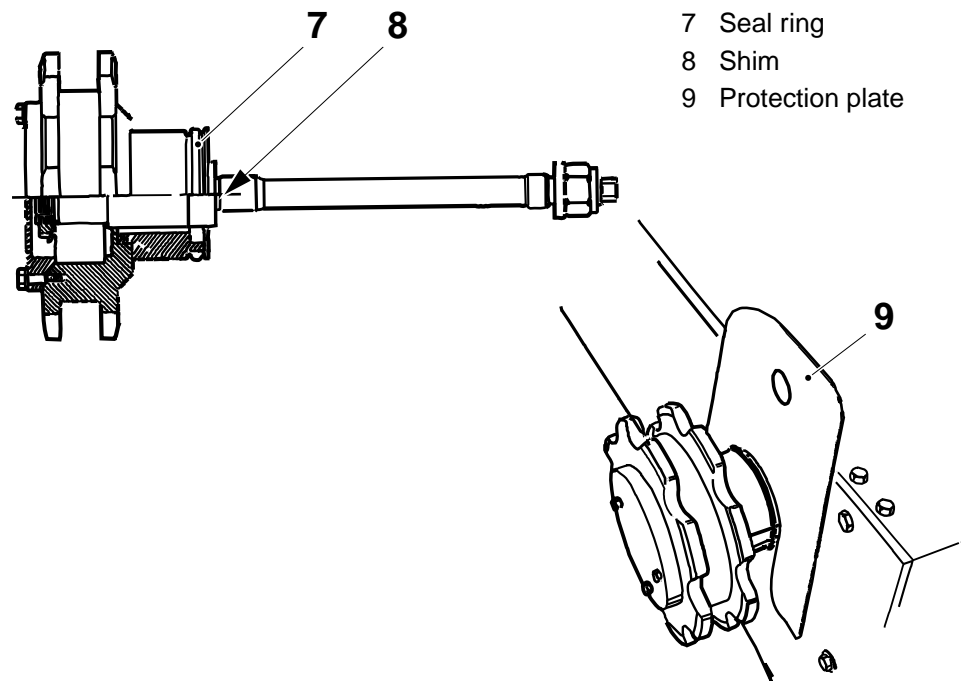
(Cont'd)

- f) Measure distance B between the RH slide rail and the supporting arm very accurately. Record the result.
- g) Remove the RH slide rail.



- h) Fit the drive wheel.
- i) Fit the shims (8) on the tension sprocket and fit the tension sprocket assembly on the final folder.

Note! Take care not to damage the seal ring (7). Use the protection plate (9) during fitting.

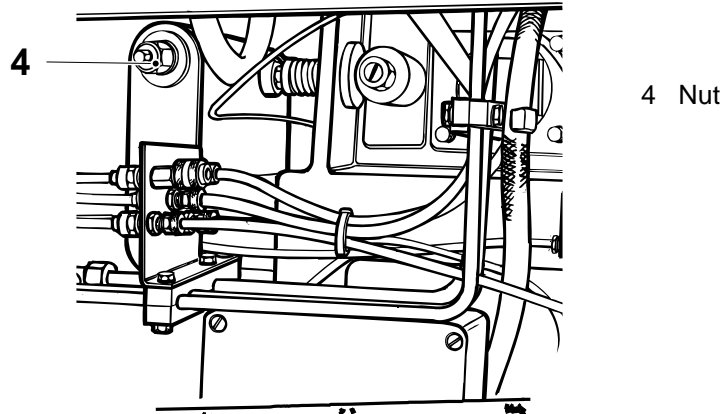


- 7 Seal ring
- 8 Shim
- 9 Protection plate

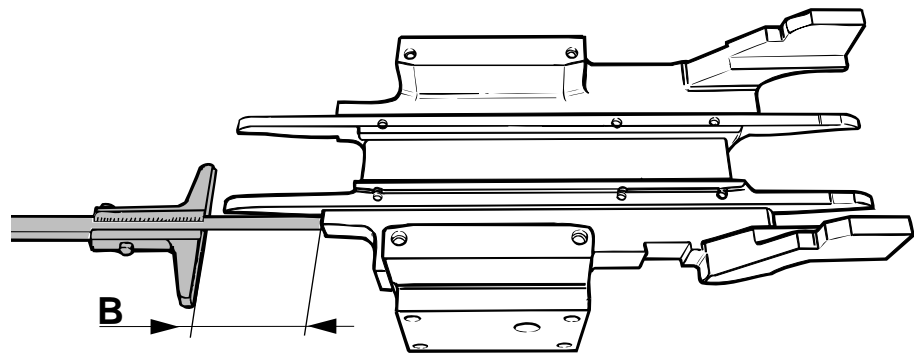
(Cont'd)

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- j) Torque the nut (4) to 140 ± 5 Nm.



- k) Fit the RH slide rail.
l) Set distance B between the slide rail and the supporting arm very accurately. Use the measure recorded above.



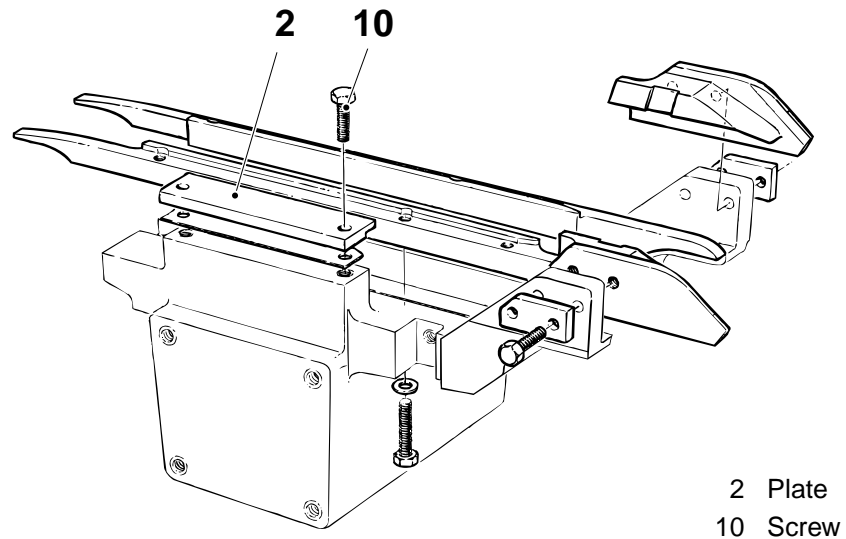
(Cont'd)

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Change plates

SPC reference	491259-020V
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- a) Unscrew the screws (10) and remove the plates (2) and the shims.
- b) Change the plates.
- c) Fit the shims (basic setting is two on each side) and the plates (with the bevelling direction inwards and downwards).



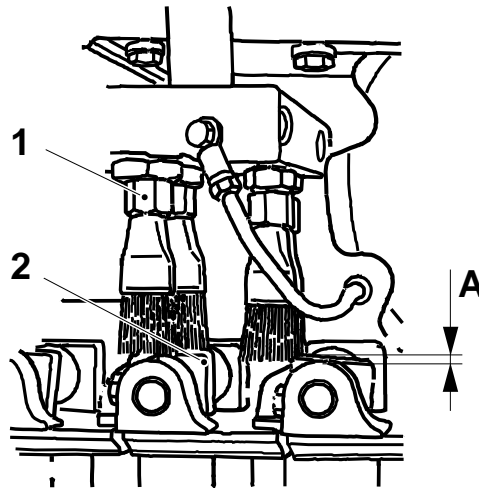
5.11 Cantilever

SPC reference	272765-80V
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5.11-1 Cantilever - change oil brushes

SPC reference	272765-80V
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- a) Change the oil brushes.
- b) Set the brushes so that they touch the sliders (2) lightly, distance A below the sliders, by means of the nut (1).



A = 2 - 3 mm

- 1 Nut
- 2 Slider

5.12 Discharger

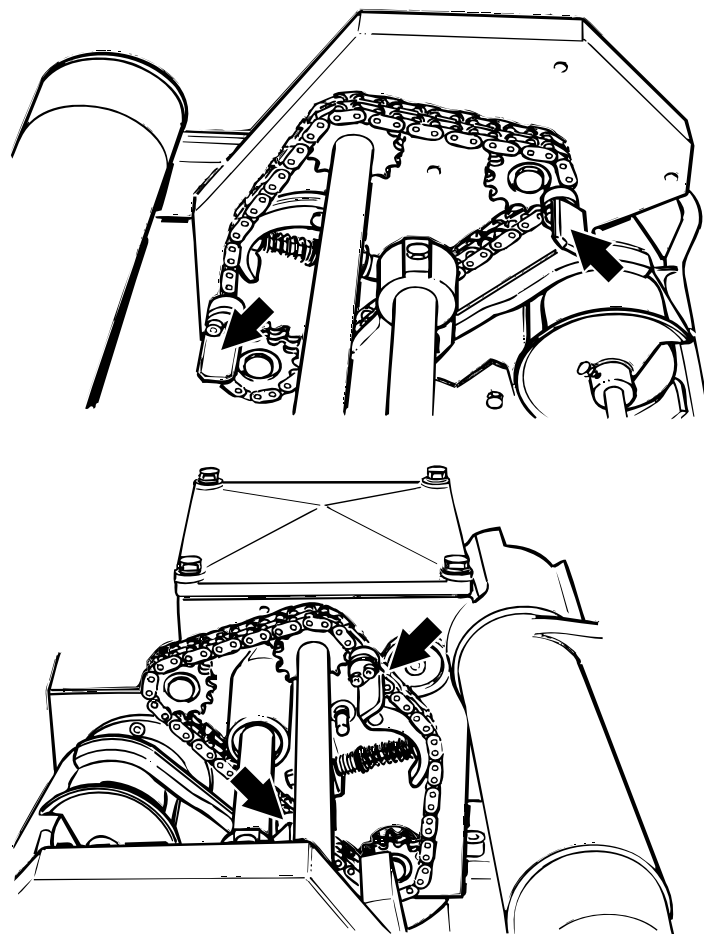
SPC reference	578703-010V
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5.12-1 Discharger - check carriers

SPC reference	578703-010V
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Check the carriers. Make sure that the carriers are straight and that the vulcanization is intact.

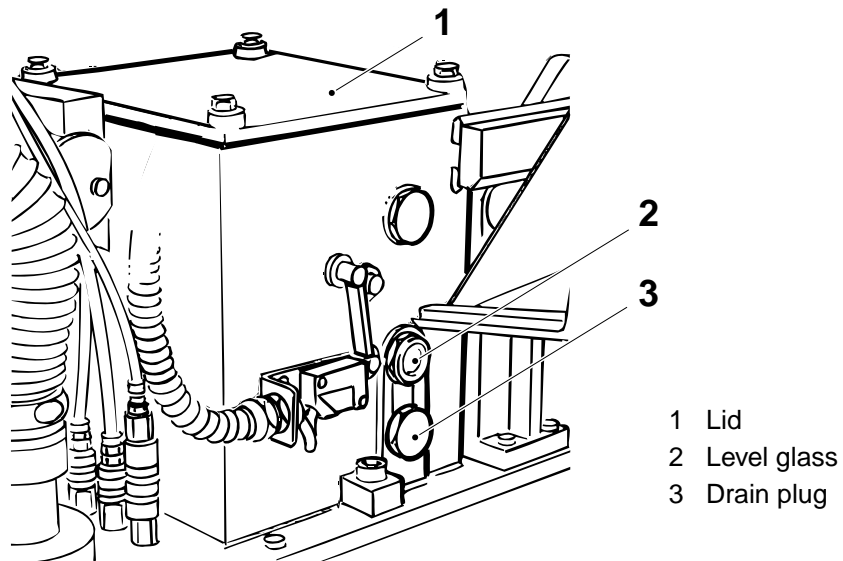
Change the carriers as required, follow the procedure in *5.12-3 Discharger - change duplex chains*.



5.12-2 Discharger - change oil

Consumables - oil	code H
SPC reference	578703-010V

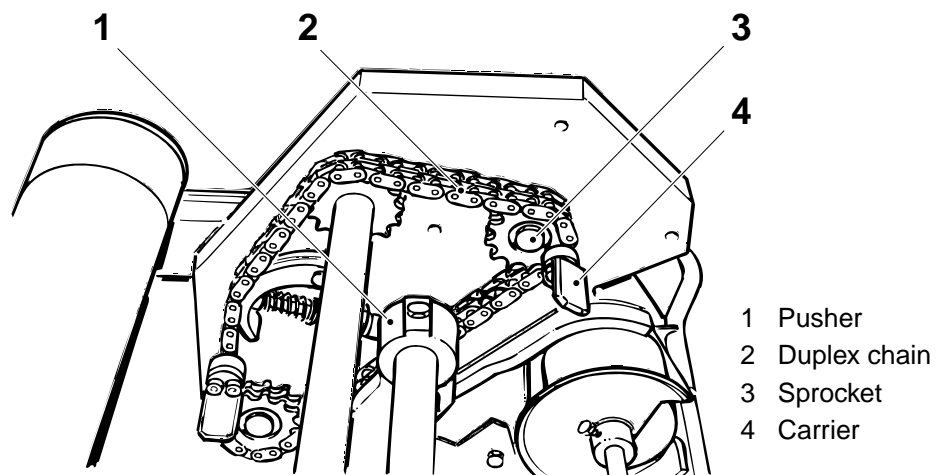
- a) Remove the lid (1). Unscrew the drain plug (3) and drain the oil.
- b) When the oil has been drained, fit the drain plug and top up with oil to the correct level in the level glass (2). Oil code H, see *10.2 Lubricants*.
- c) Fit the lid.



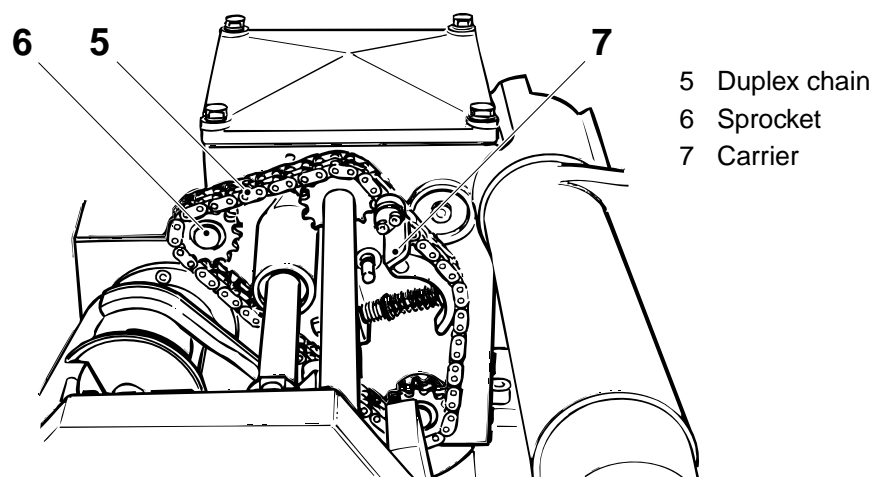
5.12-3 Discharger - change duplex chains

Machine status	Power On
SPC reference	578703-010V

- a) Crank until the pusher (1) is in its outer position.
- b) Remove the sprocket (3) and lift the duplex chain (2) off the sprockets.
- c) Remove the chain locks from the back of the carriers (4) and remove the carriers. Change the duplex chain.
- d) Fit back the carriers and the chain locks. Put back the duplex chain on the sprockets.



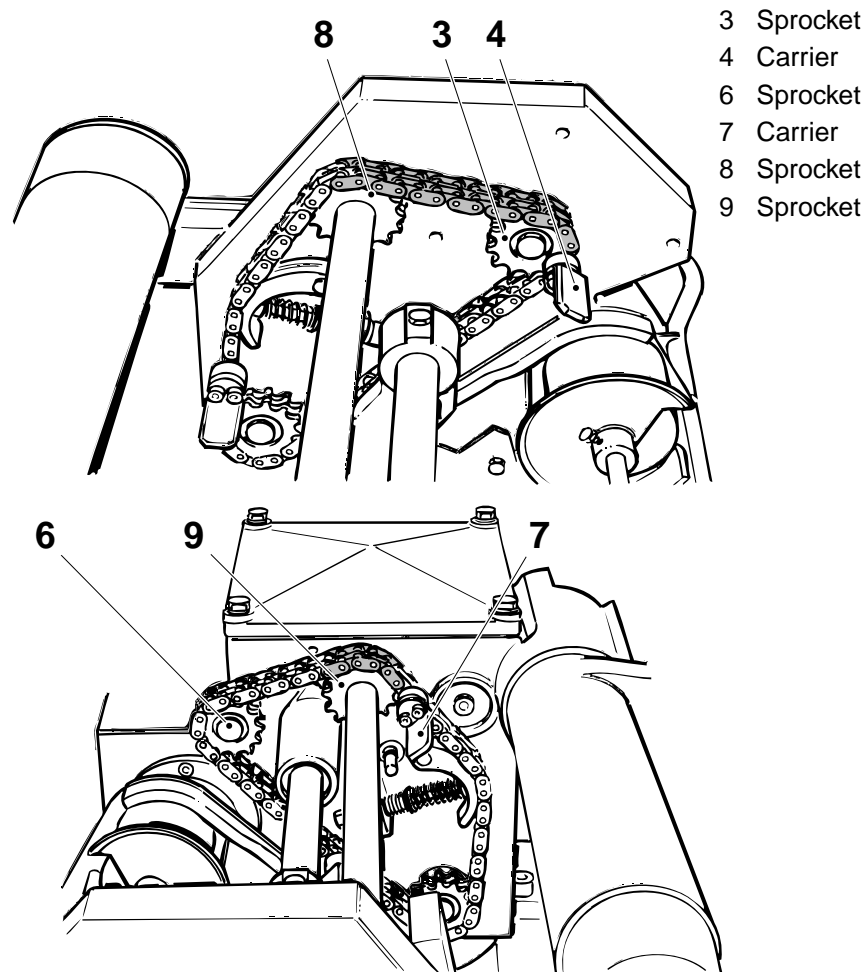
- e) Remove the sprocket (6) and lift the duplex chain (5) off the sprockets.
- f) Remove the chain locks from the back of the carriers (7) and remove the carriers. Change the duplex chain.
- g) Fit back the carriers and the chain locks. Put back the duplex chain on the sprockets.



(Cont'd)

(Cont'd)

- h) Set the position of the chains;
- The **RH** duplex chain is in correct position when there are **6 - 7** chain links (for **330 S** 6 chain links) from the top of the sprocket (8) to the carrier (4).
Skip teeth on the sprocket to get the correct position.
 - The **LH** duplex chain is in correct position when there are **2 - 3** chain links (for **330 S** 3 chain links) from the top of the sprocket (9) to the carrier (7).
Skip teeth on the sprocket to get the correct position.
- i) Fit the sprockets (3) and (6).

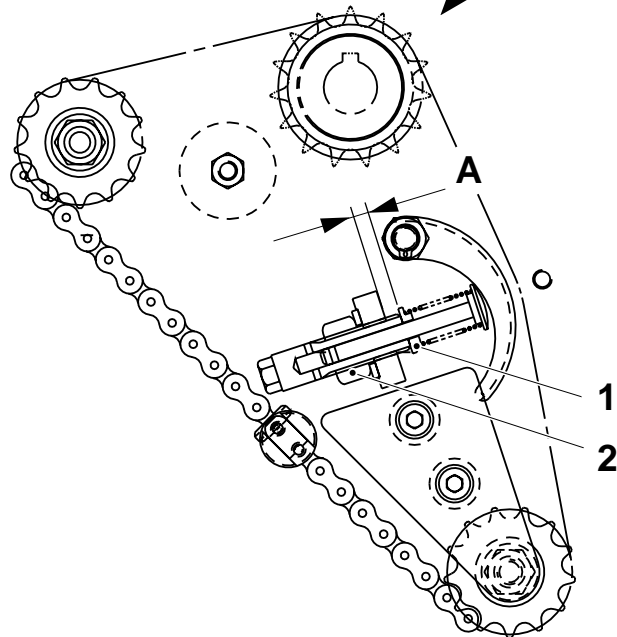
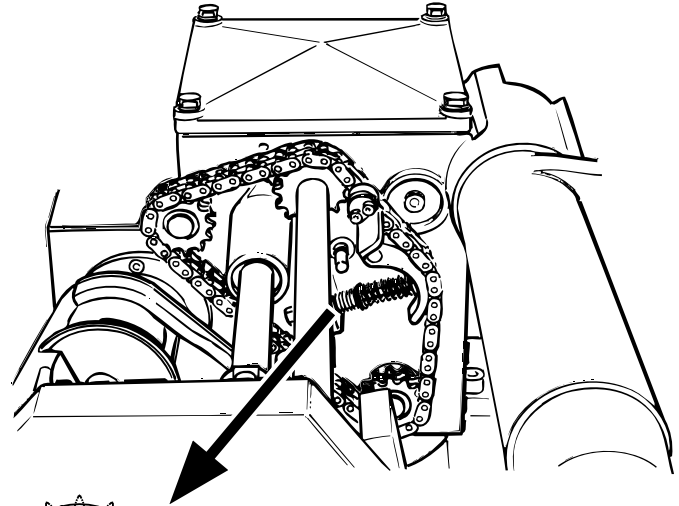


2.2E0794E.12.en

5.12-4 Discharger - set slider

SPC reference 578703-010V

Adjust on the nut (2) so that there is distance A between the washer (1) and the flange.



- 1 Washer
- 2 Nut

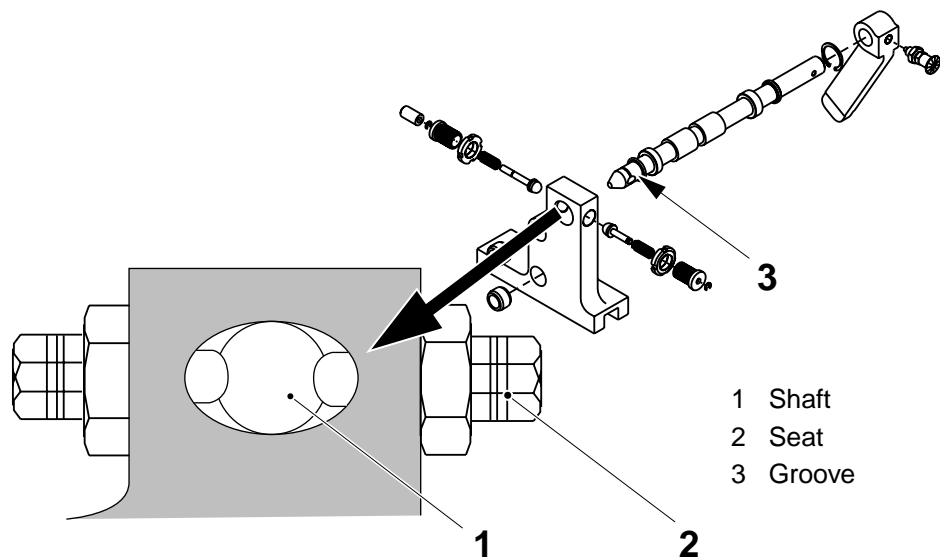
A = 4 - 6 mm

2.2B0794E12.en

5.12-5 Discharger - set overload protection

Machine status	Power On Air On
SPC reference	578703-010V

- Remove the discharger lid. Make sure that the groove (3) on the shaft (1) is in the correct position.
- Tighten the seats (2) until they slightly touch the shaft (1).
- Check if the shaft (1) is centered.
- Tighten the seats (2) **one more turn**.
- Fit back the cover of the discharge unit.

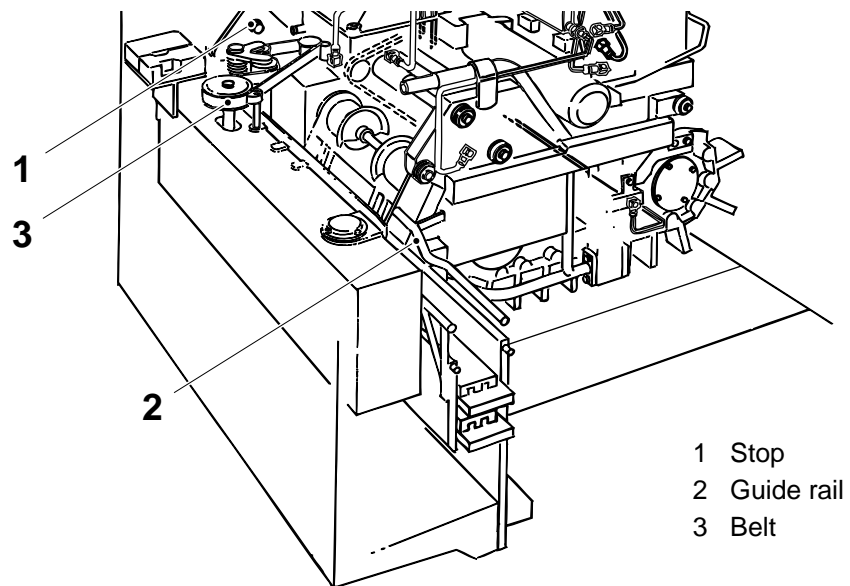


5.12-6 Discharger - change bearings and bushings

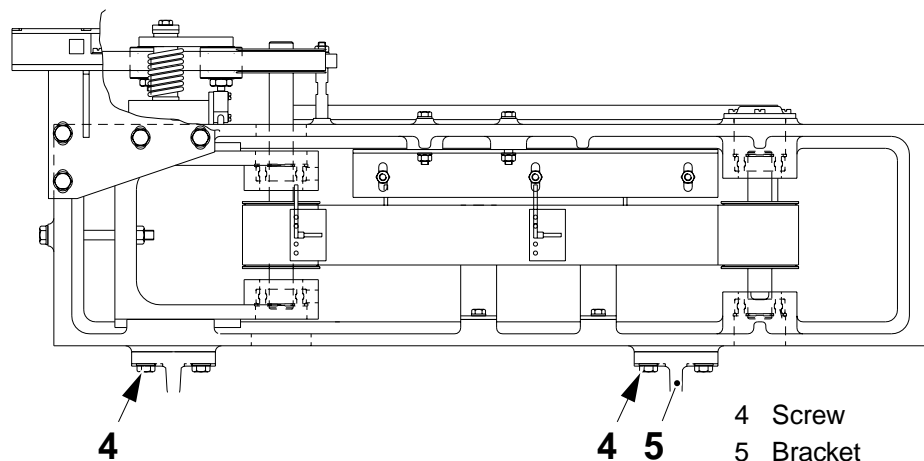
Consumable	
- locking fluid	TP No. 90157-16
- oil	code H
- silicon	TP No. 90157-22
SPC reference	578703-010V

Removal

- Unscrew the stop (1) and remove the final folder cover, the RH and LH side plates, the front plate and the guide rail (2).
- Turn the eccentric and lift the belt (3) off the toothed pulley.



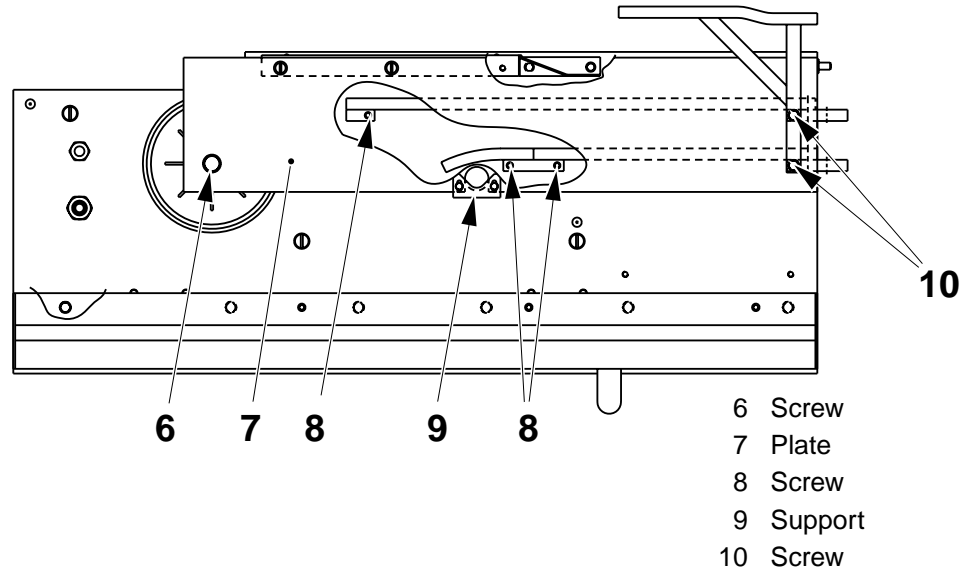
- Unscrew the screws (4) and remove the side feeder. Remove the bracket (5).



(Cont'd)

(Cont'd)

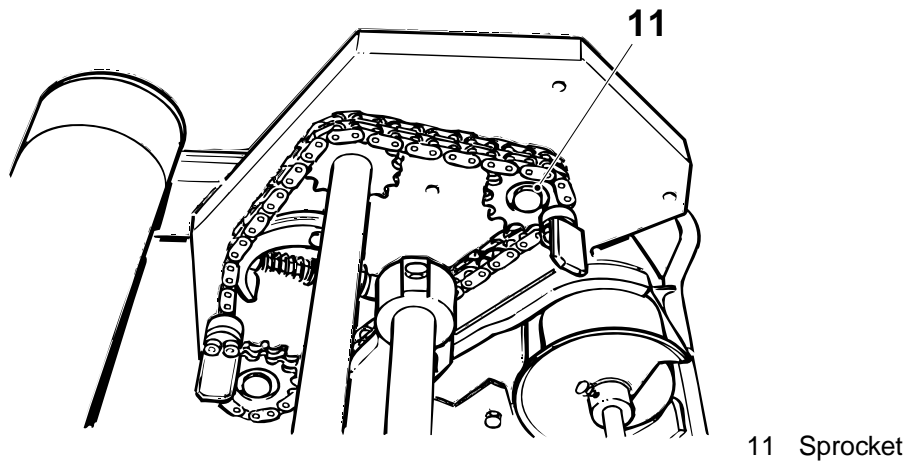
- d) Remove the support (9) to the cleaning pipe.
- e) Unscrew the screws (10) and remove the rail. Unscrew the screws (8) and remove the conveyor. Loosen the screw (6) and turn the plate (7) to upright position. Tighten the screw.



- f) Remove the sprocket (11) and lift off the chain.

Note! Do not lose any of the banjo connection parts.

- g) Disconnect the banjo connections from the covering panel.

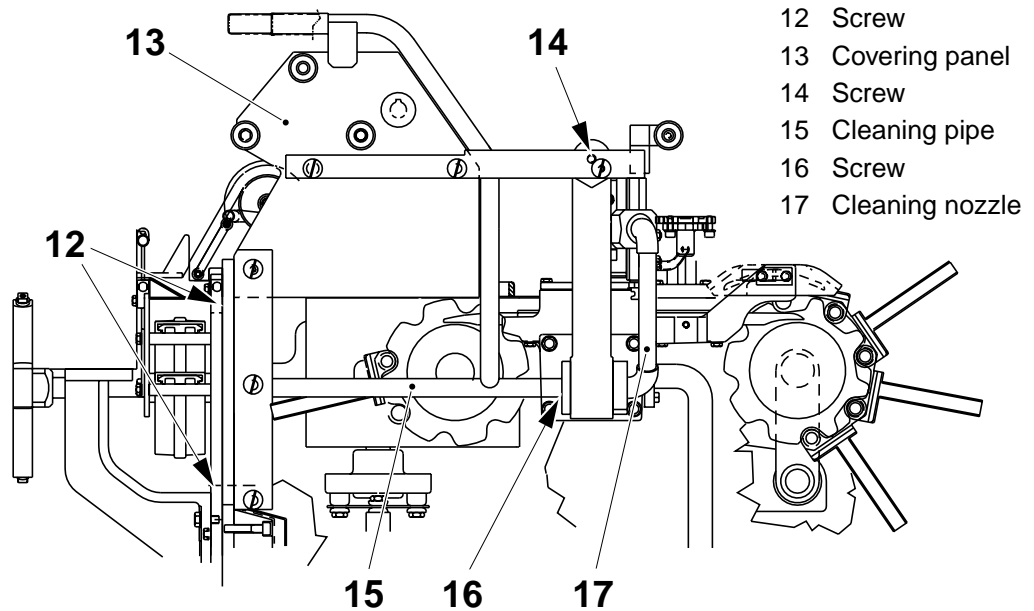


(Cont'd)

2.2E0794E12.en

(Cont'd)

- h) Unscrew the screws (12). Tap out the pins.
 Unscrew the screws (14) and (16), remove the cleaning nozzle (17).
 Move the cleaning pipe (15) aside and remove the covering panel (13).

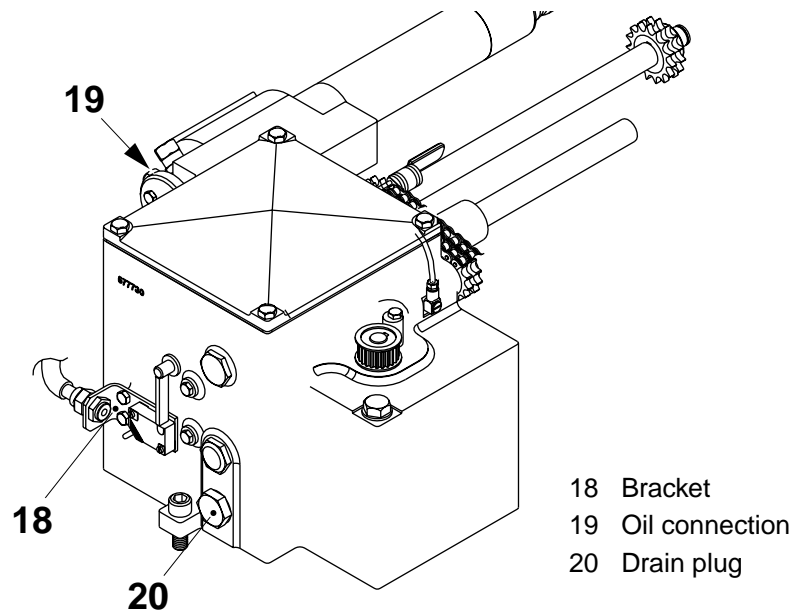


- i) Remove the pivot frame assembly. Follow the procedure in 5.8-1 Frame - change pivot frame assembly.

(Cont'd)

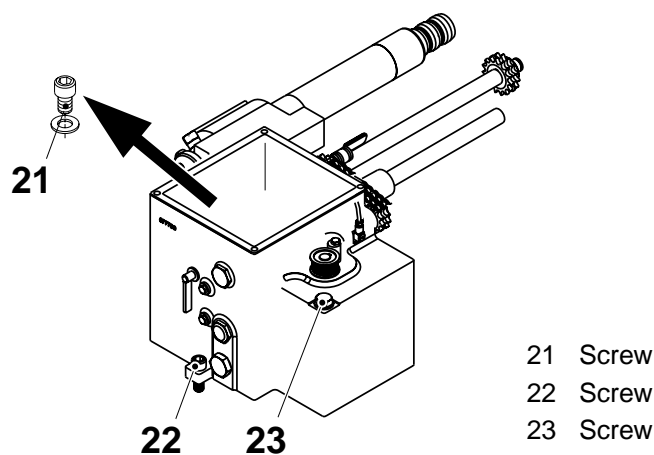
(Cont'd)

- j) From the discharger, disconnect:
- the inductive switch bracket (18)
 - the hydraulic oil connections (19)
 - the banjo connections
 - the air connection
- k) Remove the lid. Unscrew the drain plug (20) and drain the oil. Fit back the drain plug.
- l) Carefully mark the position of the discharger on the cover plate.



Note! The screw (21) is alternative design.

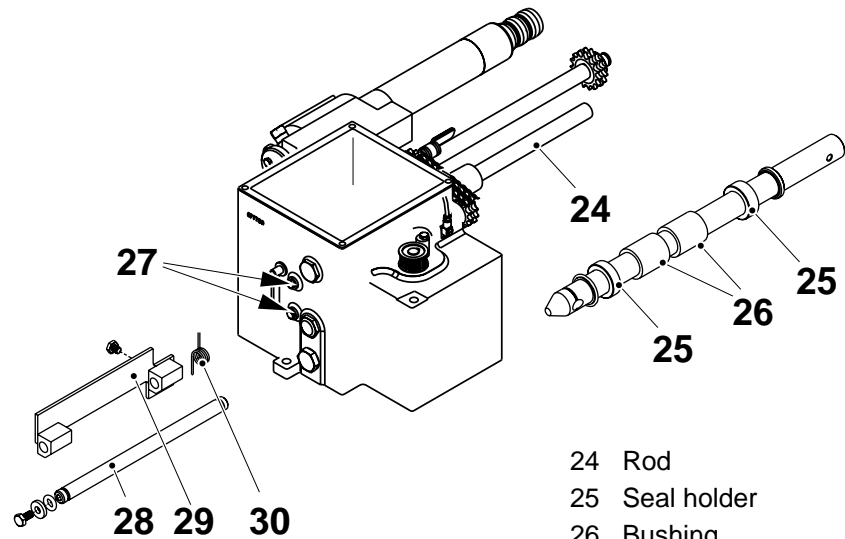
- m) Unscrew the screws (21), (22) and (23) and lift out the discharge unit.



(Cont'd)

*(Cont'd)***Dismantling**

- a) Pull out the rod (24) and change the bushings (26) and the seal holders (25).
- b) Unscrew the screws (27) pull out the shafts (28) and remove the arm (29). Change the spring (30).

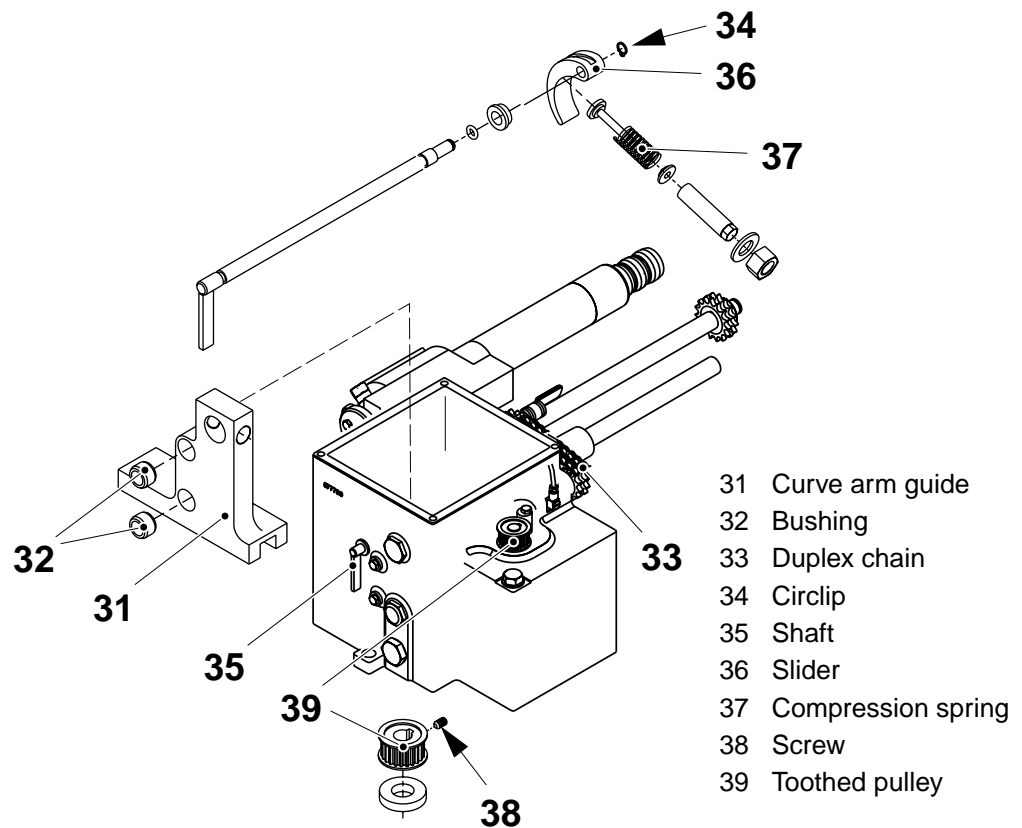


- 24 Rod
- 25 Seal holder
- 26 Bushing
- 27 Screw
- 28 Shaft
- 29 Arm
- 30 Spring

(Cont'd)

(Cont'd)

- c) Remove the curve arm guide (31) and change the bushings (32).
- d) Remove the sprocket and lift off the duplex chain (33).
- e) Remove the circlip (34) and pull out the shaft (35). Change the slider (36) and the compression spring (37).
- f) Unscrew the screw (38) and remove the toothed pulley (39).

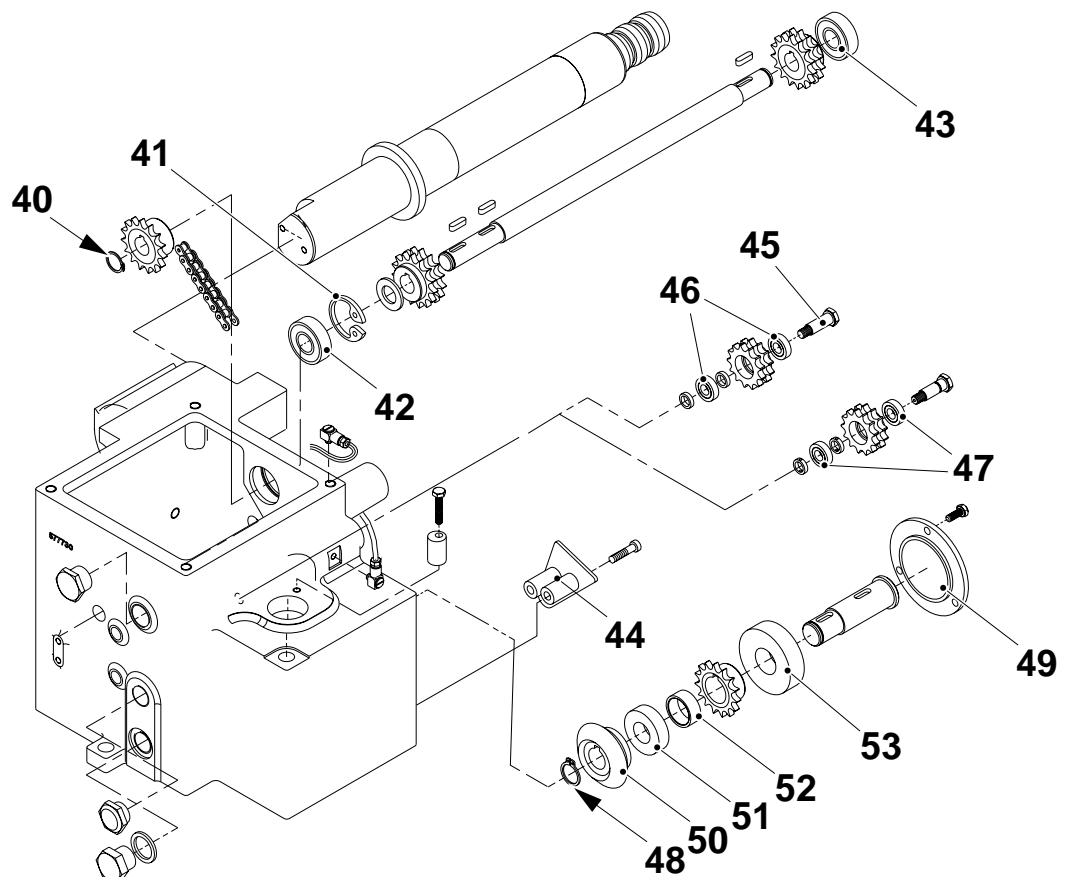


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(Cont'd)

(Cont'd)

- g) Remove the lock ring (40) and the gear wheel. Lift off the chain.
- h) Remove the circlip (41) and pull out the shaft and change the ball bearing (42). Change the ball bearing (43).
- i) Remove the guard plate (44). Unscrew the screw (45), remove the sprocket and change the ball bearings (46). Change the ball bearings (47).
- j) Remove the circlip (48), the oil seal (49) and the gear wheel (50). Pull out the shaft and change the ball bearings (51) and (52), and the spacer (53).



40	Lock ring	47	Ball bearing
41	Circlip	48	Circlip
42	Ball bearing	49	Oil seal
43	Ball bearing	50	Ball bearing
44	Guard plate	51	Ball bearing
45	Screw	52	Ball bearing
46	Ball bearing	53	Spacer

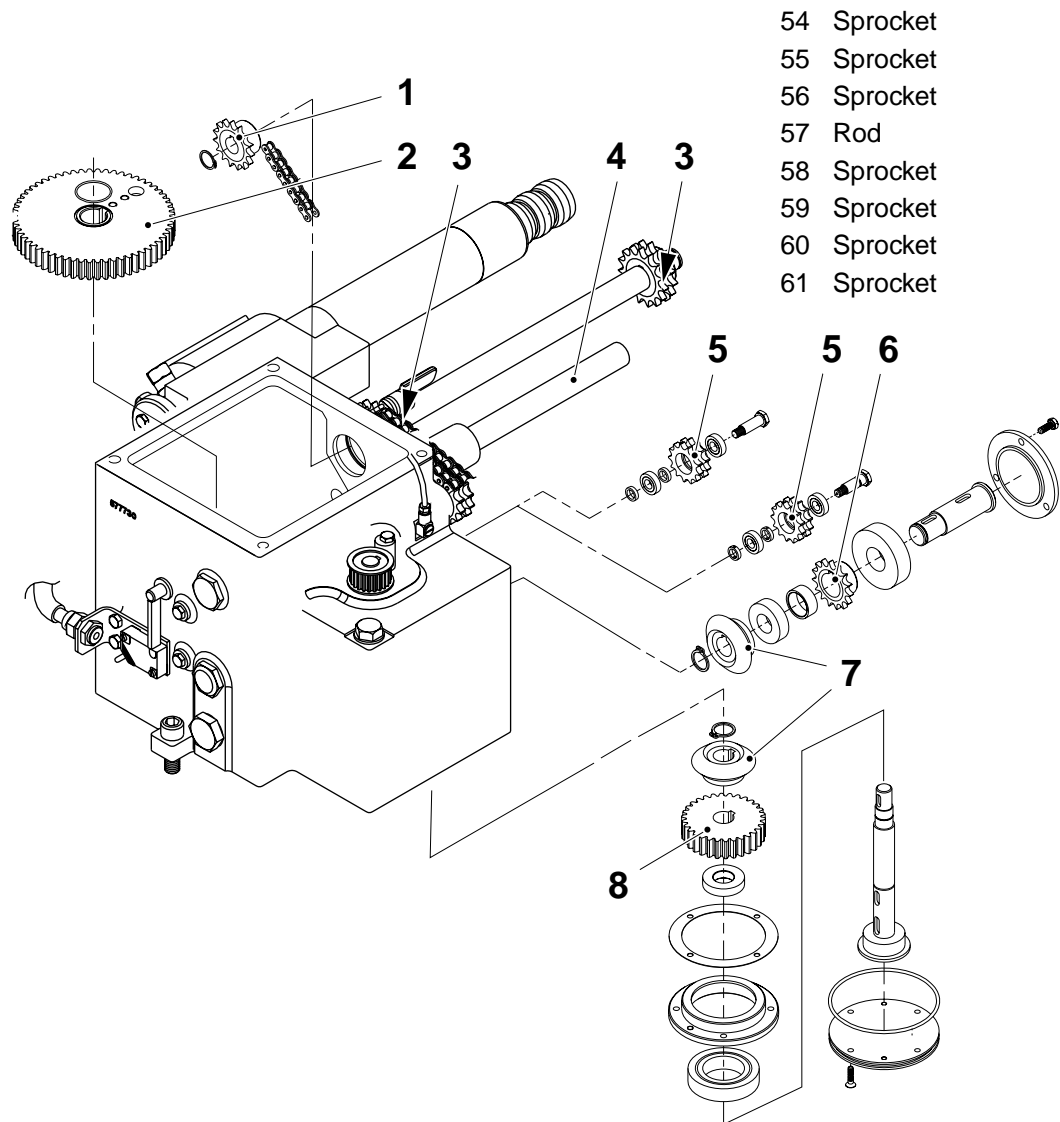
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(Cont'd)

k) Check also the following details for wear and/or damage.

- the sprocket (54), (55) and (56)
- the pusher rod (57)
- the sprocket (58), (59), (60) and (61)

l) Change as required.



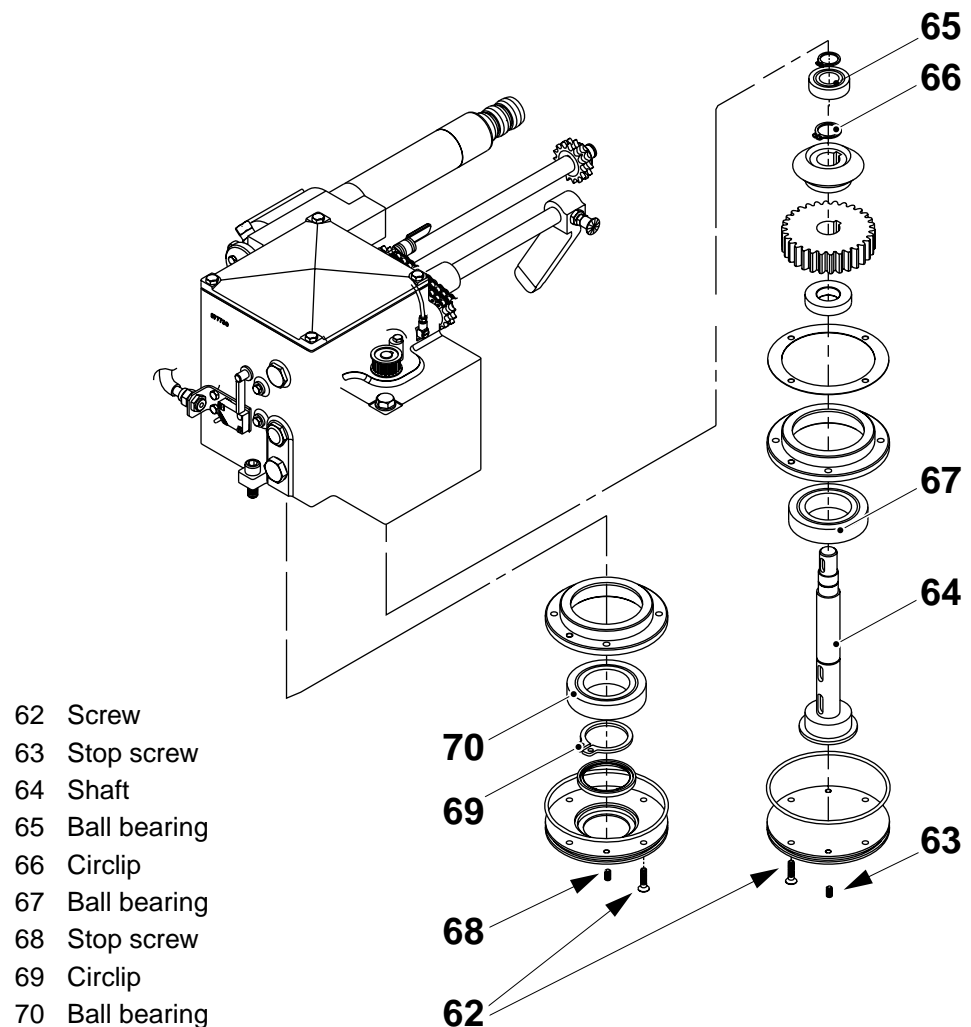
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(Cont'd)

(Cont'd)

- m) Turn the discharger over and remove the screws (62).
- n) Extract the lid by means of the stop screws (63).
- o) Pull out the shaft (64) assembly.
- p) Remove the circlip and change the ball bearing (65).
- q) Remove the circlip (66) and the flat wedges, and change the ball bearing (67).
- r) Extract the lid by means of the stop screws (68).
- s) Remove the circlip (69) and change the ball bearing (70).
- t) Assemble the discharger in the reverse order.

Note! Apply some locking fluid on the screws (62) before fitting them.

*(Cont'd)*

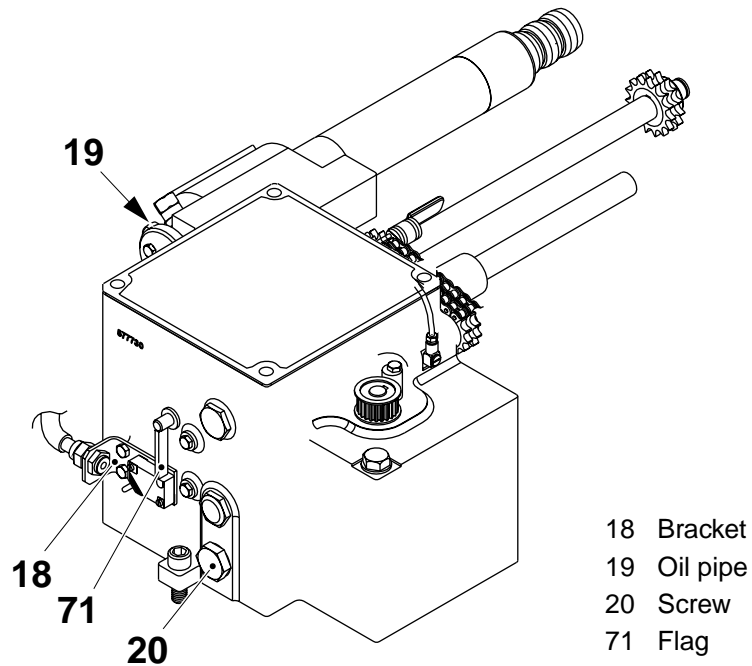
(Cont'd)

Fitting

a) Fit the discharger according to the marks made before.

Note! Fit the screws (20), but do not tighten them yet.

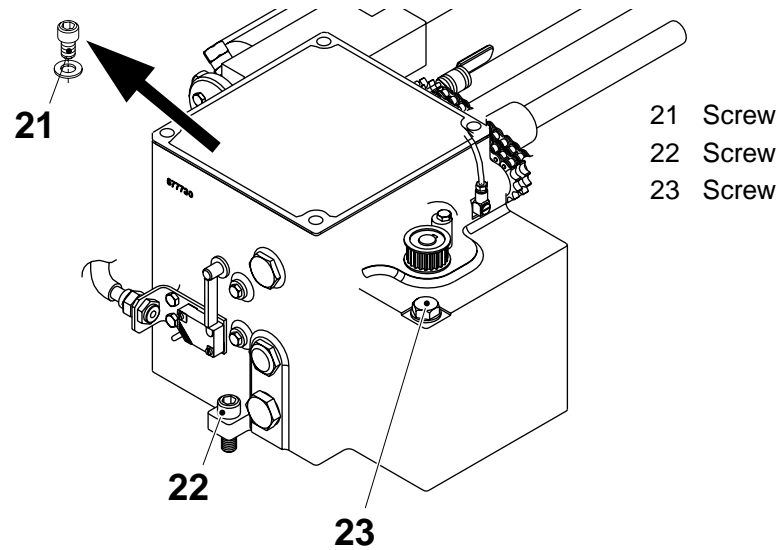
- b) Fit the bracket (18) on the discharger and connect the cable in the connection box.
- c) Connect the hydraulic oil pipes (19), the air hose and the lubrication hoses to the discharger.
- d) Make sure that the flag (71) on the shaft is positioned over the mark on the inductive switch when the overload protection is **not** activated.
- e) Fit the pivot frame assembly following the procedure in *5.8-1 Frame - change pivot frame assembly*.
- f) Make sure that the pivot frame assembly is positioned centered over the station chain.



(Cont'd)

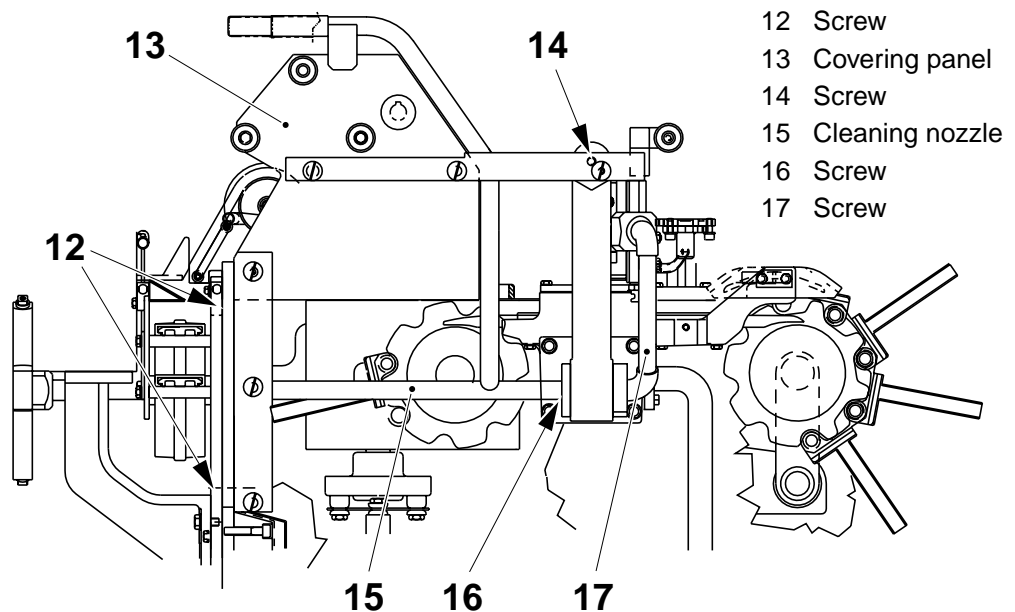
(Cont'd)

g) Tighten the screws (21), (22) and (23) and apply silicon around the unit.

**Chemical products!**

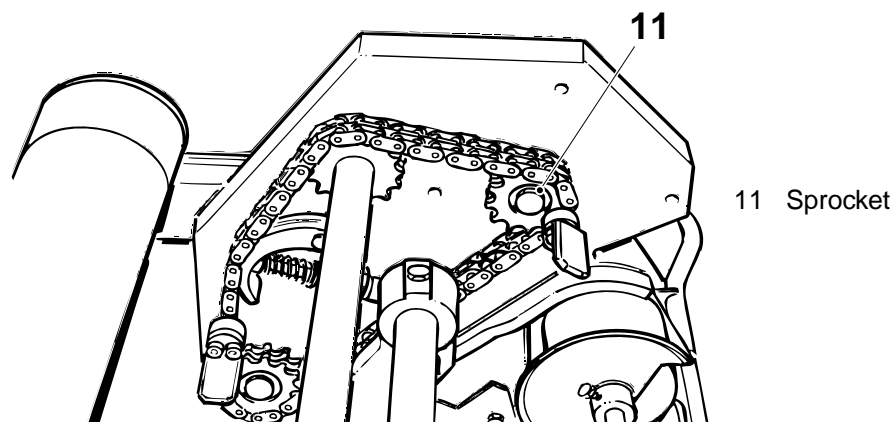
Lubricant. Follow the *Safety precautions*.

- h) Top up with oil code H, see *10.2 Lubricants* until the level reaches the level glass. Fit the lid over the discharge unit.
- i) Fit back the covering panel (13). Position the cleaning pipe (15), fit the cleaning nozzle (17) and tighten the screws (14) and (16).
- j) Tighten the screws (12) and tap in the pins.

*(Cont'd)*

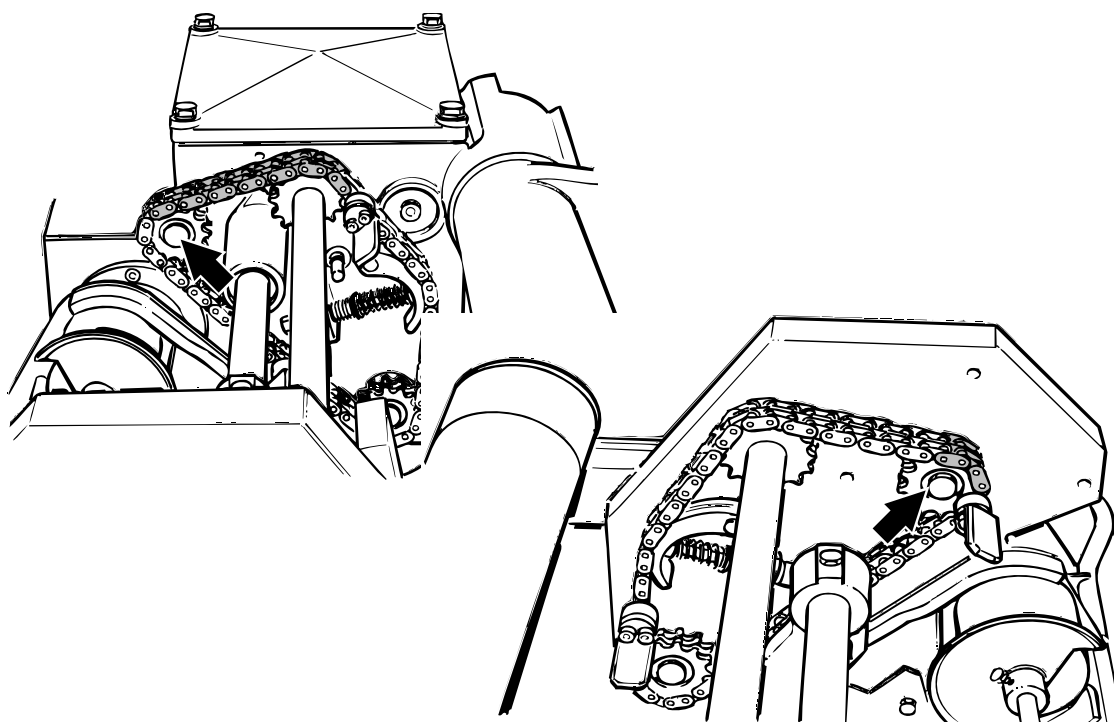
(Cont'd)

- k) Connect the banjo connections to the covering panel. Apply the chain and fit the sprocket (11).



- l) Make sure that the chains are correctly positioned;
- the **RH** duplex chain is in correct position when there are **6 - 7** chain links (for **330 S** 6 chain links) from the top of the sprocket (arrow) to the carrier.
 - the **LH** duplex chain is in correct position when there are **2 - 3** chain links (for **330 S** 3 chain links) from the top of the sprocket (arrow) to the carrier.

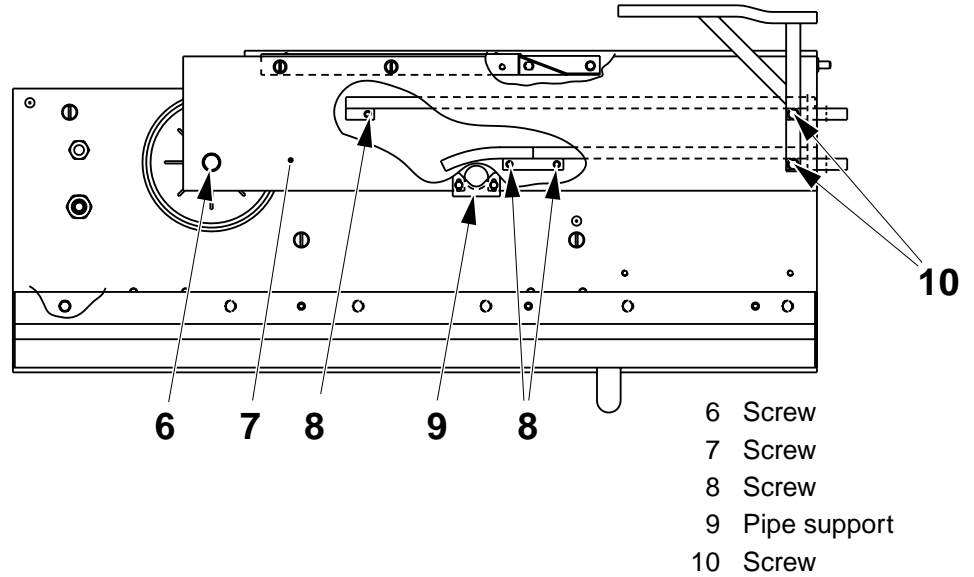
If required, adjust as described in 5.12-3 Discharger - *change duplex chains*.



(Cont'd)

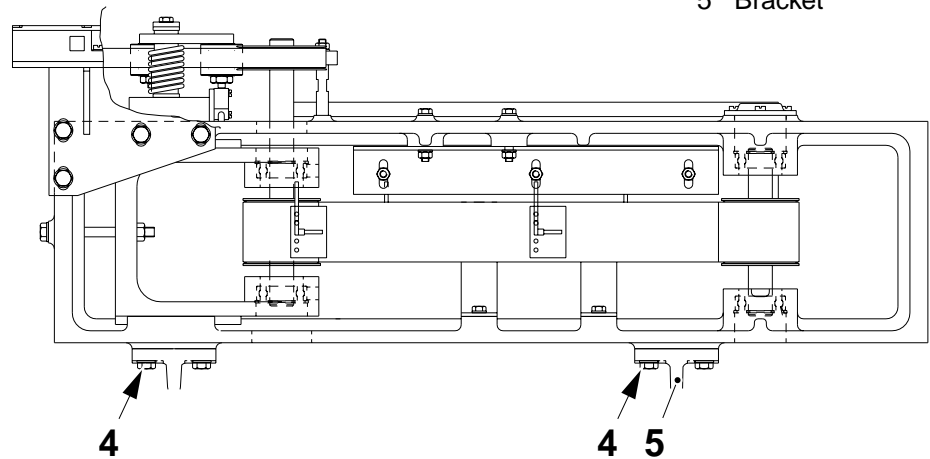
(Cont'd)

- m) Loosen the screw (6). Fit the plate and the conveyor. Tighten the screws (7) and (8). Fit back the rail and tighten the screws (10).
- n) Fit back the cleaning pipe support (9).



- o) Fit the side feeder bracket (5). Fit the side feeder and tighten the screws (4).

- 4 Screw
- 5 Bracket

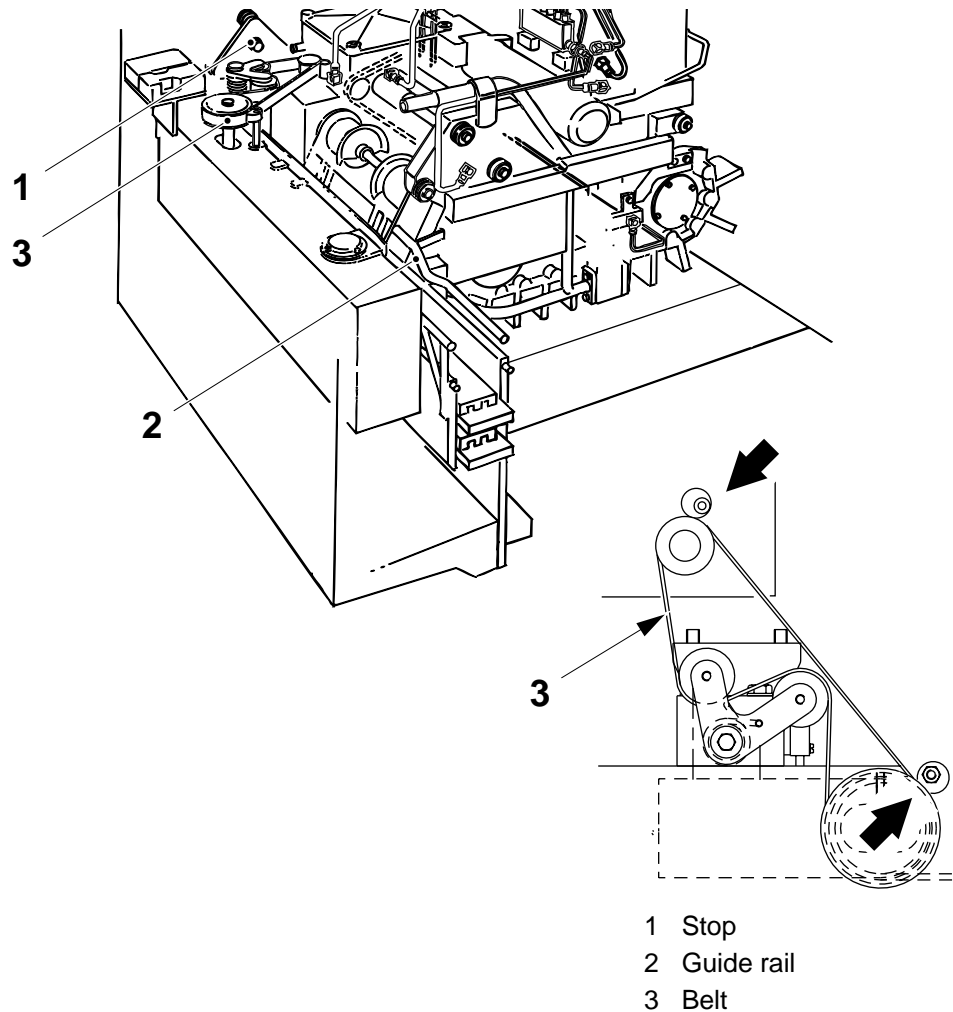


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- p) Apply the belt (3) and turn the eccentrics (arrow) to fix the belt position. Fit the guide rail (2).
- q) Fit the front plate and the LH and RH side plates.
- r) Set the slider, see 5.12-4 Discharger - set slider.
- s) Set the side feeder, see 5.15-3 Side feeder - set.
- t) Fit the final folder cover the stop (1).



5.13 Cleaning system

SPC reference	456588-040V
	979471-010V
	441811-010V
	456455-040V
	441798-010V

5.13-1 Cleaning system - check rotors and nozzles

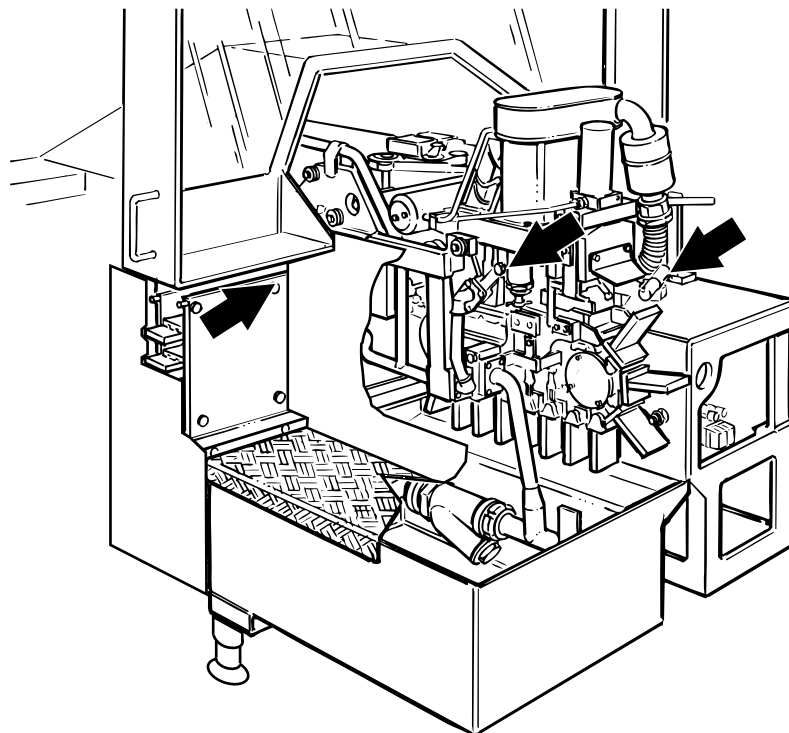
SPC reference	456588-040V
	979471-010V
	441811-010V
	456455-040V
	441798-010V

Note! If the nozzles have been removed, set them, see 5.13-2 *Cleaning system - set nozzles*.

Final folder

Check that all nozzles for the external cleaning are clean.
If required, remove the nozzles and clean and/or delime them.

Check that the three cleaning rotors rotate freely.
If required, overhaul the rotors as follows.



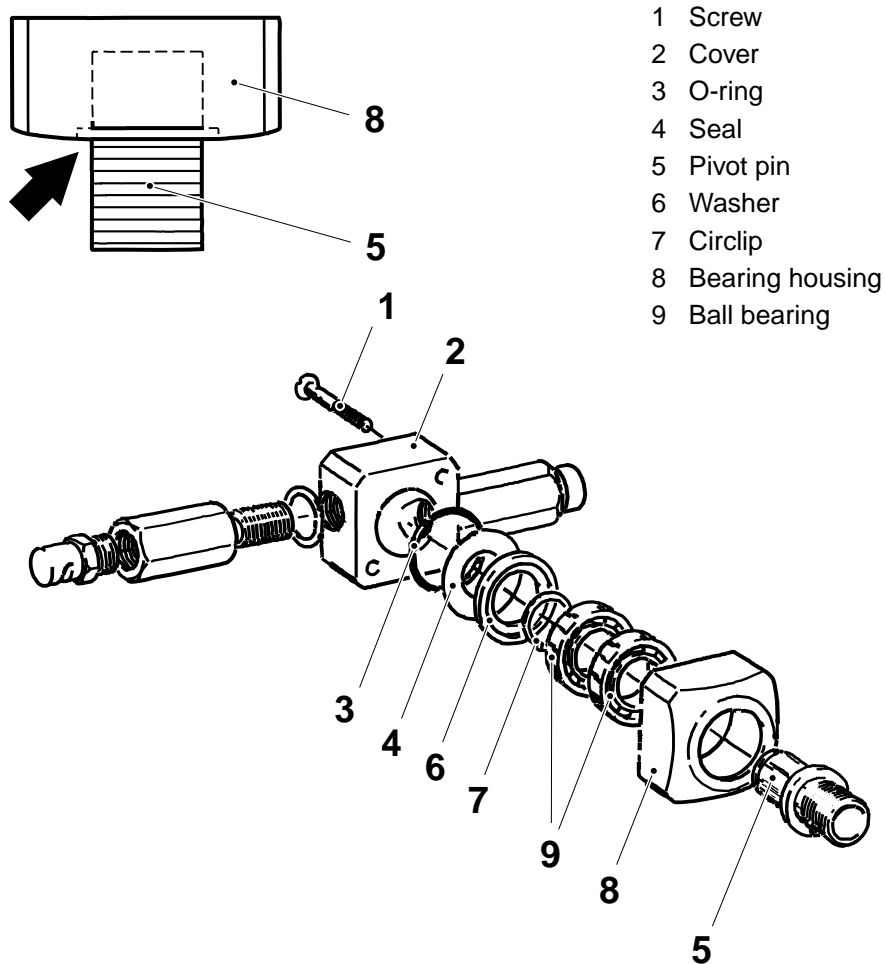
(Cont'd)

(Cont'd)

- a) Unscrew the screws (1) and remove the cover (2) and the O-ring (3).
- b) Carefully remove the seal (4).
- c) Unscrew the pivot pin (5) with the aid of an allen key.
- d) Remove the washer (6) and the circlip (7).
- e) Remove the pivot pin from the bearing housing (8) and remove the ball bearings (9).
- f) Change worn and/or damaged details.
- g) Assemble in the reverse order.

Note! Make sure that the pivot pin flange is in level with the bottom of the bearing housing.

- h) Make sure that the cleaning rotors rotate freely.



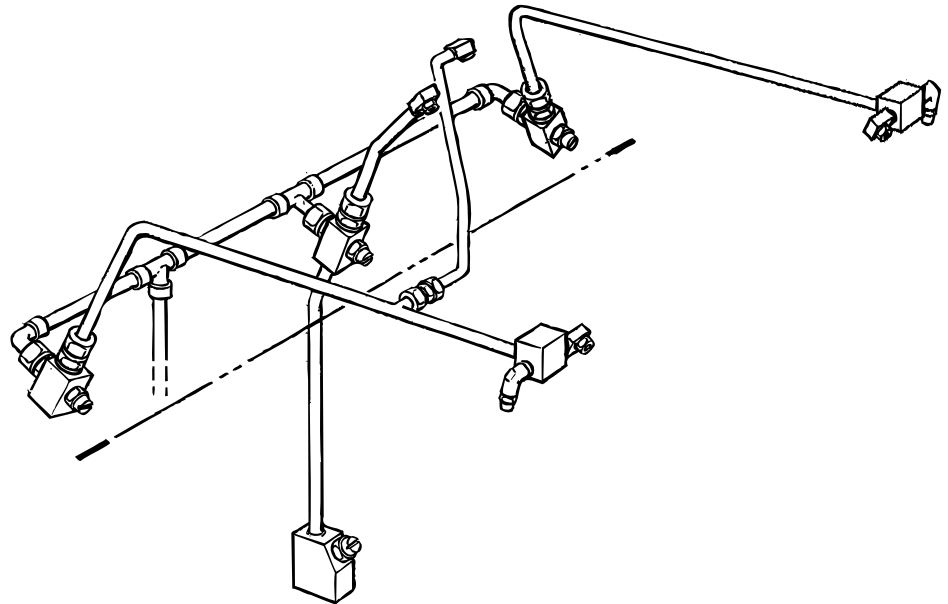
(Cont'd)

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Jaw system

Check that all nozzles for the external cleaning are clean.
If required, remove the nozzles and clean and/or delime them.

Make sure that all pipes and pipe connections are tight.

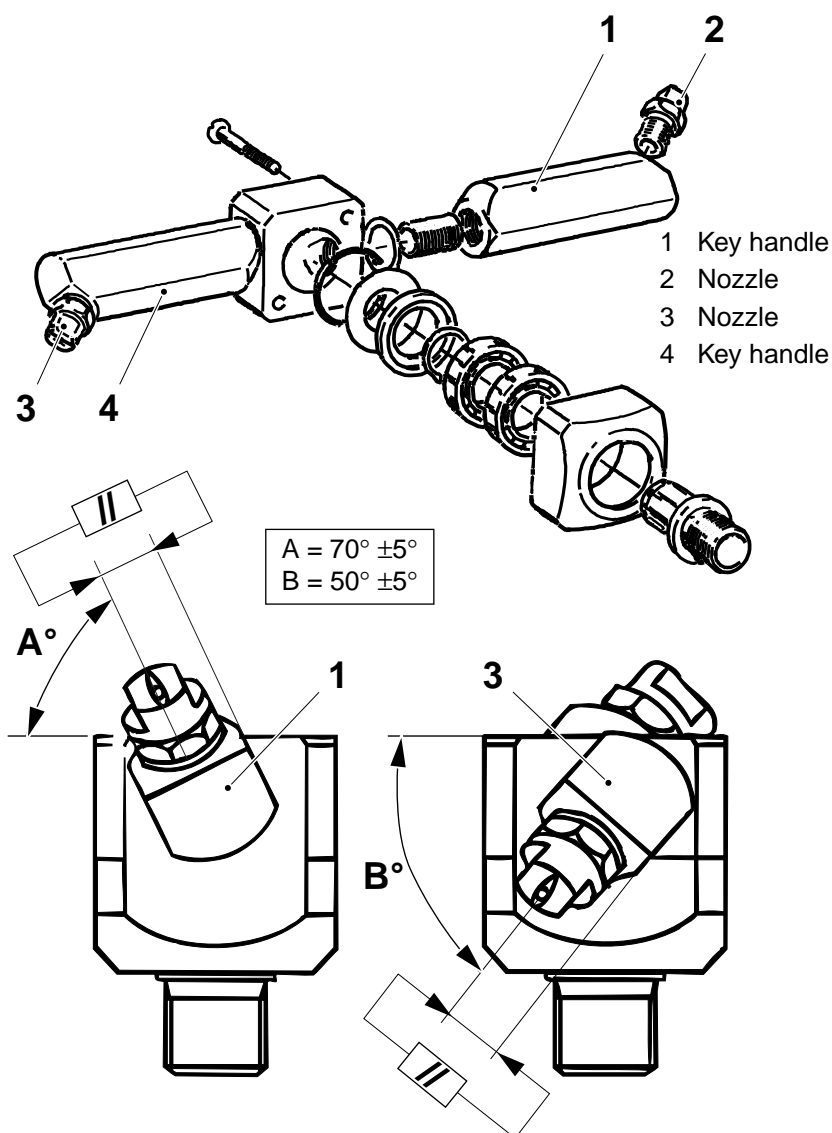


5.13-2 Cleaning system - set nozzles

SPC reference	456588-040V
	979471-010V
	441811-010V
	456455-040V
	441798-010V

Rotor nozzles

- Set the opening of the nozzle (2) parallel with the key handle (1), with the jet direction at angle A.
- Set the opening of the nozzle (3) parallel with the key handle (4), with the jet direction at angle B.

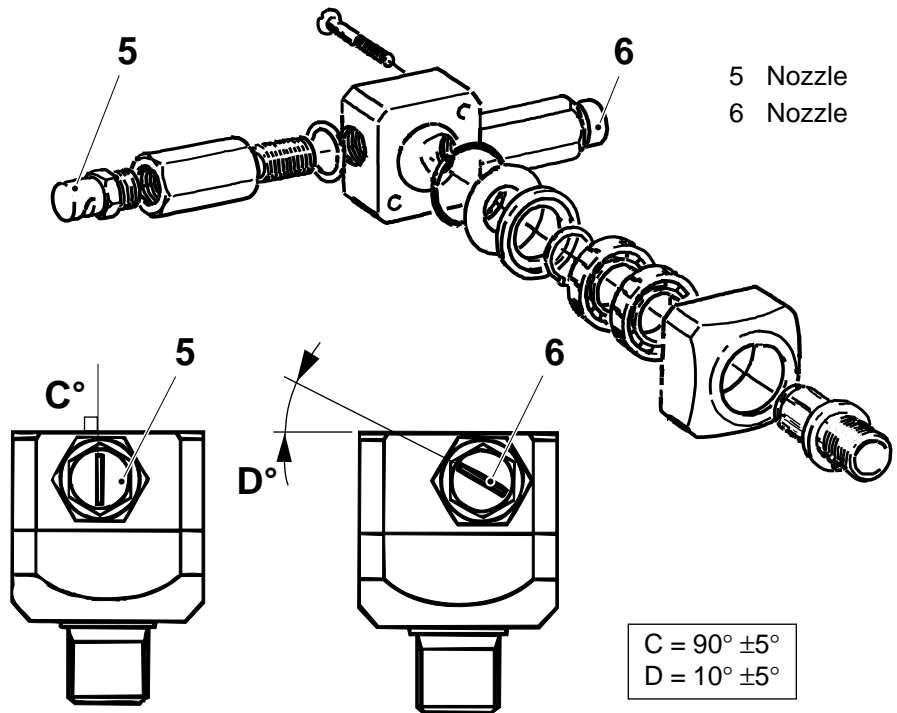


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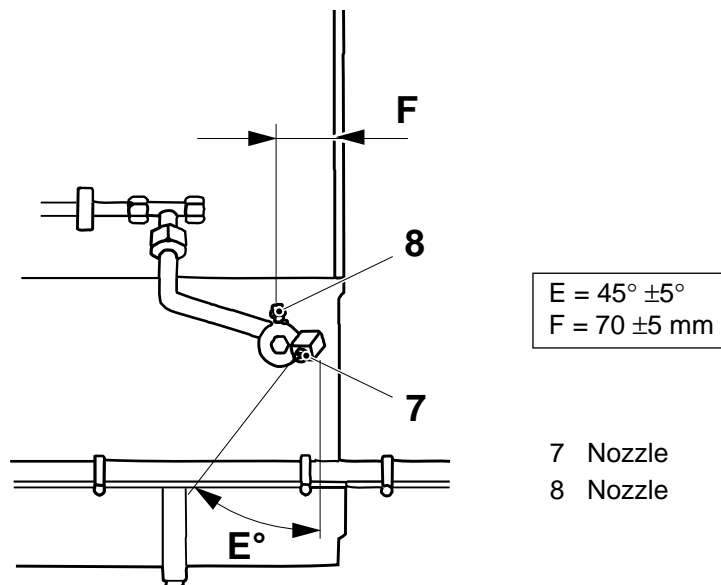
(Cont'd)

- c) Set the jet direction of the nozzle (5) at right angle, angle C, and the nozzle (6) at angle D to the cover of the nozzle.



Fixed nozzles

- a) Set the nozzles so that the slots are horizontal.
- b) Set the jet direction of the nozzle (7) at angle E and the nozzle (8) at distance F from the inside of the tray.

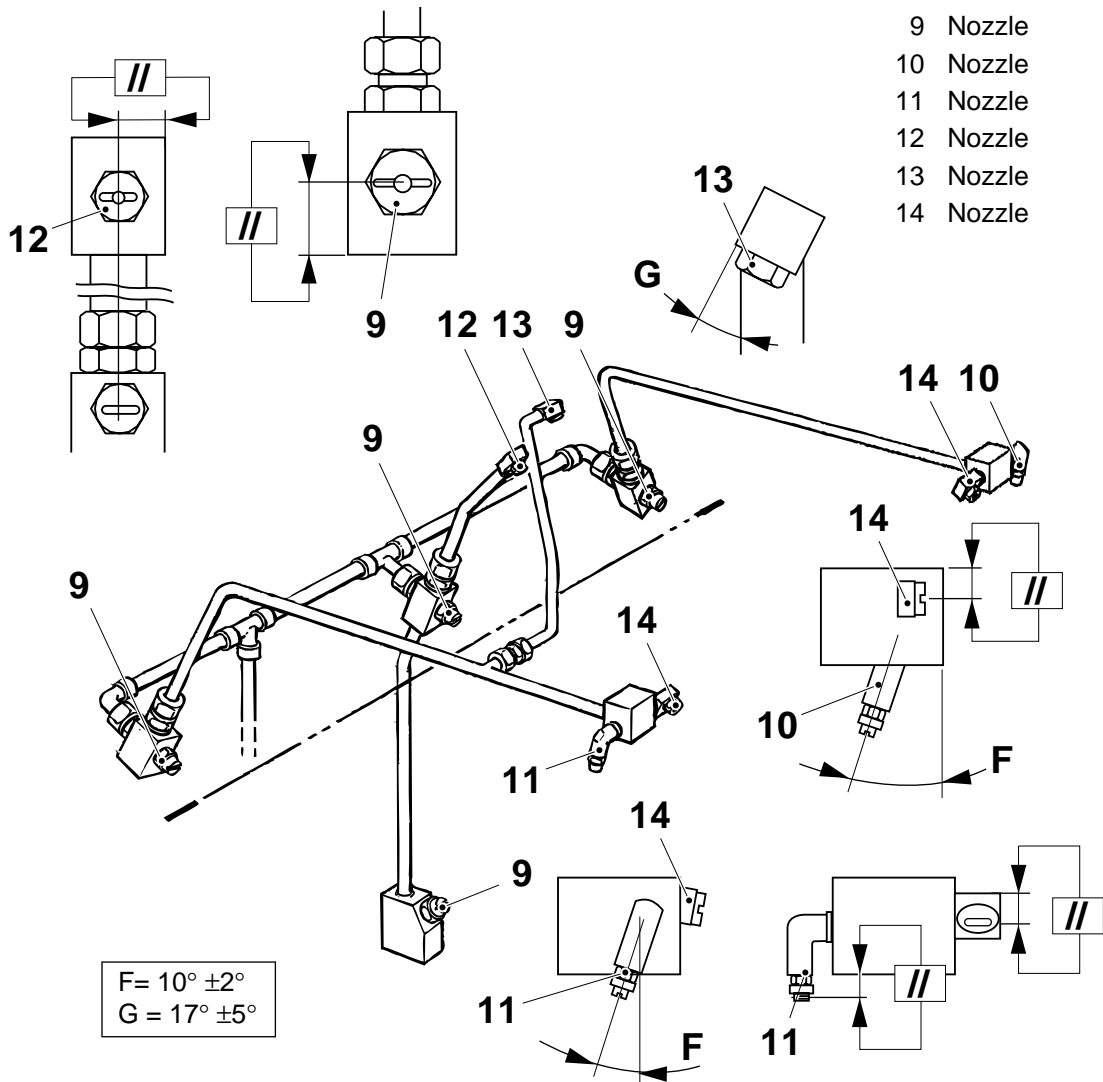


(Cont'd)

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(Cont'd)

- c) Set the openings of the nozzles (9) and (14) parallel with the blocks.
- d) Set the jet direction of nozzle (10) at angle F.
- e) Set the openings of nozzle (11) parallel with the block (view from below) and at angle F to the vertical plane.
- f) Set the nozzle (12) parallel with the pipe.
- g) Set the nozzle (13) at angle G.



2.2E0794E13.en

5.13-3 Cleaning system - check pump

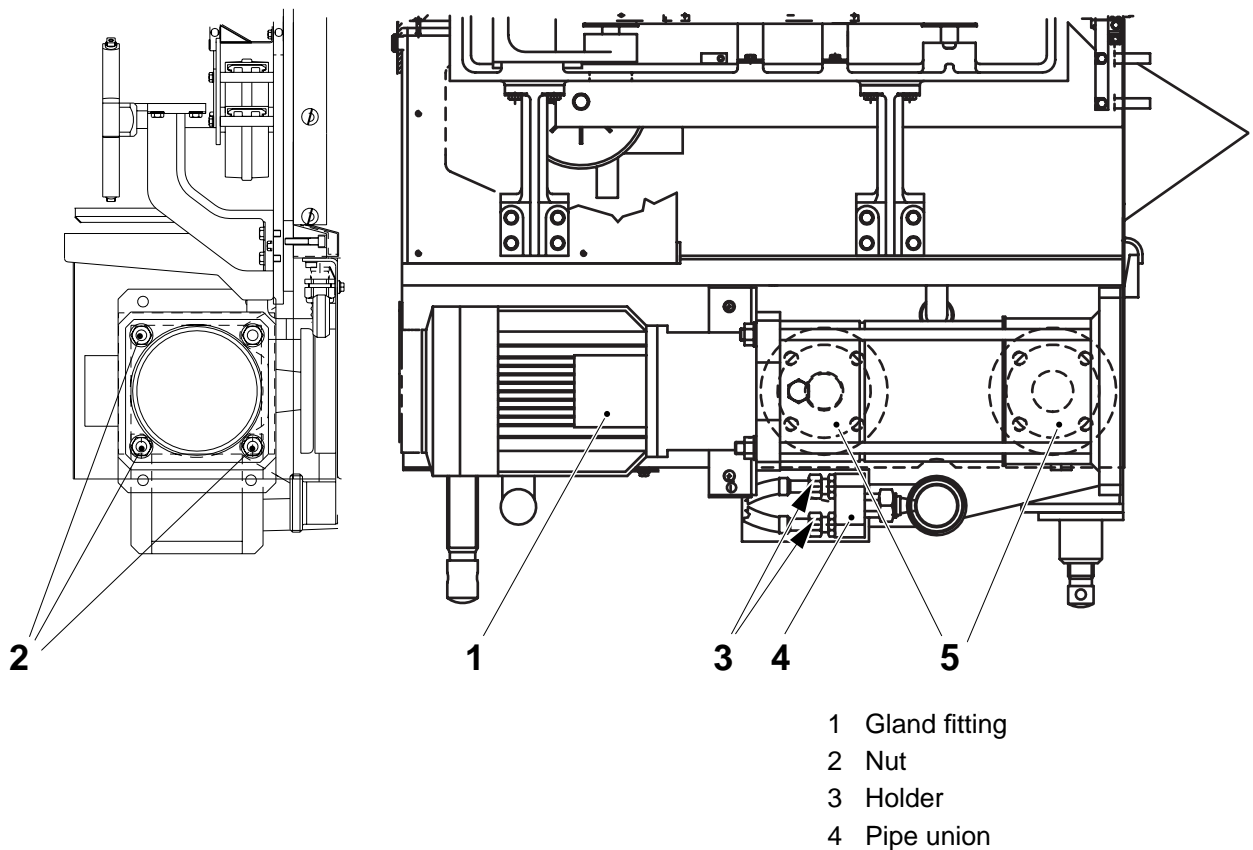
Machine status	External cleaning
SPC reference	456588-040V

- Remove the cover over the cleaning pump.
- Put a screwdriver in contact with the cleaning pump and listen for abnormal noise or vibrations in the pump.
- Change the pump as required, see 5.13-4 *Cleaning system - change pump*.

5.13-4 Cleaning system - change pump

SPC reference	456588-040V
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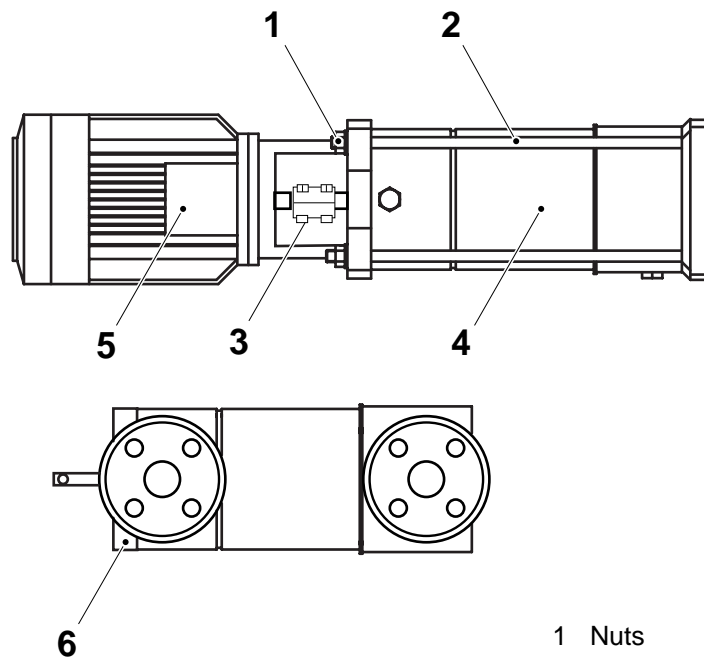
- Remove the cover over the cleaning pump.
- Mark and disconnect the cable from the gland fitting (1).
- Unscrew the nuts (2) and remove the holder (3).
- Unscrew the screws to the pipe unions (4) and remove the pump.
- Change the pump and assemble in the reverse order.



5.13-5 Cleaning system - clean pump

SPC reference	456588-040V
---------------	-------------

- a) Remove the cleaning pump according to 5.13-4 *Cleaning system - change pump* items a) to d).
- b) Remove the nuts (1) and the rods (2).
- c) Remove the protection cover and the clamp (3).
- d) Detach the housing (4) from the motor (5).
- e) Press out the cover (6) and pull out the inner body.



- 1 Nuts
- 2 Rods
- 3 Clamp
- 4 Housing
- 5 Motor
- 6 Cover

(Cont'd)

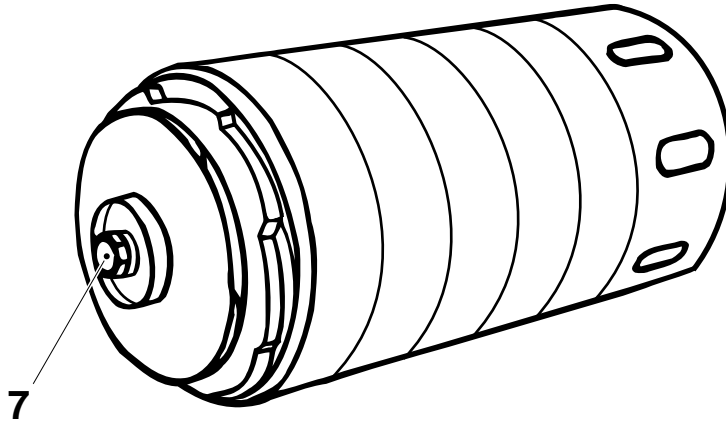
(Cont'd)

f) Hold the shaft and remove the screw (7).

Note! Note the correct position of the parts.

g) Remove and clean the parts of the pump.

h) Assemble in the reverse order.



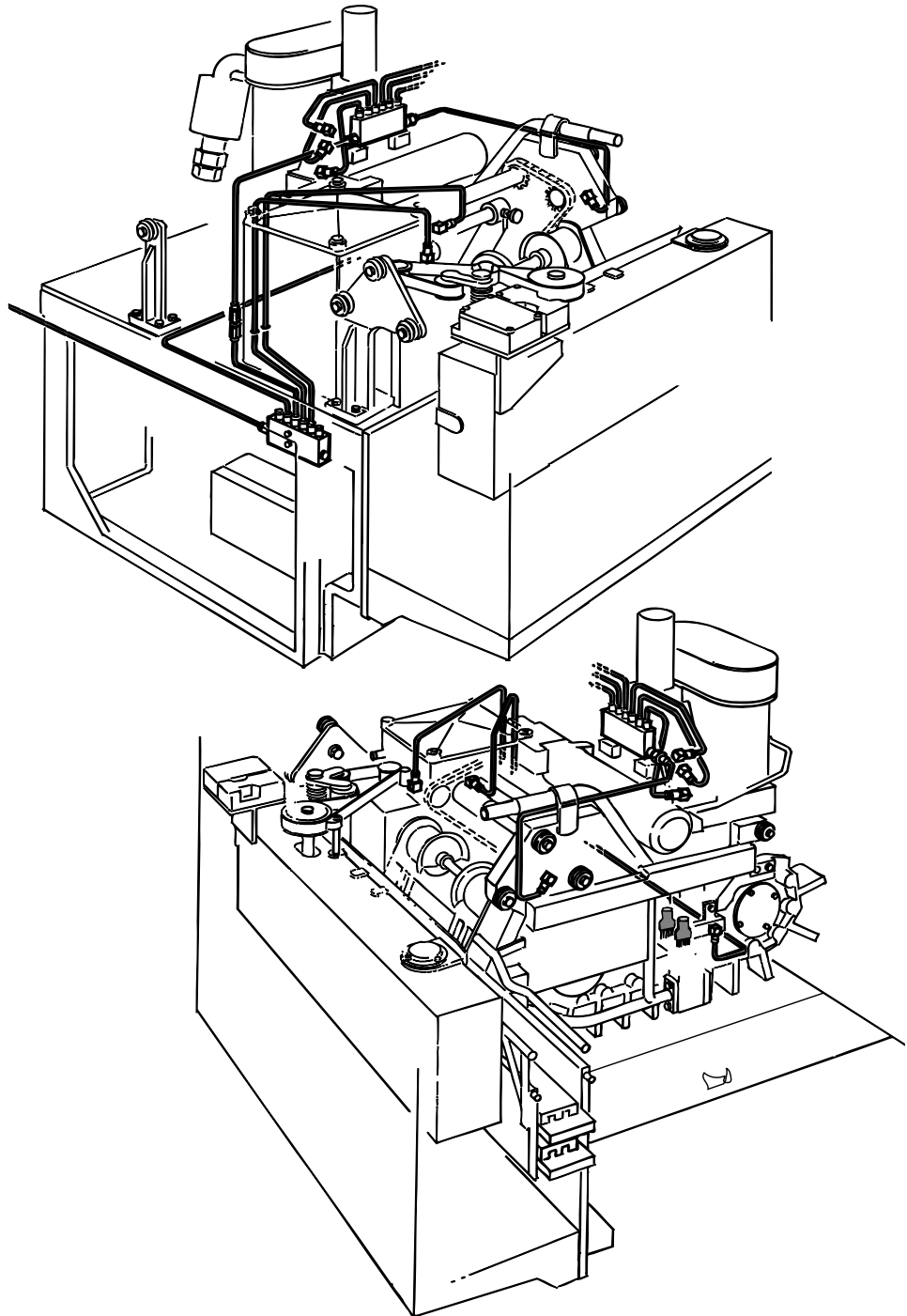
7 Screw

5.14 Central lubrication

5.14-1 Central lubrication - check oil distribution

Machine status	Power On Air On Water On
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Push the **Manual lubrication** button and check that lubrication oil is distributed to all lubrication points.



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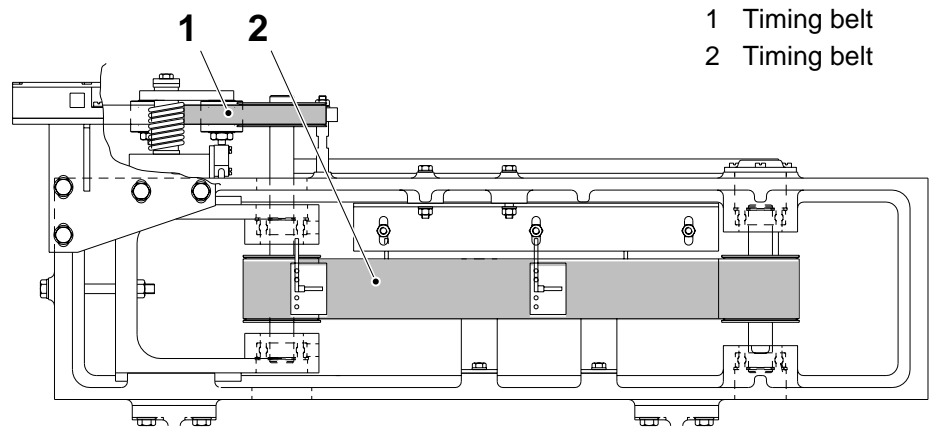
5.15 Side feeder

SPC reference	979403-010V
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5.15-1 Side feeder - check timing belts

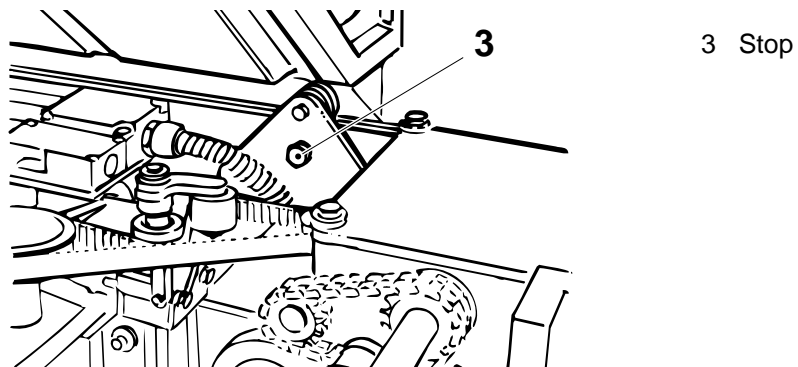
SPC reference	979403-010V
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Check the timing belts (1) and (2) for wear and/or damages. Change as required.



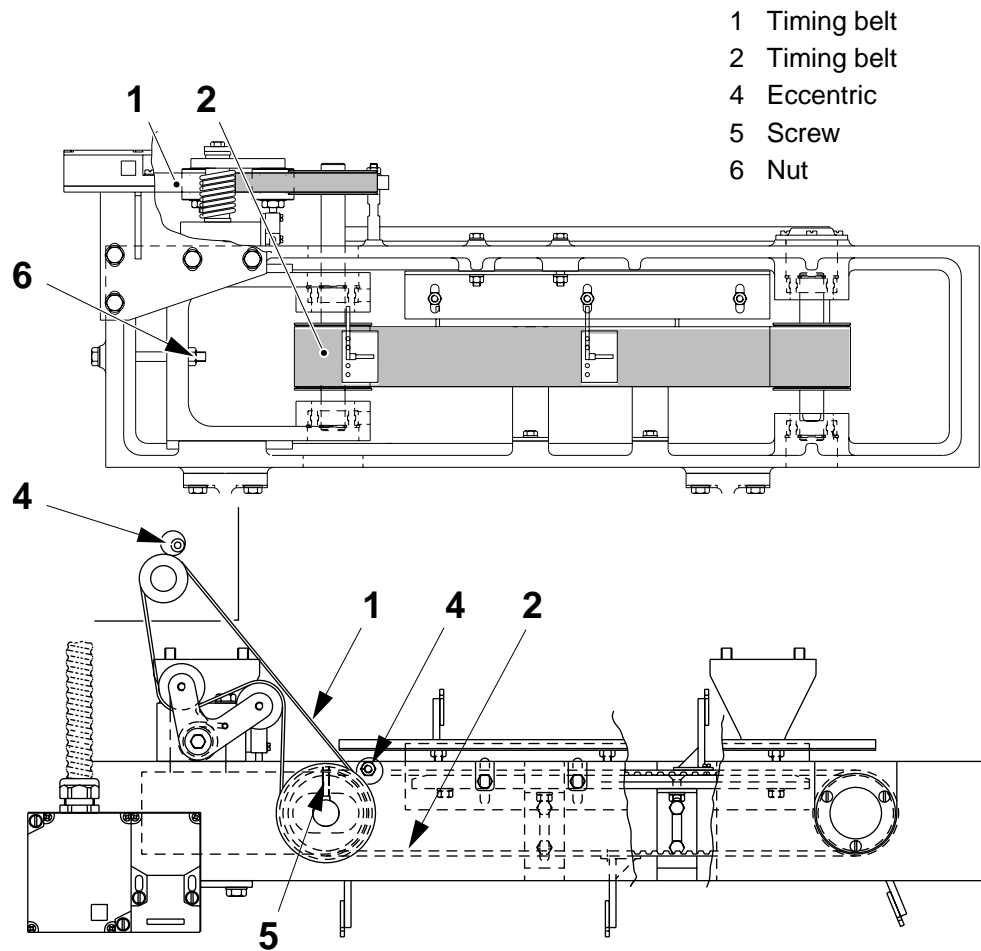
Change belts

a) Unscrew the stop (3) and remove the final folder cover.



(Cont'd)

- b) Turn the eccentrics (4) and lift the belt (1) off the rollers.
- c) Loosen the screw (5), remove the flat wedge in the toothed pulley and remove the pulley.
- d) Unscrew the nut (6) to take the tension off the belt (2).



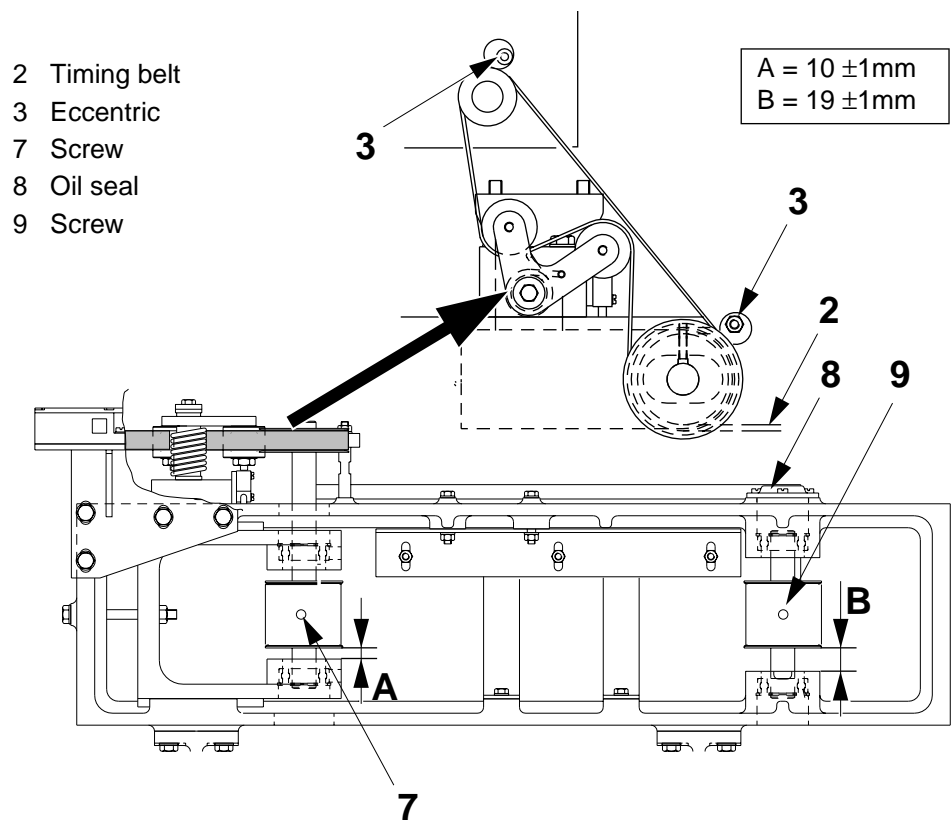
2.2B0794E:15.en

(Cont'd)

(Cont'd)

- e) Move the belt out of the way and loosen the screw (7) and remove the flat wedge in the toothed pulley.
- f) Remove the circlips and tap out the shaft.
- g) Remove the oil seal (8), remove the flat wedge and the circlips. Loosen the screw (9). Tap out the shaft.
- h) Change the timing belt (2).
- i) Assemble in the reverse order. Set distances A and B before tightening the screws (7) and (9). Tighten the belt (2) so that it is still possible to move the carriers slightly up and down.

Note! Make sure to position the eccentrics (3) as illustrated; 0.1 mm between the eccentric and the belt.

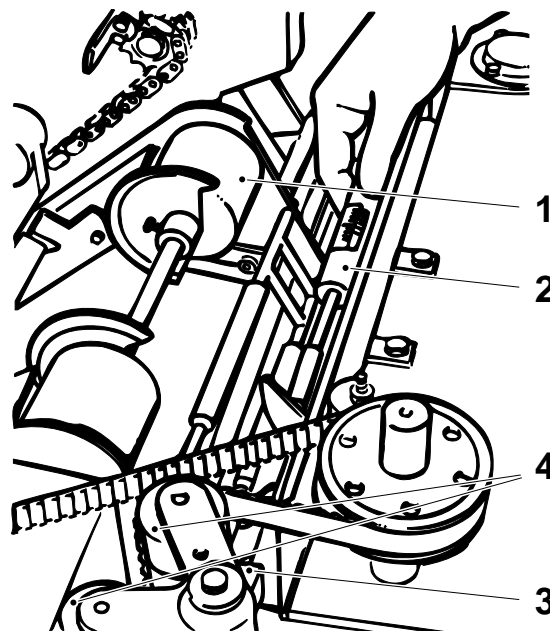


- j) Set the side feeder, see 5.15-3 Side feeder - set.

5.15-2 Side feeder - check overload protection

Machine status	Power On
Tools - spring balance	TP No. 74767-102
SPC reference	979403-010V

- a) Crank until one carrier is in the middle between the two rollers (1) of the discharge chute.
- b) Apply the spring balance (2) to the carrier.
- c) Check the cut-out force of the overload protection. At a force of 50 - 60 Nm, the LED of the inductive switch (3) should go out.
- d) If not, check;
 - the belt tension; the belt must not be too tightened. It must be possible to move the carriers slightly
 - the bearings of the two toothed pulleys; change bearings as required. Follow the procedure in *5.15-1 Side feeder - check timing belts*.
 - the rollers (4); make sure that they rotate freely;. If required, remove the belt and change the rollers. Follow the procedure in *5.15-1 Side feeder - check timing belts*.

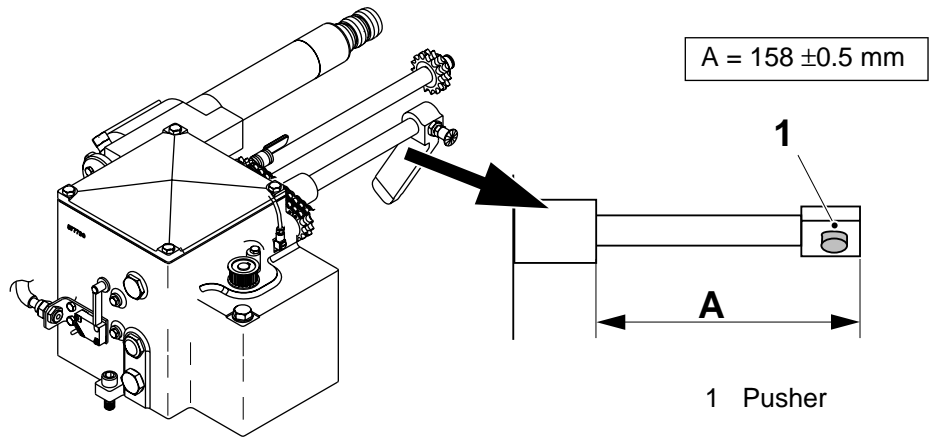


- 1 Roller
- 2 Spring balance
- 3 Inductive switch
- 4 Roller

5.15-3 Side feeder - set

Machine status	Power On
SPC reference	979403-010V

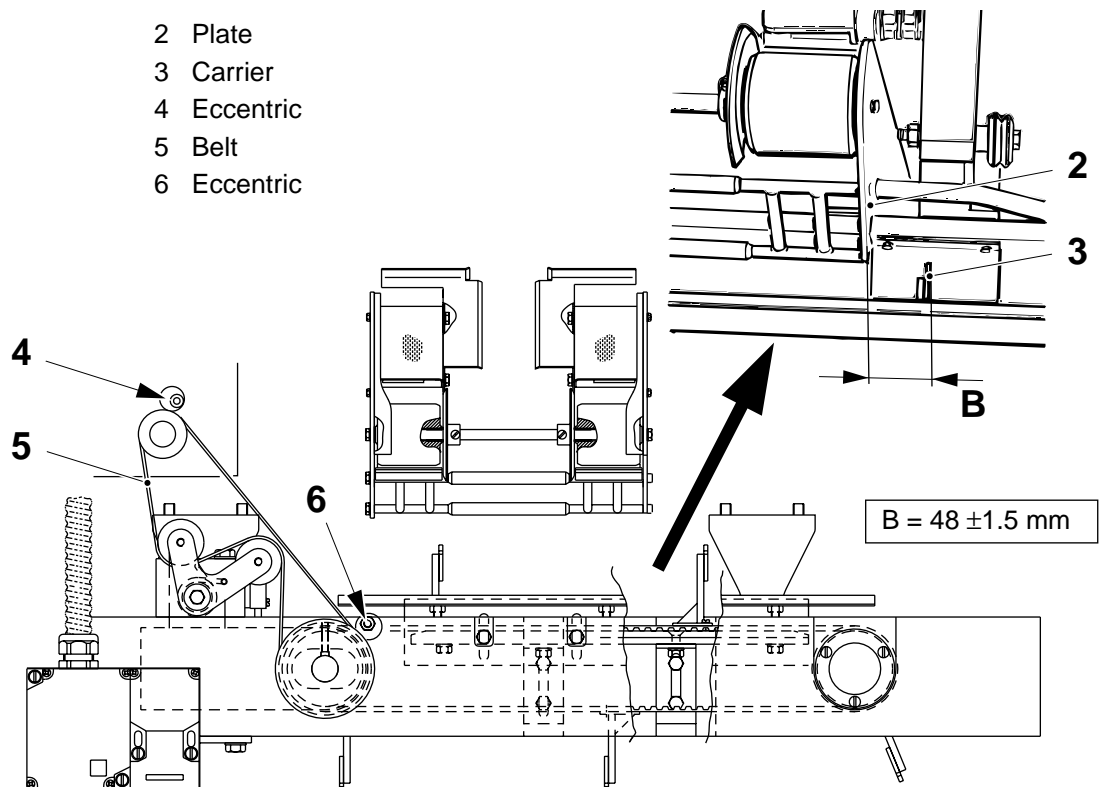
- a) Crank until the pusher (1) is in its outer position, distance A from the flange.



- b) Set distance B between the carrier (3) of the side feeder and the plate (2). Adjust by slackening the belt (5) on the belt tensioner. Skip teeth on the belt.

Note! Make sure that the eccentrics (4) and (6) are positioned as illustrated; 0.1 mm between the eccentric and the belt.

- 2 Plate
- 3 Carrier
- 4 Eccentric
- 5 Belt
- 6 Eccentric

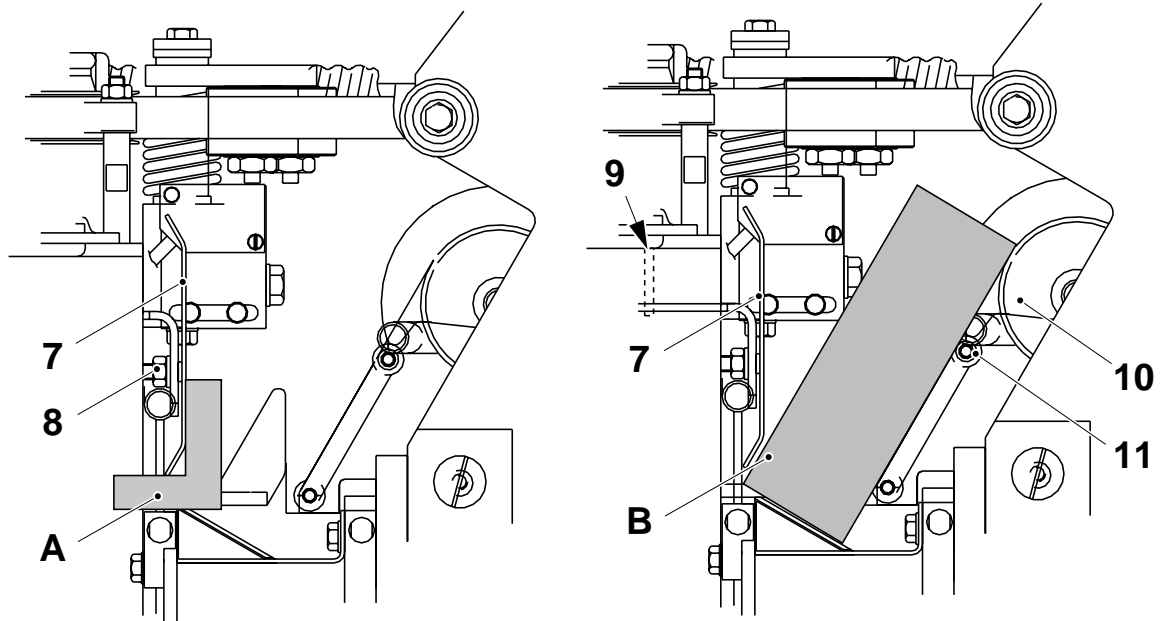


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(Cont'd)

- c) Apply template A as illustrated and set the plate (7) vertically, so that it touches the template. Adjust on the screws (8).
- d) Apply template B so that it touches the roller (10) and the rails (11). Loosen the screws (9) and shift the plate so that it touches the template.



Package	Template A, TP No.	Template B, TP No.
100 S	79979	79980
125 S	79979	79980
160 S	79979	79981
180 B	79979	79982
200 B	79979	79982
200 M	79979	79981
200 S	79979	79981
236 B	79979	79982
250 B	79979	79982
250 S	79979	79981
284 B	79979	79982
300 S	79979	79982
330 S	79979	590512

- 7 Plate
- 8 Screw
- 9 Screw
- 10 Roller
- 11 Rail

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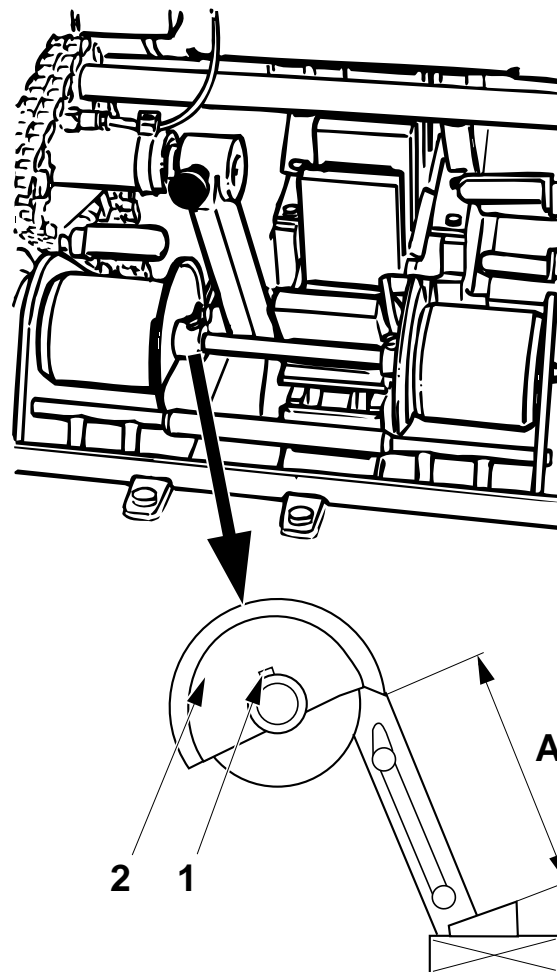
5.16 Discharge chute

SPC reference	979264-010V
---------------	-------------

5.16-1 Discharge chute - set

Machine status	Power On
Tools - template	TP No. 79978
SPC reference	979264-010V

- a) Set distance A between the head plate (2) and the plate on the conveyor.
- b) If required, loosen the screws (1) and turn the plate (2).



Package	A ±1 (mm)
100 B	95
125 S	95
160 S	103
180 B	85
200 B	92
200 M	114
200 S	128
236 B	109
250 B	115
250 S	140
284 B	128
300 S	128
330 S	148

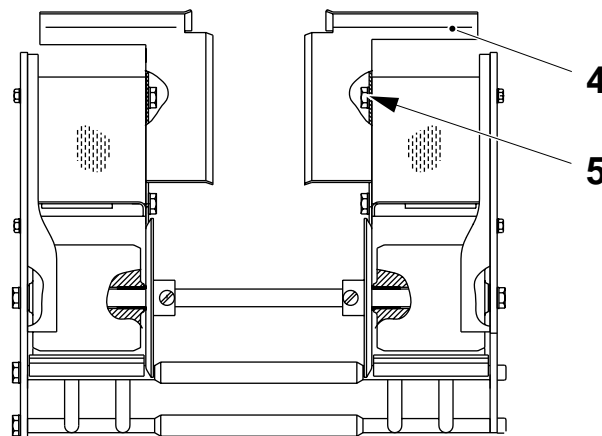
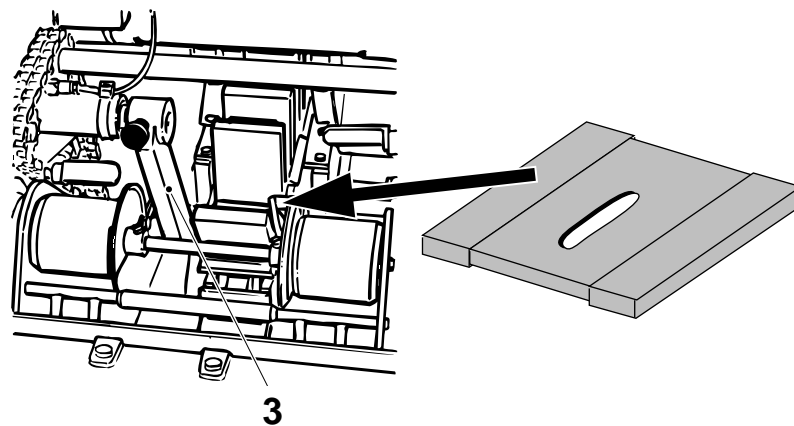
- 1 Screw
- 2 Head plate

(Cont'd)

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(Cont'd)

- c) Crank until the station chain stops indexing.
- d) Remove the pusher (3) and place the template in the station chain. The “bottom“ of the template should rest on the station chain bottom.
- e) Fix the template to the station chain by means of the screw, the washers and the wing nut.
- f) Loosen the screws (5) and adjust the head plates (4) so that they touch the template, both the “bottom” edge of the template and the under side.
- g) Tighten the screws, remove the template and fit back the pusher.



- 3 Pusher
4 Head plate
5 Screw

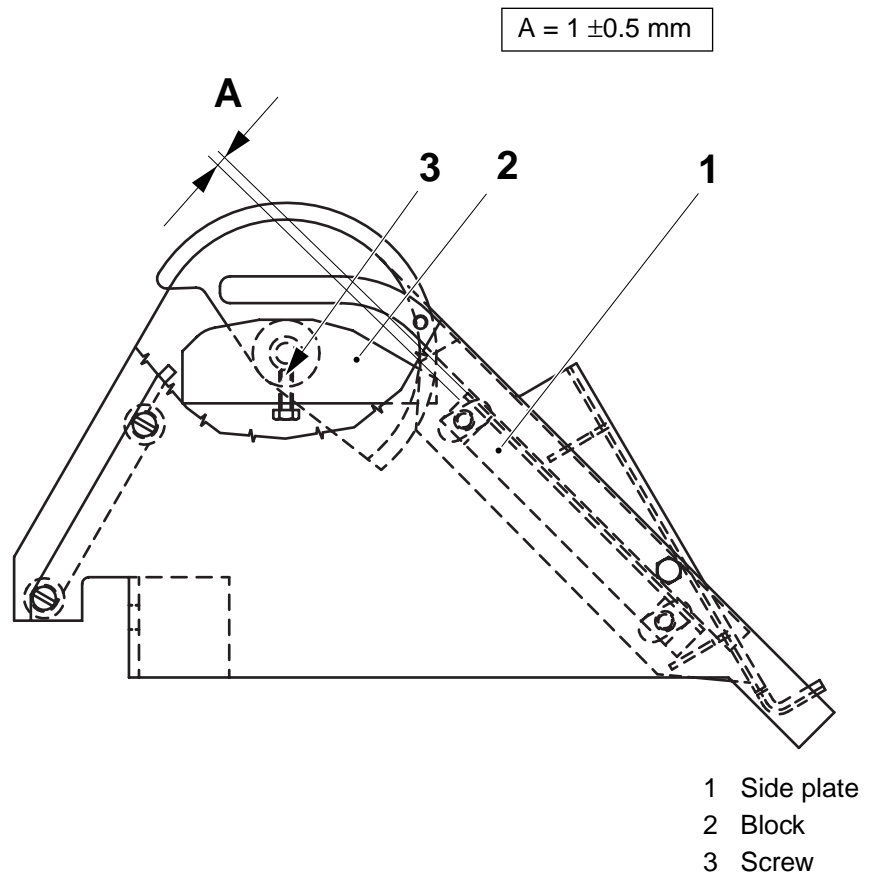
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Valid for 200 S

- h) Loosen the screws (1) and set distance A between the blocks (2) and the side plates (3).
- i) Tighten the stop screws.

Note! Make sure that the packages runs easily over the drop chute.



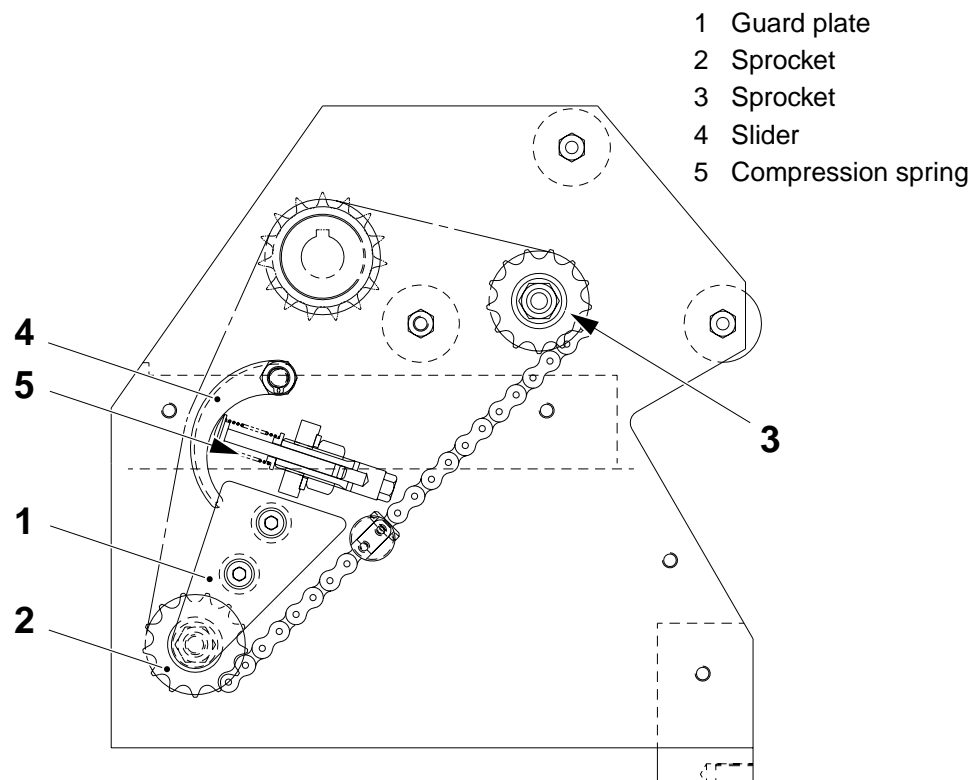
5.17 Covering panel

SPC reference	979457-010V
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5.17-1 Covering panel - change slider and bearings

SPC reference	979457-010V
---------------	-------------

- a) Remove the guard plate (1).
- b) Unscrew the axle bolts and remove the sprockets (2) and (3). Change the bearings.
- c) Remove the circlip and change the slider (4) and the compression spring (5).
- d) Assemble in the reverse order.

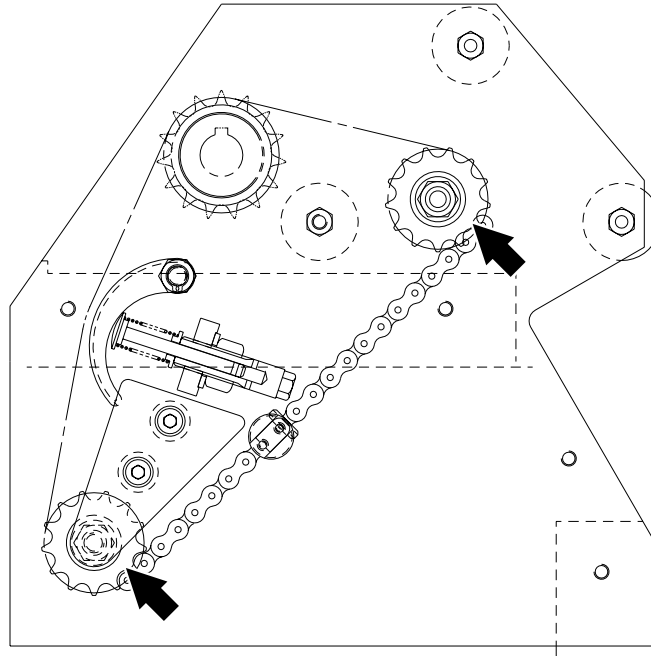


5.17-2 Covering panel - check

SPC reference	979457-010V
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Check the sprockets for wear and/or damage.

Change as required.

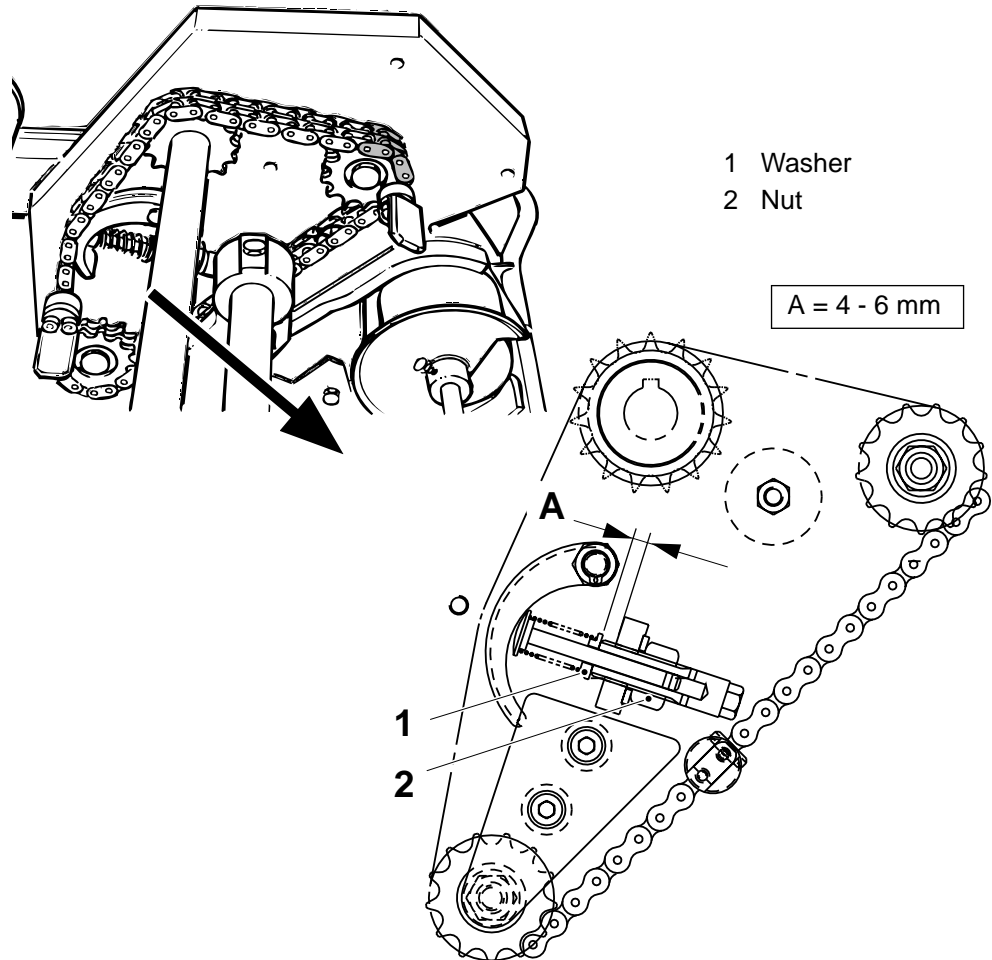


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5.17-3 Covering panel - set slider

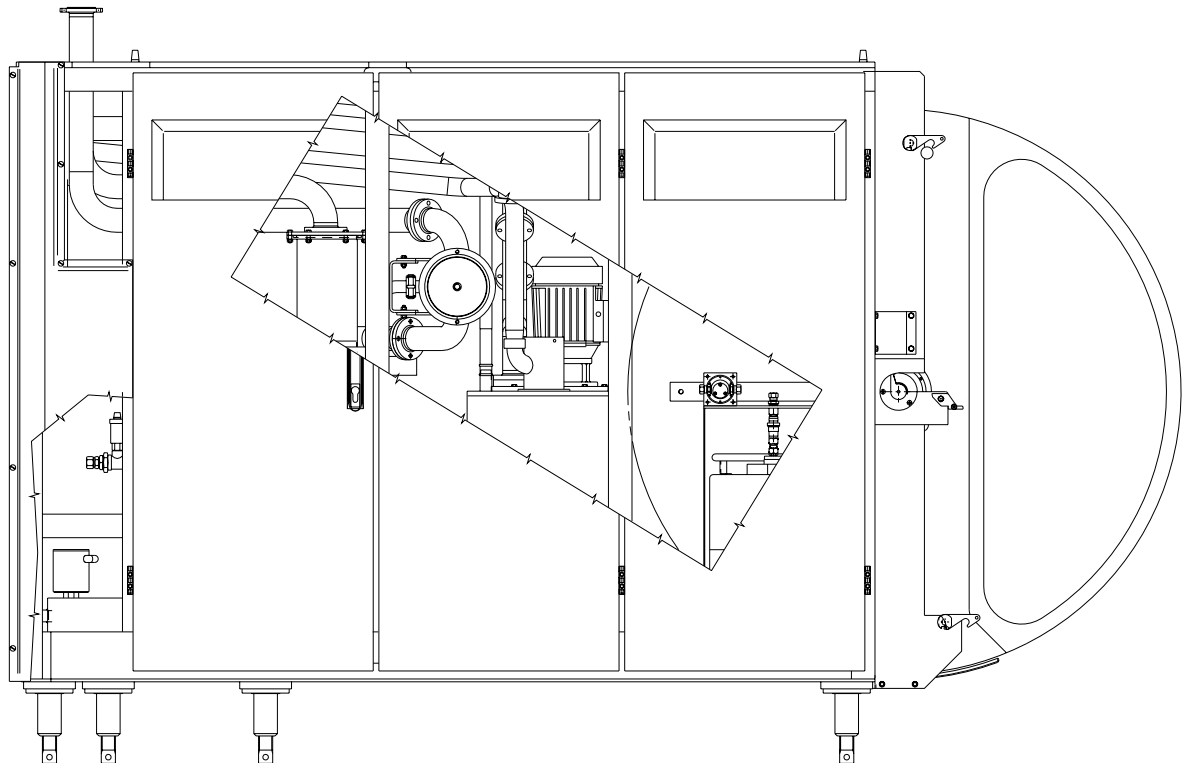
SPC reference	979457-010V
---------------	-------------

Adjust on the nut (2) so that there is distance A between the washer (1) and the flange.



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6 Service unit

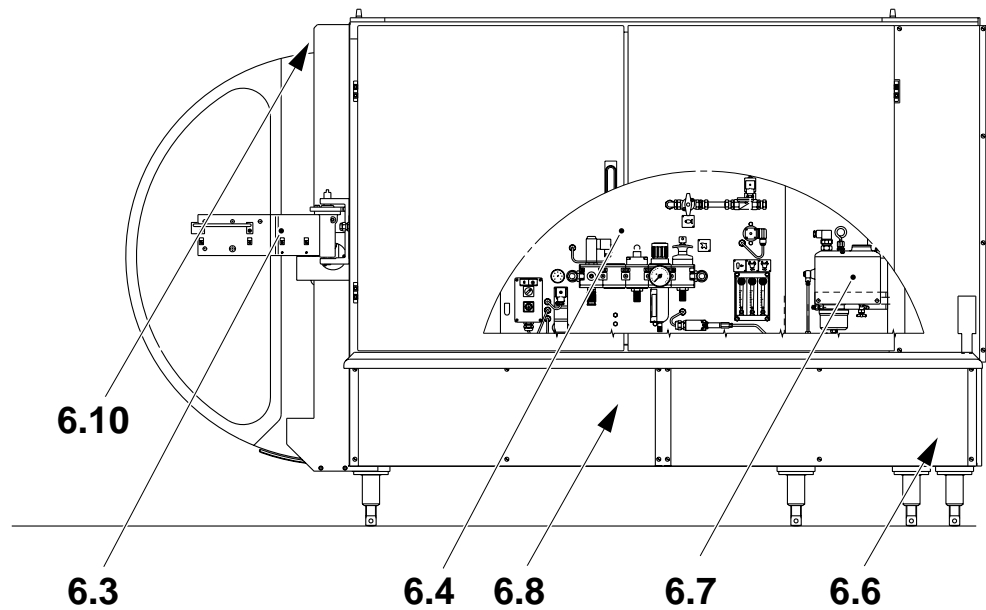
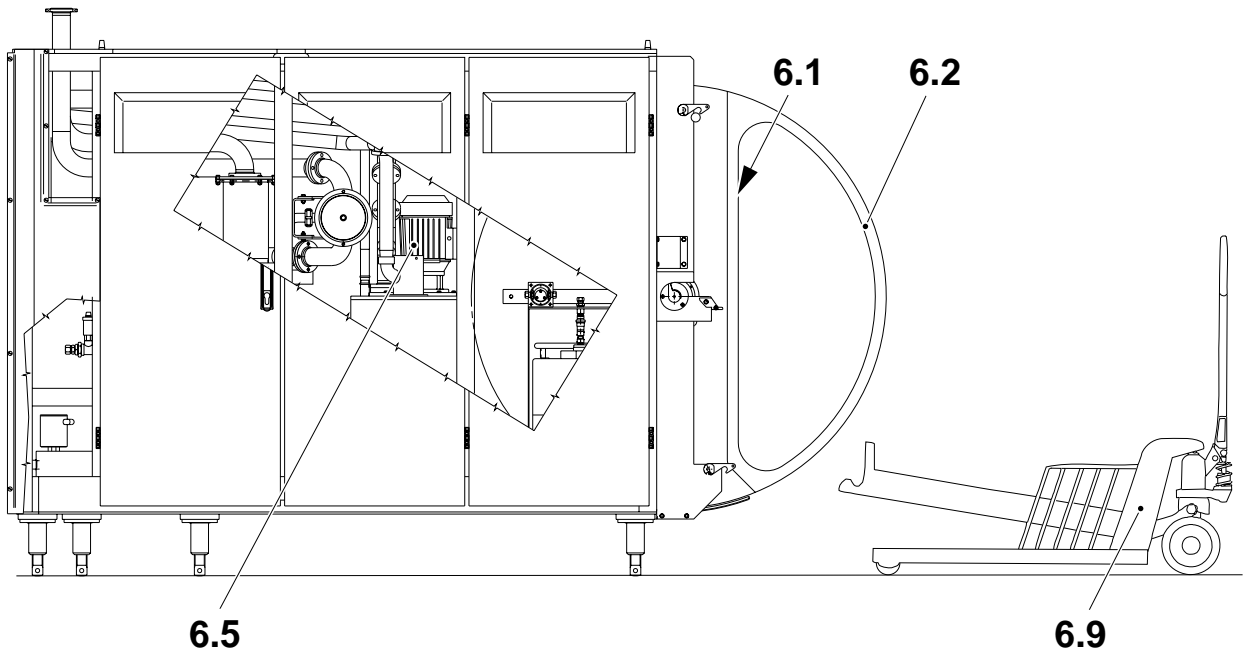


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6 Service unit

6-1 Service unit - description

SPC reference 648106-110V



- 6.1 Paper magazine
- 6.2 Cover
- 6.3 Splicing device
- 6.4 Valve panel
- 6.5 Peroxide and sterile system
- 6.6 Impulse transmitter
- 6.7 Central lubrication
- 6.8 Hydraulic system
- 6.9 Paper reel trolley
- 6.10 PT brake cassette unit

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6.1 Paper magazine

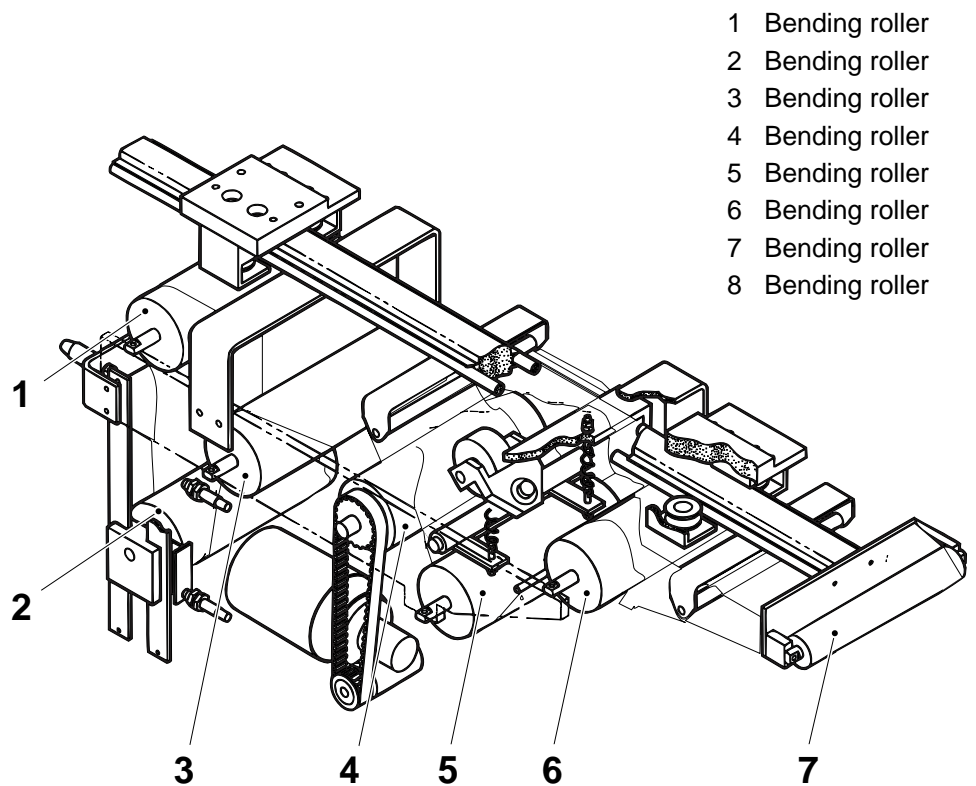
SPC reference	574921-010V
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6.1-1 Paper magazine - check bending rollers

SPC reference	574921-010V
---------------	-------------

- Pull out the paper magazine.
- Check the surfaces of the bending rollers (1), (2), (3), (4), (5), (6), (7) and (8). Make sure that the rollers rotate freely.
- If required, change the rollers and/or the bearings, see below.

Note! Before removing a roller, mark its position on the shaft.

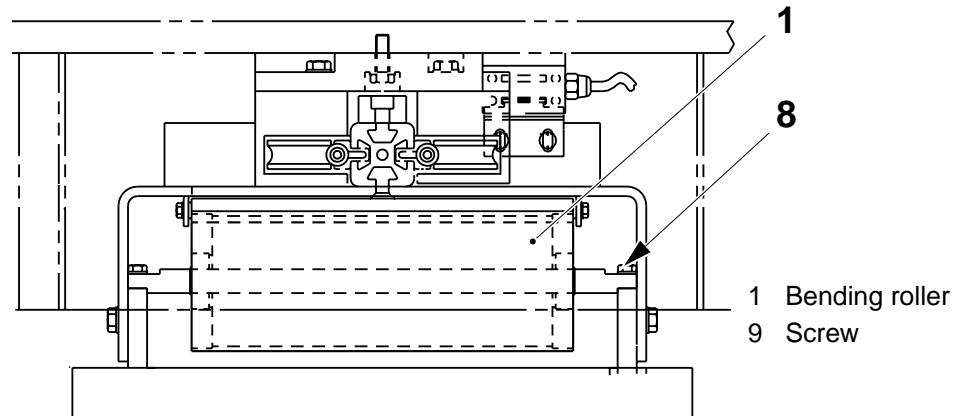


- Bending roller
- Bending roller
- Bending roller
- Bending roller
- Bending roller
- Bending roller
- Bending roller
- Bending roller

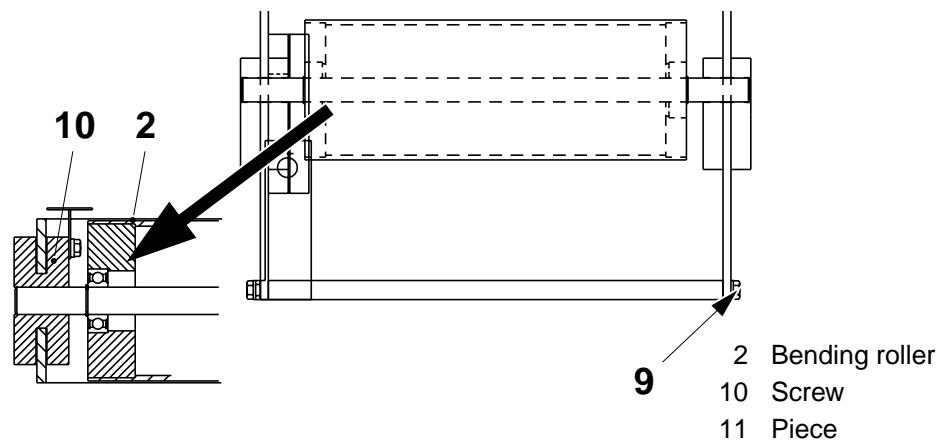
(Cont'd)

*(Cont'd)***Bending roller (1)**

- a) Unscrew the screws (8) and remove the bending roller (1).
- b) Remove the circlips and change the roller and/or the bearings.
- c) Assemble in the reverse order.

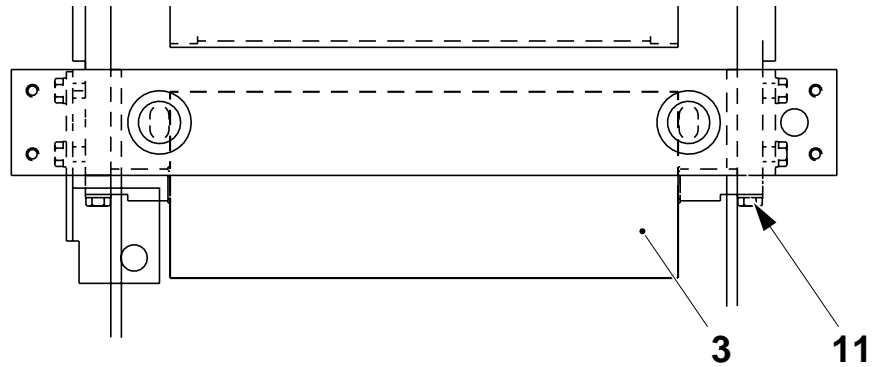
**Bending roller (2)**

- a) Unscrew the screws (9), remove the plate and pull out the roller.
- b) Unscrew the stop screws and remove the pieces (10).
- c) Remove the circlips, change the roller and/or the bearings.
- d) Assemble in the reverse order.

*(Cont'd)*

*(Cont'd)***Bending roller (3)**

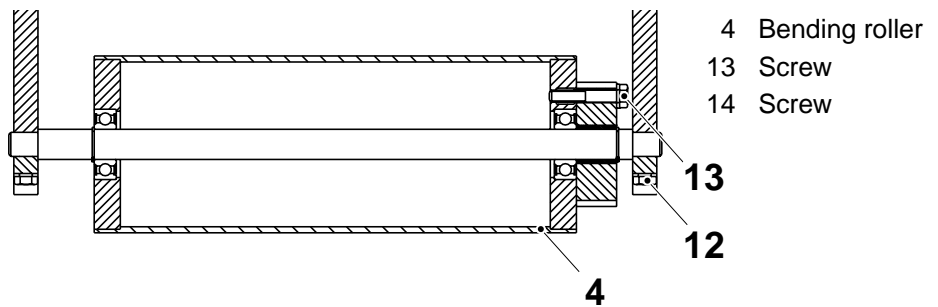
- a) Unscrew the screws (11) and remove the bending roller (3).
- b) Remove the circlips and change the roller and/or the bearings.
- c) Assemble in the reverse order.



- 3 Bending roller
12 Screw

Bending roller (4)

- a) Remove the protection cover.
- b) Unscrew the screws (12), lift off the belt and remove the roller.
- c) Unscrew the screws (13) and remove the toothed wheel.
- d) Remove the circlips and change the roller and/or the bearings.
- e) Assemble in the reverse order.

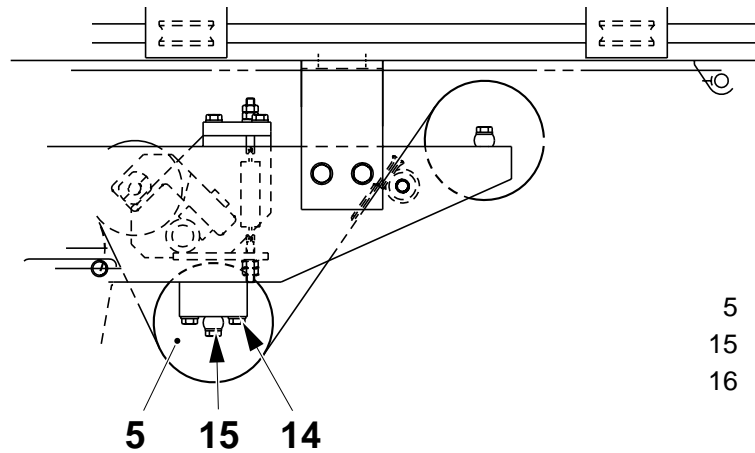


- 4 Bending roller
13 Screw
14 Screw

(Cont'd)

*(Cont'd)***Bending roller (5)**

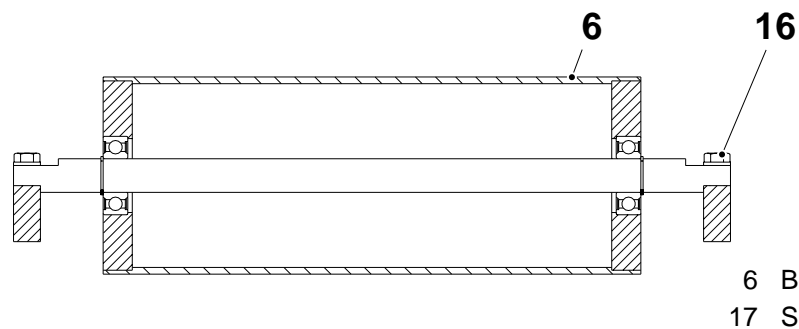
- a) Unscrew the screws (14).
- b) Unscrew the screws (15) and remove the spacer.
- c) Remove the circlips and change the roller and/or the bearings.
- d) Assemble in the reverse order.



- 5 Bending roller
- 15 Screw
- 16 Screw

Bending roller (6)

- a) Unscrew the screws (16).
- b) Remove the circlips and change the roller and/or the bearings.
- c) Assemble in the reverse order.



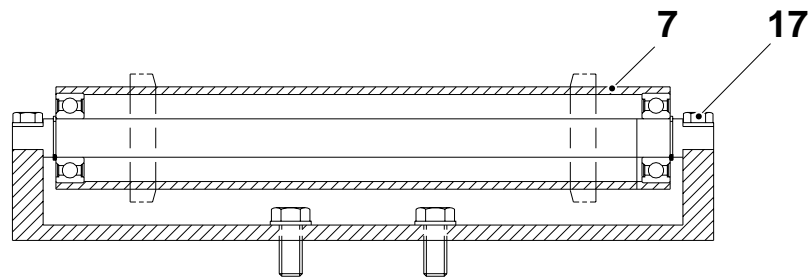
- 6 Bending roller
- 17 Screw

(Cont'd)

(Cont'd)

Bending roller (7)

- a) Unscrew the screws (17).
- a) Remove the circlips and change the roller and/or the bearings as required.
- b) Assemble in the reverse order.

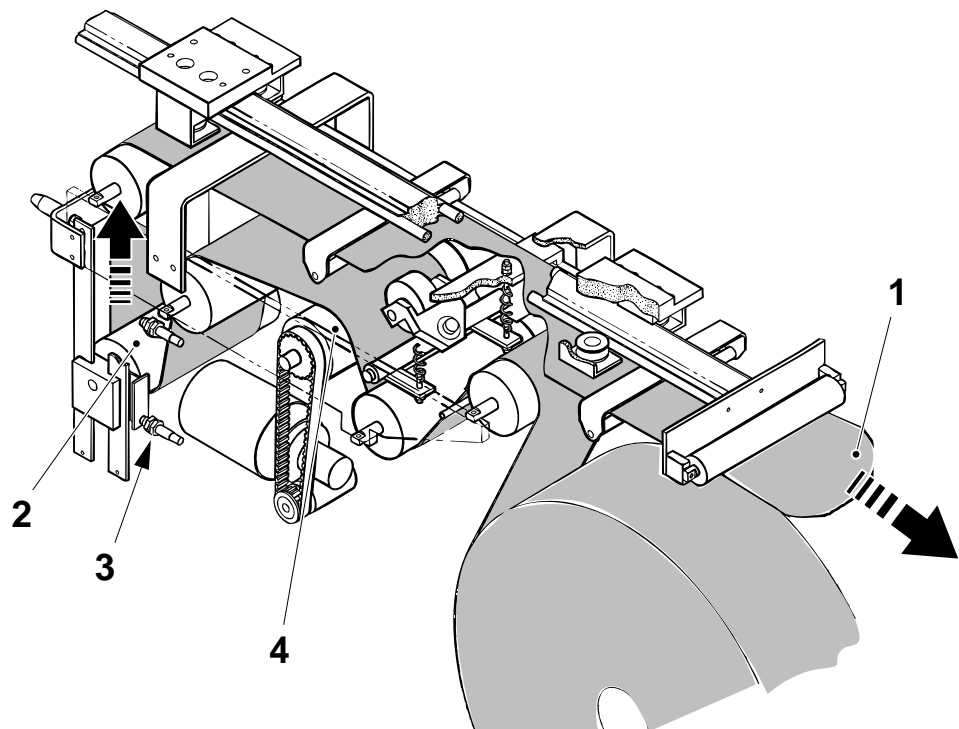


- 7 Bending roller
18 Screw

6.1-2 Paper magazine - check unreeling function

Machine status	Preheating I
SPC reference	574921-010V

- a) Lift the bending roller (2) and check that it moves freely.
- b) Tread the packaging material web through the paper magazine.
- c) Push in the paper magazine to production position.
- d) Push **Alarm reset**.
- e) Pull in the end piece (1) of the packaging material web until the bending roller (2) is raised above the lower proximity switch (3).
- f) Check that the driven bending roller (4) starts and that it works in a proper way.
- g) Close the paper magazine cover.



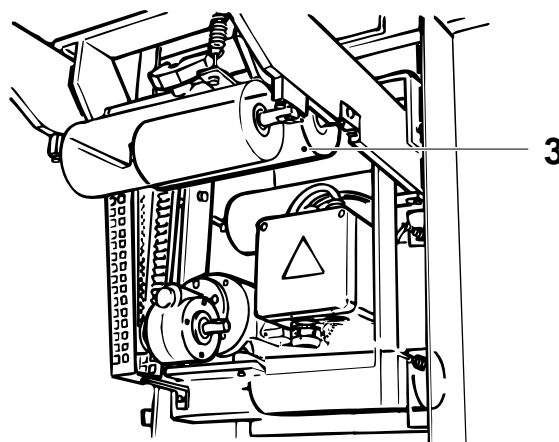
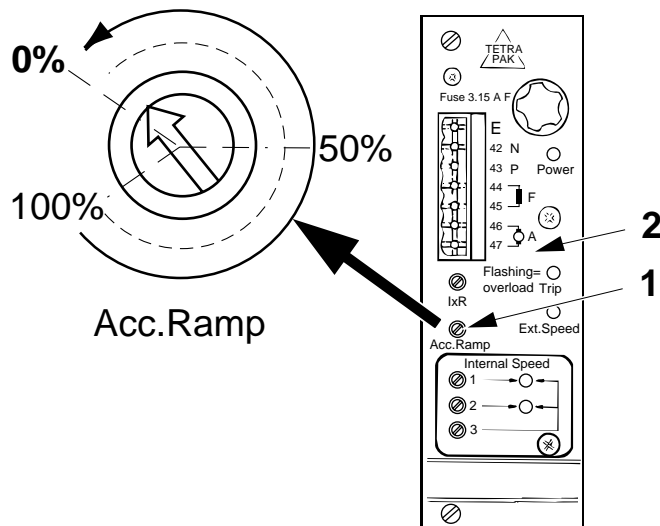
- 1 End piece
- 2 Bending roller
- 3 Proximity switch
- 4 Driven bending roller

6.1-3 Paper magazine - set bending roller speed

Machine status	Power On
Tools - tachometer - AT compatible PC	TP No. 90243-105
SPC reference	574921-010V

Push in the paper magazine to production position. Push **Alarm reset**. All three LEDs on the card A402 (1) are to be lit up.

- With the aid of the AT compatible PC, override output (%Q026). The power LED lights up.
- The driven bending roller (3) starts to rotate.
- Turn the potentiometer (1) fully counter-clockwise (FIG.1).



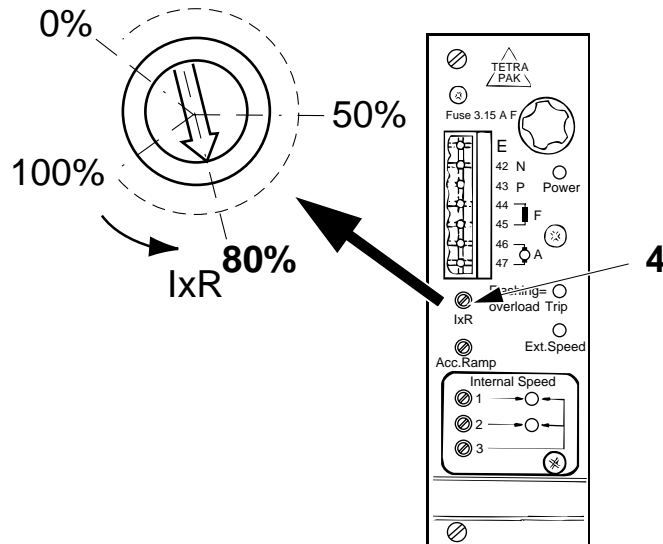
- Potentiometer
- Stop/safety module
- Bending roller

(Cont'd)

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(Cont'd)

- d) Turn the potentiometer (4) fully clockwise. Then turn it counter-clockwise approx. of the 20%.



4 Potentiometer

- e) Override outputs (%Q094) and (%Q095).

(Cont'd)

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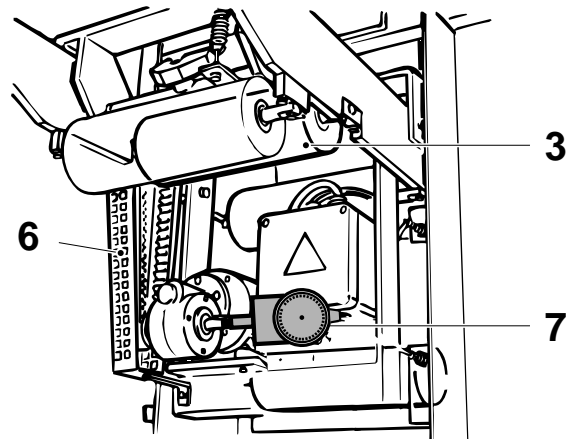
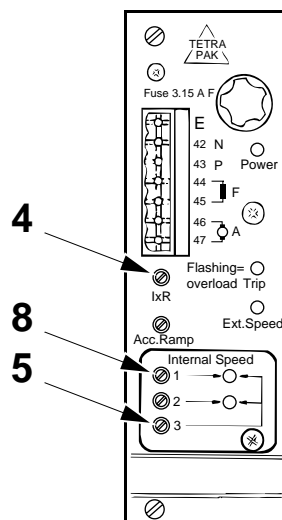
(Cont'd)

- f) With the potentiometer (5), set the speed of the bending roller motor to **60 rpm**. Adjust clockwise to increase the speed.



Note! If required, remove the cover (6) over the bending roller motor.

- g) Measure the speed with the tachometer (7).
- h) Break the driven bending roller (3) with your hand. If the speed decreases more than 4 rpm, adjust the speed on the potentiometer (4).
- i) Check that the speed is still correct. If required adjust on the potentiometer (5).
- j) Remove the override from the outputs (%Q094) and (%Q095).
- k) Override output (%Q095). With the potentiometer (8), set the min. speed of the driven bending roller, see page 516.
- l) Measure the speed with the tachometer.



- 3 Bending roller
4 Potentiometer
5 Potentiometer
6 Cover
7 Tachometer
8 Potentiometer

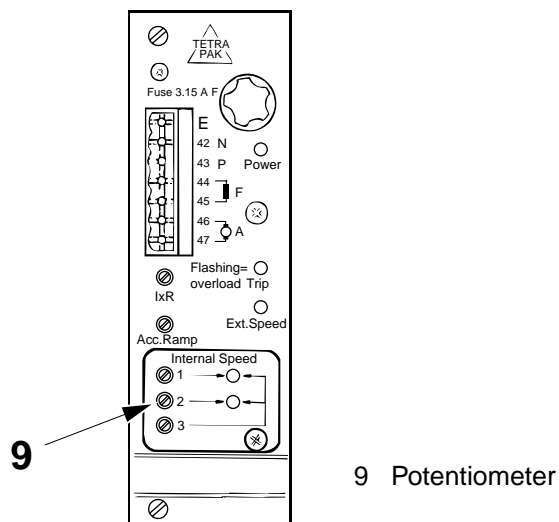
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- m) Remove the override from the output (%Q095).
- n) Override output (%Q094). Set the max. speed of the driven bending roller, see table below, with the potentiometer (10).
- o) Measure the speed with the tachometer.
- p) Remove the override from the PLC outputs (%Q026) and (%Q094).
- q) If removed, fit back the cover over the motor.

Package	Capacity 7500 p/h		Capacity 6000 p/h	
	Min. speed	Max. speed	Min. speed	Max. speed
100 B	65	85	-	-
125 S	71	98	57	78
160 S	81	111	-	-
180 B	-	-	-	-
200 B	77	105	62	84
200 M	95	120	-	-
200 S	95	130	76	104
236 B	-	-	-	-
250 B	90	123	72	98
250 S	102	140	82	112
284 B	97	133	78	106
300 S	97	133	78	106
330 S	102	140	-	-

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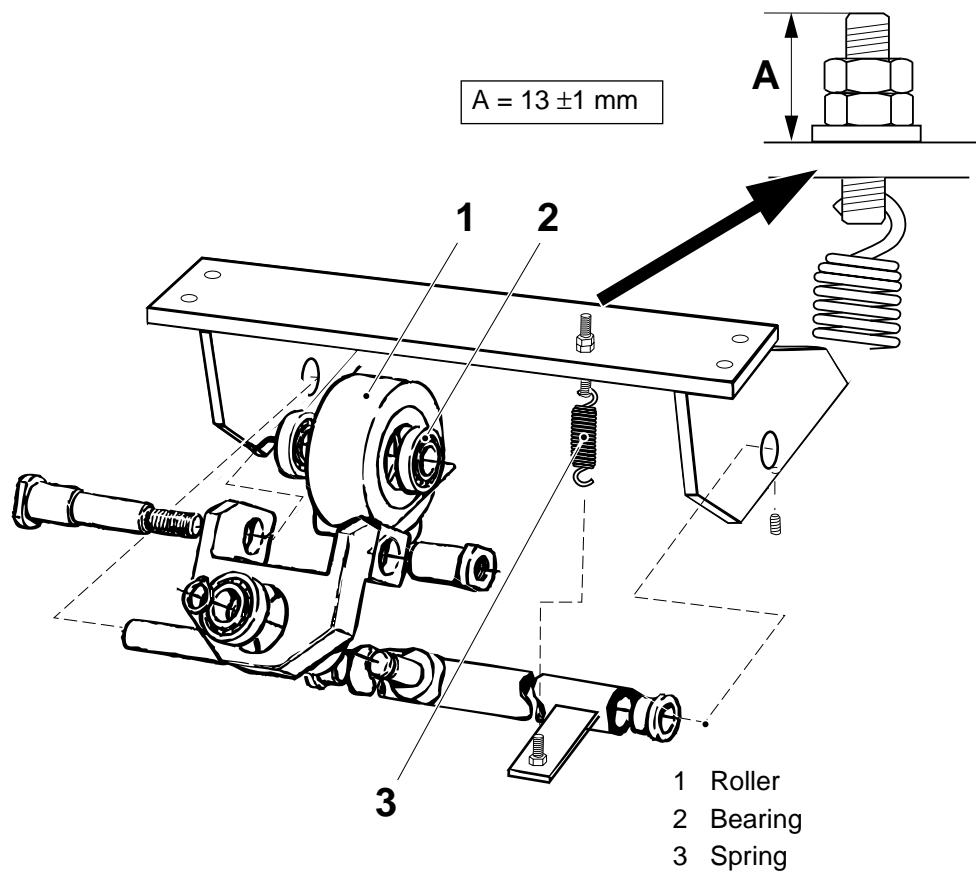


6.1.1 Brake

6.1.1-1 Brake - check

SPC reference	578682-010V
---------------	-------------

- Check that the roller (1) is clean and undamaged. Clean or change the roller as required.
- Make sure that the roller rotates freely. Change the bearings (2) as required.
- Make sure that the spring (3) is undamaged. Change as required.
- Make sure that there is distance A between the screw and the plate.

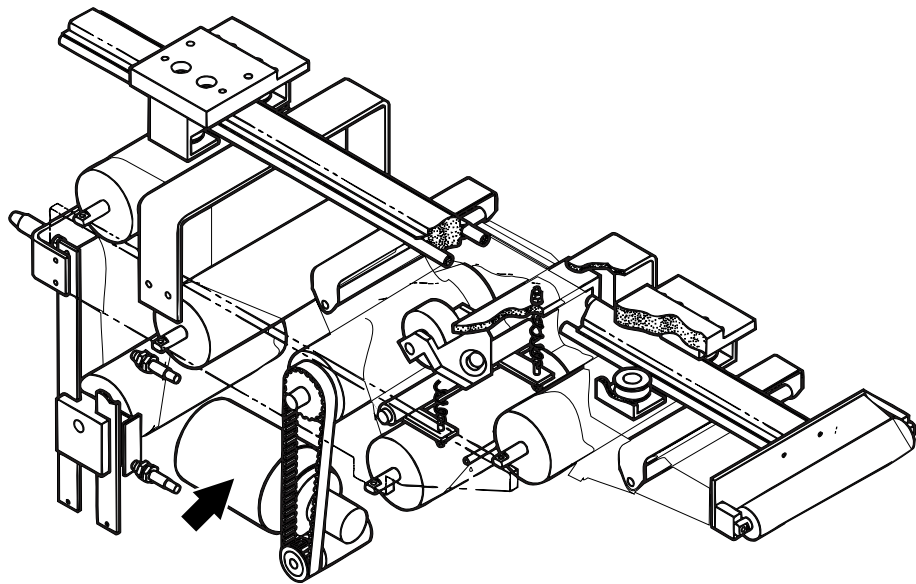


6.1.2 Bending roller motor

6.1.2-1 Bending roller motor - change carbon brushes

SPC reference	574921-010V
---------------	-------------

- a) Pull out the paper magazine.
- b) Remove the protection cover from the motor.
- c) Unscrew the two carbon brushes and change them.
- d) Fit back the protection cover.

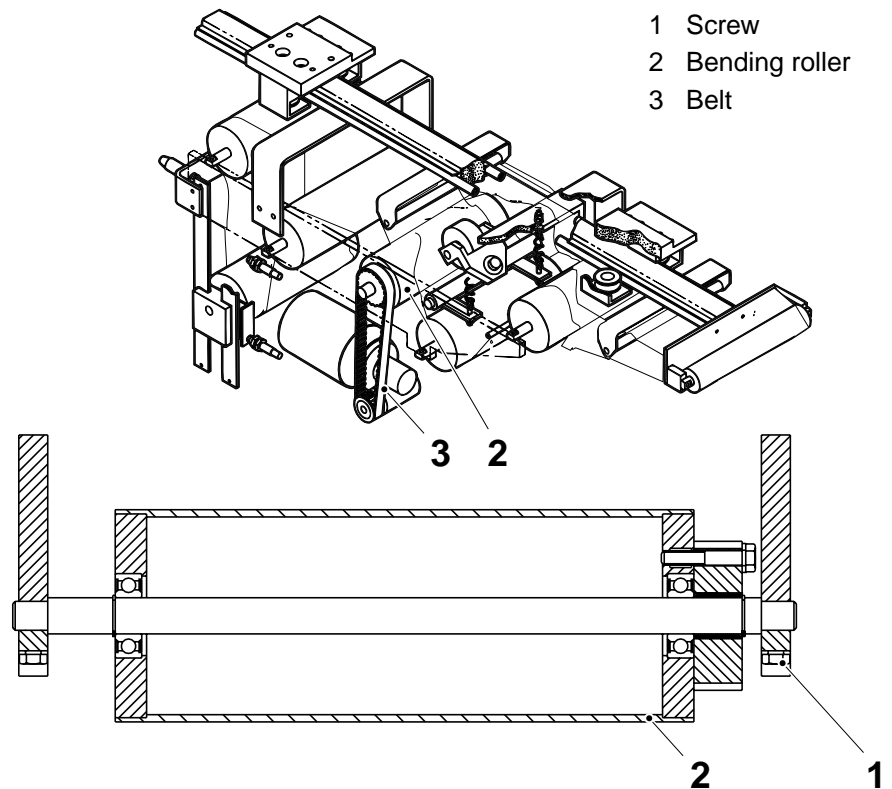


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6.1.2-2 Bending roller motor - change belt

SPC reference	574921-010V
---------------	-------------

- a) Pull out the paper magazine.
- b) Remove the protection cover from the motor.
- c) Unscrew the screws (1), lower the bending roller (2) and lift off the belt (3).
- d) Change the belt.
- e) Assemble in the reverse order.



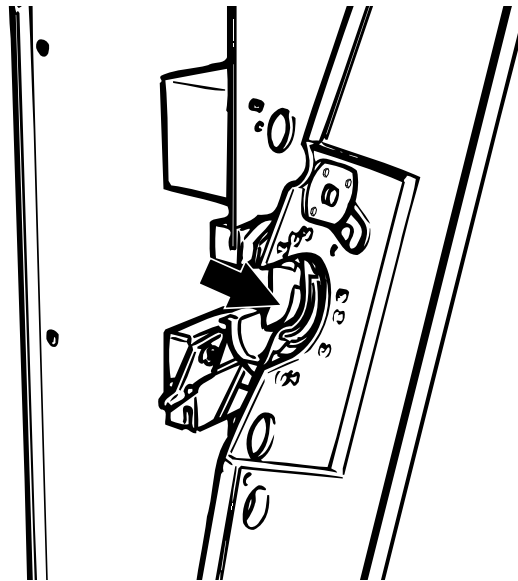
6.2 Cover

SPC reference	574922-010V
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6.2-1 Cover - check bearing blocks

SPC reference	574922-010V
---------------	-------------

- a) Lower the packaging material magazine cover to its **lowest** position.
- b) Make sure that the bearing blocks are not worn out. The reel holder must not touch the cover. If required, remove the cover and change the bearing blocks, see 6.2-2 *Cover - remove*.

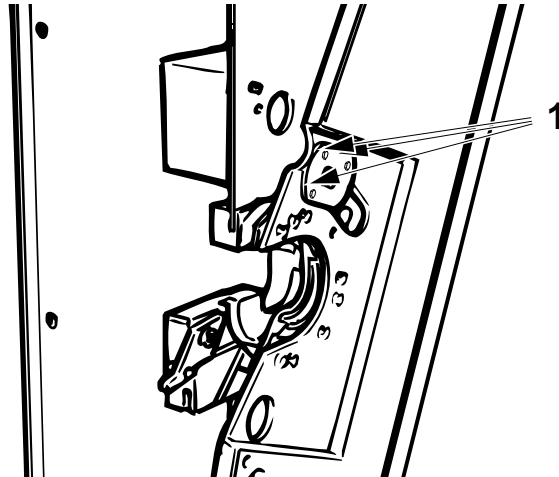


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6.2-2 Cover - remove

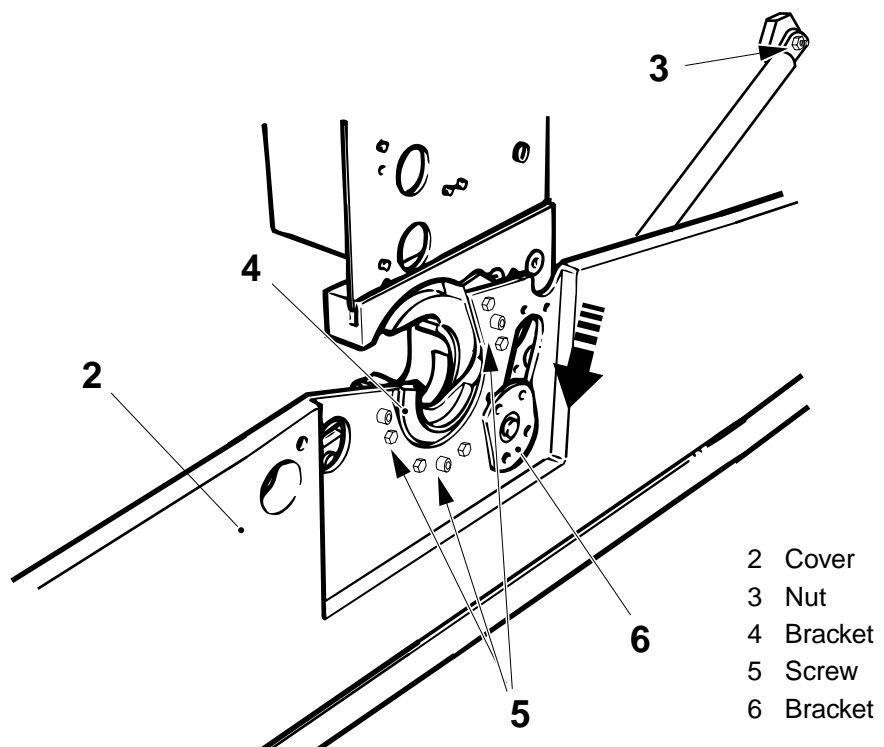
SPC reference	574922-010V
---------------	-------------

- a) Lower the packaging material magazine cover to its **lowest** position.
- b) Unscrew the screws (1).



1 Screw

- c) Raise the cover (2) to its **intermediate** position. Make sure that the brackets (6) are in their lower positions.
- d) Unscrew the nuts (3) and remove the dampers from the axles.
- e) Unscrew the screws (5), remove the brackets (4), the slide rings, and the cover.
- f) Assemble, see 6.2-3 *Cover - assemble*.

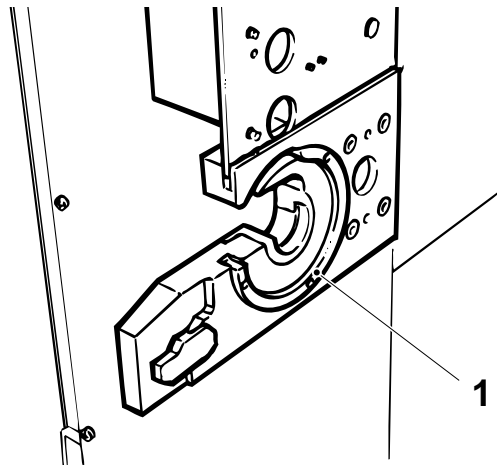


2 Cover
3 Nut
4 Bracket
5 Screw
6 Bracket

6.2-3 Cover - assemble

SPC reference	574922-010V
---------------	-------------

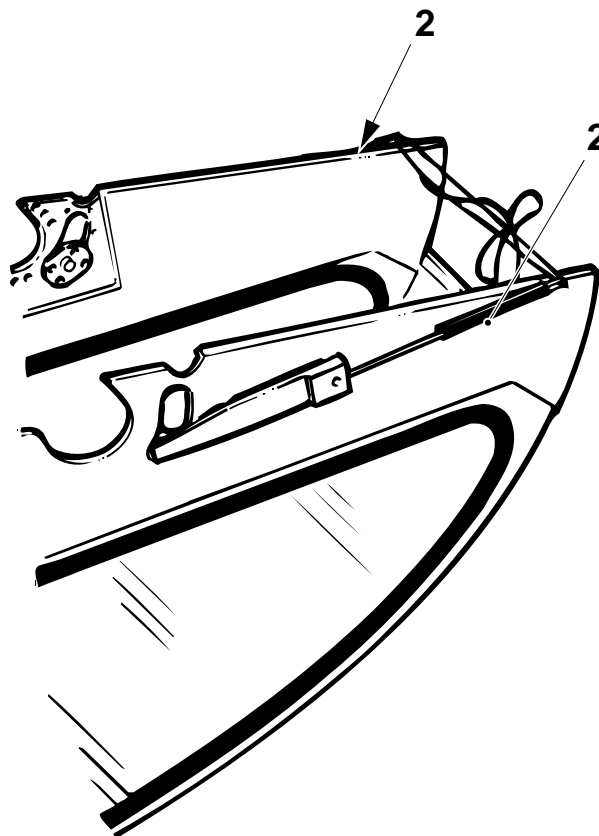
- a) Put the slide rings (1) in the tracks.



1 Slide ring

Note! Before fitting the cover tie up the dampers (2).

- b) Place the cover in the cassette.

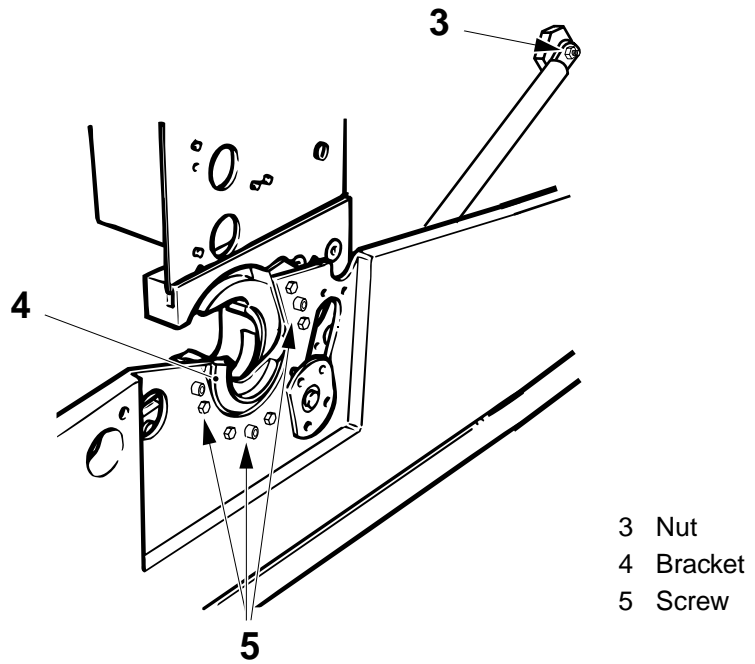


2 Damper

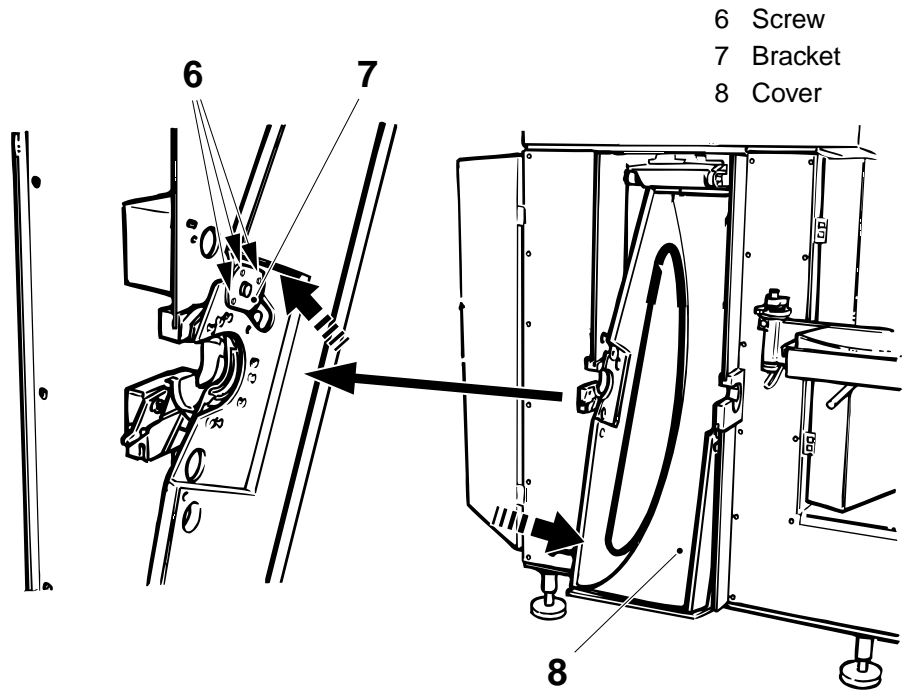
(Cont'd)

(Cont'd)

- c) Fit the brackets (4), lift the cover and fit the screws (5).
- d) Untie the dampers and fit them on their axles. Fit the nuts (3).



- e) Lower the packaging material magazine cover (8) to its **lowest** position. Make sure that the brackets (7) are in their upper position.
- f) Fit the screws (6).



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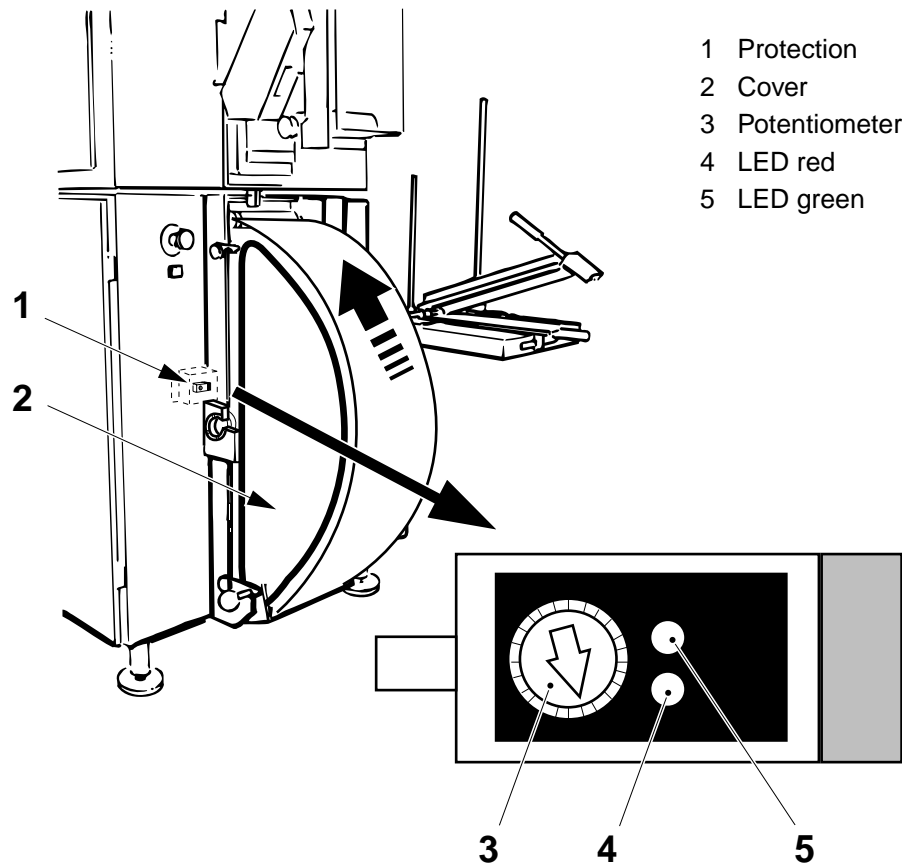
6.2-4 Cover - set photocell

Machine status	Power On
SPC reference	574922-010V

Note! There are **two different types** of photocells. Make sure to follow the correct instruction!

Photocell type 1

- a) Remove the photocell protection (1). Close the cover (2).
- b) Turn the potentiometer (3) fully clockwise (the LEDs (4) and (5) light up).
- c) Turn the potentiometer slowly counter-clockwise until the LEDs (4) and (5) go out and then clockwise until the LED (5) **just** lights up again.
- d) Put a packaging material reel in position and check that both LEDs (4) and (5) light up.
- e) Fit the protection (1).



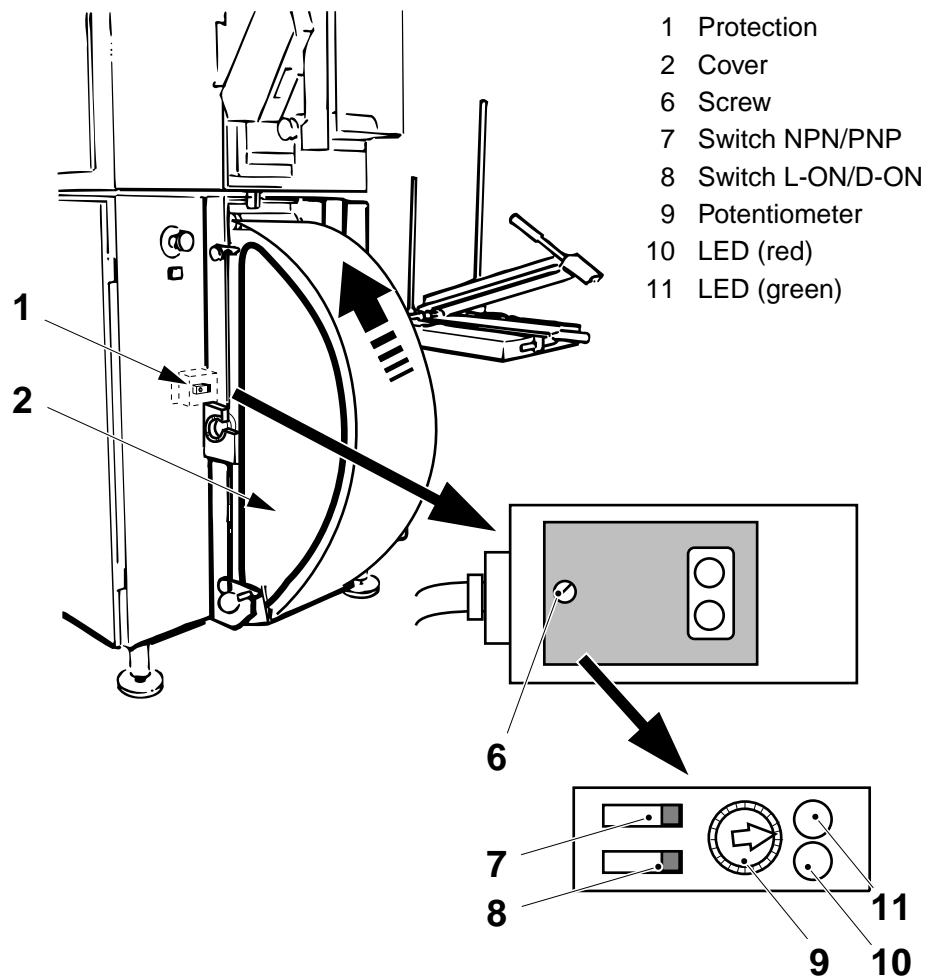
- 1 Protection
- 2 Cover
- 3 Potentiometer
- 4 LED red
- 5 LED green

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(Cont'd)

*(Cont'd)***Photocell type 2**

- a) Remove the photocell protection (1). Close the cover (2).
- b) Unscrew the screw (6) and remove the cover.
- c) Set the switch (7) in position **PNP** and the switch (8) in position **D-ON**.
- d) Turn the potentiometer (9) fully clockwise (the LEDs (10) and (11) lights up).
- e) Turn the potentiometer slowly **counter-clockwise** until the LEDs go out and then slowly **clockwise** until they just light up.
- f) Put a packaging material reel in position and make sure that the LED (10) go out. The LED (11) should remain lit up.
- g) Fit back the cover and tighten the screw (6).
- h) Fit back the protection (1).



6.3 Splicing device

SPC reference	271699-050V
---------------	-------------

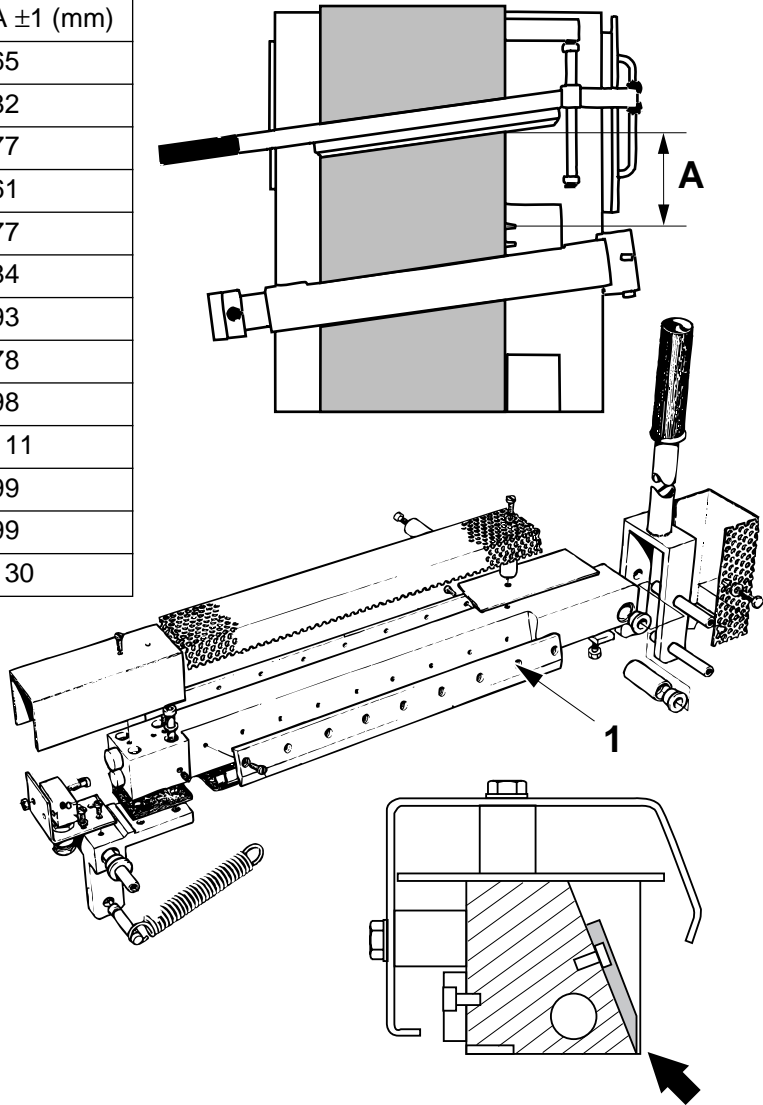
6.3-1 Splicing device (standard) - set

Tools - pyrometer	
SPC reference	271699-050V



- Set the knife (1) so that the edge is in level with the bottom of the sealing arm.
- Set distance A, see table. The overlap in the sealing zone is to be 10 - 15 mm on both sides.

Package	A ±1 (mm)
100 B	65
125 S	82
160 S	77
180 B	61
200 B	77
200 M	84
200 S	93
236 B	78
250 B	98
250 S	111
284 B	99
300 S	99
330 S	130



1 Knife

(Cont'd)

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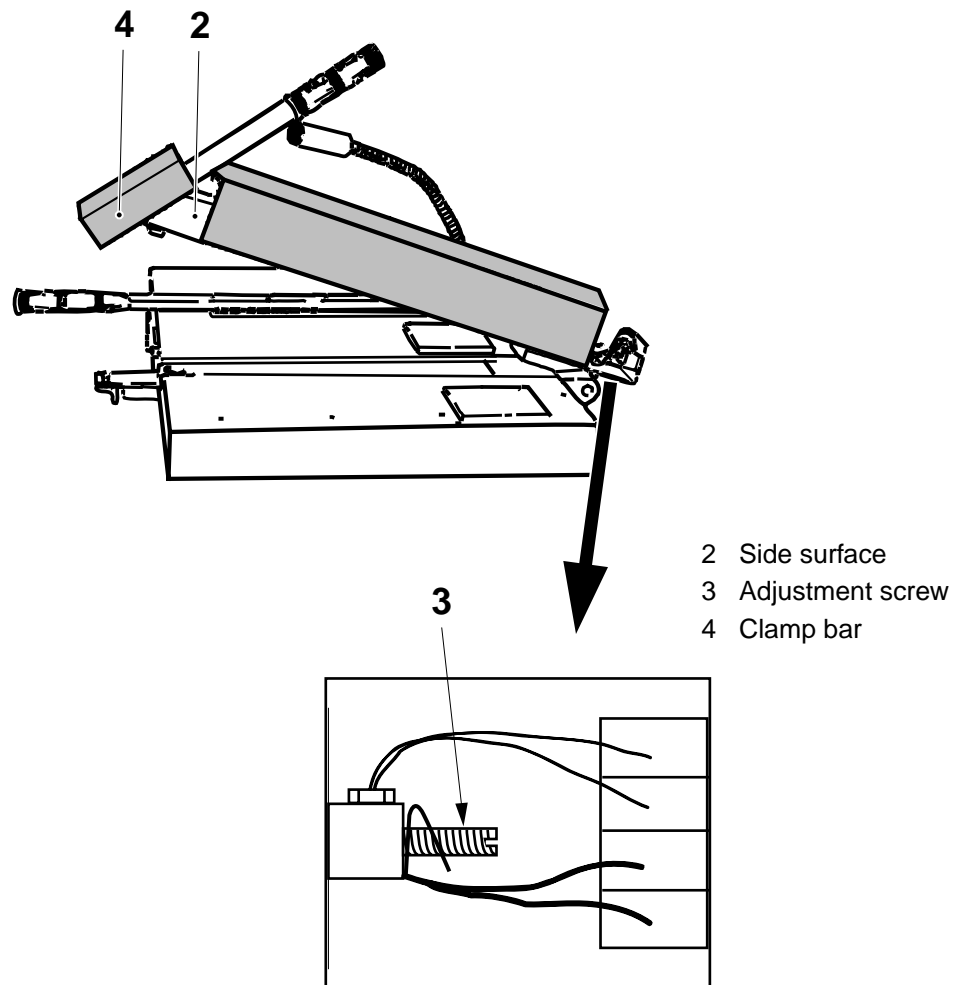
(Cont'd)

c) Step up the machine to **Preheating I** and wait for approx. 10 minutes.

d) Remove the cover and set the temperature of the outer sealing arm to approx. 200° C by means of the screw (3). Measure the temperature with the aid of the pyrometer in the center of the arm length.



Note! Measure on the side surface (2) of the heating element, as close to the clamp bar (4) as possible.



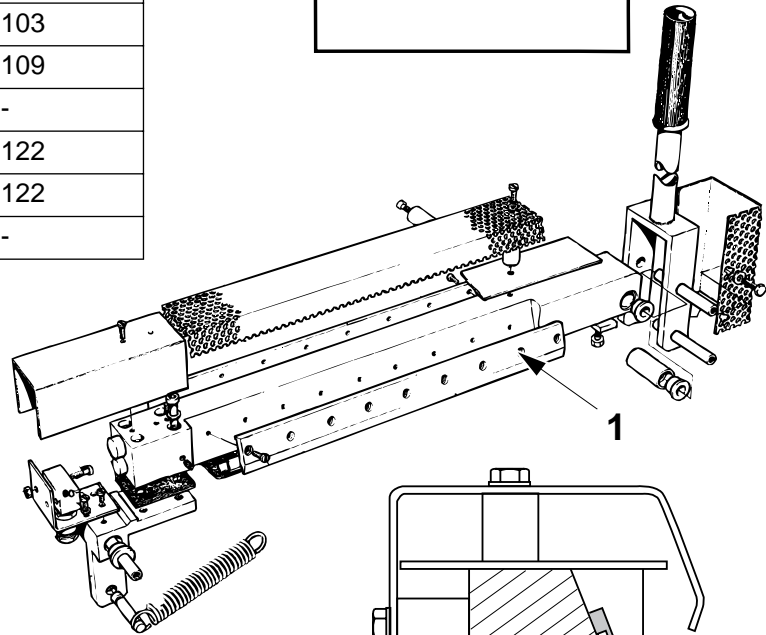
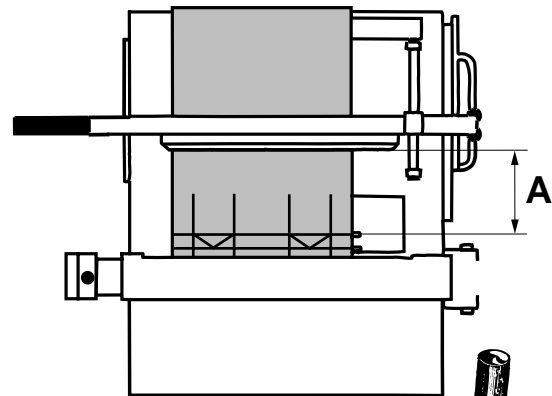
6.3-2 Splicing device (option) - set

Tools - pyrometer	
SPC reference	581070-010V

Note! This instruction is valid for the straight splicing table (option), used for Offset 1.

- a) Set the knife (1) so that the edge is in level with the bottom of the sealing arm.
- b) Set distance A, see table. The overlap in the sealing zone is to be 10 - 15 mm on both sides.

Package	A ±0.5 mm
100 B	-
125 S	219
160 S	-
180 B	211
200 B	86
200 M	-
200 S	122
236 B	103
250 B	109
250 S	-
284 B	122
300 B	122
330 S	-



1 Knife

(Cont'd)

2.2B0794F03.en

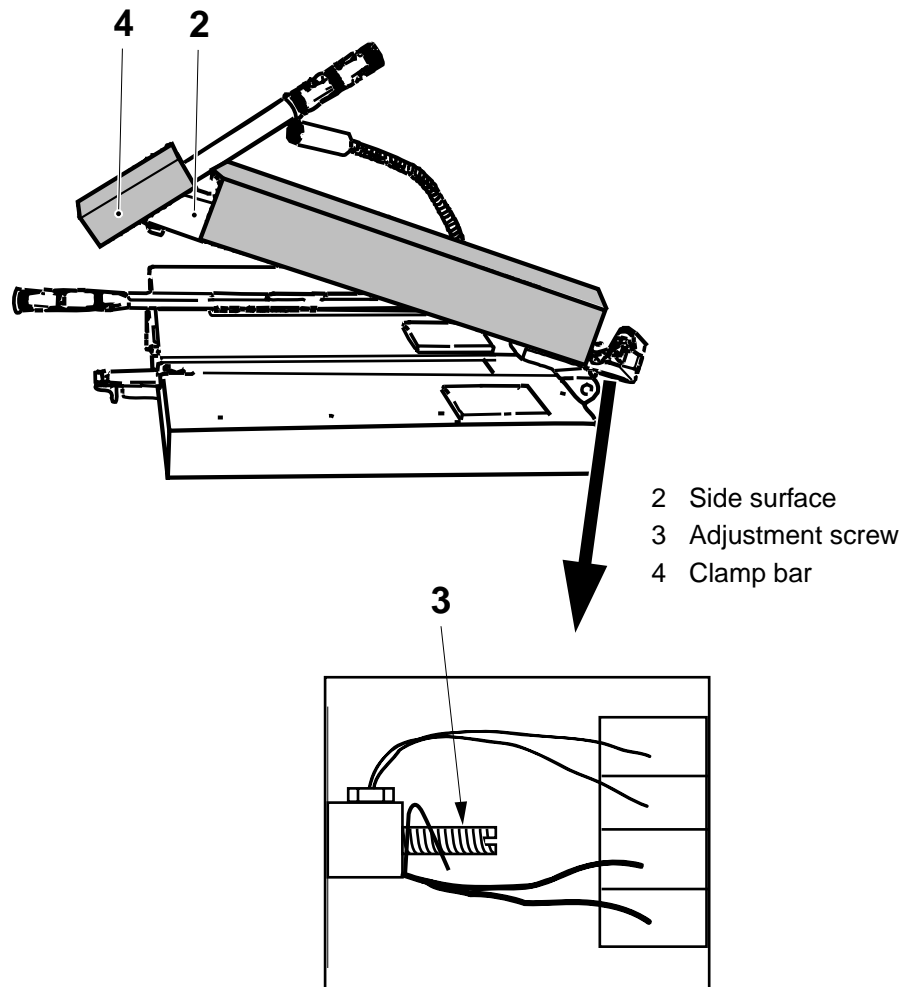
(Cont'd)

c) Step up the machine to **Preheating I** and wait for approx. 10 minutes.

d) Remove the cover and set the temperature of the outer sealing arm by means of the screw (3) to approx. 200° C. Measure the temperature with the aid of the pyrometer.



Note! Measure on the side surface (2) of the heating element, as close to the clamp bar as possible.



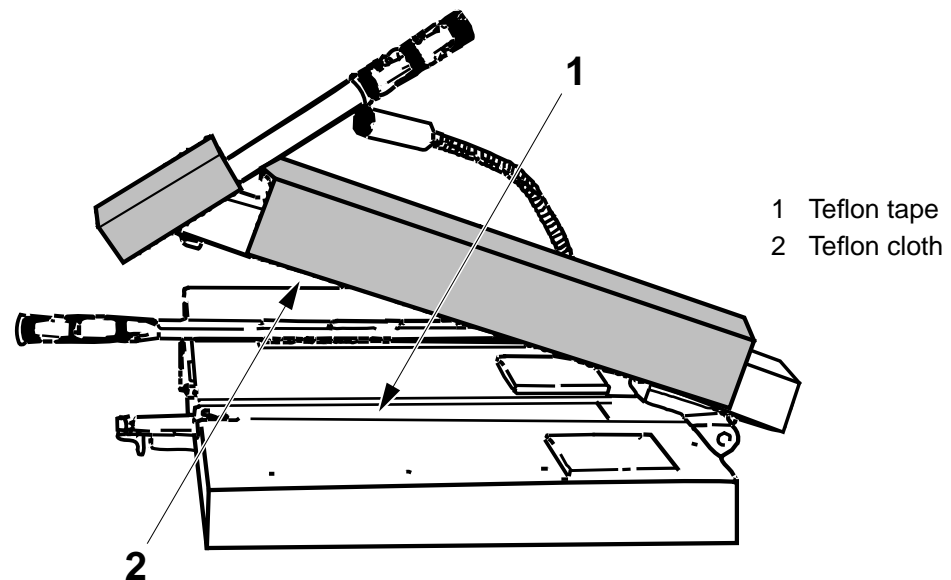
6.3.1 Heating block and counter rail

6.3.1-1 Heating block and counter rail - check teflon tape and cloth

Consumable - degreasing agent	
Tools - hot-air gun	
SPC reference	37877-030V 37894-030V

Check that the teflon tape (1) and teflon cloth (2) are not worn and/or damaged.

If required, change as follows.

**Change**

- Remove the old teflon tape from the counter rail.
- Degrease the surface of the counter rail. Heat it up to approx. 80 °C.

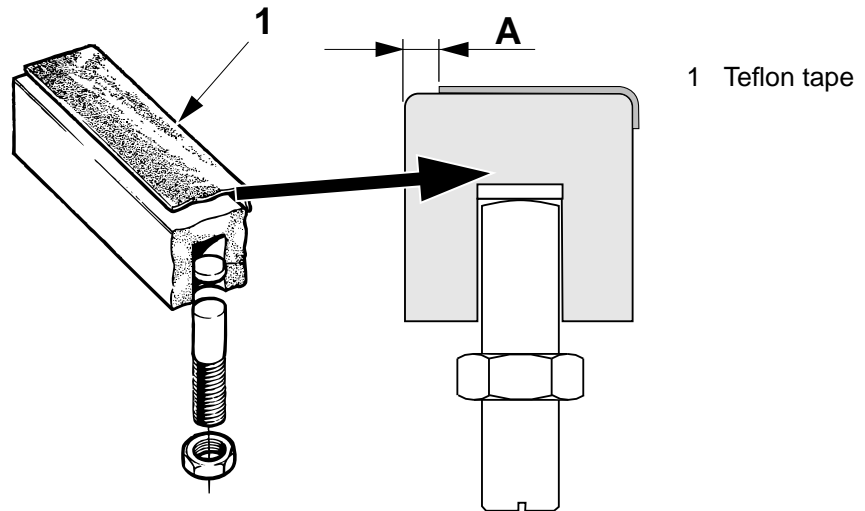
(Cont'd)



(Cont'd)

- c) Apply the new teflon tape (1) as illustrated.

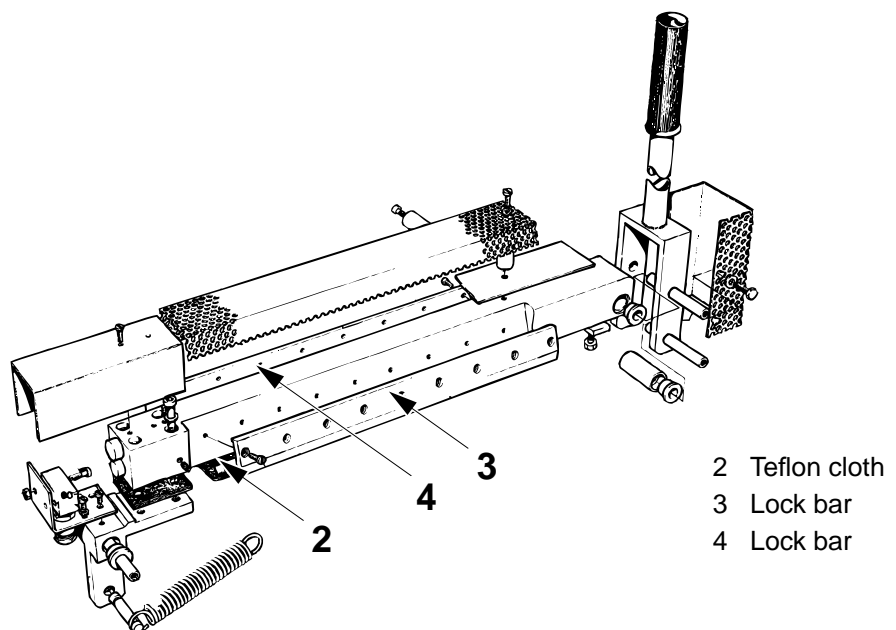
Note! Make sure that there are no air bubbles between the tape and the rail.



- d) Remove heat protection, the lock bars (3) and (4), and old teflon cloth from the heating block.
- e) Fit the new teflon cloth.

Note! Make sure to straighten the cloth properly.

- f) Fit back the lock bars and the heat protection.



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6.4 Valve panel

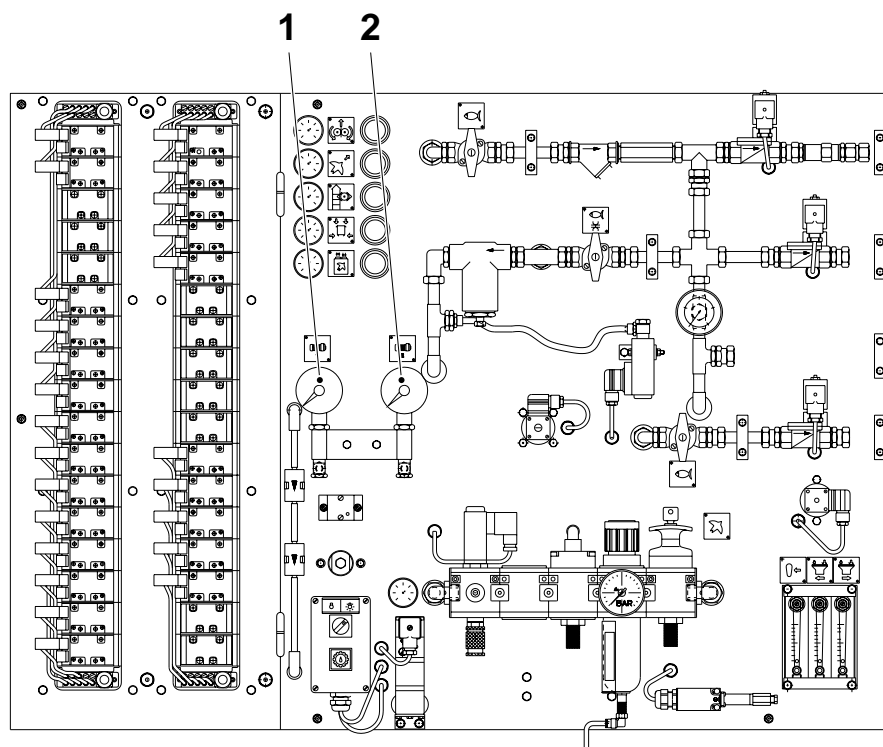
SPC reference	577826-010V
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6.4.1 Valve plate

6.4.1-1 Valve plate - check sterile air pressure

Machine status	Preheating II
SPC reference	577821-010V

Check that the pressure on the pressure gauges (1) and (2) is correct when the compressor is running. See *10.1 Technical data*.



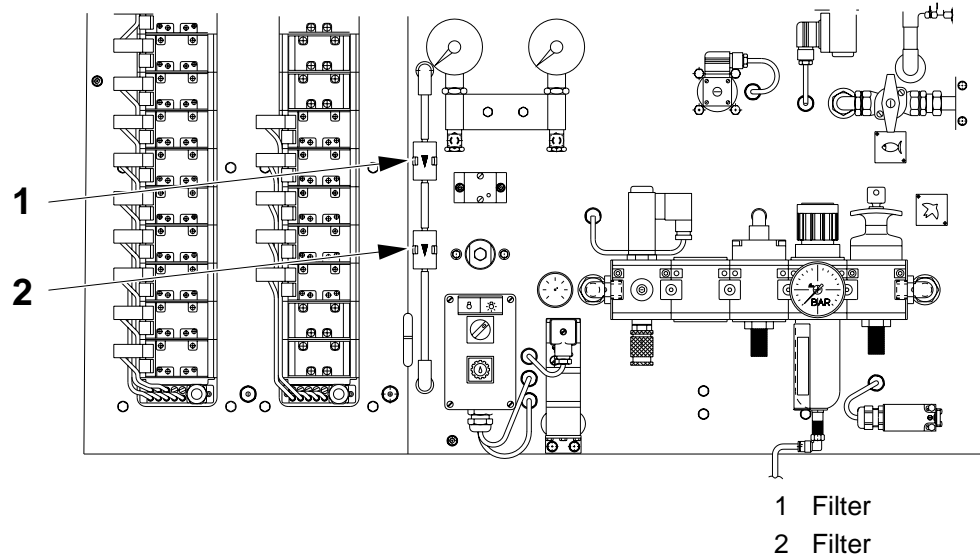
- 1 Pressure gauge
- 2 Pressure gauge

6.4.1-2 Valve plate - check photocell air filters

SPC reference	577821-010V
---------------	-------------

Check the colour of the air filters of the photocells.

- The liquid and gas filter (1) is to be changed if it is red.
- The moisture-absorbing filter (2) is to be changed if it is pink.

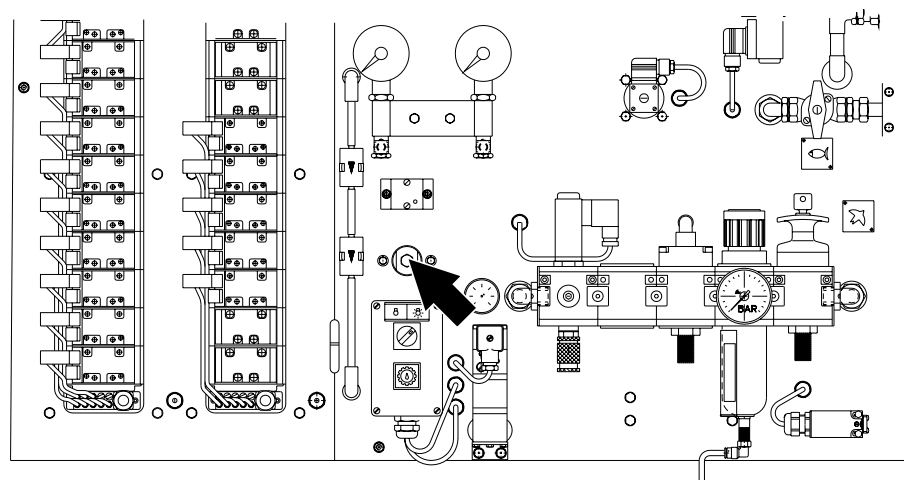


6.4.1-3 Valve plate - change spray filter cartridge

SPC reference	577821-010V
---------------	-------------

Note! Make sure that the air inlet is properly closed.

Unscrew the filter cover and change the filter cartridge.

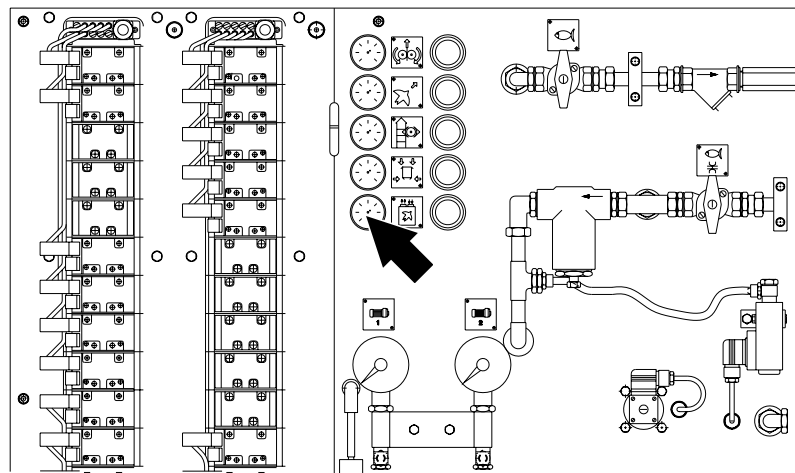


6.4.2 Pressure regulator group

6.4.2-1 Pressure regulator group - check photocell air pressure

Machine status	Air On Power On
SPC reference	577822-010V

Check that the air pressure is correct, see *10.1 Technical data*.

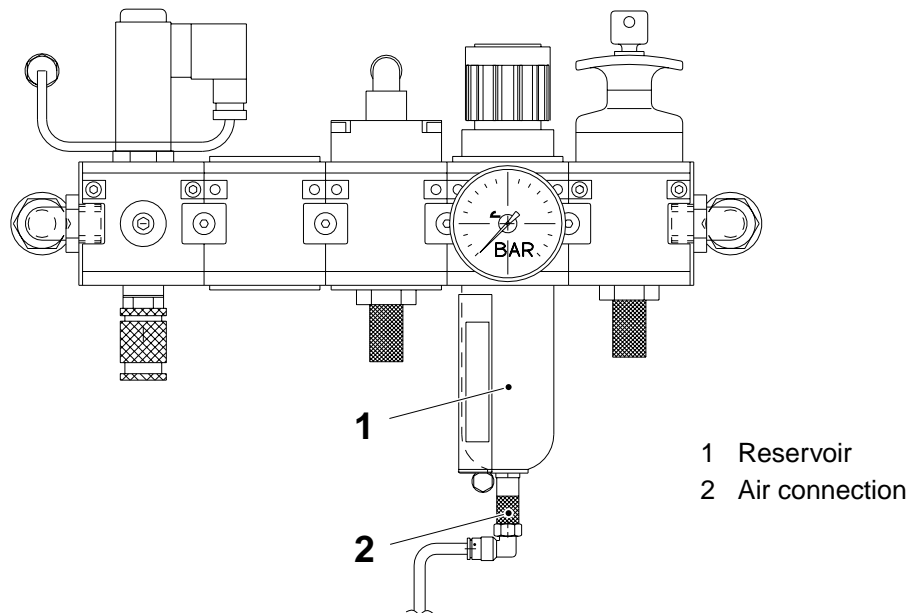


6.4.3 Air inlet group

6.4.3-1 Air inlet group - change filter insert

Consumables - soap	
SPC reference	577823-010V

- Unscrew the air connection (2) and remove the reservoir (1).
- Clean the reservoir with soapy water. Rinse with water.
- Remove and clean the filter cartridge with compressed air.
- Fit the reservoir. Make sure that the O-ring is correctly fitted.
- Open the air inlet valve and check that the filter regulator is tight.

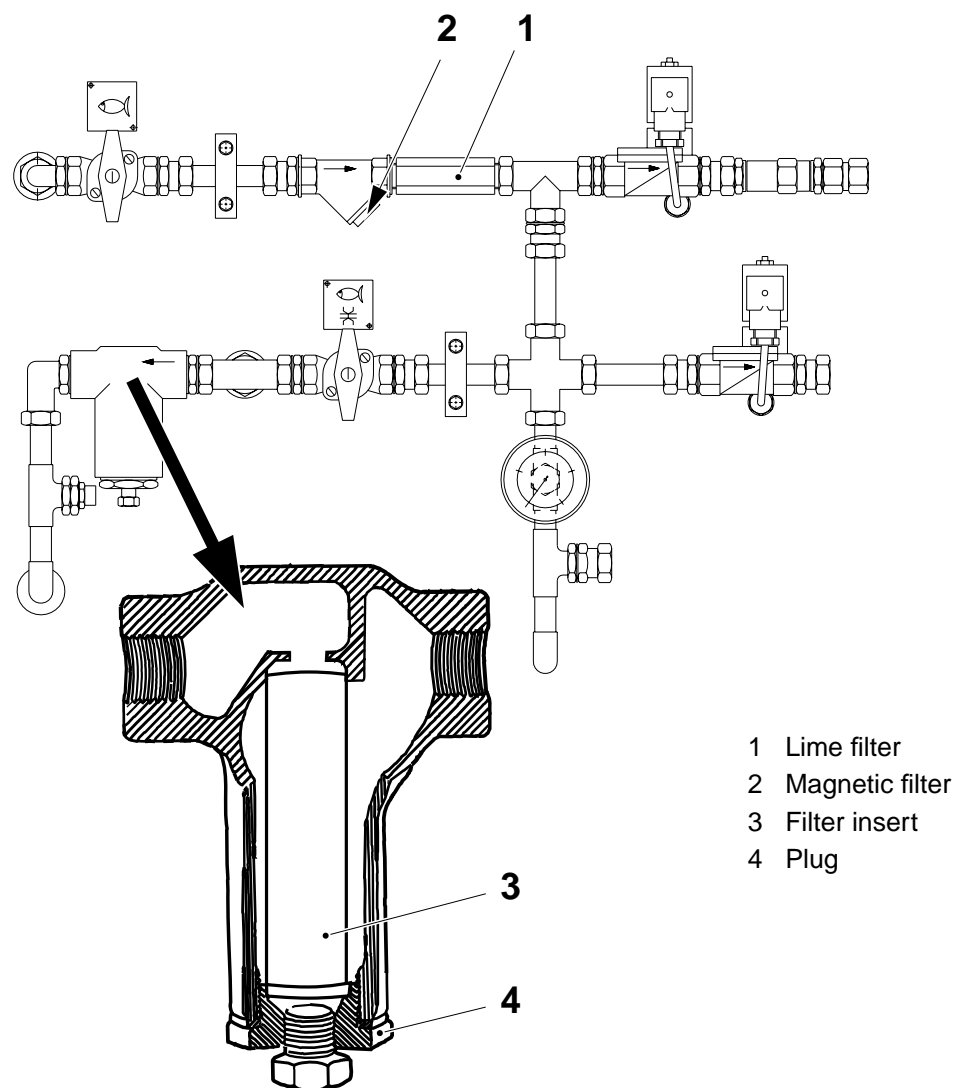


6.4.4 Cool water valve

6.4.4-1 Cool water valve - clean water filters

SPC reference	577824-010V
---------------	-------------

- a) Drain the water through the spray gun.
- b) Unscrew the plug (4) and pull out the filter insert (3). Blow the filter insert clean with compressed air and fit back.
- c) Remove the magnetic filter (2) and blow it clean. If the filter is badly clogged with lime deposits, remove and clean also the lime filter (1).
- d) Fit the filters.



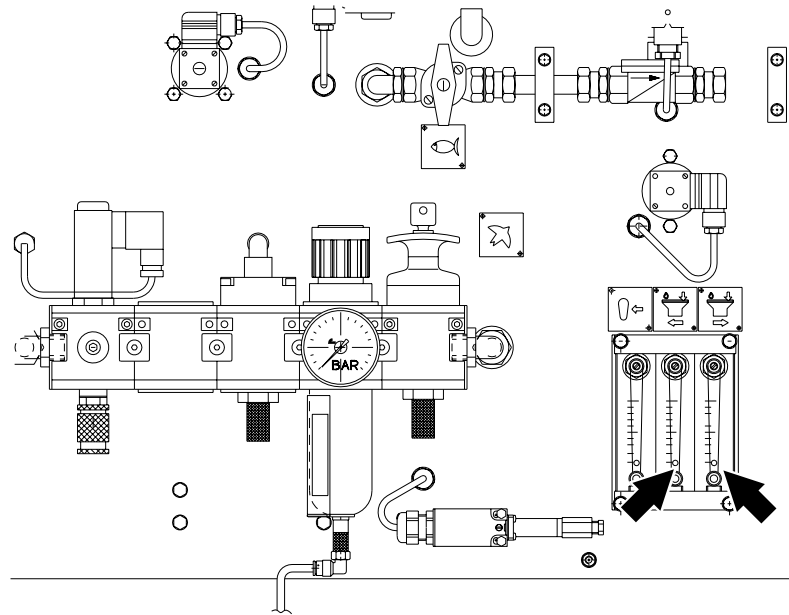
6.4.5 Flow meter

6.4.5-1 Flow meter - check flows

Machine status	Water On
SPC reference	577835-010V

Check that the correct water flows are shown on the flow meters, see section *10.1 Technical data*.

Record the results.



6.5 Peroxide and sterile systems

SPC reference	978834-010V
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6.5-1 Peroxide and sterile systems - check for leaks

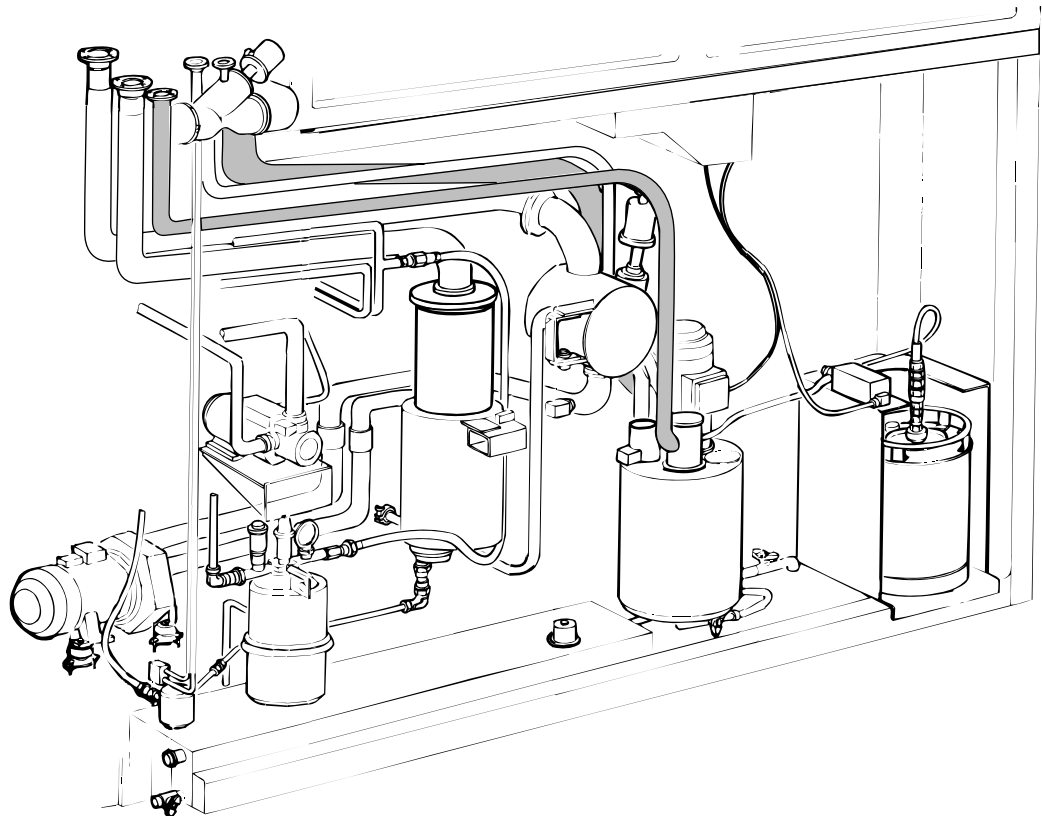
Machine status	Preheating II
SPC reference	978834-010V



Hydrogen peroxide!

Follow the *Safety precautions*.

When hydrogen peroxide is being pumped through the system, check that components, pipe connections, and pipes (marked grey) do not leak.



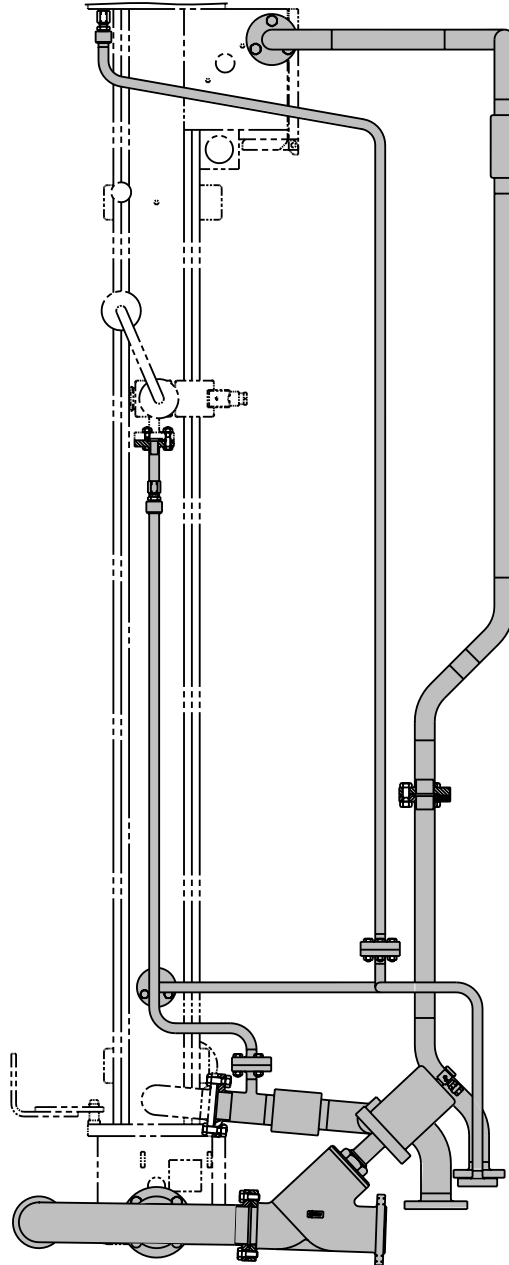
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(Cont'd)

Take actions to eliminate any leakage.

See also 1.13-2 *Spray system - check for leaks.*



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6.5-2 Peroxide and sterile systems - check safety lids

SPC reference	751373-020V 751398-030V
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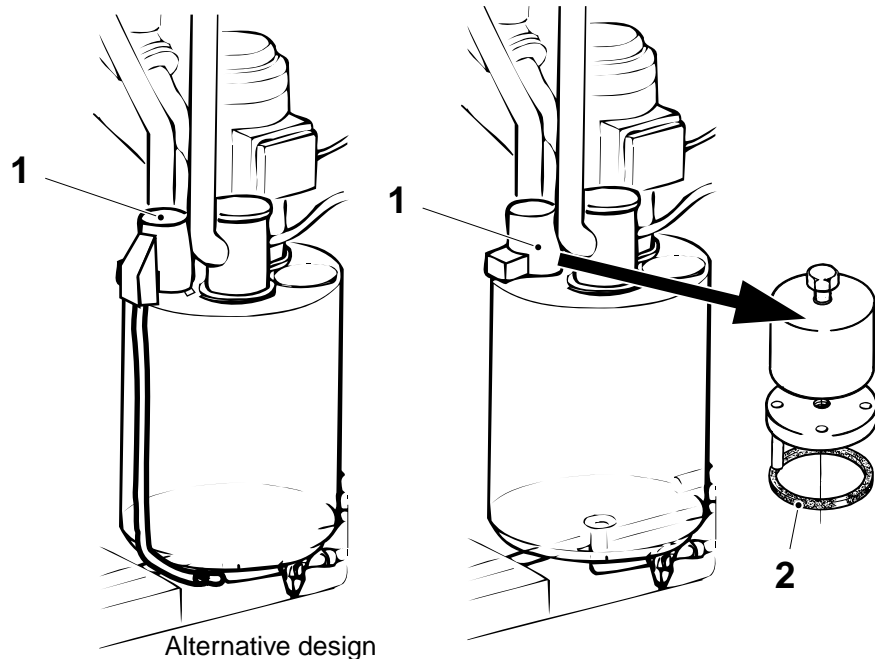
Hydrogen peroxide!
Follow the *Safety precautions*.

Peroxide tank

- a) Remove the cover (1) and make sure that the safety lid is loose and easy to lift.
- b) Check the strip (2) under the safety lid. Change as required

Alternative design

Check the gasket under the cover. Change the gasket as required.



Alternative design

- 1 Cover
- 2 Strip

(Cont'd)

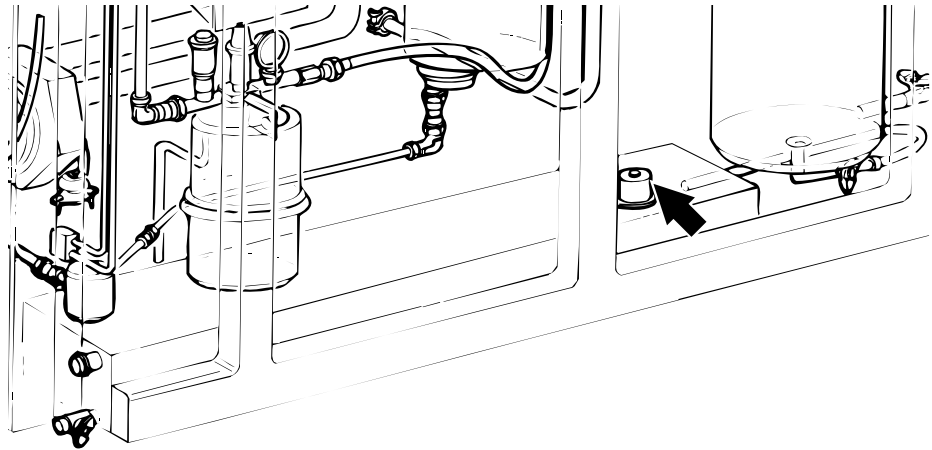
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(Cont'd)

Dilution tank

Check that the safety lid is loose and easy to lift. Check the O-ring under the cover.

Change as required.

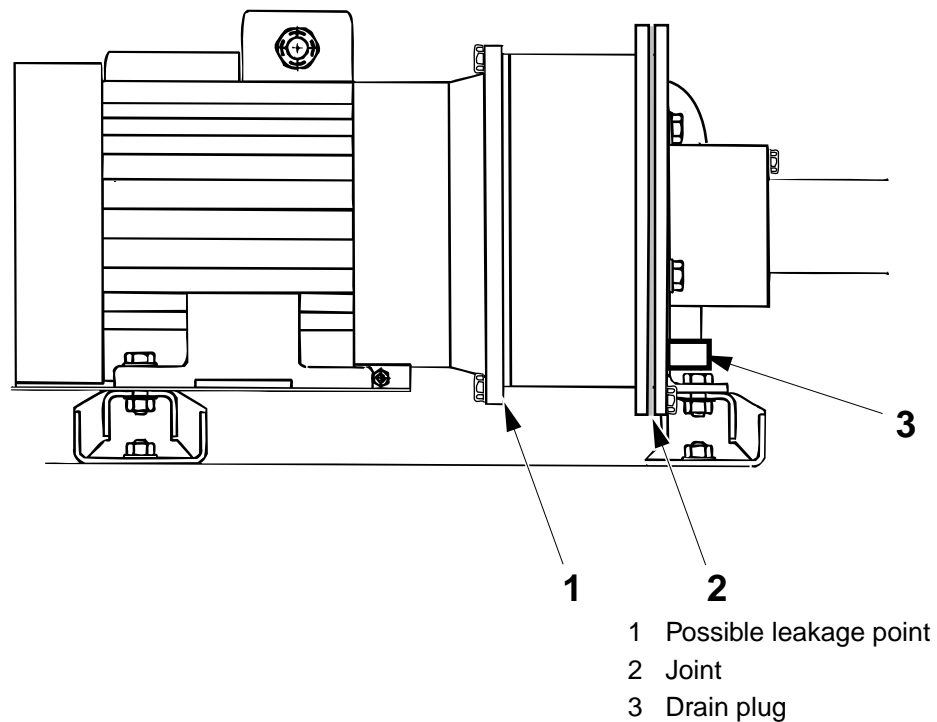


6.5.1 Compressor unit

6.5.1-1 Compressor unit - check for leaks and vibrations

Machine status	Preheating II
SPC reference	469452-040V

- a) Check that the compressor is running without any abnormal sounds. Abnormal sound may be caused by dirt. If required, remove the drain plug (3) and flush with water to clean the compressor.
- b) Check that the axial sealing of the compressor does not leak. Any leakage can be seen on the underside at the joint (2) between the motor and the compressor housing.
- c) Check that there is no leakage at point (1). If required, overhaul the compressor, see 6.5.1-2 *Compressor unit - change seals*.



6.5.1-2 Compressor unit - change seals

Tools - extractor	TP No. 74305-101
SPC reference	469452-040V

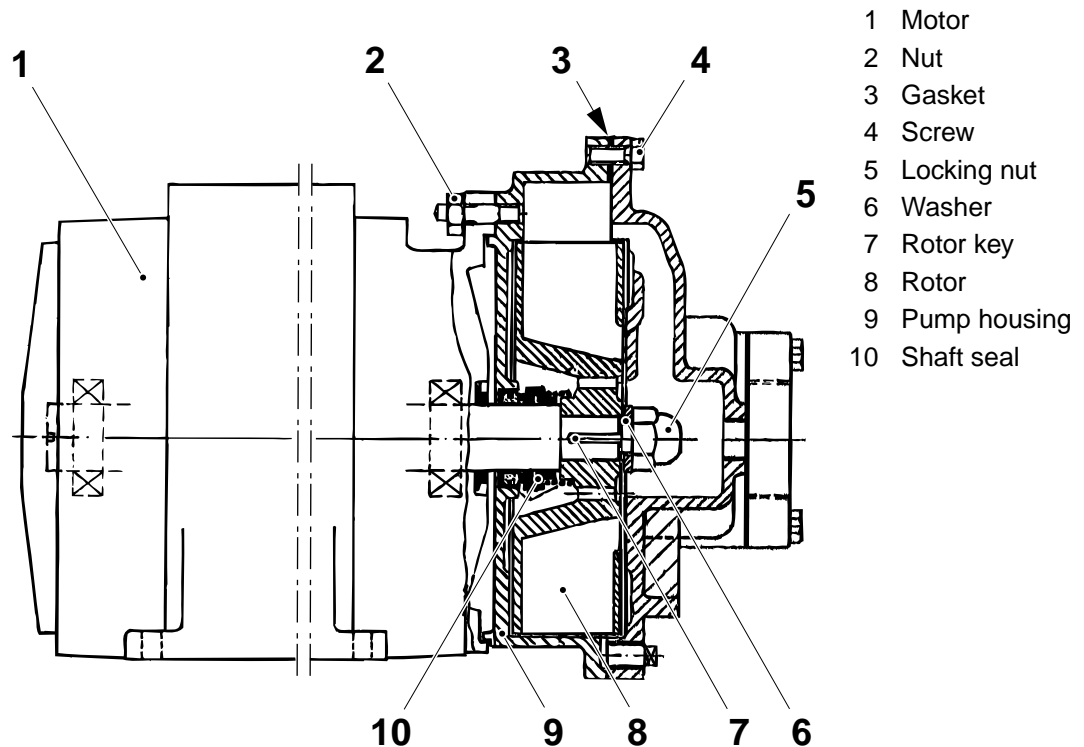


Removal

- a) Remove the compressor cover.
- b) Unscrew the screws (4) and remove the gasket (3).
- c) Remove, with the aid of the extractor (there are two holes in the rotor), the locking nut (5), the washer (6) and the rotor (8).
- d) Remove the rotor key (7).

Note! Take care not to damage the surfaces of the shaft seal (10) when removing the pump housing.

- e) Unscrew the nuts (2) and separate the pump housing (9) from the motor (1). The shaft seal (10) will come off with the pump housing. Change the mechanical shaft seal.



- 1 Motor
- 2 Nut
- 3 Gasket
- 4 Screw
- 5 Locking nut
- 6 Washer
- 7 Rotor key
- 8 Rotor
- 9 Pump housing
- 10 Shaft seal

(Cont'd)

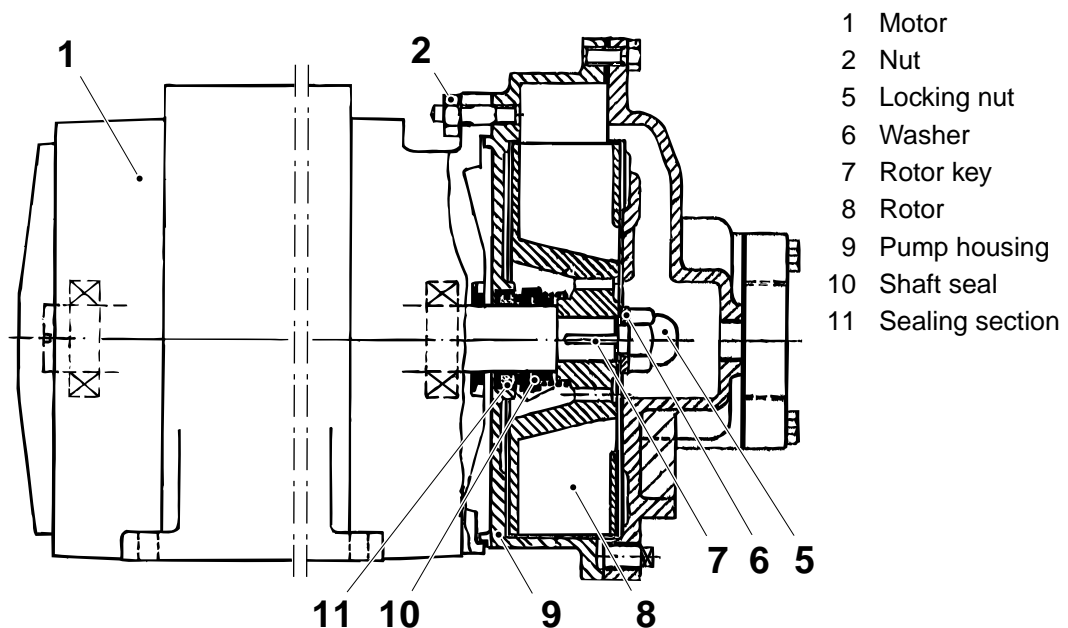
(Cont'd)

- f) Remove the fixed sealing section (11) from the pump housing (9) by applying an even pressure from the motor side. Change the fixed sealing section.

Caution! Do not put grease on the sealing surfaces.

Assembly

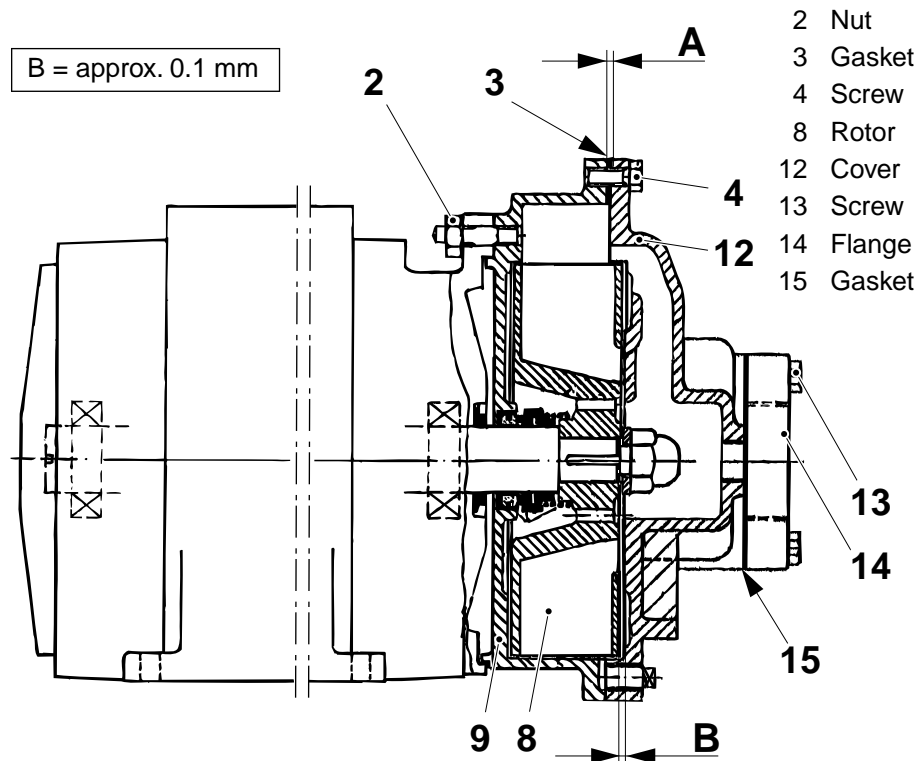
- a) Fit the fixed sealing section (11) and the shaft seal (10) in the pump housing (9) using a thin film of oil on the rubber sleeve.
- b) Fit the pump housing on the motor (1) and tighten the nuts (2).
- c) Fit the rotor key (7) in the keyway, fit the rotor (8), the washer (6) and the locking nut (5). Tighten the locking nut firmly.



(Cont'd)

(Cont'd)

- Note!** Before tightening the screws (4), loosen the nuts (2).
- d) Fit the gasket (3) and the end cover (12), and tighten the screws (4).
 - e) Fit shims at the four screws between the pump housing (9) and the mounting flange of the motor.
 - Shim thickness; measure distance A at the four screws. Add 0.1 - 0.2 mm to the average distance A.
 - f) Tighten the nuts (2). Make sure that there is distance B between the rotor (8) and the end cover is (measure through the inlet pipe or the outlet pipe).
 - g) Loosen the screws (4), make sure that the end cover is in the centre and tighten the screws.
 - h) Make sure that the rotor rotates freely. (Check by rotating the motor fan.)
 - i) Fit the inlet and outlet flanges (14). Fit the gasket (15) and tighten the screws (13).
 - j) Make sure that the rotor still can rotate freely. Fit back the compressor cover.



6.5.2 Peroxide tank

6.5.2-1 Peroxide tank - check pump for noise and vibrations

Machine status	Preheating II
SPC reference	751373-020V

Put a screwdriver in contact with the hydrogen peroxide pump and listen for abnormal noise or vibrations in the pump.

Change the pump as required, see 6.5.2-2 *Peroxide tank - change pump*.

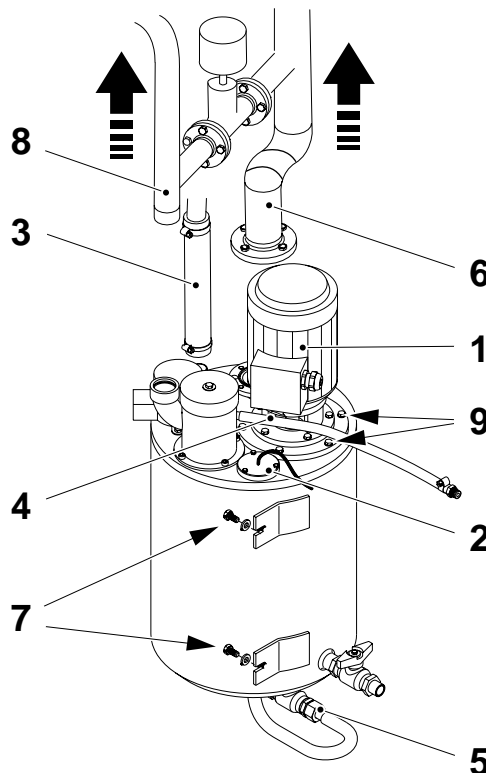
6.5.2-2 Peroxide tank - change pump

SPC reference	751373-020V
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Hydrogen peroxide!
Follow the *Safety precautions*.

- Drain the hydrogen peroxide and rinse the system with deionized water.
- Mark the electrical connections of the motor (1) and remove the cables.
- Remove the float (2).
- Loosen the hose clip and pull off the rubber hose (3) from the tank.
- Remove the hose (4) and the connection (5) from the tank.
- Unscrew the screws to the pipe (6).
- Unscrew the screws (7).
- Lift the pipes (6) and (8) so that they are not attached to the tank and lift out the tank.
- Unscrew the screws (9) and remove the pump.
- Change the pump and assemble in the reverse order.



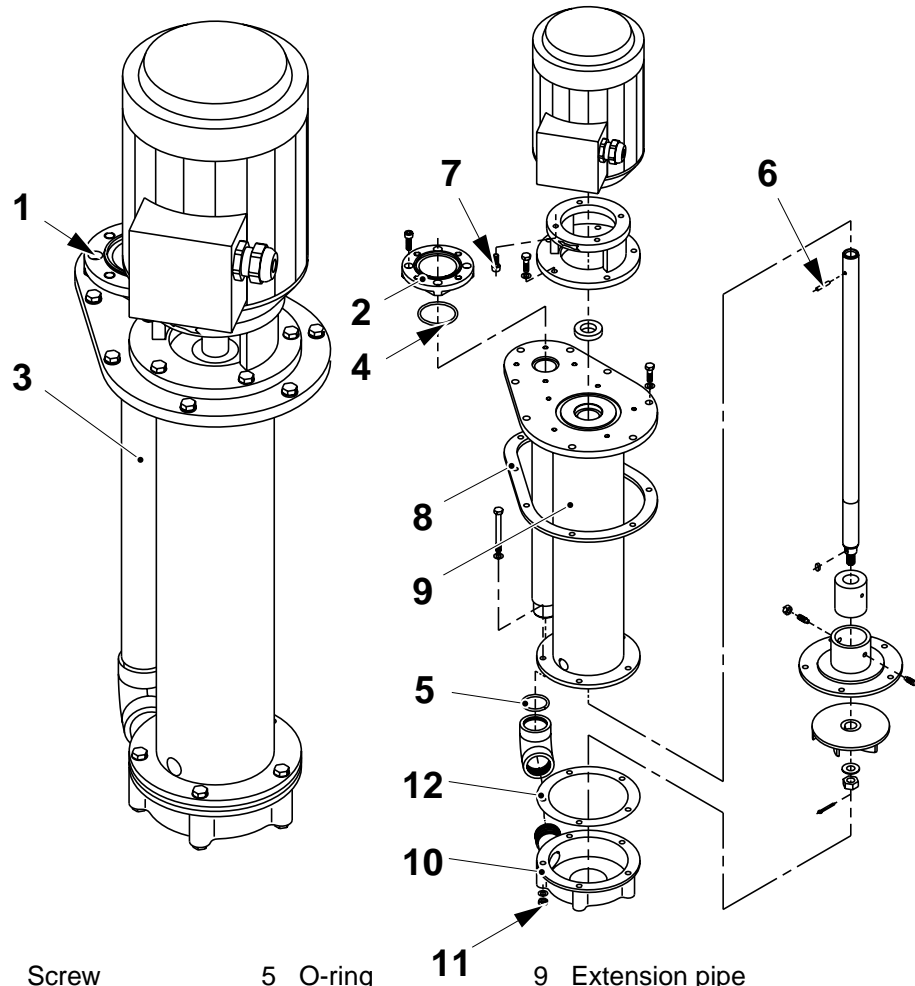
- Motor
- Float
- Rubber hose
- Hose
- Connection
- Pipe
- Screw
- Pipe
- Screw

6.5.2-3 Peroxide tank - overhaul pump

SPC reference	751373-020V
---------------	-------------

Removal

- a) Remove the pump, see 6.5.2-2 *Peroxide tank - change pump*.
- b) Unscrew the screws (1) and remove the flange (2) and the pipe (3). Change the O-rings (4) and (5).
- c) Push out the pin (6).
- d) Unscrew the screws (7), and remove the motor from the plate.
- e) Change the gasket (8).
- f) Mark the position of the extension pipe (9) on the pump housing (10).
- g) Unscrew the screws (11), remove the pump housing and change the gasket (12).



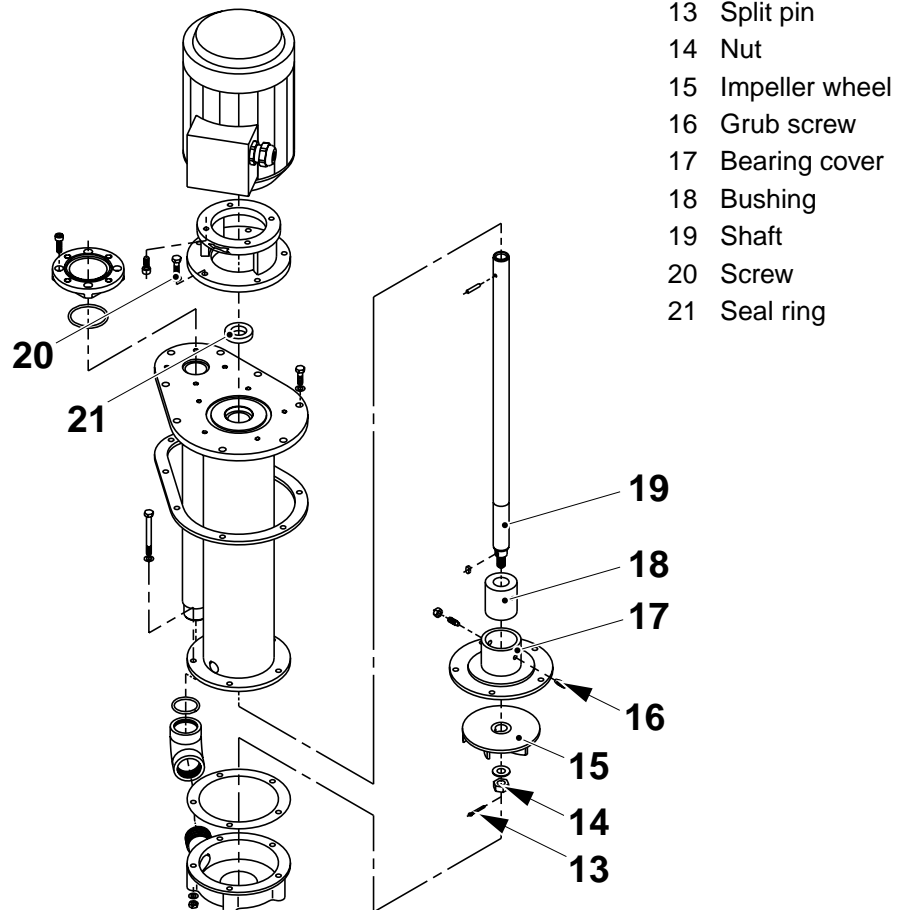
- | | | |
|----------|----------|------------------|
| 1 Screw | 5 O-ring | 9 Extension pipe |
| 2 Flange | 6 Pin | 10 Pump housing |
| 3 Pipe | 7 Screw | 11 Screw |
| 4 O-ring | 8 Gasket | 12 Gasket |

(Cont'd)

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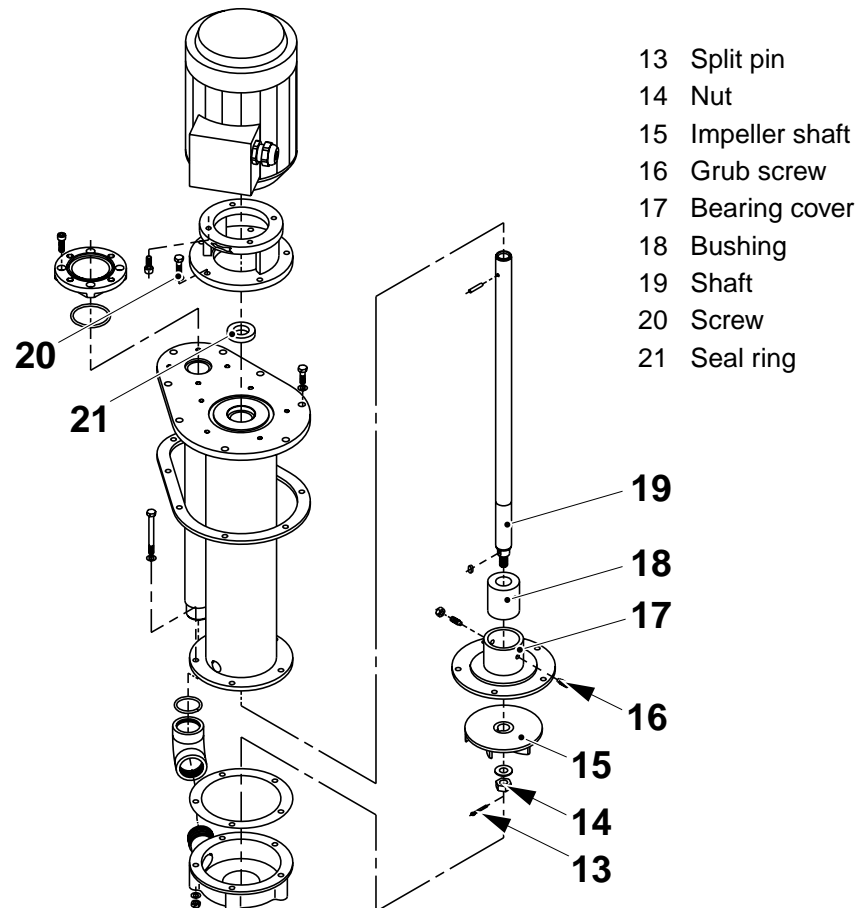
- h) Remove and change the split pin (13). Unscrew the nut (14) and pull off the impeller wheel (15). Use a puller if necessary. Change the impeller wheel as required.
- i) Remove the bearing cover (17) from the extension pipe.
- j) Unscrew the grub screws (16) and change the bushing (18) and the shaft (19).
- k) Unscrew the screws (20) and change the seal ring (21).

*(Cont'd)*

(Cont'd)

Assembly

- a) Fit the seal ring (21) and tighten the screws (20).
- b) Fit the shaft (19) and the bushing (18), and tighten the grub screws (16).
- c) Fit the bearing cover (17) on the extension pipe.
- d) Fit the impeller wheel (15) and tighten the nut (14). Fit the split pin (13).

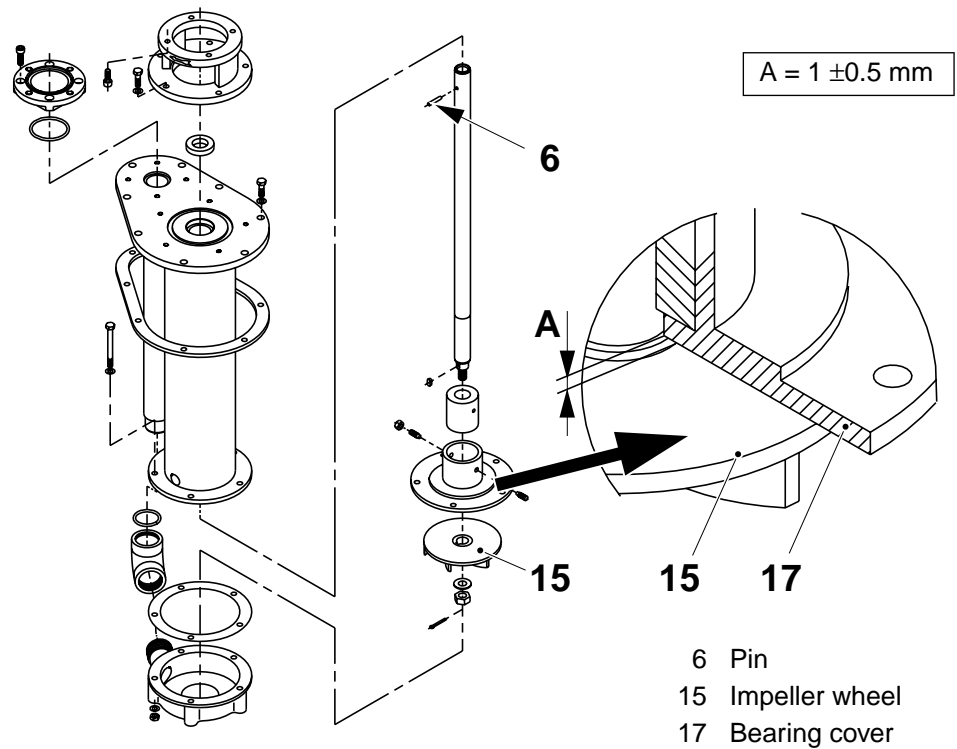


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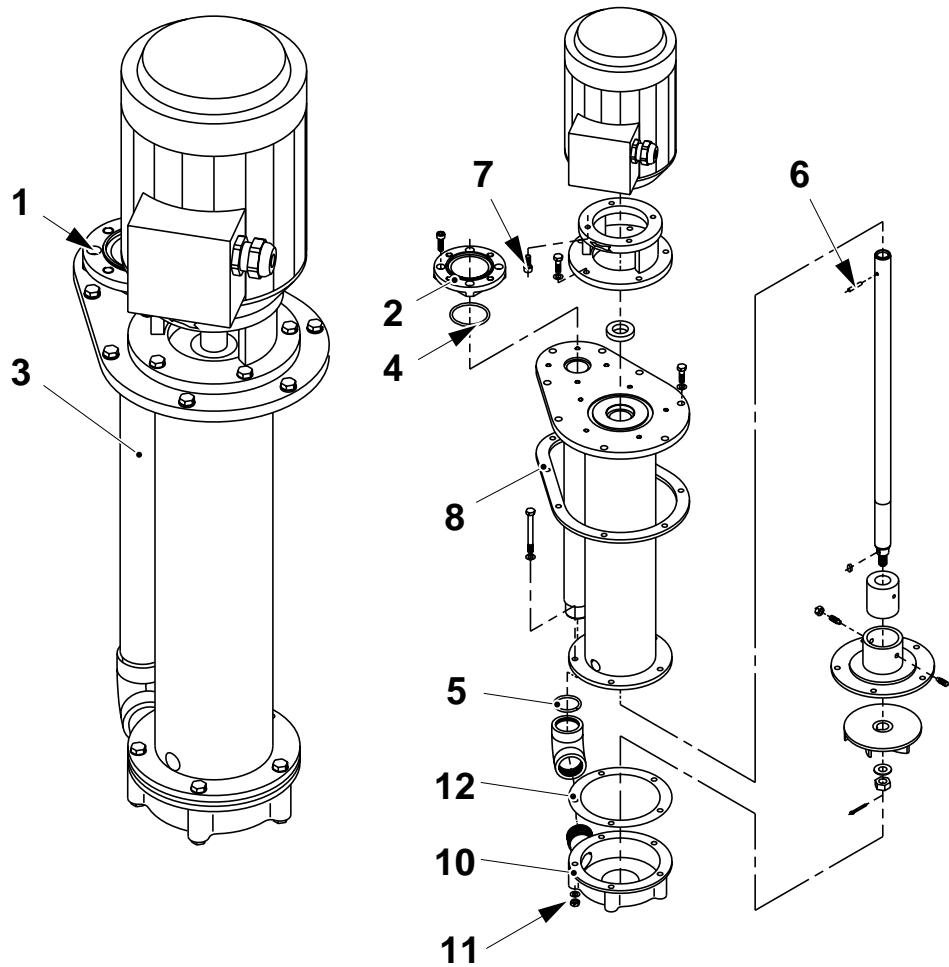
- e) Make sure that there is distance A between the bearing cover (17) and impeller wheel (15). If required, remove the pin (6) and adjust. Repin.



(Cont'd)

(Cont'd)

- f) When the pin (6) is in position, fit the gasket (12) and the O-rings (4) and (5).
- g) Fit the pump housing (10) according to the mark and tighten the screws (11).
- h) Fit the gasket (8), the plate and the motor. Tighten the screws (7).
- i) Fit the pipe (3) and the flange (2), and tighten the screws (1).



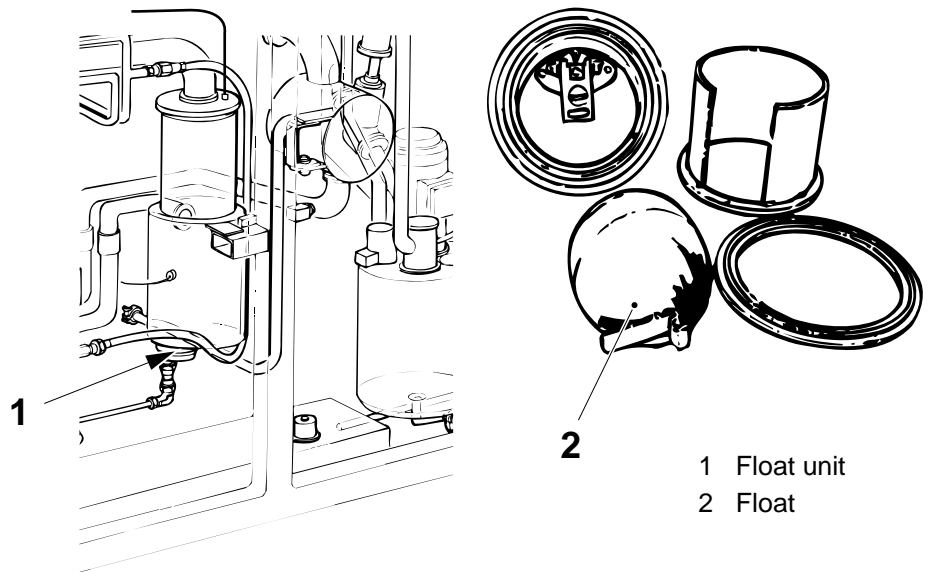
- | | | |
|----------|----------|-----------------|
| 1 Screw | 5 O-ring | 10 Pump housing |
| 2 Flange | 6 Pin | 11 Screw |
| 3 Pipe | 7 Screw | 12 Gasket |
| 4 O-ring | 8 Gasket | |

6.5.3 Separator

6.5.3-1 Separator - check float

SPC reference	978988-010V
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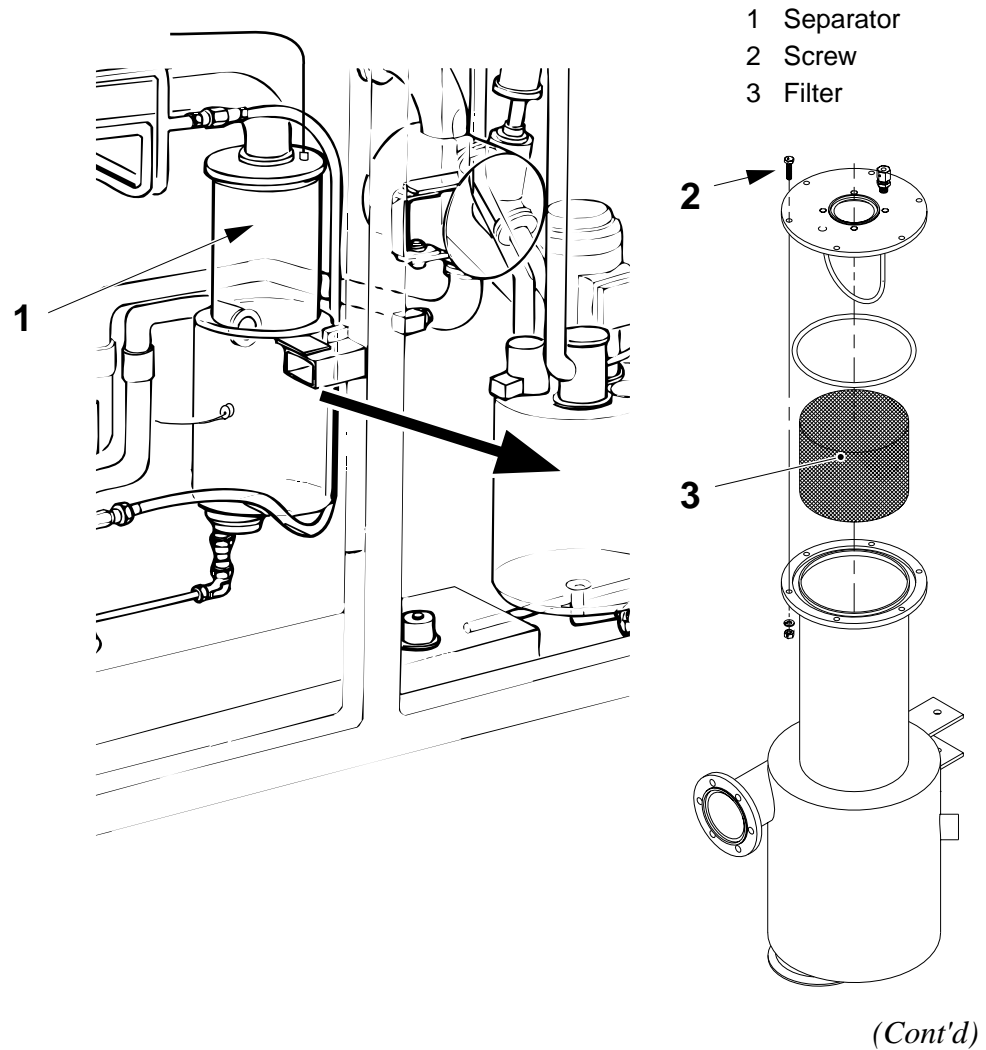
- a) Unscrew the pipe connection under the float unit (1).
- b) Remove the clamp and pull out the float unit.
- c) Remove the float (2) and shake it to check that no liquid has leaked into it. Change as required.
- d) Clean the float unit and assemble in the reverse order.



6.5.3-2 Separator - clean filter

Consumables - deliming acid	see list below
SPC reference	978988-010V

- a) Unscrew all connections to the separator (1) and lift it out.
- b) Unscrew the screws (2) and remove the filter (3).



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(Cont'd)

**Chemical products!**Cleaning compound. Follow the *Safety precautions*.

c)

Delime the filter with one of the four acid solutions listed below. All solutions must have a temperature of 50° - 60°C during deliming.

Caution!Do **not** use hydrochloric acid (HCl).

- acetic acid (CH₃COOH), 20%
- nitric acid (HNO₃), 5 - 10%
- citric acid (C₆H₈O₇), 20%
- phosphoric acid (H₃PO₄), 5 - 10%

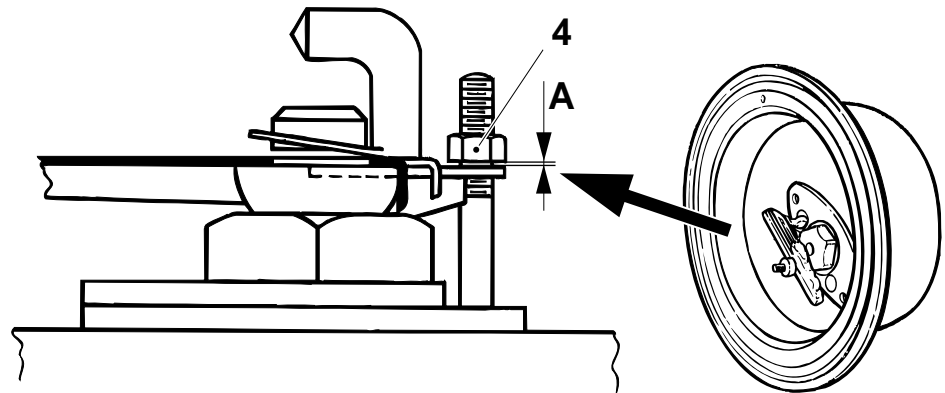
**Risk of eye injury!**

Wear protective goggles.

d) Flush with water and blow dry with compressed air.

e) Check that there is distance A between the nut and the valve lever. If required, adjust on the nut (4).

f) Assemble in the reverse order.



4 Nut

6.5.4 Scrubber

6.5.4-1 Scrubber - delime filter

Consumables - deliming acid	see list below
SPC reference	978989-010V

- a) Remove the cover (1) and pull out the filter (2).

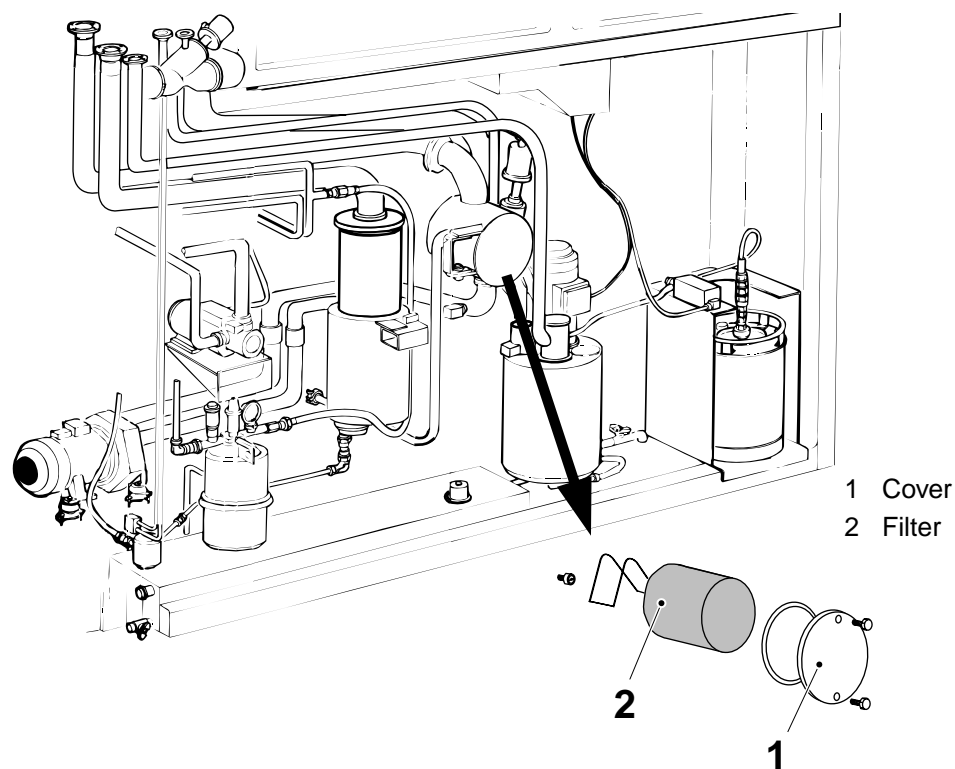
**Chemical products!**

Cleaning compound. Follow the *Safety precautions*.

- b) Delime the filter with one of the four acid solutions listed below. All solutions must have a temperature of 50° - 60°C during deliming.

Caution! Do **not** use hydrochloric acid (HCl)

- acetic acid (CH₃COOH), 20%
- nitric acid (HNO₃), 5 - 10%
- citric acid (C₆H₈O₇), 20%
- phosphoric acid (H₃PO₄), 5 - 10%



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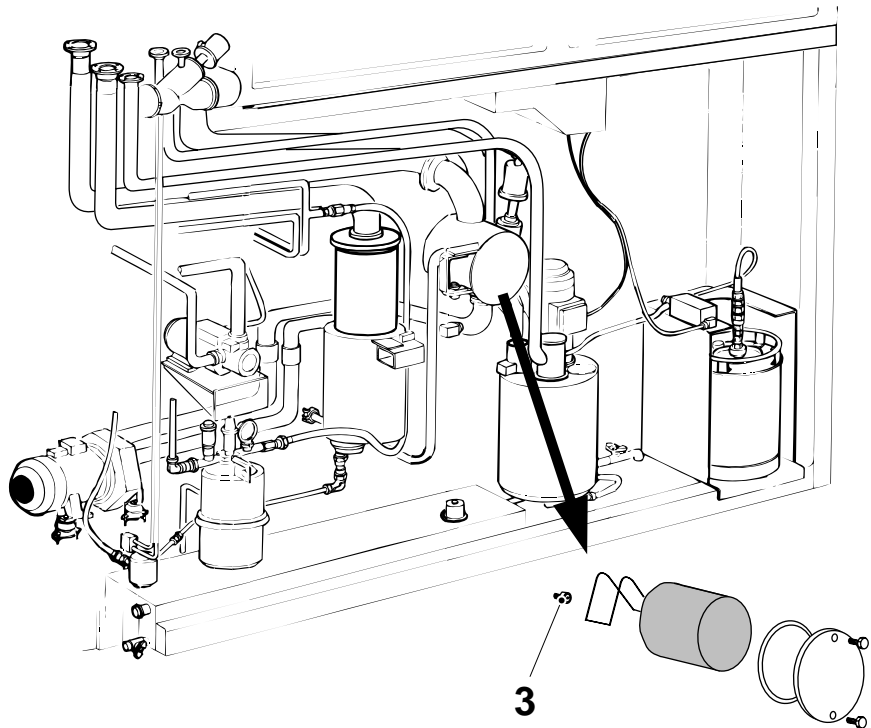


(Cont'd)

Risk of eye injury!

Wear protective goggles.

- c) Flush with water and blow dry with compressed air.
- d) Remove the nozzle (3).
- e) Blow through the nozzle from the inside with compressed air. If required, very carefully clean the nozzle with the aid of a needle.
- f) Assemble in the reverse order.



3 Nozzle

6.5.5 Water circulation

6.5.5-1 Water circulation - check pressure

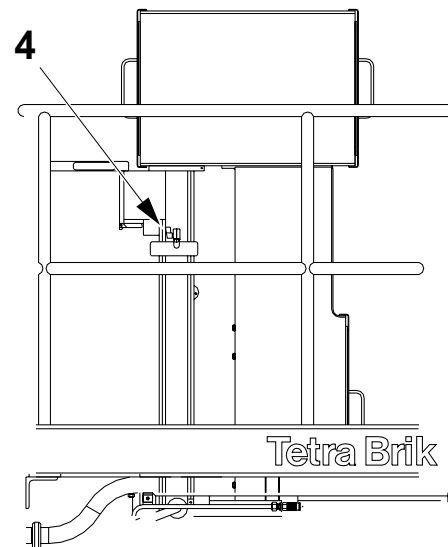
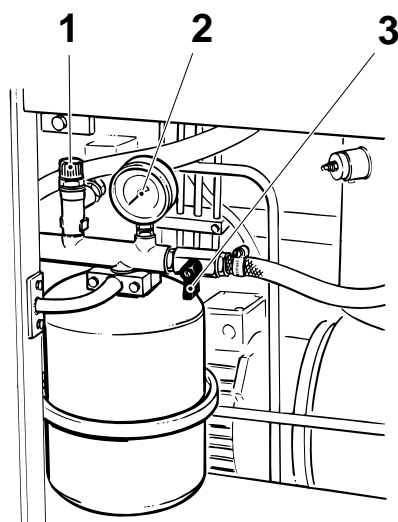
Machines status	Water On
Tools - hose	
SPC reference	979026-010V

Check the water pressure on the pressure gauge (2), see *10.1 Technical data*.

If the pressure is too **low**, fill up as follows.

- a) Connect a hose to the bleeder valve (4).
- b) Open the valve (3). Close valve when water comes out of the bleeder valve.
- c) Close the bleeder valve.
- d) Open the valve (3) again and fill up until the safety valve (1) releases.
- e) Close the valve and disconnect the hose.

Caution! The pressure **must not**, at any time, be **below** 0.5 bar.

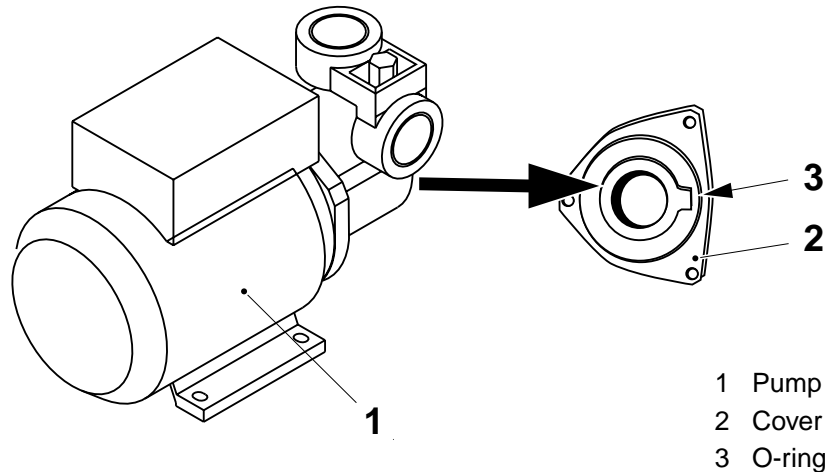


- 1 Safety valve
- 2 Pressure gauge
- 3 Valve
- 4 Bleeder valve

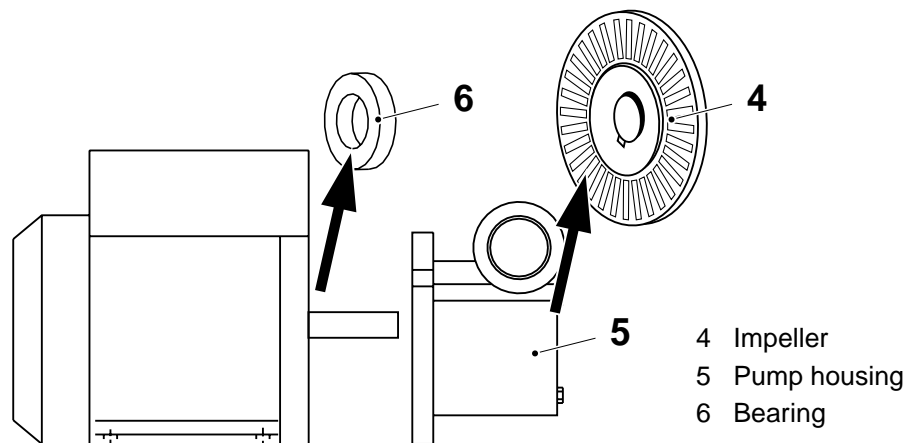
6.5.5-2 Water circulation - overhaul pump

SPC reference	979026-010V
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- a) Remove the connections to the pump (1) and lift it out.
- b) Remove the cover (2) and change the O-ring (3).



- c) Remove the impeller (4) and the key.
- d) Change the impeller.
- e) Remove the circlip and the spring.
- f) Unscrew the screws and pull off the pump housing (5). Change the bearing (6).
- g) Assemble in reverse order.



6.5.6 Cabinet H₂O₂6.5.6-1 Cabinet H₂O₂ - check transfer function

Machine status	Preheating I
SPC reference	979328-010V



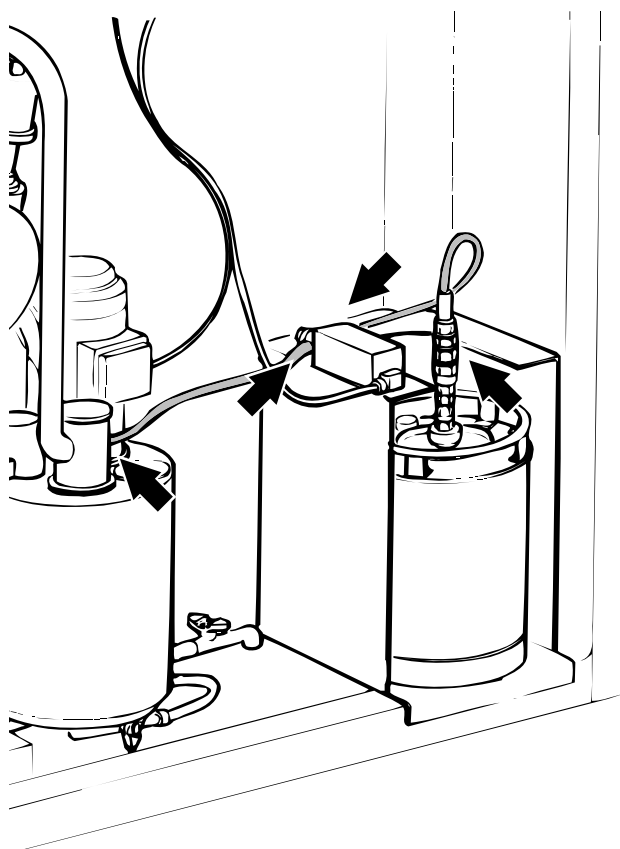
Hydrogen peroxide!
Follow the *Safety precautions*.

- a) Make sure that the drain tank is empty. Drain it as required.

Note! If the machine has been in production for more than 24 hours, the hydrogen peroxide concentration in the dilution tank is less than 1%.

Caution! If the machine has been in production **less than 24 hours**, **dilute** with water when draining.

- b) Drain some hydrogen peroxide into the dilution tank.
c) Check, when the hydrogen peroxide is being filled from the container, that there is no hydrogen peroxide leakage from the connections and the hoses. Change as required.



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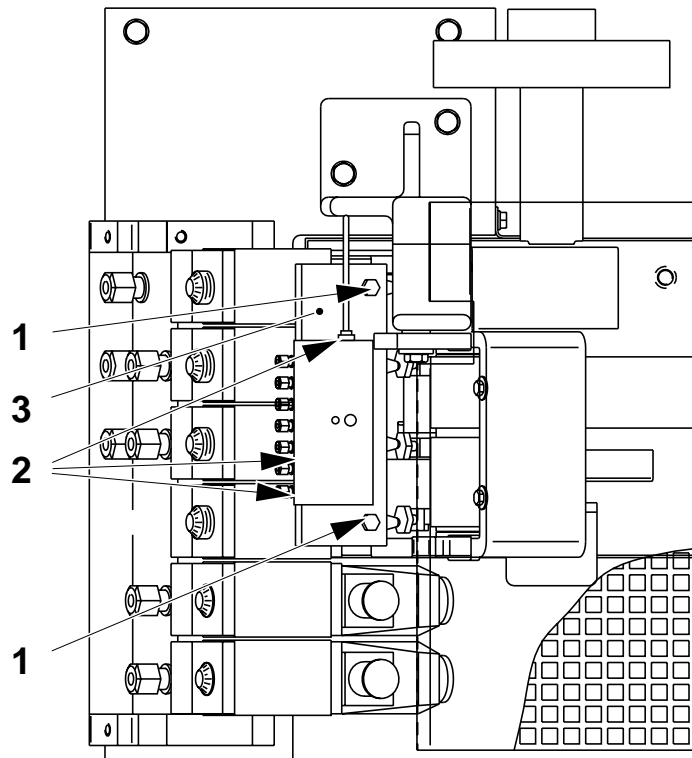
6.6 Impulse transmitter

SPC reference	751691-020V
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6.6-1 Impulse transmitter - check valve clearance

Machine status	Power On Air On
Tools - tension tool	TP No. 76138
SPC reference	751691-020V

- a) Remove the protective grating.
- b) Unscrew the screws (1), the oil pipe connections (2), and remove the plate (3) together with the distribution block.

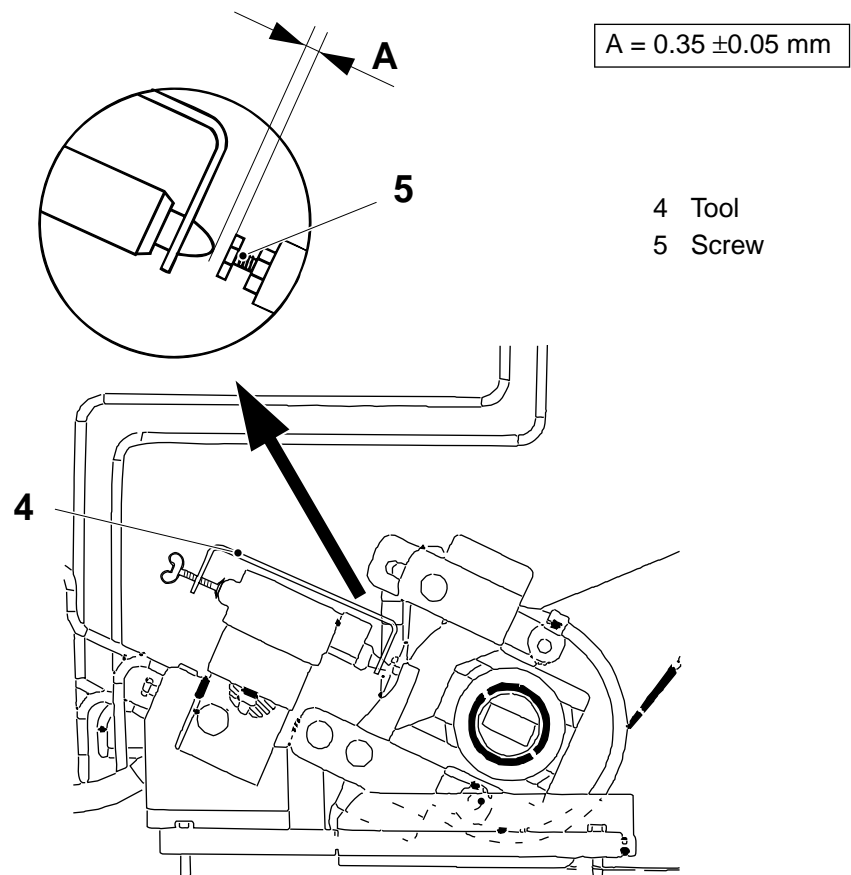


- 1 Screw
- 2 Oil pipe connection
- 3 Plate

(Cont'd)

(Cont'd)

- c) Crank until one of the cam rollers raises on the cam and fit the tension tool (4).
- d) Tighten until the valve reaches the bottom.
- e) Check and, if required, set distance A. Adjust by means of the screw (5).
- f) Repeat the items *b) - e)* for all the valves.
- g) Remove the tool and assemble in the reverse order.
- h) Push the **Manual lubrication** button on the valve panel to bleed the oil pipes.



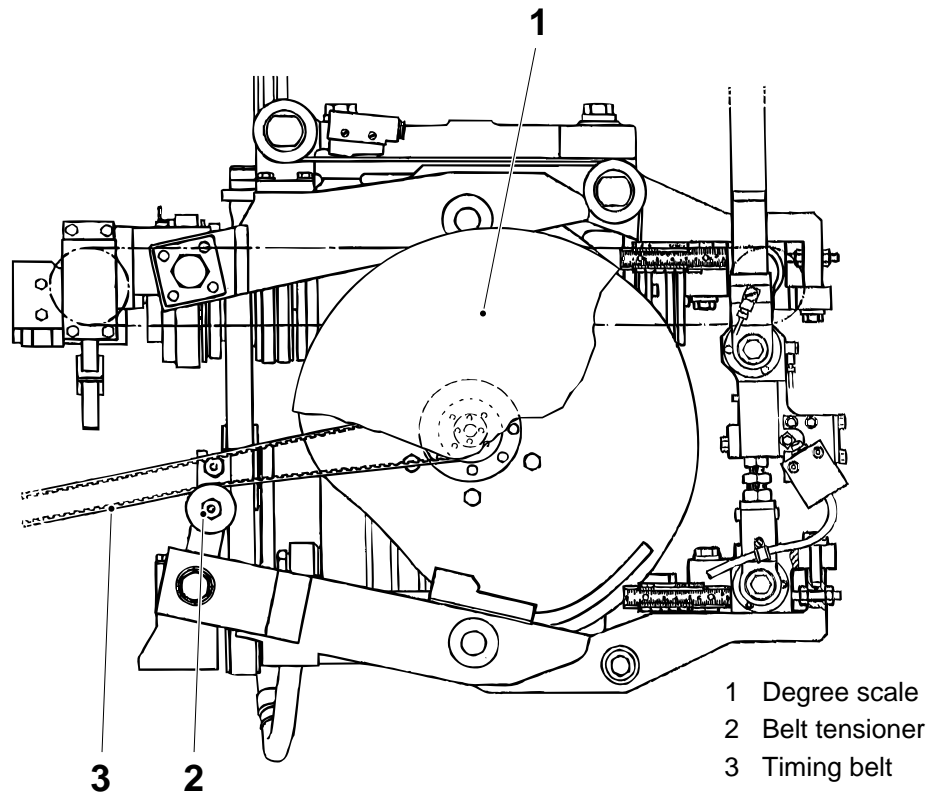
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6.6-2 Impulse transmitter - change timing belt

Tools - spring balance	TP No. 76767-102
SPC reference	751691-020V

Caution! Be careful **not to damage** or change the setting of the pointer.

- a) Remove the degree scale (1).
- b) Loosen the belt tensioner (2) and change the timing belt (3).
- c) Assemble in the reverse order.
- d) Set the belt tension to 8 ± 1 mm deflection with the aid of a spring balance, use 15 ± 1 N load force.
- e) Set the impulse transmitter, see 6.6-3 *Impulse transmitter - set zero position*.



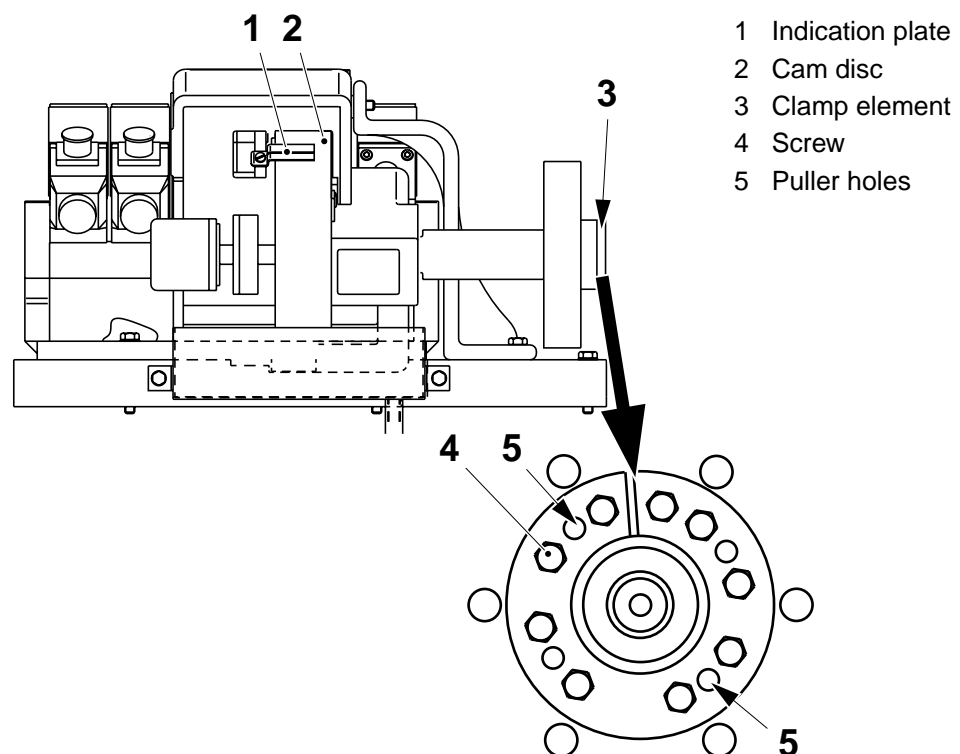
6.6-3 Impulse transmitter - set zero position

Machine status	Power On
Consumables - oil	code D
Tools - torque wrench	min 15 Nm
SPC reference	751691-020V

- a) Crank to exactly 0°.
- b) Loosen the clamp element (3) by unscrewing the screws (4) a couple of turns.
- c) If required, fit two of the screws in the puller holes (5) and tighten cross-wise, in small steps, until the outer sleeve comes off the inner one.

Caution! **Never use** grease or oil which contains molybdenum sulphide or with oil with high pressure agent.

- d) Zero the cam disc (2) by turning the axle until the mark on the cam disc is positioned opposite the indication plate (1). If required, apply a small amount of oil.



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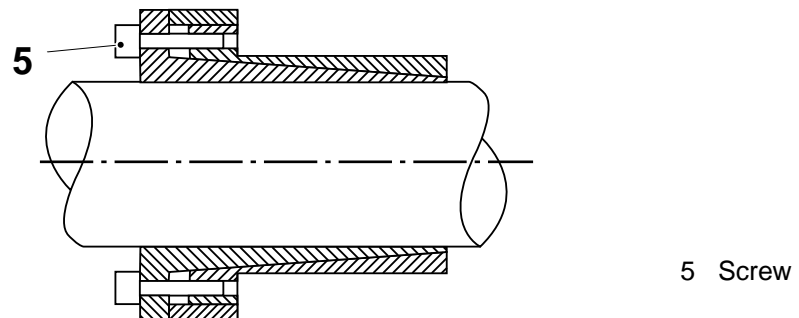
(Cont'd)

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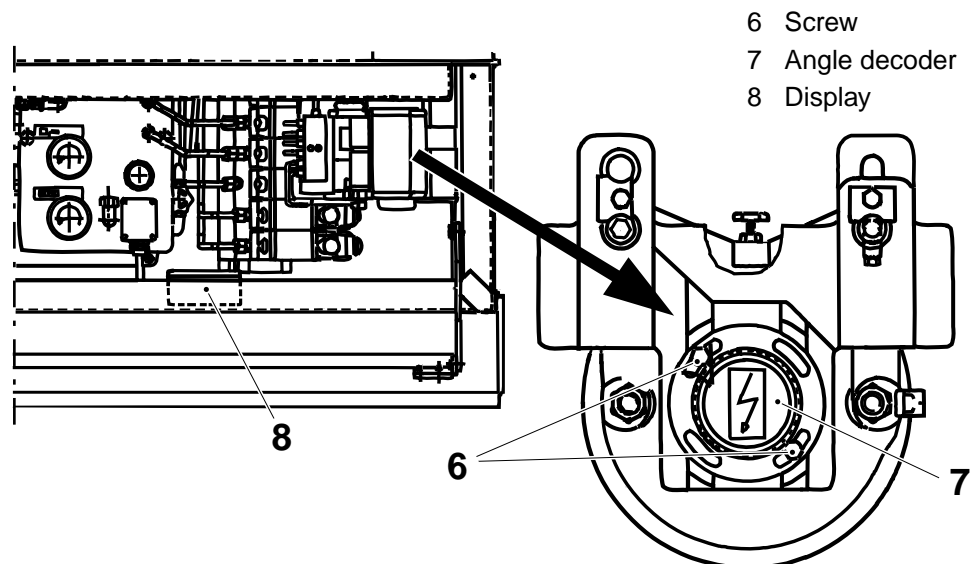
- e) Lubricate the screws (5).
- f) Keep the clamp element apart and oil it.
- g) Put the clamp elements in place. Torque the screws (5) cross-wise, first by hand and then to 6 ± 0.5 Nm with the aid of the torque wrench.
- h) Finally torque cross-wise to 11.5 ± 0.5 Nm.

Note! Torque the screws cross-wise several times, with full tightening torque, until it is not possible to tighten them further.

- i) Crank to exactly 0° .



- j) Unscrew the screws (6) and turn the angle encoder (7) until the display (8) shows 0.
- k) Tighten the screws (6).



Function check

When the display shows 0_8 inputs A 10610-A 10617 should be out.

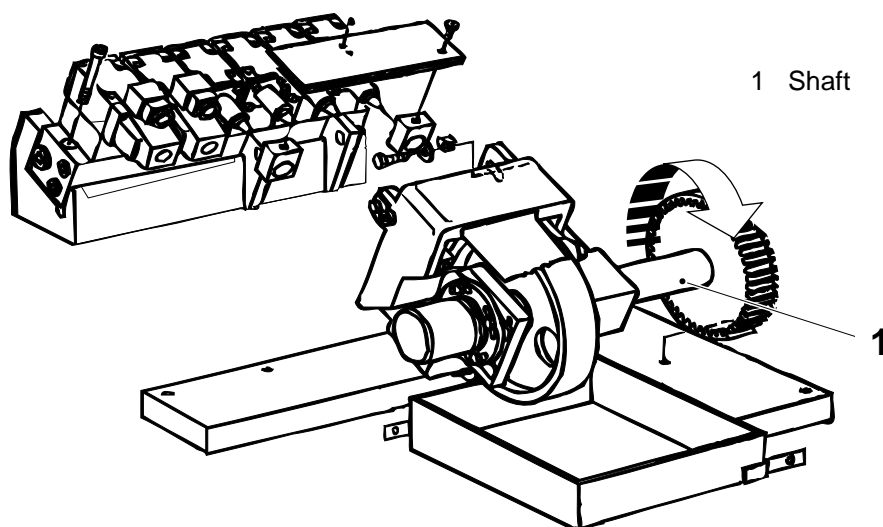
Crank to 252_8 . The inputs are to be on, alternatively the impulse transmitter display should show 252_8 .

6.6.1 Curve pack

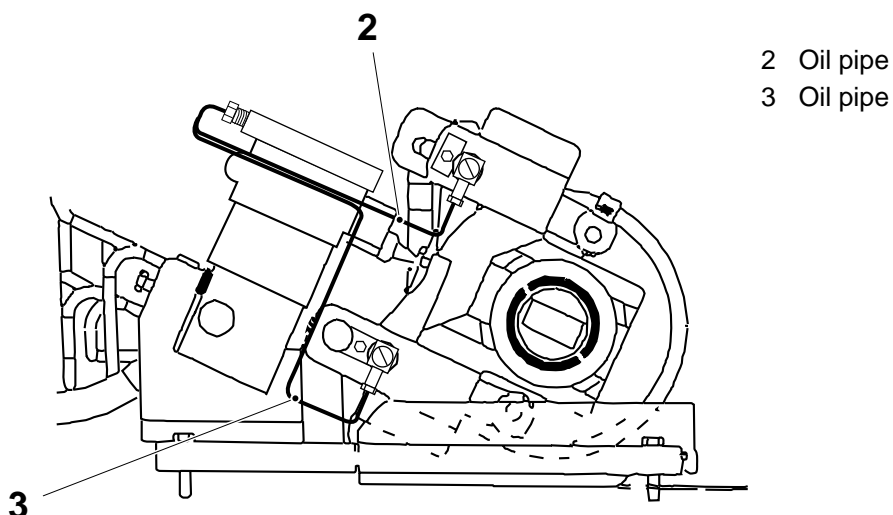
6.6.1-1 Curve pack - check bearings

Tools	
- torque wrench	min 15 Nm
SPC reference	751689-020V

- a) Lift the timing belt off the timing belt pulley. Follow the procedure in 6.6-2 *Impulse transmitter - change timing belt*.
- b) Make sure that the shaft (1) rotates freely. Listen for abnormal noise from the bearings. Check for play. Change the bearings as required.

**Remove cam pack**

- a) Remove the oil pipes (2) and (3).



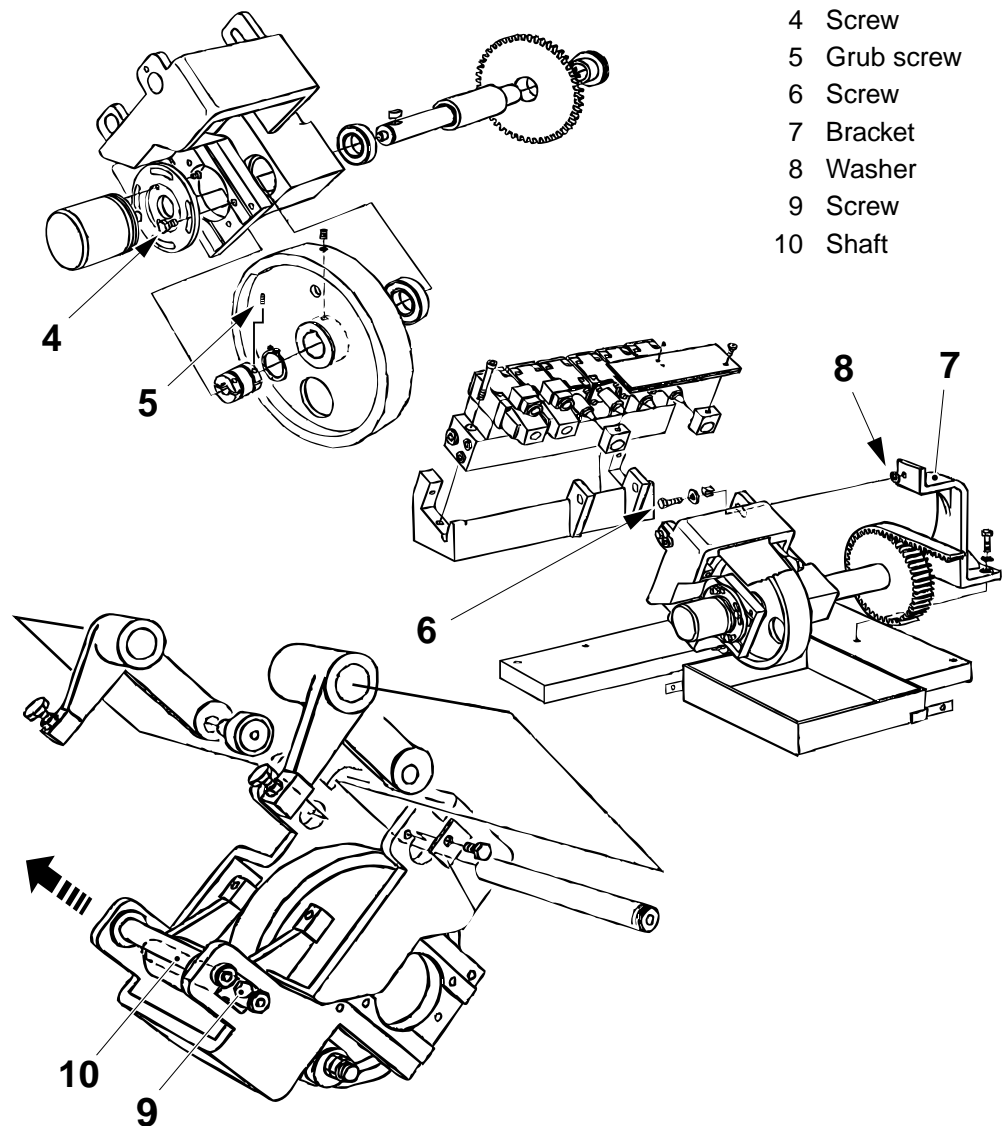
(Cont'd)

(Cont'd)

- b) Unscrew the screws (4) and the grub screw (5). Remove the angle encoder.
- c) Unscrew the screw (6) and remove the bracket (7).

Note! There is a washer (8) between the brackets.

- d) Unscrew the screw (9), remove the lock washer and pull out the shaft (10) in the arrow direction.
- e) Remove the cam pack.



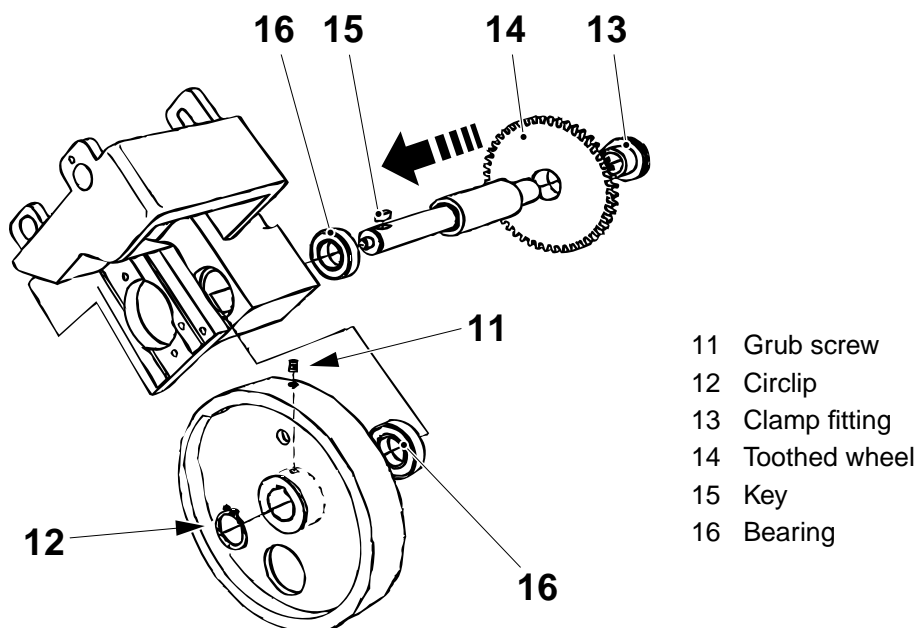
- 4 Screw
- 5 Grub screw
- 6 Screw
- 7 Bracket
- 8 Washer
- 9 Screw
- 10 Shaft

(Cont'd)

(Cont'd)

Remove bearings

- a) Unscrew the grub screw (11) and remove the circlip (12).
- b) Loosen the screws in sequence around the flange and remove the clamp fitting (13), the toothed wheel (14) and the spacer sleeve.
- c) Remove the axle in the arrow direction **or** remove the key (15) to make it possible to pull out the axle in the other direction.
- d) Change the bearings (16).



- e) Assemble in the reverse order. Torque the screws of the clamp fitting cross-wise, first by hand and then to 6 ± 0.5 Nm with the aid of the torque wrench. Finally torque cross-wise to 11.5 ± 0.5 Nm.

Note! Torque the screws cross-wise several times, with full tightening torque, until it is not possible to tighten them further.

- f) Set the impulse transmitter, see 6.6-3 *Impulse transmitter - set zero position*.

6.7 Central lubrication

SPC reference	978823-010V
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6.7-1 Central lubrication - clean oil tank

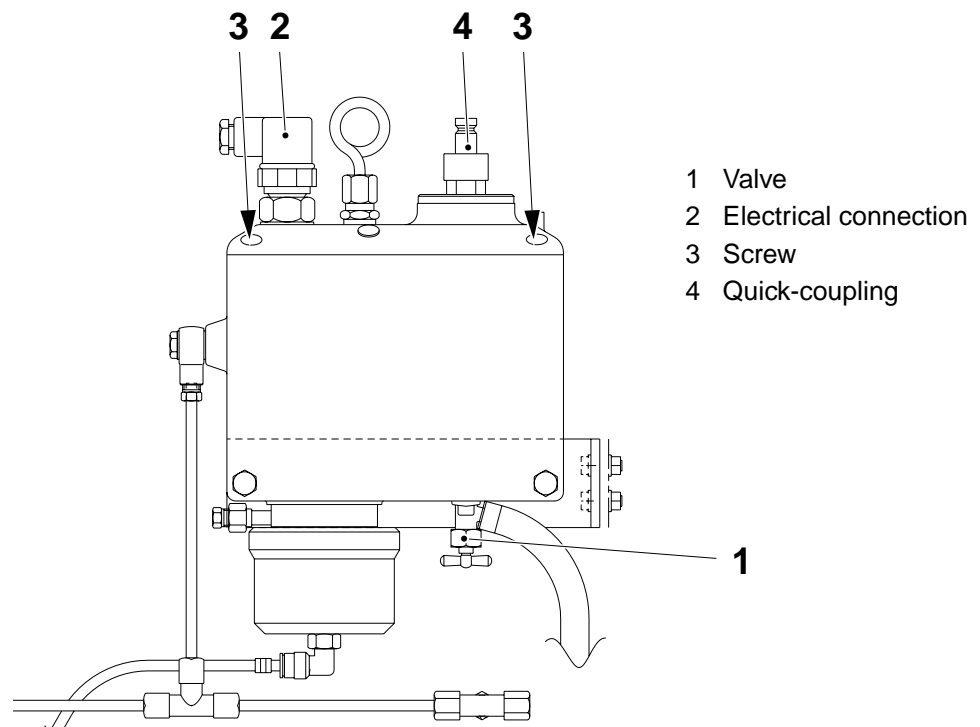
Consumables - oil	code H
SPC reference	978823-010V



Chemical products!

Cleaning compound. Follow the *Safety precautions*.

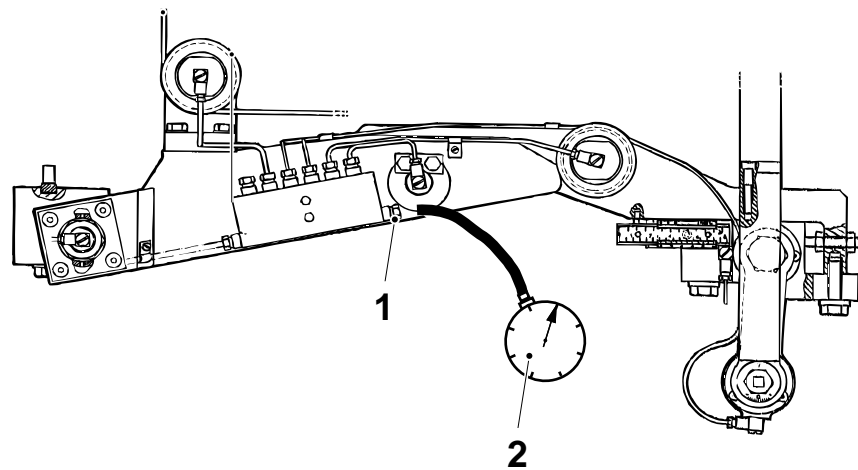
- Open the valve (1) and drain the oil.
- Remove the electrical connection (2).
- Unscrew the screws (3) and remove the cover.
- Clean the tank with lint-free cloths.
- Assemble in the reverse order.
- Fill up with oil through the quick-coupling (4). Use oil code H, see *10.2 Lubricants*.



6.7-2 Central lubrication - check pressure

Machine status	Preheating I
Tools - pressure gauge	0 - 6 MPa
SPC reference	978823-010V

- a) Unscrew the plug (1) on the distribution block of the LH yoke lifter arm.
- b) Connect the pressure gauge (2).
- c) Push **Manual lubrication**.
- d) Check that the pressure raises to 3 - 5 MPa. If not, check for leaks.
Change the lubrication pump as required, see 6.7-3 *Central lubrication - change pump*.
- e) Remove the pressure gauge and fit the plug.



- 1 Plug
- 2 Pressure gauge

6.7-3 Central lubrication - change pump

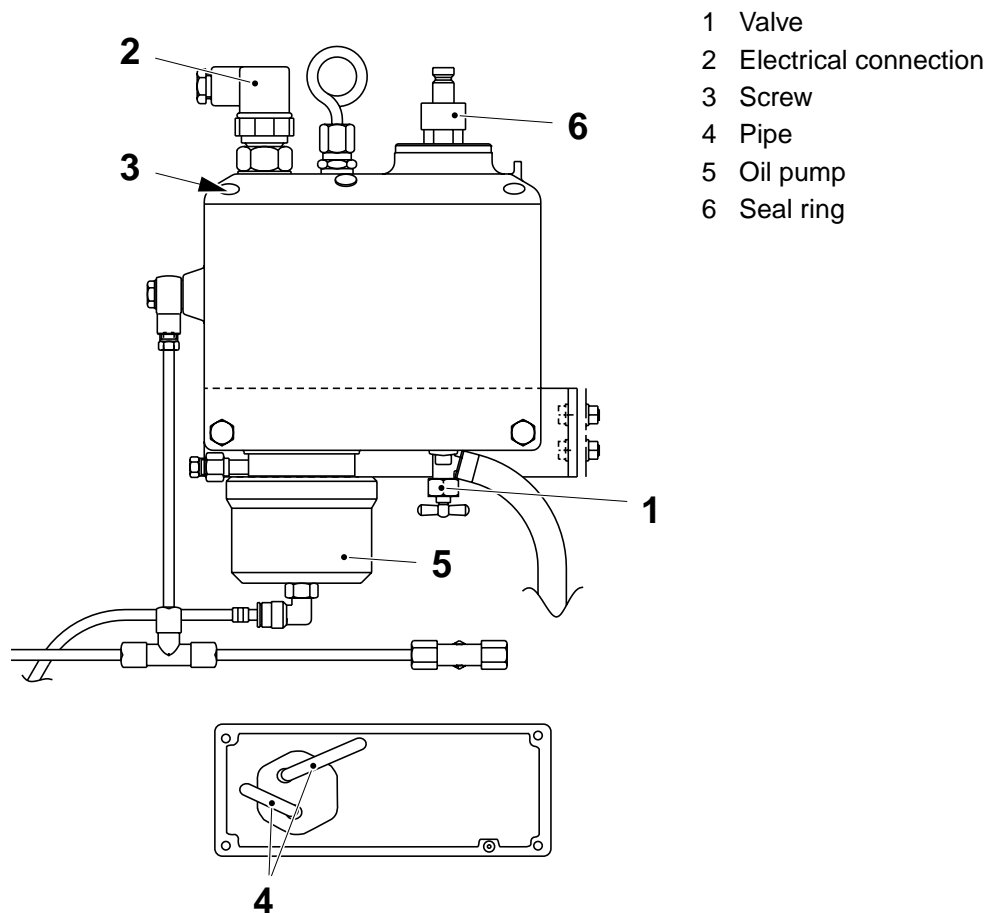
Consumables - locking liquid - oil	Loctite code H
SPC reference	978823-010V



Chemical products!

Lubricant. Follow the *Safety precautions*.

- a) Open the valve (1) and drain the oil.
- b) Remove the electrical connection (2).
- c) Unscrew the screws (3) and remove the cover.
- d) Clean the tank with lint-free cloths.
- e) Remove the pipes (4). Unscrew the oil pump (5) (turn its lower part).
- f) Change the pump. Take apart the new pump and apply locking liquid on the threads.
- g) Change the seal ring (6) on the quick-coupling.
- h) Assemble in the reverse order.
- i) Fill up with oil through the quick-coupling. Use oil code H, see *10.2 Lubricants*.



6.8 Hydraulic system

SPC reference	491894-020V
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6.8-1 Hydraulic system - clean oil tank

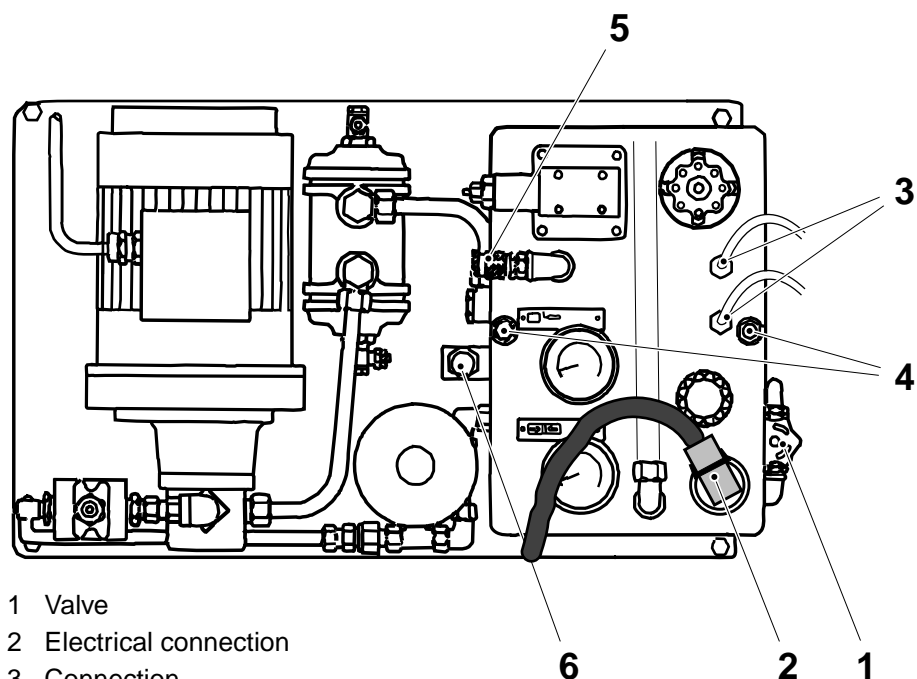
Consumables - oil	code C
SPC reference	491894-020V



Chemical products!

Lubricant. Follow the *Safety precautions*.

- Open the valve (1) and drain the oil.
- Remove the electrical connection (2) and the connections (3).
- Unscrew the screws (4) and lift off the cover.
- Clean the tank with lint-free cloths.
- Assemble in the reverse order.
- Close the valve (1) and fill up with oil through the quick-coupling (5). Use oil code C, see *10.2 Lubricants*. Check the level on the level glass (6).



- 1 Valve
- 2 Electrical connection
- 3 Connection
- 4 Screw
- 5 Quick-coupling
- 6 Level glass

6.8-2 Hydraulic system - change oil and filter

Consumables - oil	code C
SPC reference	491894-020V

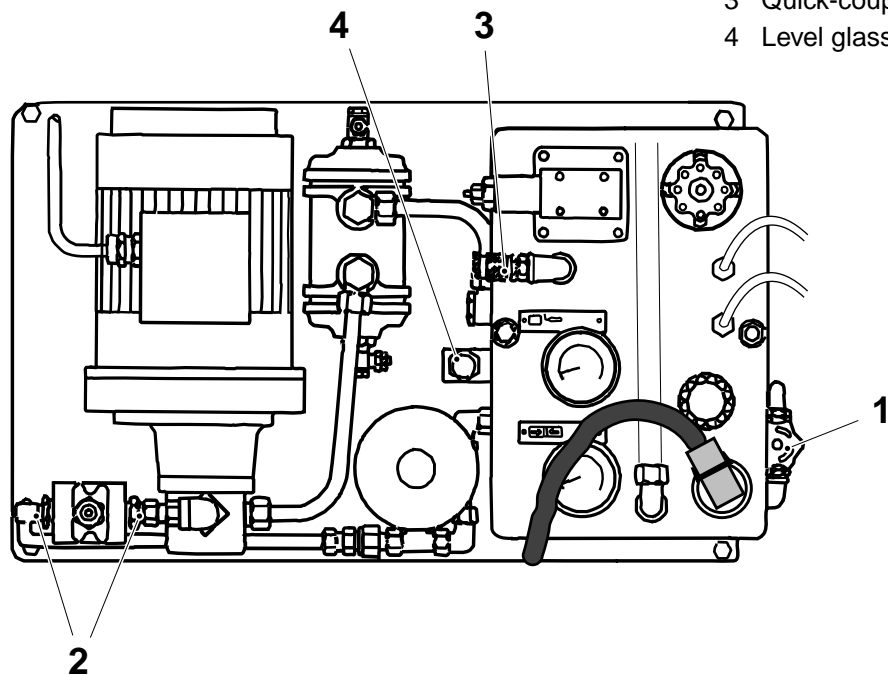


Chemical products!

Lubricant. Follow the *Safety precautions*.

- Open the valve (1) and drain the oil.
- Remove the connections (2) and the filter unit.
- Change the filter insert and fit back.
- Close the valve (1) and fill up with oil through the quick-coupling (3). Use oil code C, see *10.2 Lubricants*. Check the level on the level glass (4).

- Valve
- Connection
- Quick-coupling
- Level glass

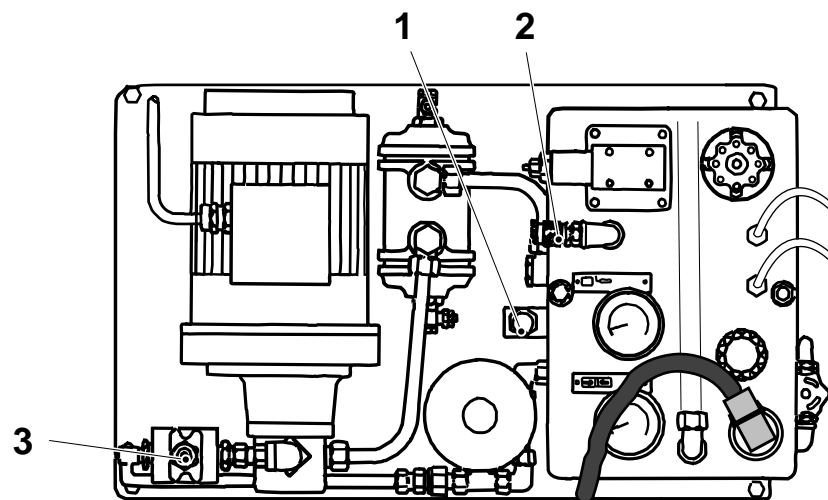


6.8-3 Hydraulic system - check oil level and filter indicator

Consumables - oil	code C
SPC reference	491894-020V

Check if the color of the blockage indicator (3) is red. If so, change the filter insert, see 6.8-2 *Hydraulic system - change oil and filter*.

Check that the oil level in the level glass (1). If required, top up with oil through the quick-coupling (2). Use oil code C, see 10.2 *Lubricants*.



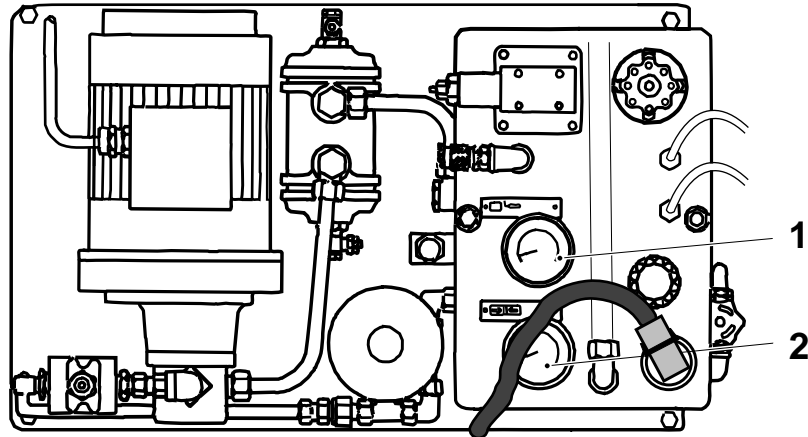
- 1 Level glass
- 2 Quick-coupling
- 3 Blockage indicator

6.8-4 Hydraulic system - check pressures

Machine status	Power On Water On Service switch On
SPC reference	491894-020V

Check the cutting pressure on the pressure gauge (1) and the jaw pressure on the pressure gauge (2). Pressures, see *10.1 Technical data*.

Record the results.

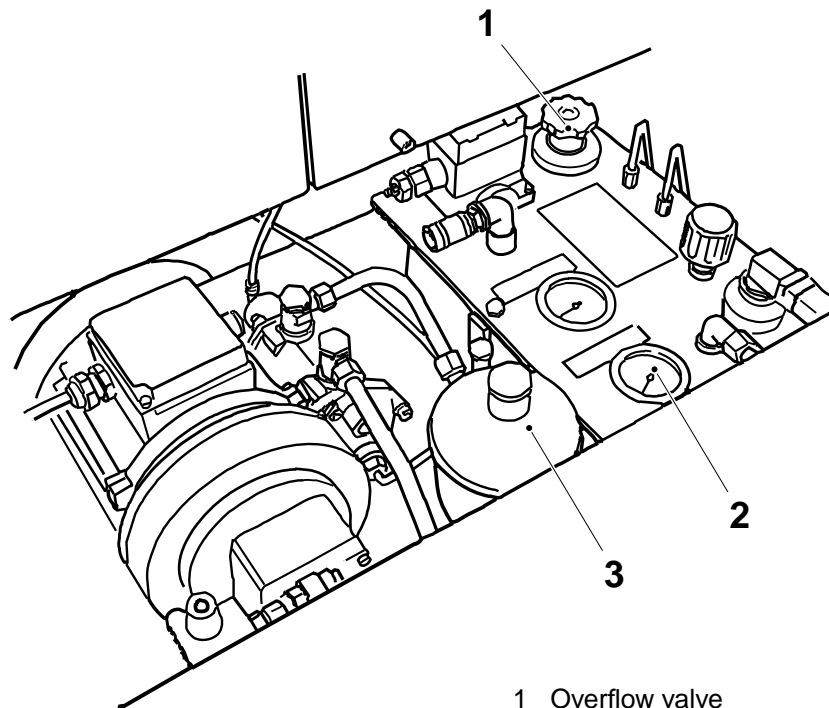


- 1 Pressure gauge
- 2 Pressure gauge

6.8-5 Hydraulic system - check accumulator

Machine status	Preheating I
SPC reference	491894-020V

- a) Push **Program down** to stop the hydraulic pump, or drop the pressure in the hydraulic system by means of the overflow valve (1).
- b) When the accumulator pressure is being passed, the pointer of the pressure gauge (2) jerks briefly.
- c) If the pressure is below 4.0 MPa at that moment, step down the machine to **Zero** position.
- d) Unscrew and change the accumulator (3).

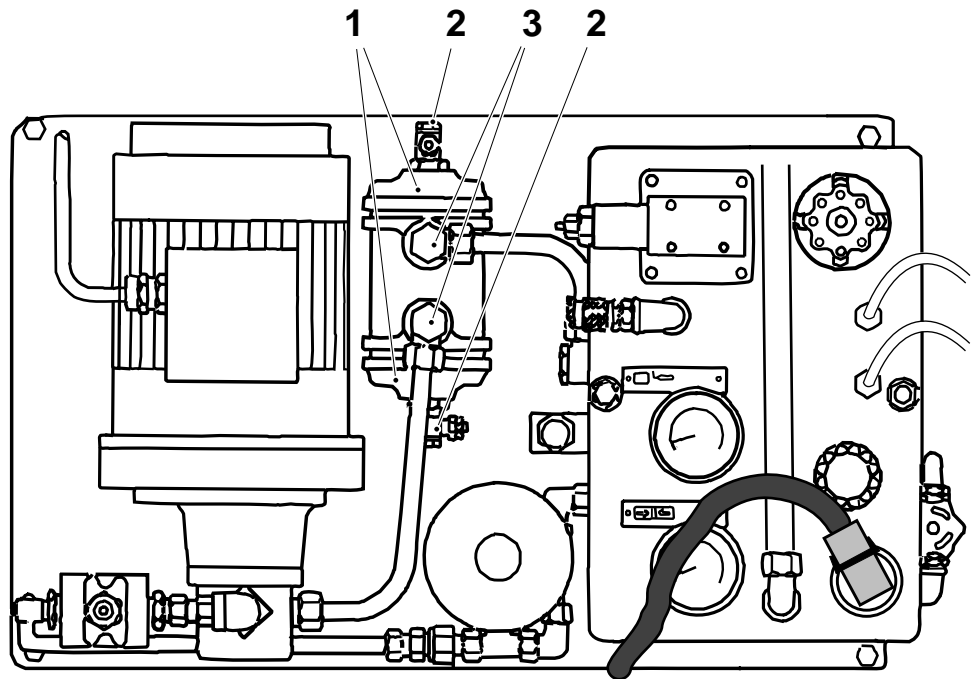


- 1 Overflow valve
- 2 Pressure gauge
- 3 Accumulator

6.8-6 Hydraulic system - delime oil cooler

Consumables - deliming agent	
SPC reference	491894-020V

- Disconnect the banjo connections (2) and (3) and remove the cooler.
- Remove the lids (1) and the O-rings.
- Clean the cooling pipes in the cooler with a brush and a deliming agent.
- Change the O-rings and assemble in the reverse order.



- Lid
- Banjo connection
- Banjo connection

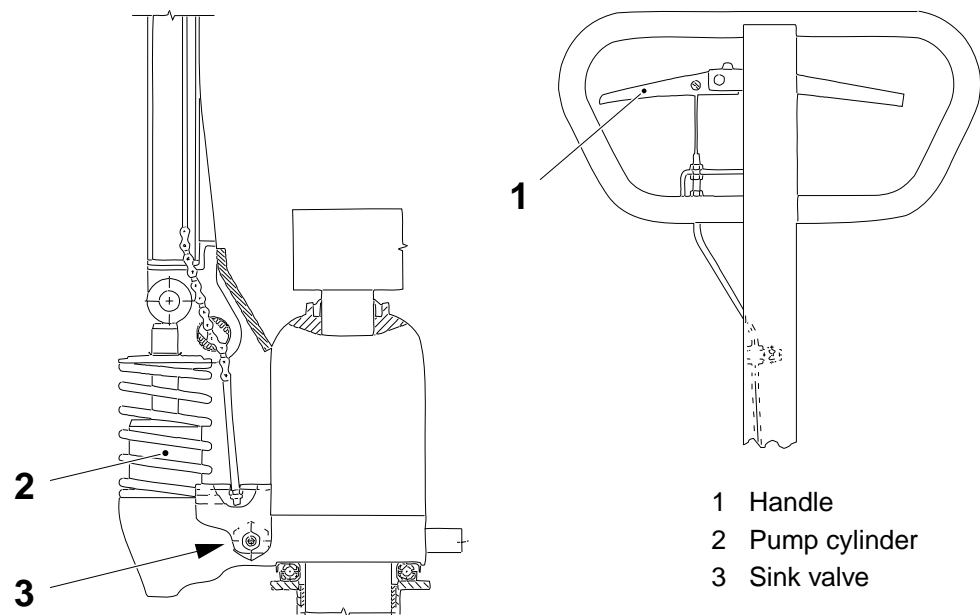
6.9 Paper reel trolley

SPC reference	491942-010V
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6.9-1 Paper reel trolley - check function

SPC reference	491942-010V
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- a) Press the handle (1) and make sure that the break releases.
- b) Check that all hydraulic connections are oil free.
- c) Put a packaging material reel on the trolley and pump until the reel lifts from the floor. Wait for 10 minutes. Make sure that the reel does not sink. If required, change the pump cylinder (2), see 6.9-2 *Paper reel trolley - change pump cylinder*.
- d) Pump up again until the reel lifts from the floor and let it down. If it sinks too fast, change the sink valve (3), see 6.9-3 *Paper reel trolley - change sink valve*.



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6.9-2 Paper reel trolley - change pump cylinder

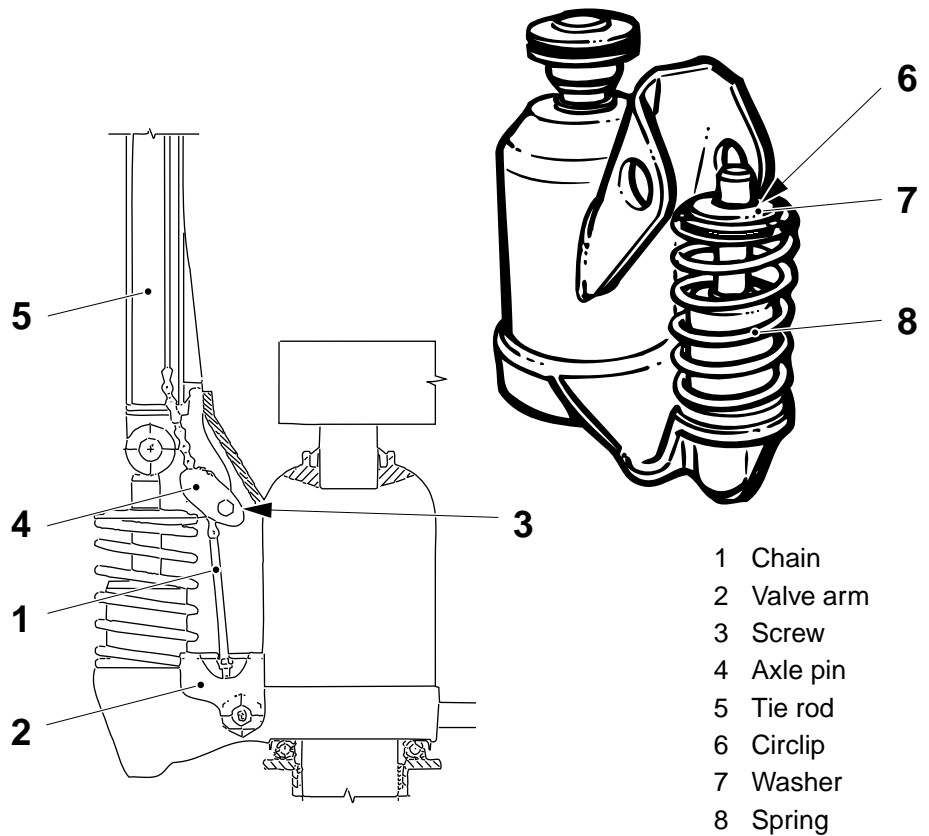
Consumables - oil	code C
SPC reference	491942-010V

Tie rod

- Unhook the chain (1) from the valve arm (2).
- Unscrew the screw (3).
- Turn the axle pin (4) a bit clockwise and pull out the chain (1).
- Pull out the axle pin and remove the tie rod (5).

Pump cylinder

- Remove the circlip (6), the washer (7) and the spring (8).



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- b) Unscrew the cylinder (9) and pull out the axle (10) in the arrow direction.
- c) Remove the oil seal (11), the circlip (12), the spacer (13) and the seal (14).
- d) Change the oil seal (11) and the seal (14).
- e) Assemble in the reverse order.

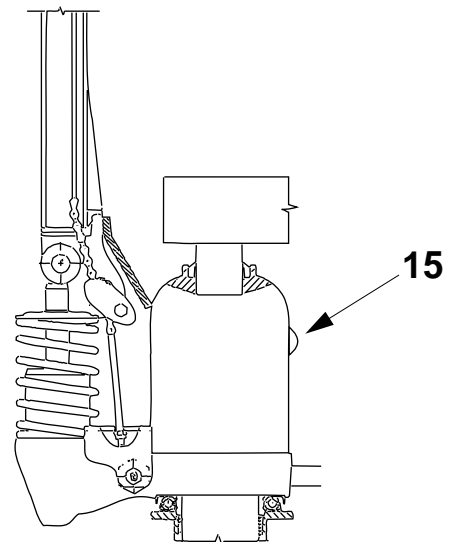
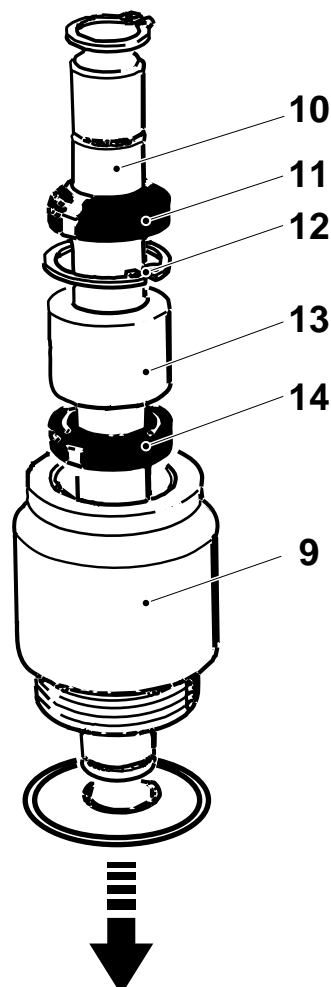
Note! Put the lifting arms in lowered position.



Chemical products!

Lubricant. Follow the *Safety precautions*.

- f) Remove the plug (15) and fill up with oil, code C, see *10.2 Lubricants*. Fill up until oil starts to flow out of the overfilling hole.



- 9 Cylinder
- 10 Axle
- 11 Oil seal
- 12 Circlip
- 13 Spacer
- 14 Seal
- 15 Oil plug

6.9-3 Paper reel trolley - change sink valve

Consumables - oil	code C
SPC reference	491942-010V

- a) Unhook the chain (1).
- b) Drive out the slotted pin (2) and remove the valve arm (3).
- c) Unscrew the sink valve (4).
- d) Change the O-rings (5), the copper washer (6) and the teflon washer (7).
- e) Assemble in the reverse order.
- f) Pump up the lifter arms to their highest position.
- g) Unscrew the setting screw (8) in the valve arm.
- h) Press in the handle and at the same time screw in the screw (8) until the lifting arms start to sink. Secure the screw with the lock nut.

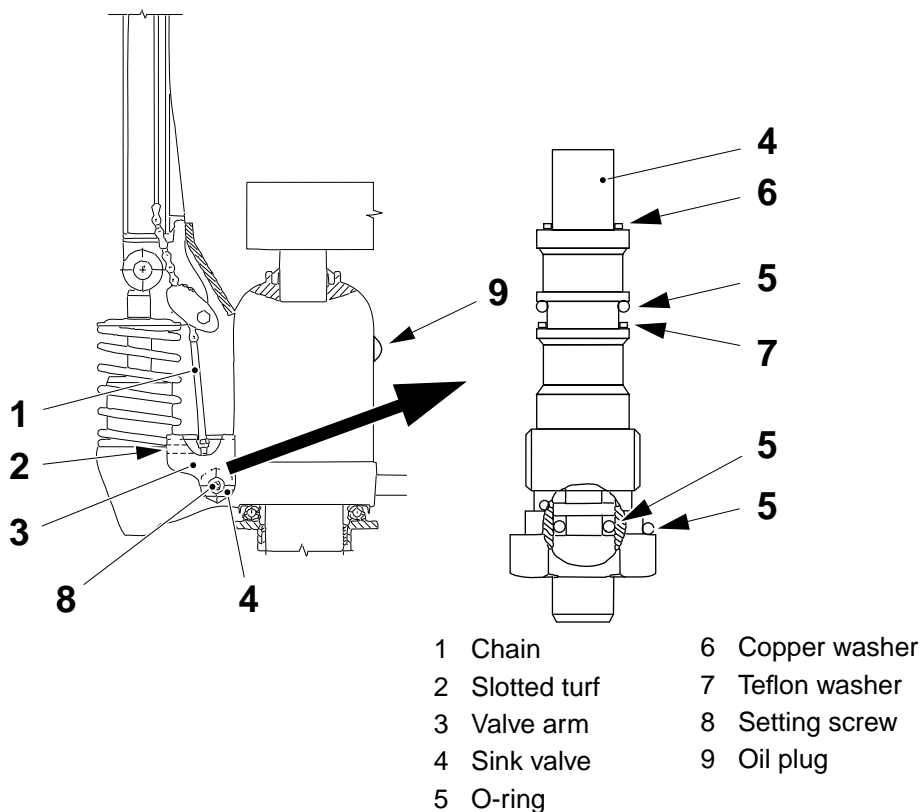
Note! Put the lifting arms in lowered position.



Chemical products!

Lubricant. Follow the *Safety precautions*.

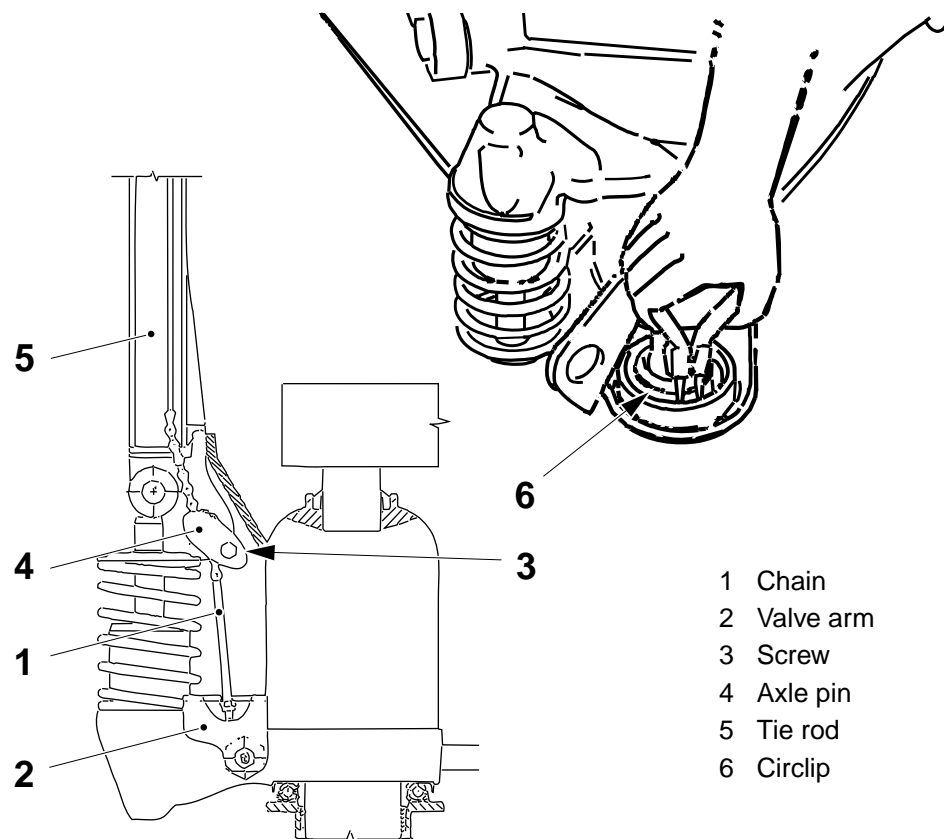
- i) Remove the oil plug (9) and fill up with oil, code C, see *10.2 Lubricants*. Fill up until oil starts to flow out of the overfilling hole.



6.9-4 Paper reel trolley - overhaul lifting cylinder

Consumables - oil	code C
SPC reference	491942-010V

- a) Unhook the chain (1) from the valve arm (2).
- b) Unscrew the screw (3).
- c) Turn the axle pin (4) a bit clockwise and pull out the chain (1).
- d) Pull out the axle pin and remove the tie rod (5).
- e) Turn the trolley upside down and remove the circlip (6).

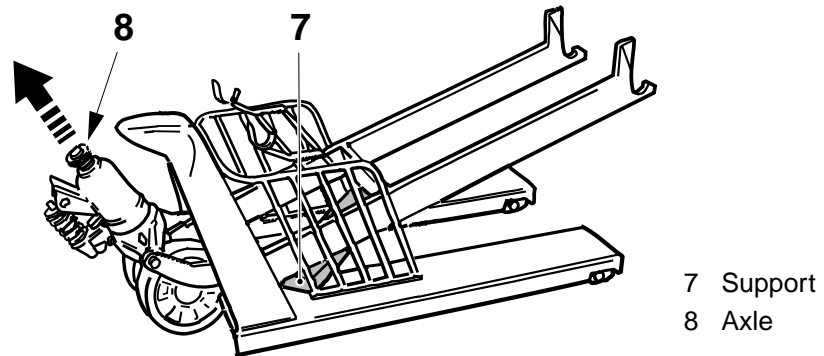


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- f) Put the trolley back on its wheel and put some support (7) under the lifting arms.
- g) Pull out the axle (8).



Caution! When removing the seals be careful **not to destroy** the surface where the seals are placed.

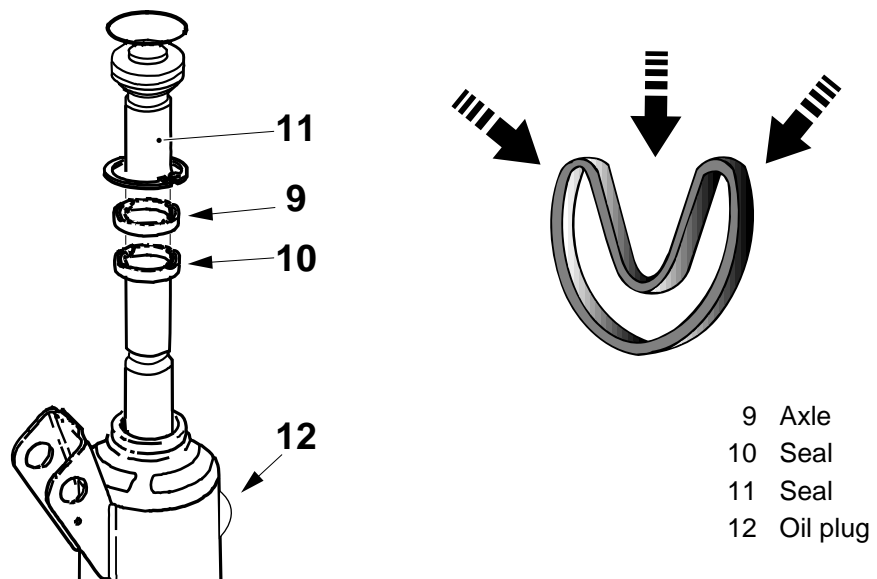
- h) With a screwdriver, remove the seals (9) and (10). Change the seals, shape them as a “V” and then fit them in correct position in the tracks.
- i) Put some oil on the axle (11) before fitting and assemble in the reverse order.

Note! Put the lifting arms in lowered position.



Chemical products!
Lubricant. Follow the *Safety precautions*.

- j) Undo the oil plug (12) and fill up with oil, code C, see 10.2 *Lubricants*. Fill up until oil starts to flow out of the overfilling hole.

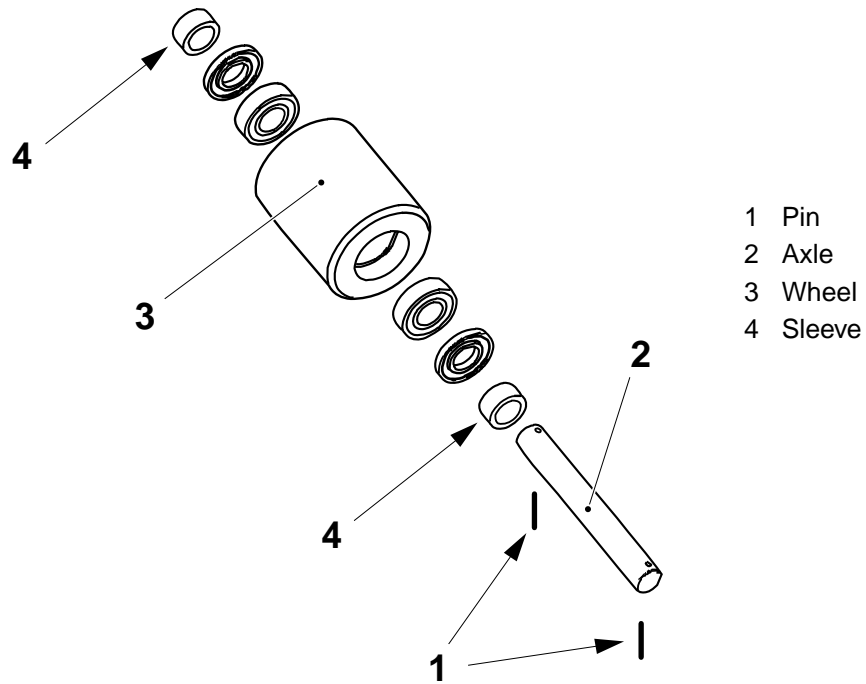


6.9-5 Paper reel trolley - remove fork wheel

SPC reference	491942-010V
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Put the trolley on its side.

- a) Drive the pins (1) in to the axle (2) and pull out the axle.
- b) Remove the wheel (3) and the sleeves (4).
- c) Assemble in the reverse order.

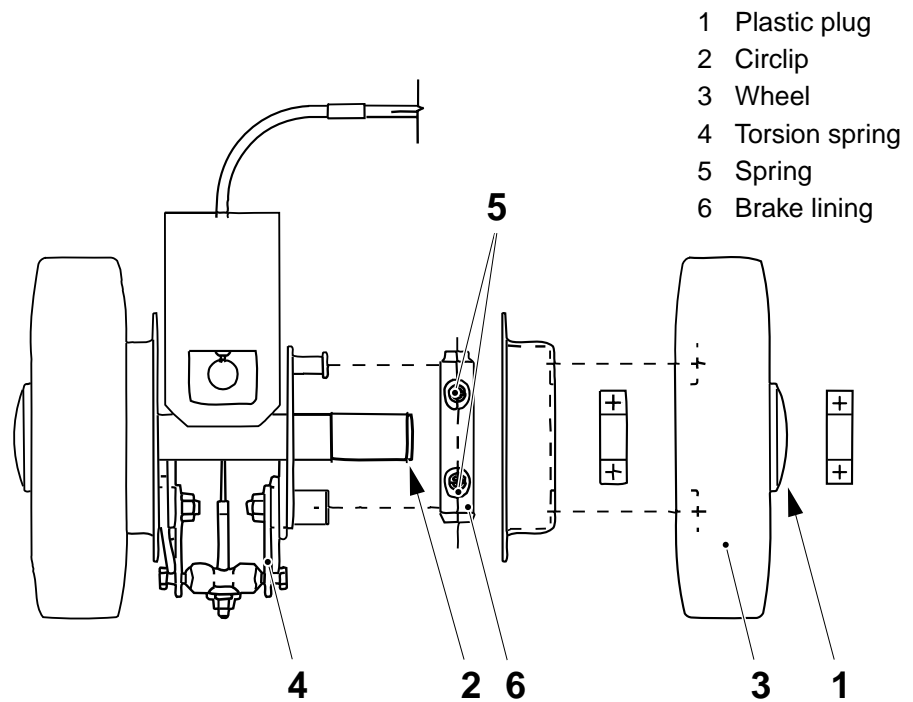


6.9-6 Paper reel trolley - remove guide wheel

SPC reference	491942-010V
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Put the trolley on its side.

- Remove the plastic plug (1), the circlip (2) and the wheel (3).
- Unhook the torsion spring (4).
- Remove the springs (5) holding the two brake linings (6) together and remove the guide wheel.
- Assemble in the reverse order.



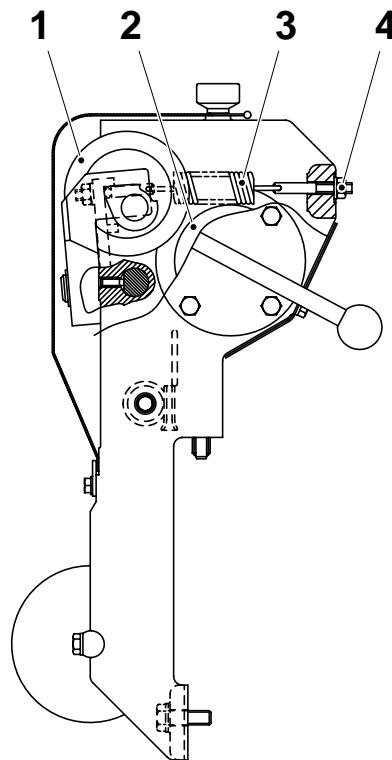
6.10 PT brake cassette unit

SPC reference	582401-010V
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6.10-1 PT brake cassette unit - set spring

SPC reference	582401-010V
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- a) Loosen the nut (4) until the spring (3) is completely released.
- b) Tighten the nut until the wheel (1) contacts the bending roller (2).
- c) Tighten the nut (4) again for two complete rotations ($2 \times 360^\circ$).

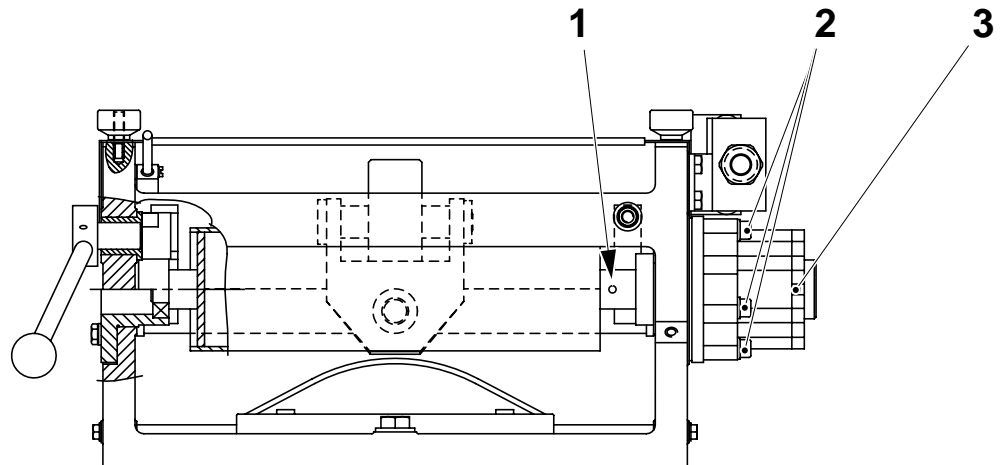


- 1 Wheel
- 2 Bending roller
- 3 Spring
- 4 Nut

6.10-2 PT brake cassette unit - change damper

SPC reference	582401-010V
---------------	-------------

- a) Tap out the pin (1).
- b) Unscrew the four screws (2) and remove the damper (3).
- c) Change the damper and assemble in the reverse order.
- d) Set the new damper to scale value **3**.
- e) Step up to **Production**.
- f) Fine set the damper by examine the action of the crease wheel in the dating unit
 - if the crease wheel turns without creasing the packaging material, increase the value set on the damper
 - if the packaging material pulls too much on the crease wheel, decrease the value set on the damper



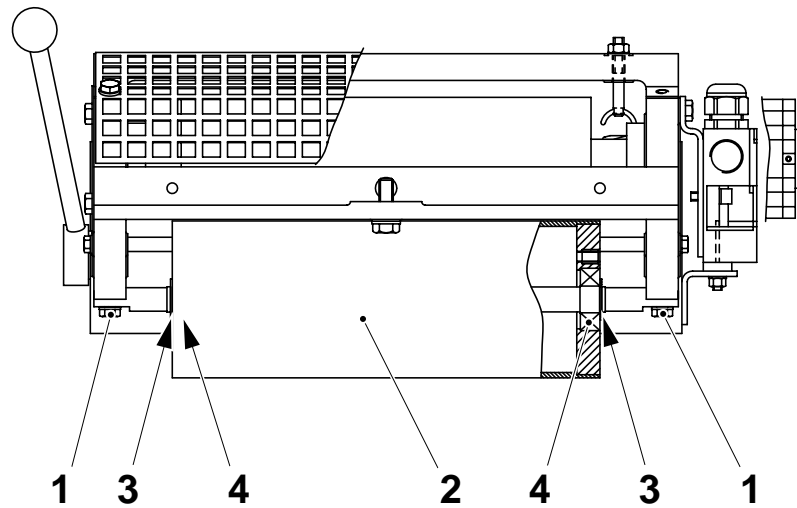
- 1 Pin
- 2 Screw
- 3 Damper

6.10-3 PT brake cassette unit - change roll balls

SPC reference	582401-010V
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Roll balls

- Unscrew the screws (1) and remove the roll (2).
- Remove the circlips (3) and pull out the roll balls (4).
- Change the roll balls and assemble in the reverse order.



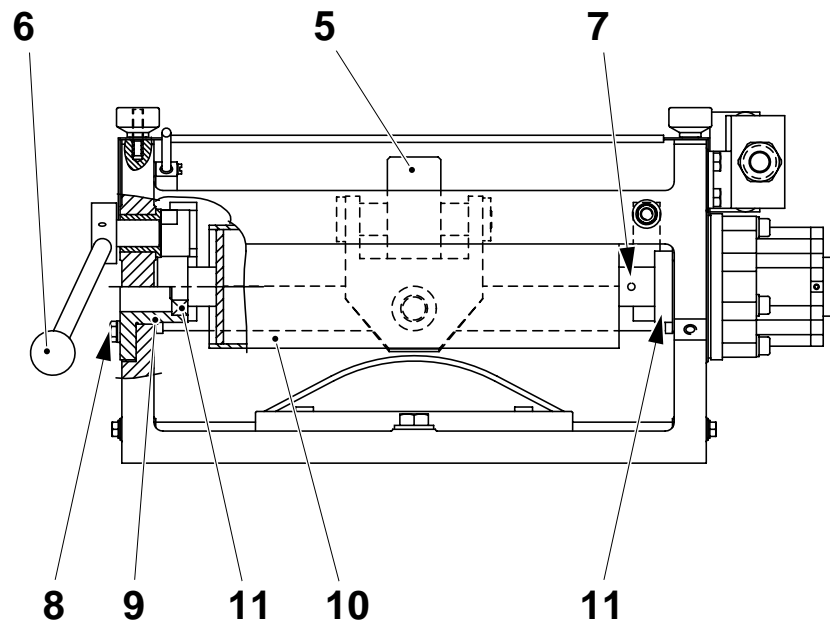
- 1 Screw
- 2 Roll
- 3 Circlip
- 4 Roll ball

(Cont'd)

(Cont'd)

Bending roller

- a) Release the pressure wheel (5) by means of the handle (6).
- b) Tap out the pin (7).
- c) Unscrew the four screws (8) and pull out the flange (9) and the roller (10).
- d) Remove the balls (11) from the flanges.
- e) Change the balls and assemble in the reverse order.



- 5 Pressure wheel
- 6 Handle
- 7 Pin
- 8 Screw
- 9 Flange
- 10 Roller
- 11 Balls

6.10.1 Paper guide

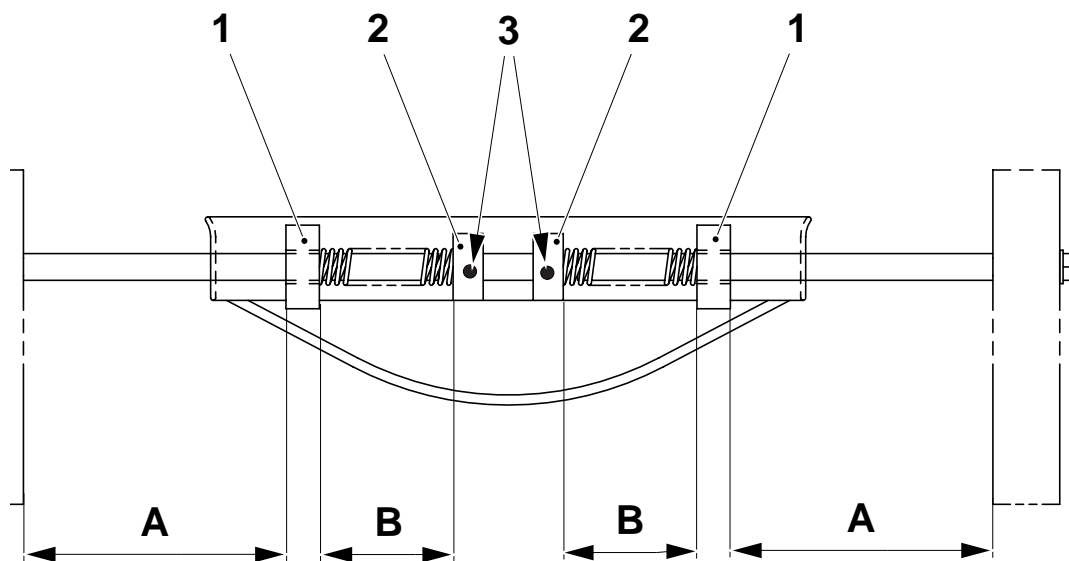
6.10.1-1 Paper guide - set

SPC reference	979619-010V
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Set distance A from the guiding arbors (1) to the frame.

Set distance B between the two guiding arbors (1) and the retaining pieces (2).

Adjust by means of stop screws (3) on the retaining pieces.



$A = 78.5 \pm 1.0 \text{ mm}$ $B = 40 \pm 1 \text{ mm}$

- 1 Guiding arbor
- 2 Retaining piece
- 3 Stop screw

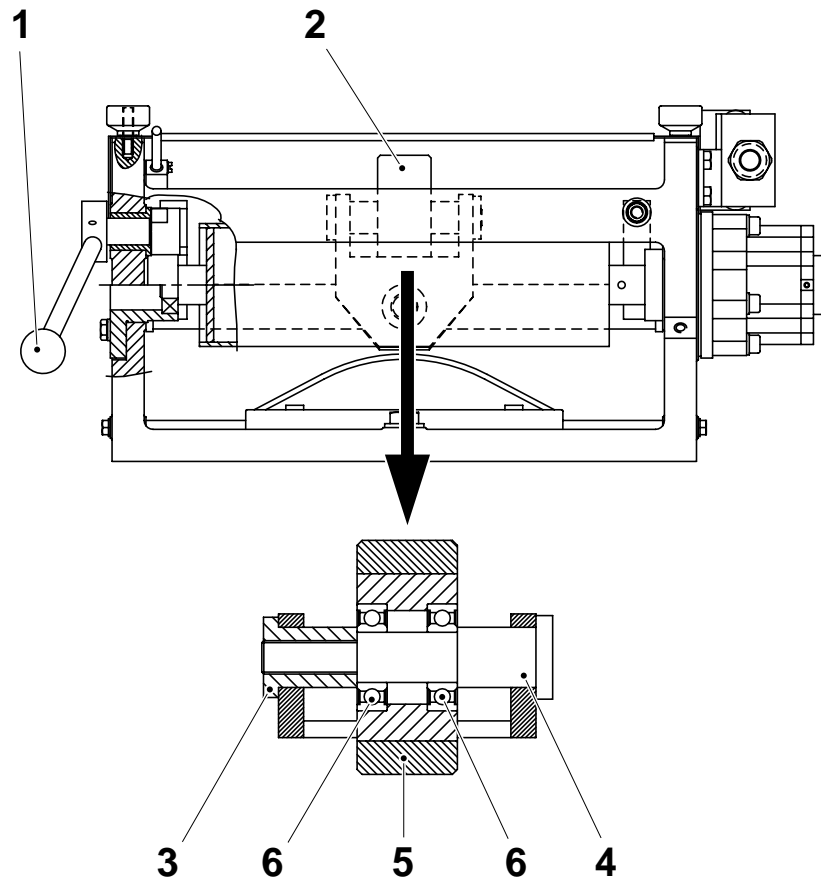
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6.10.2 Paper guide plate

6.10.2-1 Paper guide plate - change wheel and ball bearings

SPC reference	979622-010V
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- a) Release the pressure wheel (1) by means of the handle (2).
- b) Unscrew the nut (3) and remove the shaft (4).
- c) Remove the wheel (5).
- d) Change the ball bearings (6) and the wheel.
- e) Assemble in the reverse order.

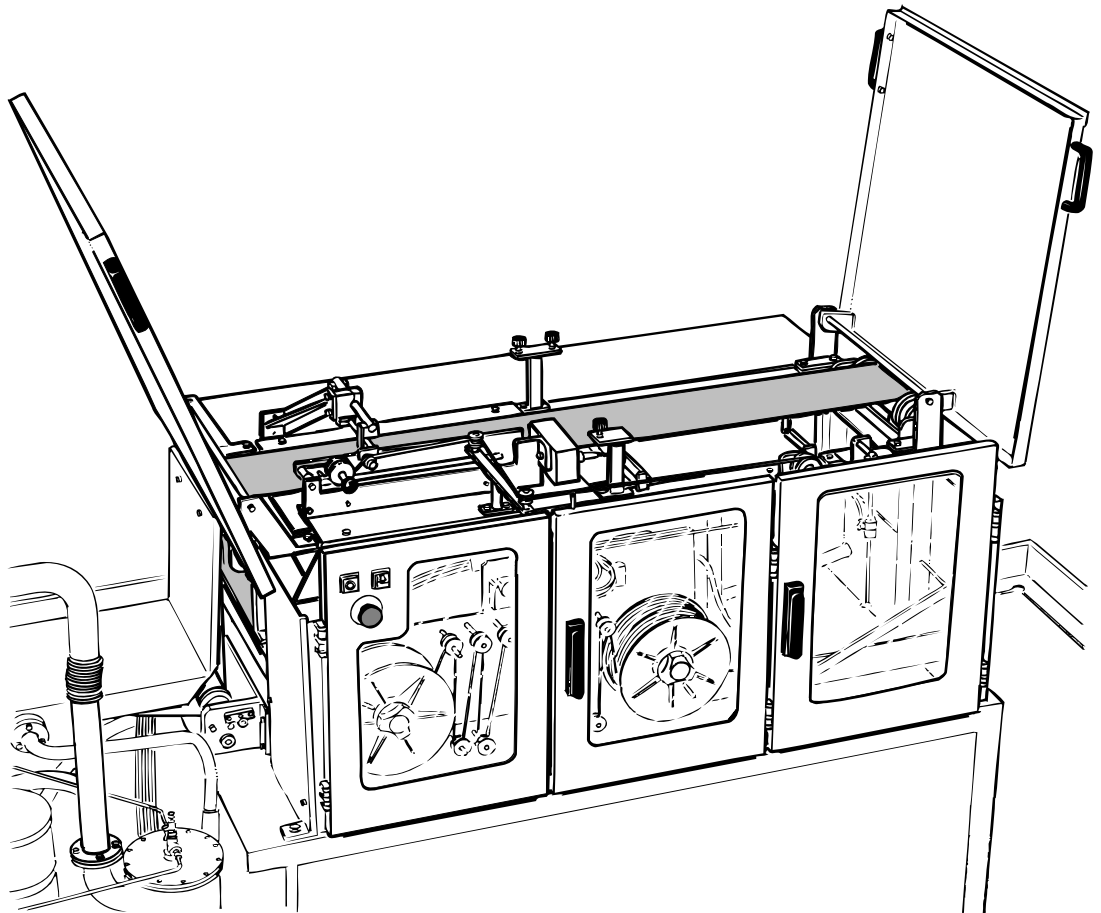


- 1 Pressure wheel
- 2 Handle
- 3 Nut
- 4 Shaft
- 5 Wheel
- 6 Ball bearing

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7 Strip applicator



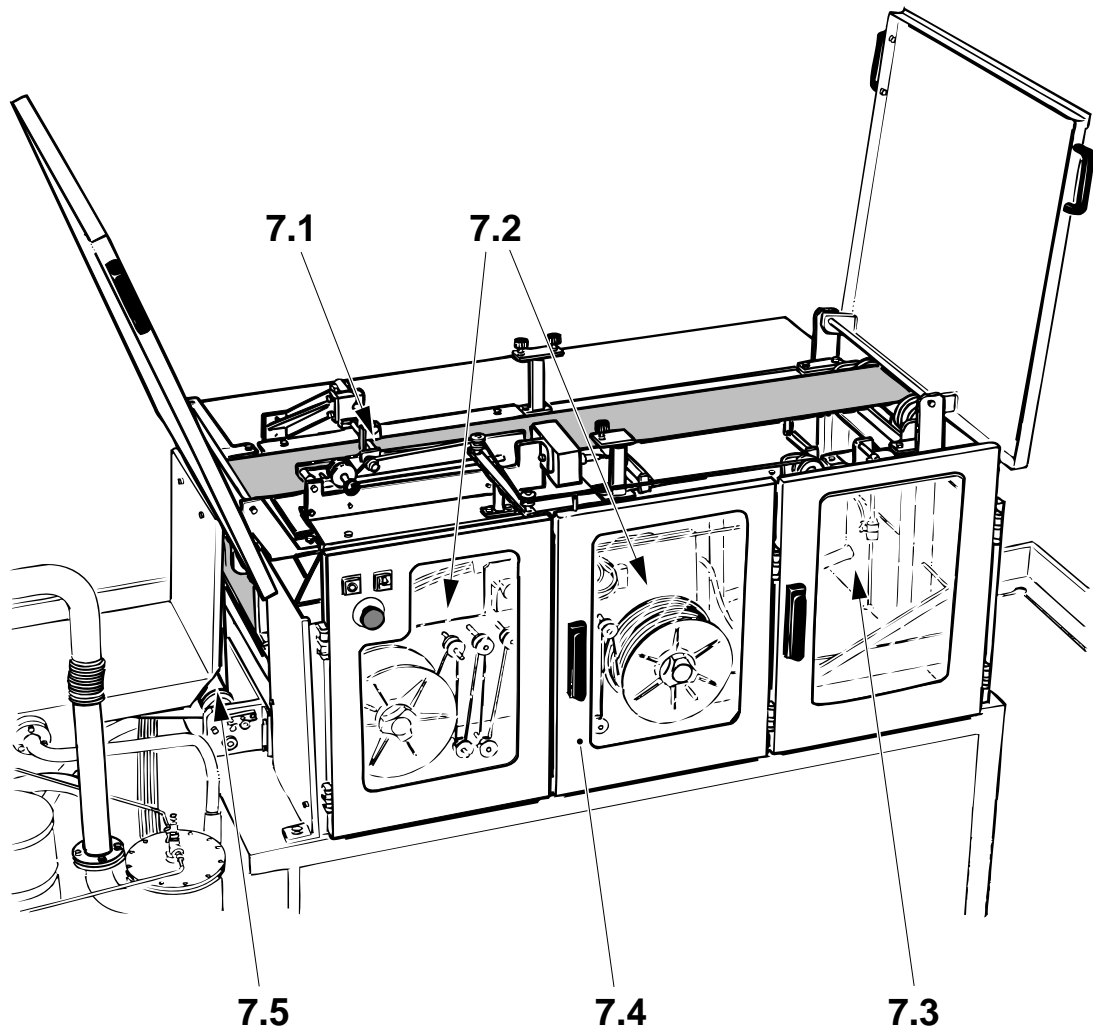
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Note! This section is not valid for machines equipped with PullTab.

7 Strip applicator

7-1 Strip applicator - description

SPC reference 648107-110V



- 7.1 Strip applicator
- 7.2 Strip magazine
- 7.3 Splicing magazine
- 7.4 Doors
- 7.5 Bending rollers

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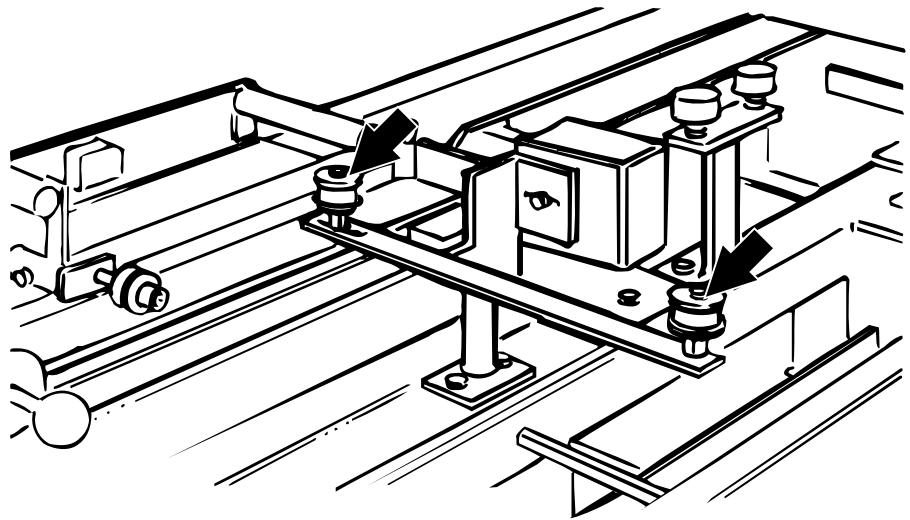
7.1 Strip applicator

SPC reference	580036-010V
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7.1-1 Strip applicator - check rollers

SPC reference	580036-010V
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- a) Make sure that the rollers rotate freely.
- b) Check that the rollers are not worn and/or damaged.
- c) Change rollers as required.

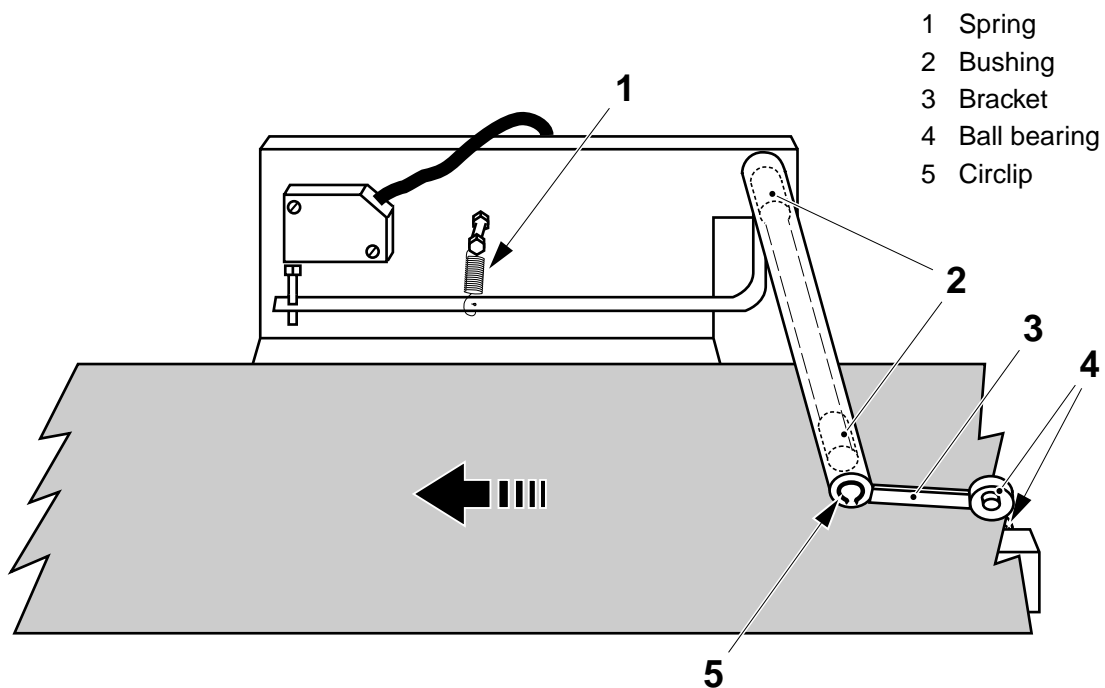


7.1.1 Splice detector

7.1.1-1 Splice detector - check function

Machine status	Short stop
SPC reference	578987-010V

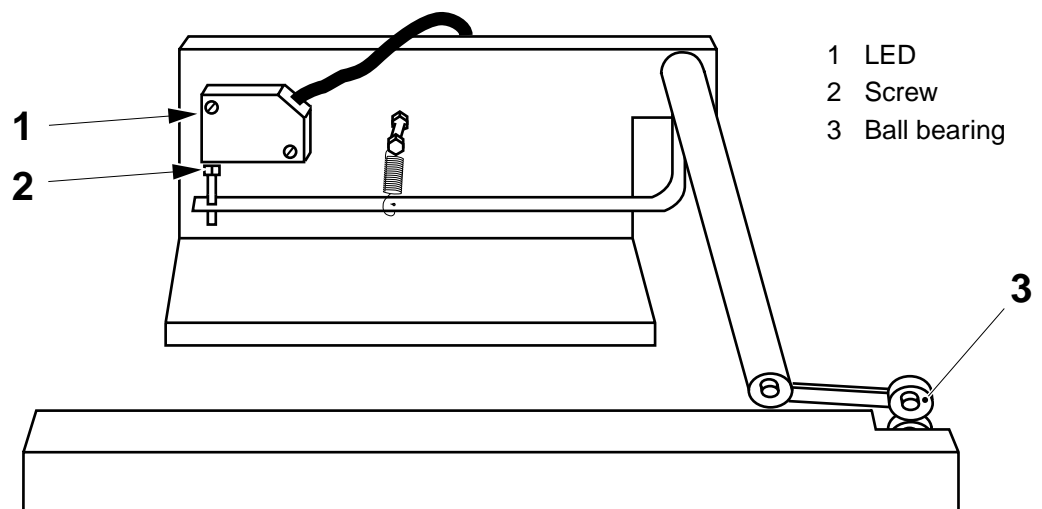
- a) Tape a piece of packaging material to the packaging material web before the splice detector, in front of the ball bearing (4).
- b) Step up to step **Production**.
- c) Make sure that the taped-on piece passes the ball bearing.
- d) The machine discards two packages. Make sure that the package with the taped-on piece is one of these.
- e) If not, check that;
 - the ball bearings (4) rotate easily; change as required
 - the spring (1) is intact; change as required
- f) Make sure that the bracket (3) is easy to turn. If required, remove the circlip (5) and the bracket.
- g) Clean or change the two bushings (2) as required.



7.1.1-2 Splice detector - set

Machine status	Power On
SPC reference	578987-010V

- Set the screw (2) so that it **just** touches the inductive switch (the LED (1) lights up).
- Place a piece of double packaging material between the ball bearings (3).
- Screw in the screw (2) until the LED goes out.
- Check, with a **single** piece of packaging material, that the LED (1) lights up.
- Check with a **double** piece of packaging material the LED goes out.



7.1.2 Pressure rollers

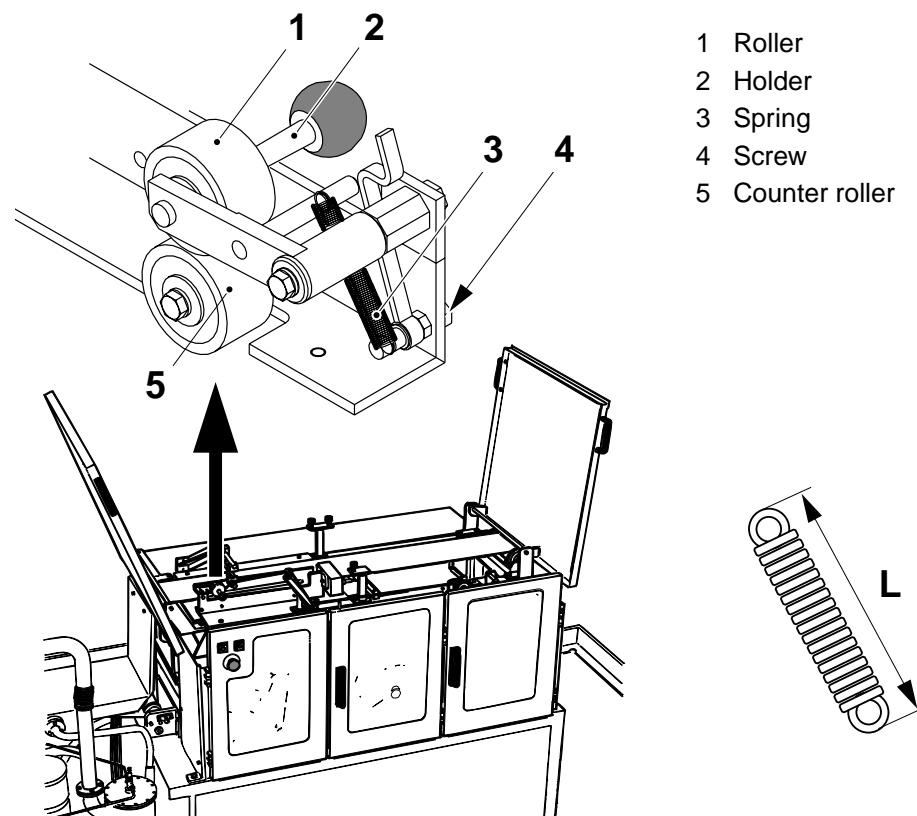
7.1.2-1 Pressure rollers - check condition and spring force

Tools - dynamometer	min 17 N
SPC reference	580039-010V

- a) Make sure that the rollers (1) and (5) rotate freely and that they are intact. Change the rollers as required, see 7.1.2-2 *Pressure rollers - change*.

Note! There are two springs available. First measure the spring length, L.

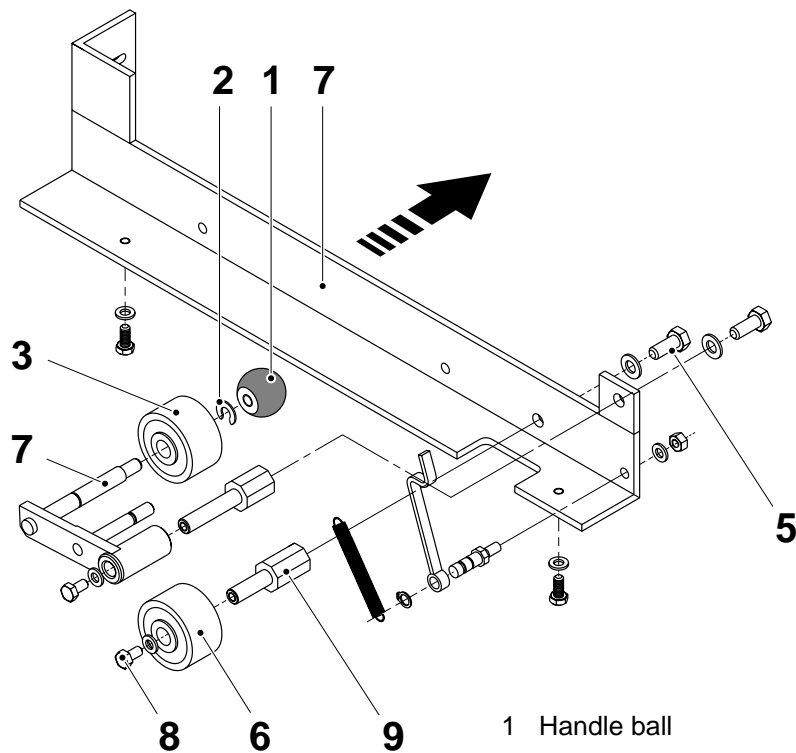
- b) Attach a dynamometer to the holder (2) and measure the spring force. Spring force when the roller (1) raises from the counter roller (5), see table.
- c) If required, set the force by means of the screw (4).
If it is not possible to obtain the correct force, change the spring (3).



7.1.2-2 Pressure rollers - change

SPC reference	580036-010V
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- Unscrew the handle ball (1), remove the locking washer (2) and change the pressure roller (3).
- Check the contact surface on the holder (4). Change the holder as required.
- Unscrew the screw (5) and remove the counter roller (6) from the bottom of the fastening bracket (7).
- Unscrew the screw (8) and change the counter roller.
- Check the contact surface on the shaft (9). Change the shaft as required.



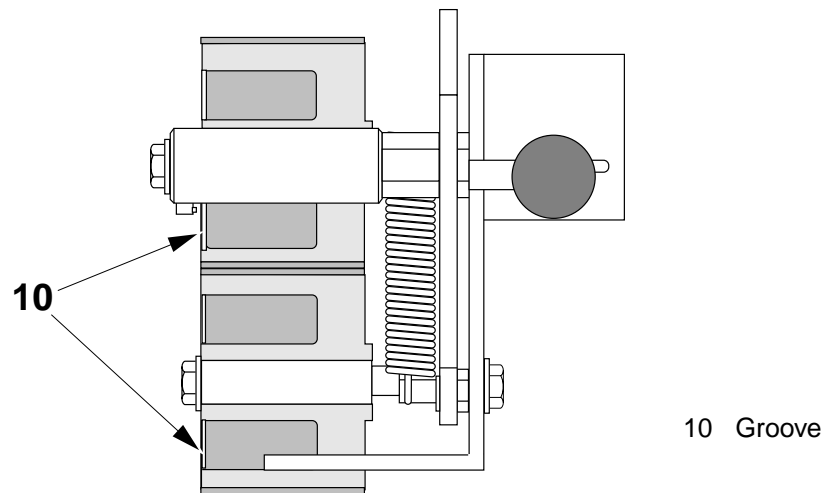
- 1 Handle ball
- 2 Locking washer
- 3 Pressure roller
- 4 Holder
- 5 Screw
- 6 Counter roller
- 7 Fastening bracket
- 8 Screw
- 9 Shaft

(Cont'd)

(Cont'd)

f) Assemble in the reverse order.

Note! Make sure to fit the pressure roller with the groove (10) against the packaging material, as illustrated.



7.1.3 Strip guide

7.1.3-1 Strip guide - check guide wheels and bushings

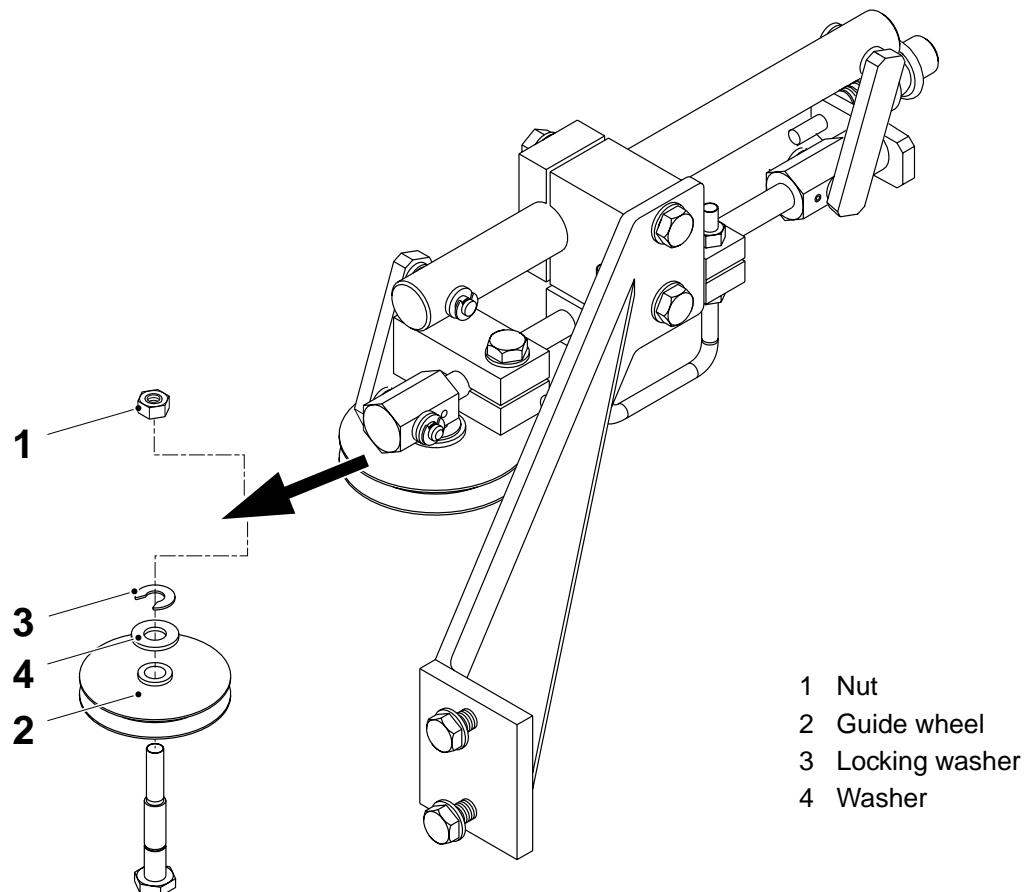
SPC reference	580040-010V
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Guide wheels

Check that the packaging material guide wheel (2) rotates freely and that it is intact.

If required, change the guide wheel as follows.

- Unscrew the nut (1) and remove the guide wheel (2).
- Remove the locking washer (3) and the washer (4).
- Change the guide wheel (2).
- Assemble in the reverse order.



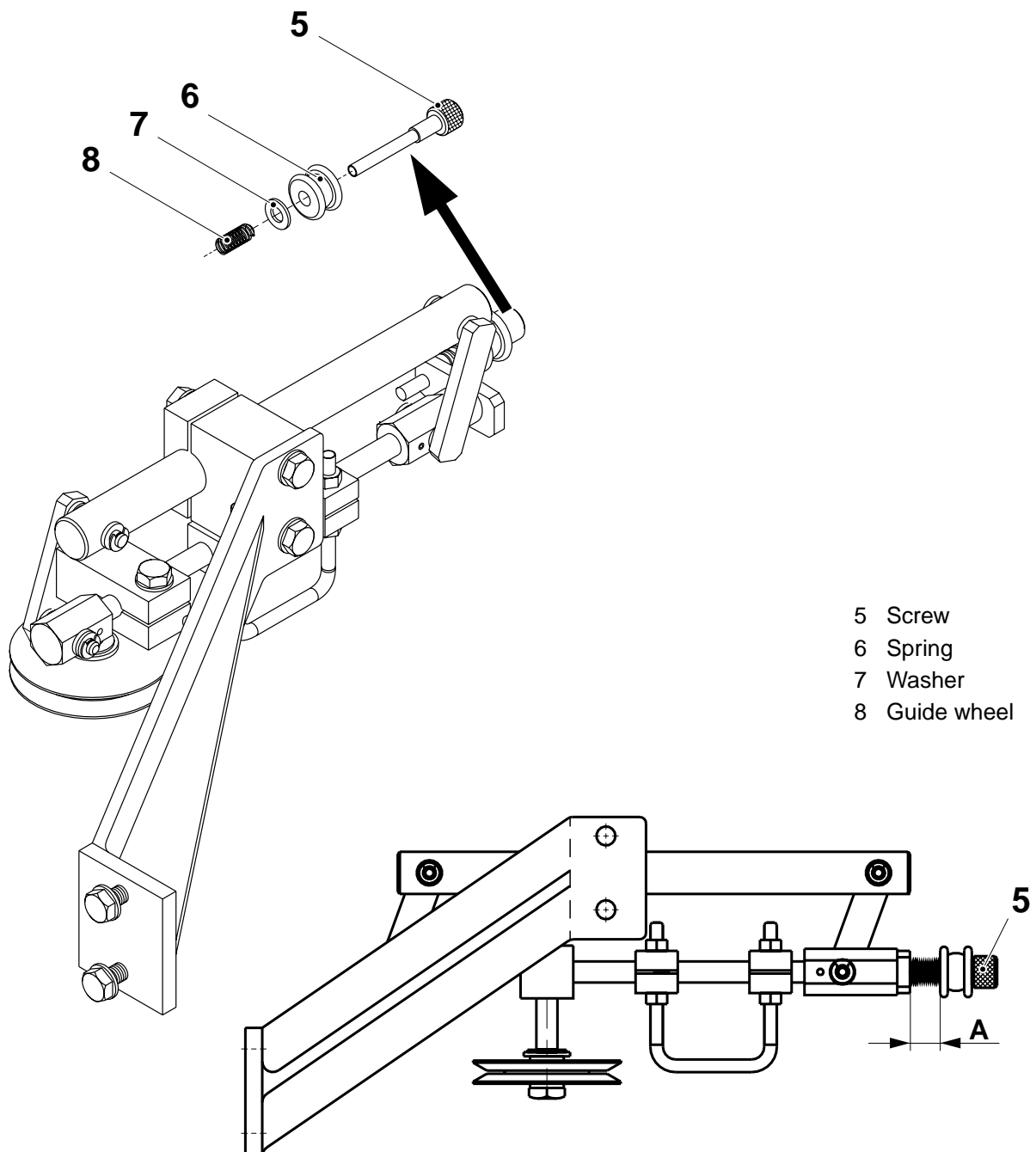
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Check that the guide wheel (8) rotates freely and that it is intact.

If required, change the guide wheel as follows.

- a) Measure and record distance A.
- b) Unscrew the screw (5) and remove the spring (6) and the washer (7).
- c) Change the guide wheel (8).
- d) Assemble in the reverse order.
- e) Set distance A (use the recorded measure) by means of the screw (5).



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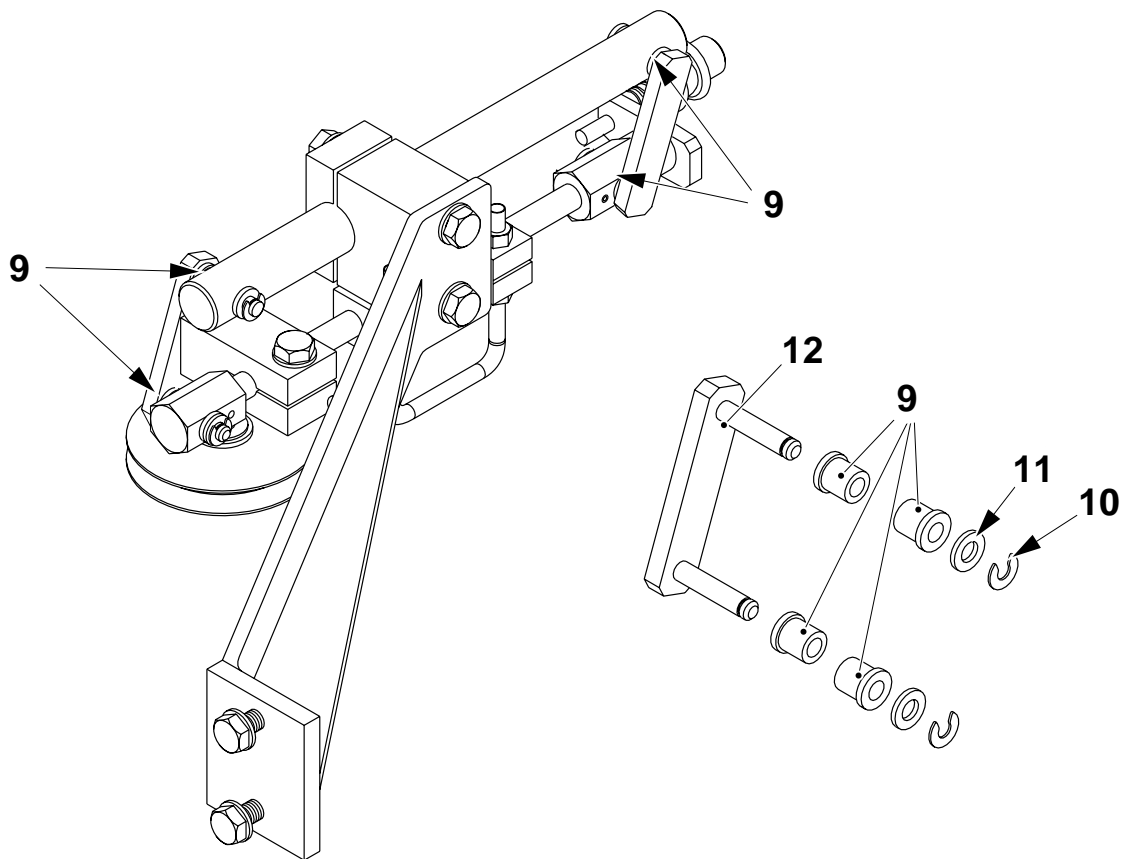
(Cont'd)

Bushings

Check that there is no play in the bushings (9). Make sure that the strip guide moves freely.

If required, change the bushings as follows.

- a) Remove the locking washers (10) and the washers (11).
- b) Remove the links (12). Check the contact surfaces.
- c) Change the links as required.
- d) Change the bushings (9).
- e) Assemble in the reverse order.



- 9 Bushing
- 10 Locking washer
- 11 Washer
- 12 Link

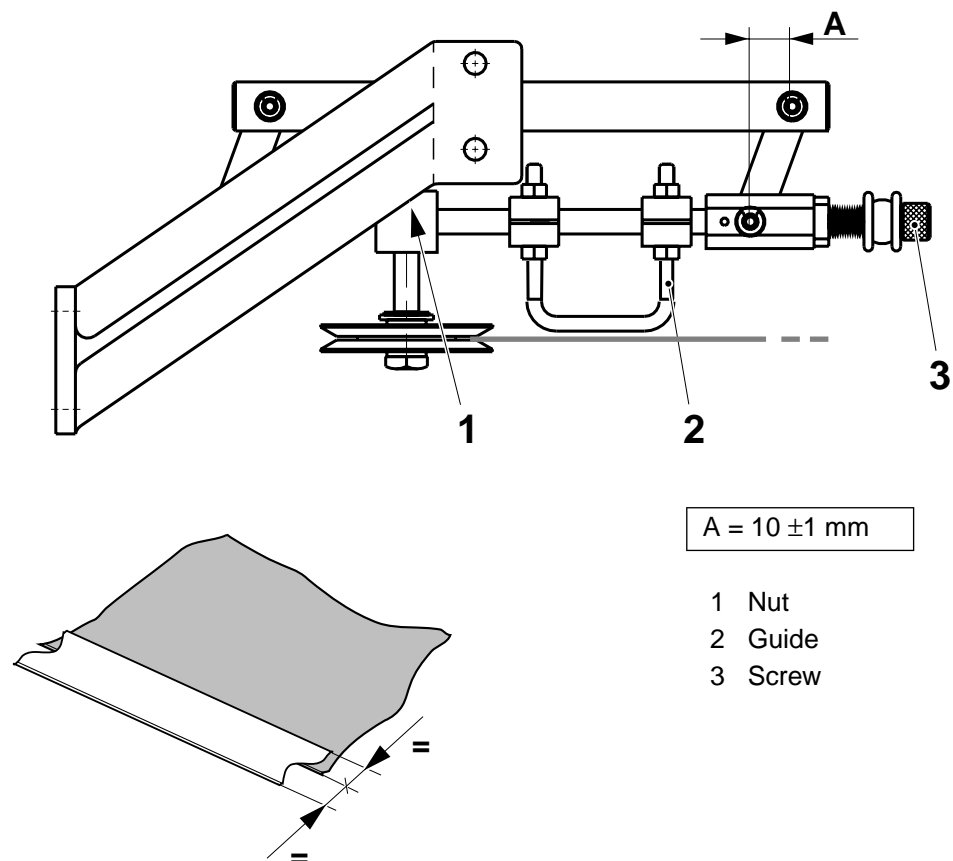
7.1.3-2 Strip guide - set

Machine status	Short stop
SPC reference	580040-010V

- a) As a basic setting, adjust on the clamp fitting so that there is approx. distance A between the bushings. Adjust on the nuts (1) as required.

Note! Make sure that the guide wheel is horizontal and that it is parallel to the packaging material web.

- b) Set the guide (2) so that it is just above the packaging material web.
 c) Step up to step **Production**.
 d) Fine set the position of the LS strip by means of the screw (3). The LS strip should be placed symmetrically over the edge of the packaging material.



7.1.4 Inductor

7.1.4-1 Inductor - check seal on ejected package

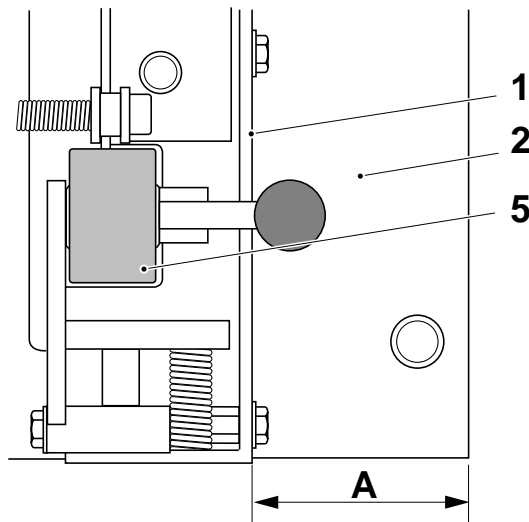
Machine status	Production
SPC reference	580038-010V

- a) Make a **Short stop**.
- b) Step up the machine to step **Production**.
- c) The machine discards three packages.
- d) Open the packages and check that the strip is sealed to the packages.
If not, check the setting of the TPIH SA power.

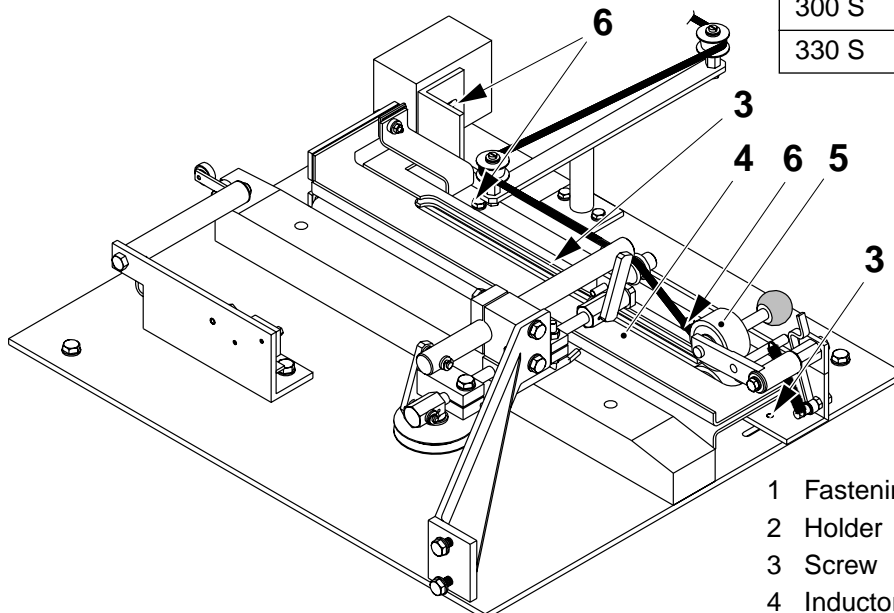
7.1.4-2 Inductor - set

Machine status	Short stop
Tools - TPIH test instrument	TP No. 68462
SPC reference	580038-010V

- a) Set distance A, see table, between the fastening bracket (1) and the holder (2). If required, loosen the screws (3) and shift the fastening bracket.
- b) Make sure that the inductor (4) does not touch the pressure roller (5) at any point. If required, loosen the screws (6) and shift the inductor. Make sure that the inductor is **parallel with** the frame.



Package	A ±0.5 (mm)
100 B	120
125 S	120
160 S	114
180 B	94
200 B	94
200 M	107
200 S	114
236 B	94
250 B	94
250 S	107
284 B	94
300 S	94
330 S	94



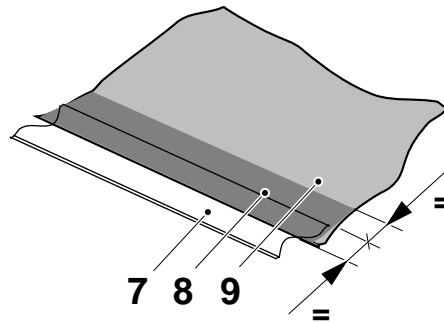
- 1 Fastening bracket
- 2 Holder
- 3 Screw
- 4 Inductor
- 5 Pressure roller
- 6 Screw

(Cont'd)

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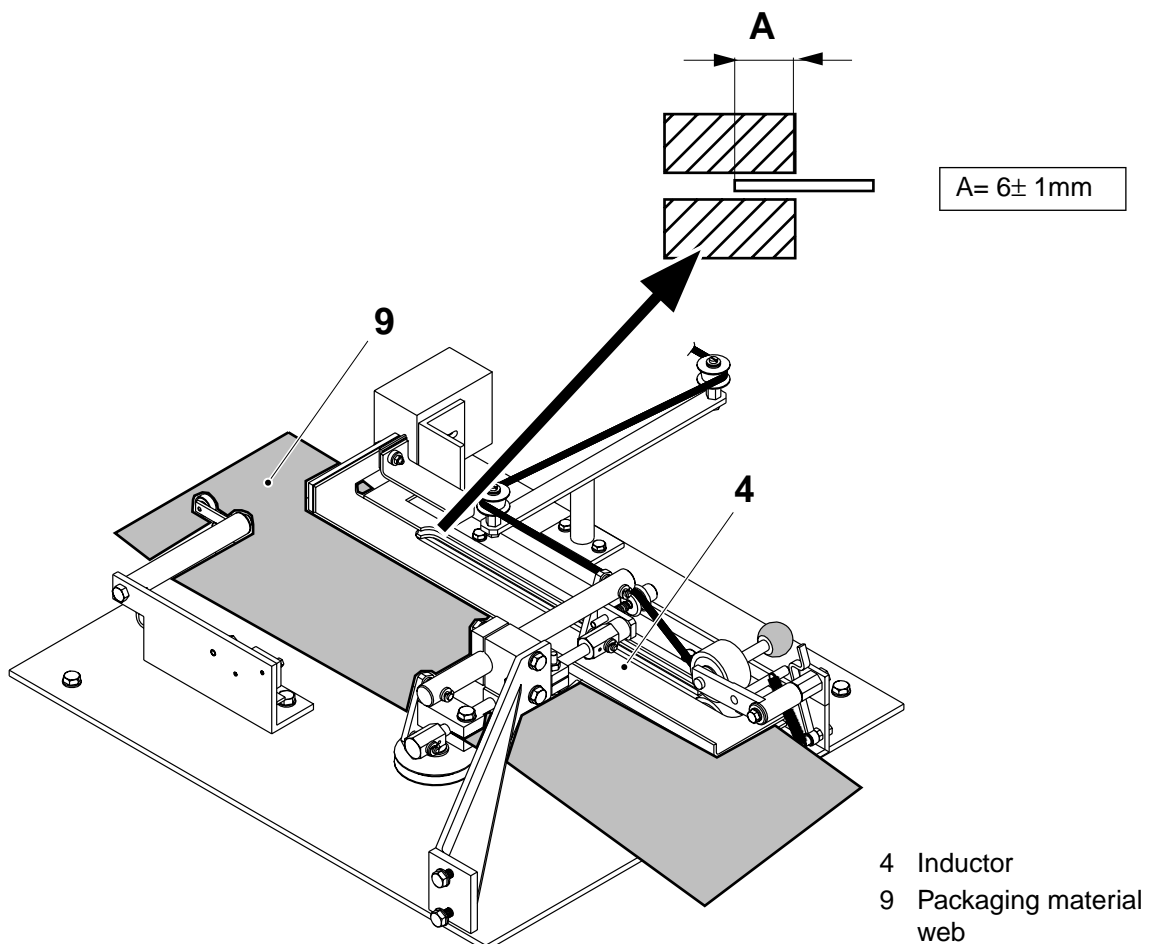
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- c) Step up to step **Production**.
- d) Make sure that the heat pattern (8) is positioned so that it covers the sealed part of the LS strip (7), and a part of the packaging material web (9), approx. 6 mm. as well.



- 7 LS strip
- 8 Heat pattern
- 9 Packaging material web

- e) Make sure that the inductor (4) overlaps the packaging material web (9) for approx. 6 mm.



- 4 Inductor
- 9 Packaging material web

(Cont'd)

7.2 Strip magazine

SPC reference	580037-010V
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7.2.1 Mounting sheet

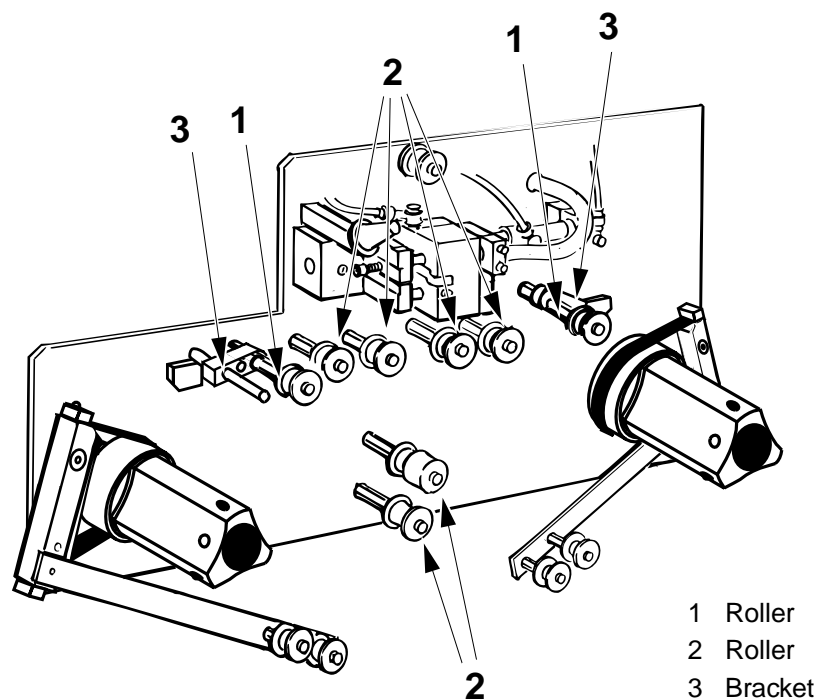
7.2.1-1 Mounting sheet - check

Machine status	Power On
SPC reference	580041-010V

Check the following details for wear and/or damage:

- the rollers (1) and (2); make sure that they rotate and slide freely
- the brackets (3); make sure that they twist freely.
- The rollers (2); make sure they rotate freely.

Clean or change as required.



7.2.2 Hub jumbo

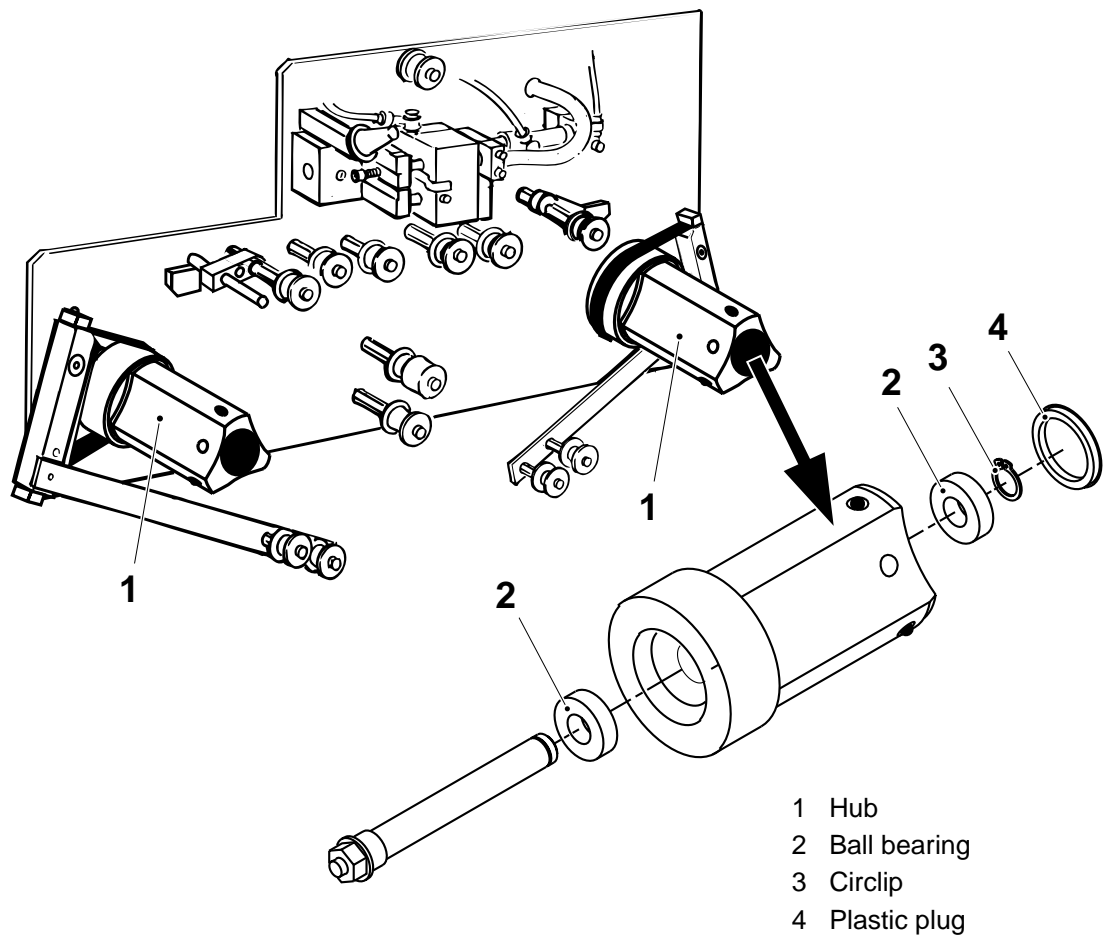
7.2.2-1 Hub jumbo - check

Consumables - locking fluid	TP No. 90157-16
SPC reference	580042-010V

Check that the hubs (1) rotate freely.

If required, change the ball bearings (2) as follows.

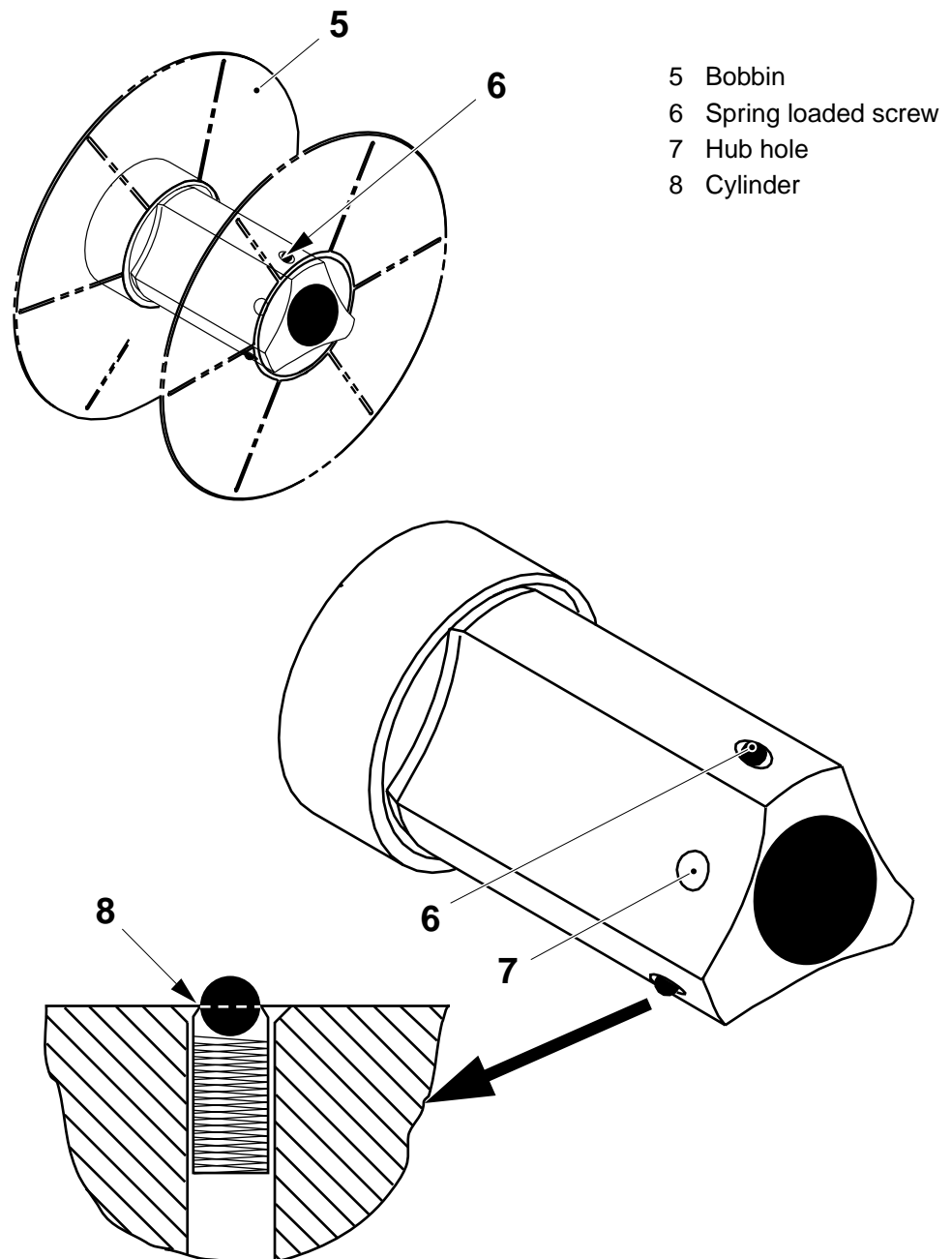
- Remove the plastic plug (4), the circlip (3) and the hub.
- Press out the ball bearings (2) from the hub and change them.
- Assemble in the reverse order.



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- d) Fit the bobbins (5) on the hubs and check that they are properly locked by the spring loaded screws (6).
- e) If required, unscrew the spring loaded screws from the hub holes (7).
- f) Change them and fit the new ones with locking fluid.
- g) Set the spring loaded screws so that the top of the cylinder (8) is in level with the hub.



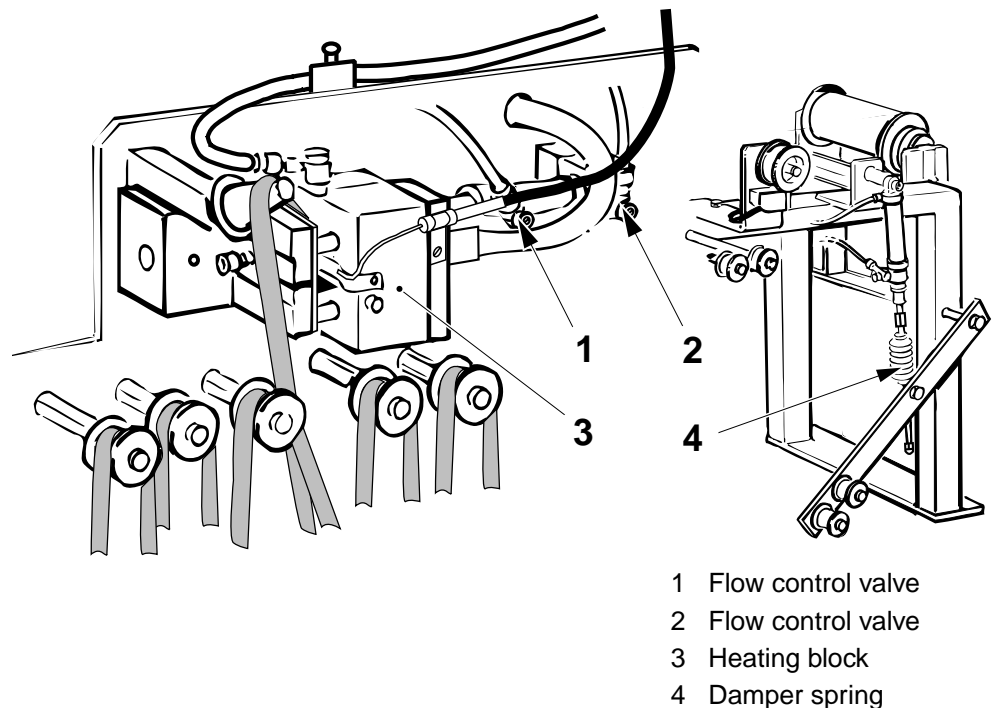
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7.2.3 Splicing device

7.2.3-1 Splicing device - check function

Machine status	Preheating I
SPC reference	580043-010V

- a) Thread the strip from both strip reels, so that the SA is prepared for splicing (see *OM*).
- b) Remove the touch guard from the splicing unit and close the safety doors.
- c) Push the **Manual strip splice** button and check the splice function. If the splicing unit does not splice correctly, see 7.2.3-2 *Splicing device - check* and below.
- d) Make sure that the cylinder piston extends **immediately** after the strip splice. If not, adjust on the flow control valve (1).
- e) Make sure that the cylinder piston retracts fully, that the strip is released from the heating block (3) **before** the splicing magazine arm starts to compress the damper spring (4). If not, adjust on the flow control valve (2).

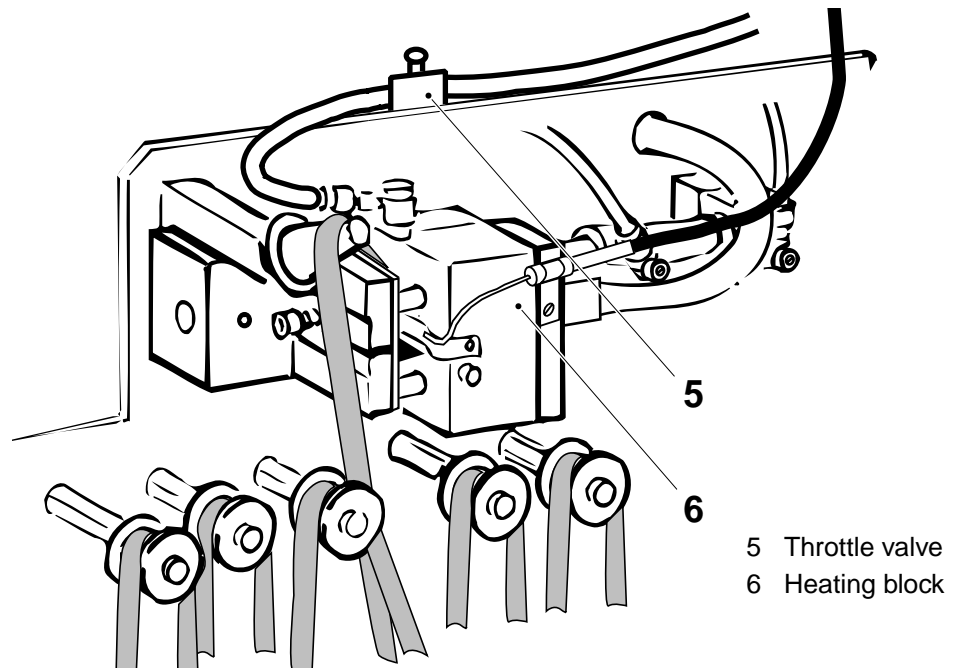


- 1 Flow control valve
- 2 Flow control valve
- 3 Heating block
- 4 Damper spring

(Cont'd)

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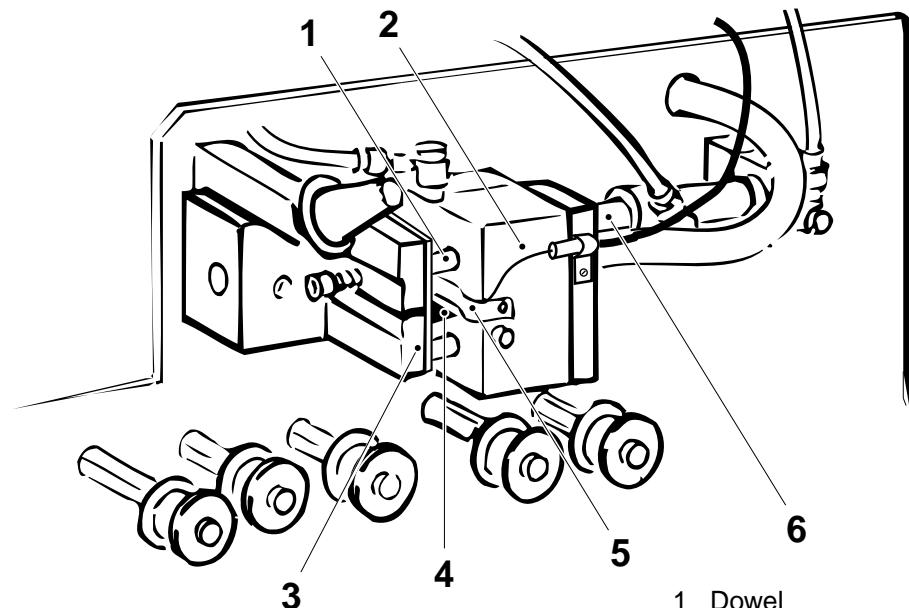
- f) Check that an air flow comes out from the heating block (6). If not, adjust on the throttle valve (5). Set the flow as high as possible without affecting the position of the strip.
- g) Fit back the touch guard.



7.2.3-2 Splicing device - check

SPC reference	580043-010V
---------------	-------------

- a) Remove the touch guard from the splicing unit.
- b) Check that the dowels (1) are clean, intact and slides freely into the heating block (2). Clean or change as required, see 7.2.3-6 *Splicing device - change dowels*.
- c) Check that the heating block (2) slides freely. Change the ball bushings as required, see 7.2.3-5 *Splicing device - change ball bushing*.
- d) Check that the rubber on the bracket (3) is clean and intact. Clean or change the bracket as required, see 7.2.3-3 *Splicing device - change bracket*.
- e) Check that the knife (4) is clean, intact and that the edge is sharp and not damaged. Clean or change as required, see 7.2.3-4 *Splicing device - change knife*.
- f) Check that the fabric (5) is clean and intact. Clean or change as required.
- g) Check that the cylinder piston (6) moves freely. Change the cylinder as required, see 7.2.3-7 *Splicing device - change cylinder*.
- h) Fit back the touch guard.

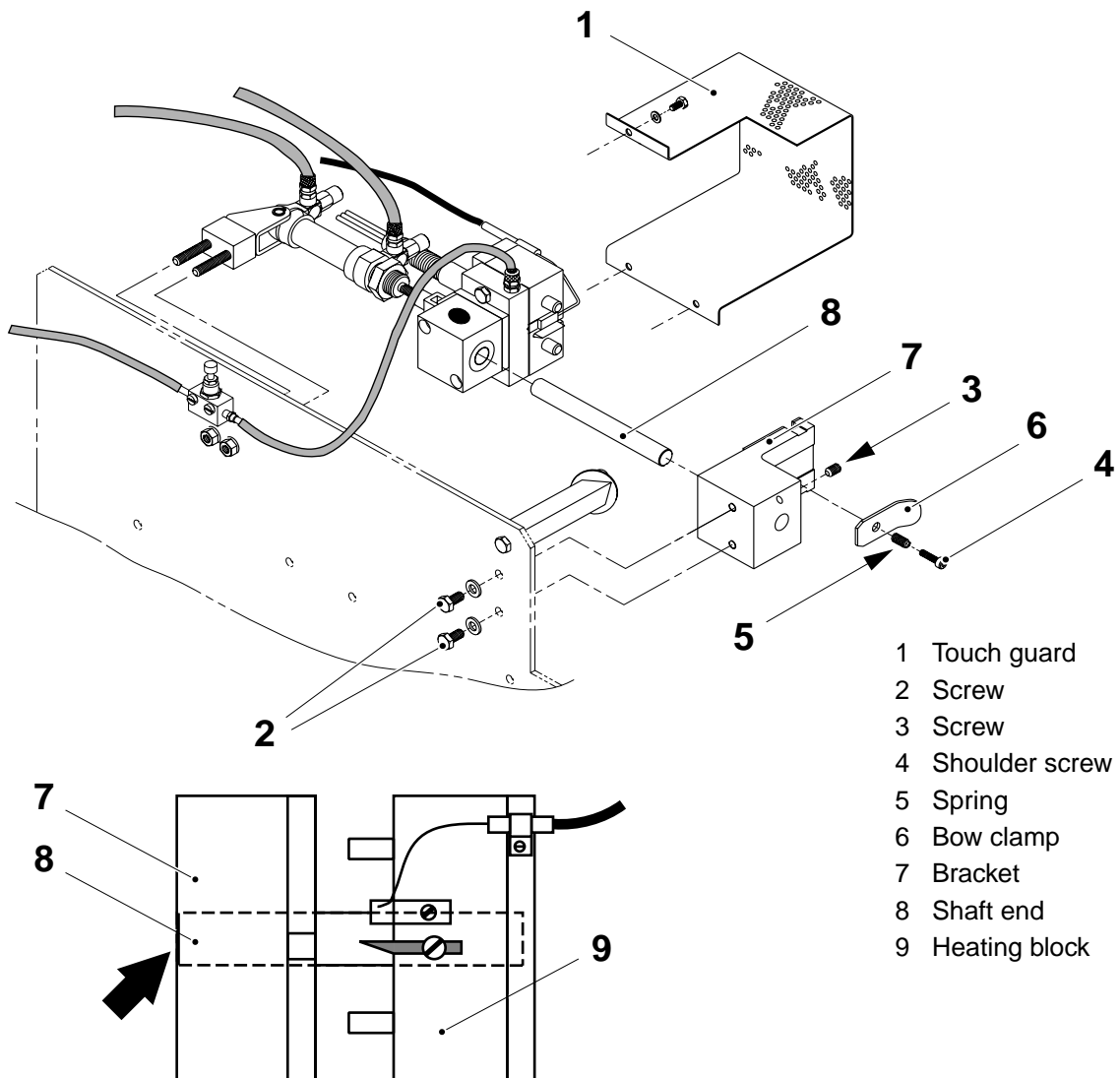


- 1 Dowel
- 2 Heating block
- 3 Bracket
- 4 Knife
- 5 Fabric
- 6 Cylinder piston

7.2.3-3 Splicing device - change bracket

SPC reference	580043-010V
---------------	-------------

- a) Remove the touch guard (1) from the splicing unit. Unscrew the screws (2) and remove the washers.
- b) Unscrew the screw (3) and the shoulder screw (4), and remove the spring (5) and the bow clamp (6).
- c) Change the bracket (7).
- d) Assemble in the reverse order.
- e) Set the heating block (9) so that the knife enters freely into the slot in the bracket (7) and, at the same time, set the shaft end (8) aligned with the surface of the bracket. Set by means of the screw (3).
- f) Fit back the touch guard.

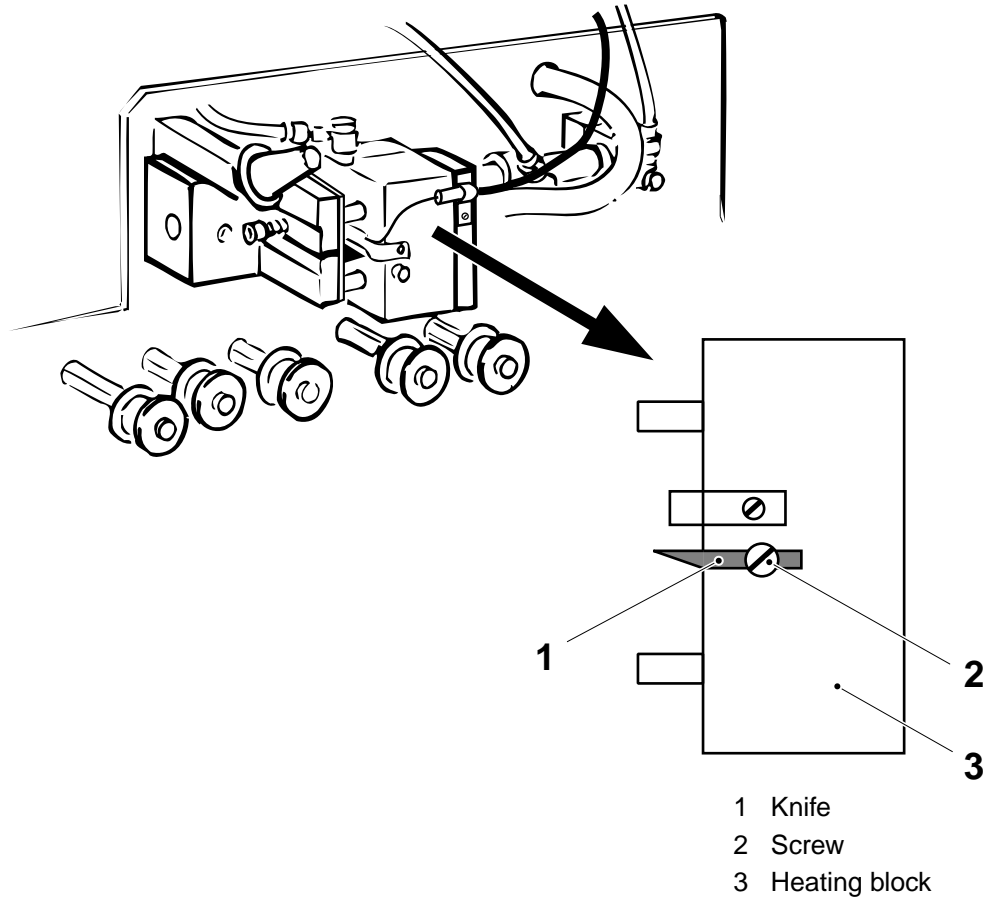


- 1 Touch guard
- 2 Screw
- 3 Screw
- 4 Shoulder screw
- 5 Spring
- 6 Bow clamp
- 7 Bracket
- 8 Shaft end
- 9 Heating block

7.2.3-4 Splicing device - change knife

SPC reference	580043-010V
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- a) Remove the touch guard from the splicing unit.
- b) Unscrew the screw (2) and change the knife (1).
- c) Make sure that the rear knife end bears against the bottom of the slot in the heating block (3). Fit the screw (2).
- d) Fit back the touch guard.



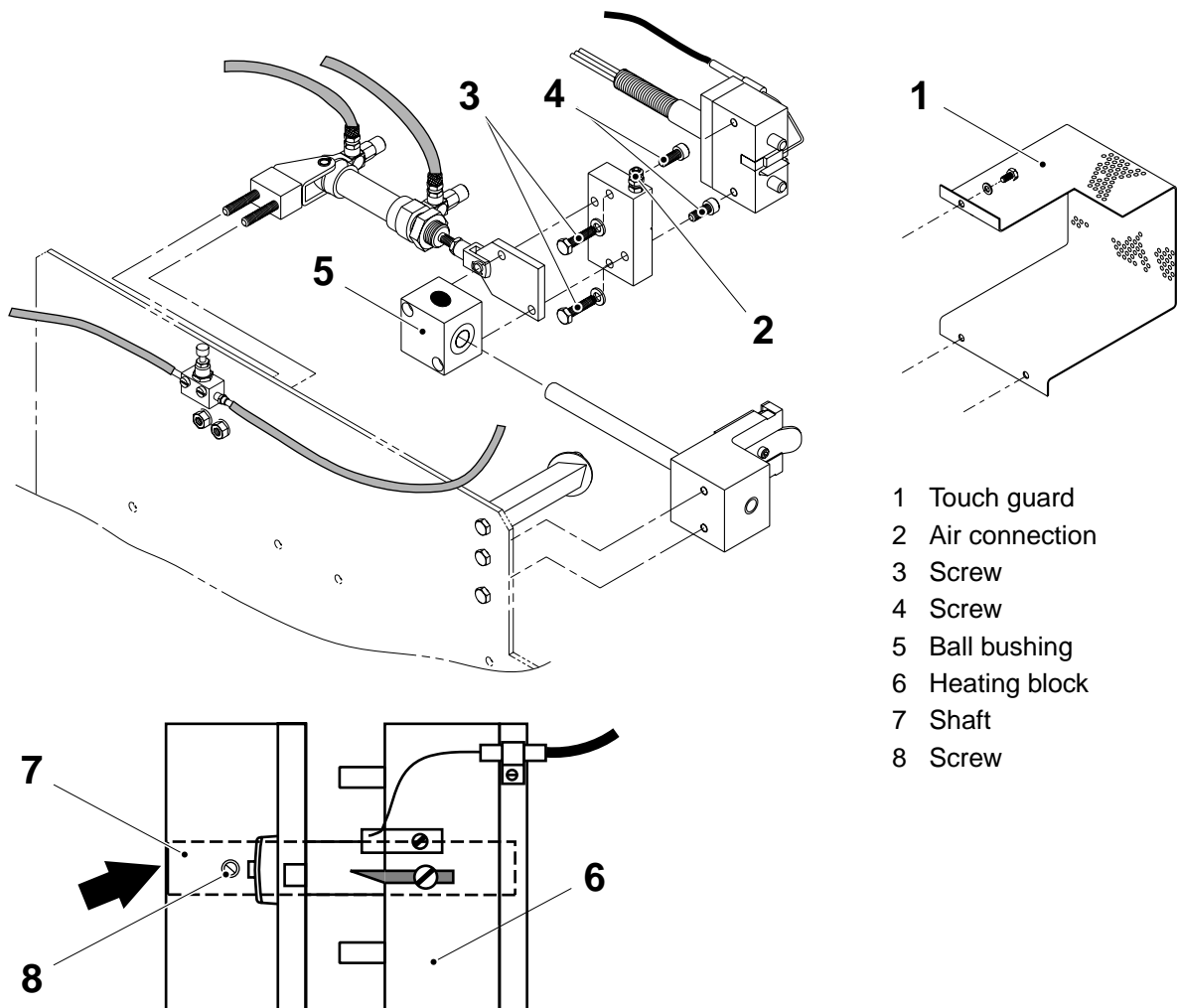
7.2.3-5 Splicing device - change ball bushing

SPC reference	580043-010V
---------------	-------------

- a) Remove the touch guard (1) from the splicing unit.
- b) Remove the air connection (2).
- c) Unscrew the screws (3) and move the heating block aside.
- d) Unscrew the screws (4) and turn the cylinder aside.

Note! There are loose balls inside the ball bushing (5).

- e) Change the ball bushing.
- f) Assemble in the reverse order.
- g) Set the heating block (6) so that the knife enters freely into the slot in the bracket and, at the same time, set the shaft end (7) aligned with the surface of the bracket. Set by means of the screw (8).
- h) Fit back the touch guard.

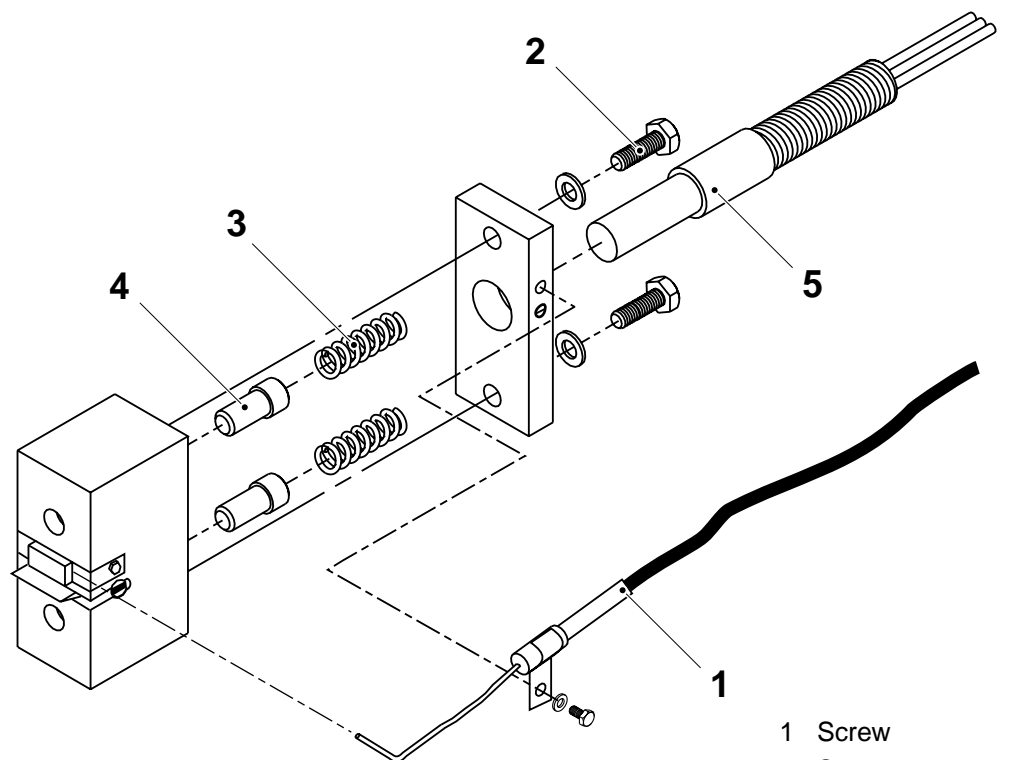


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7.2.3-6 Splicing device - change dowels

Consumables - silicon paste	TP No. 90296-51
SPC reference	580043-010V

- a) Remove the touch guard from the splicing unit.
- b) Unscrew the screw and put the thermocouple (1) aside.
- c) Unscrew the screws (2) and remove the washers.
- d) Remove the springs (3). Change springs as required.
- e) Change the dowels (4).
- f) Put silicon paste on the heating element (5) and assemble in the reverse order.

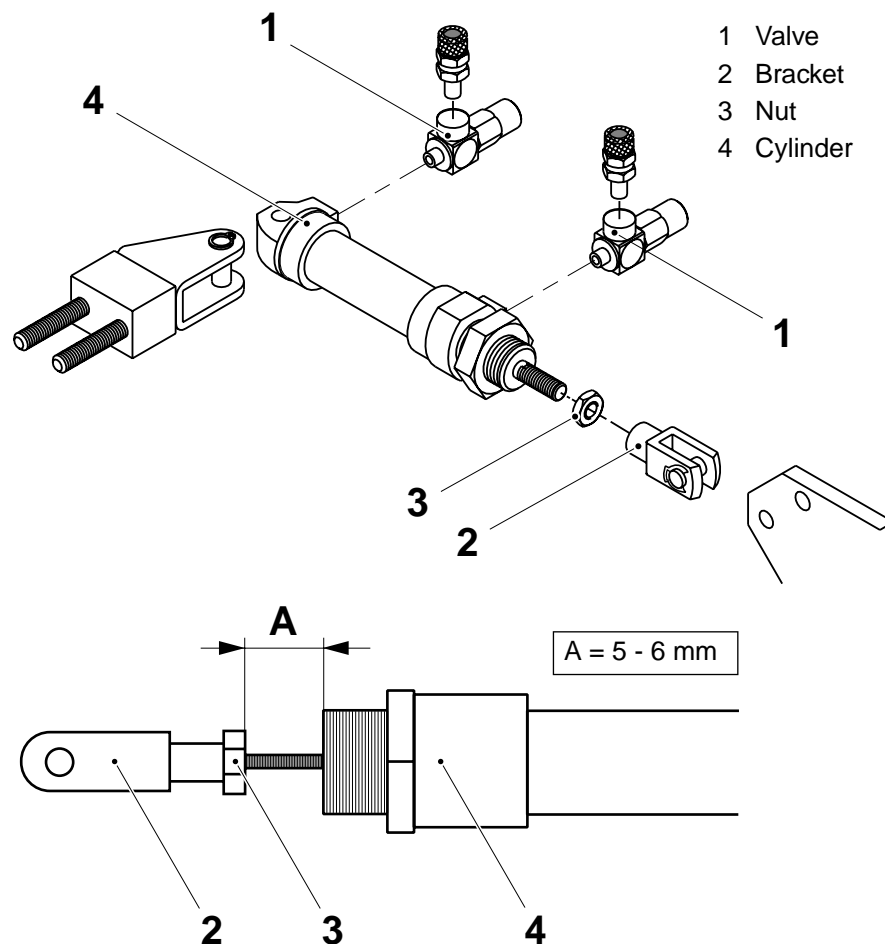


- 1 Screw
- 2 Screw
- 3 Spring
- 4 Dowel
- 5 Heating element

7.2.3-7 Splicing device - change cylinder

SPC reference	580043-010V
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- Remove the touch guard from the splicing unit.
- Remove the valves (1) and the cylinder (4).
- Remove the bracket (2) and the nut (3) from the cylinder.
- Change the cylinder and fit the nut and the bracket.
- With the piston fully retracted, set distance A between the nut and the cylinder.
- Fit the cylinder and the valves.
- Fit the touch guard.
- Check the function of the cylinders, see 7.2.3-1 *Splicing device - check function*.



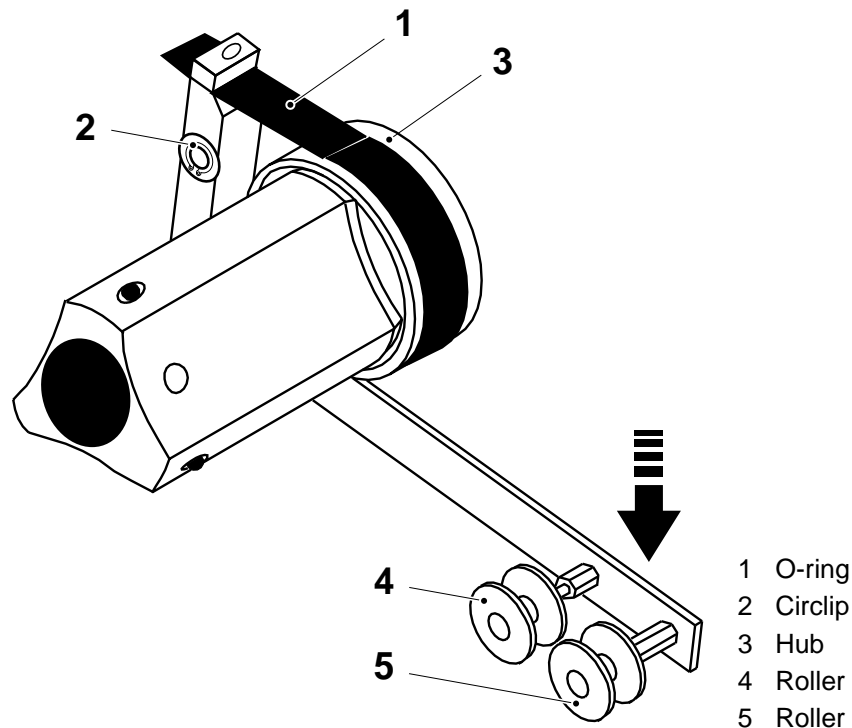
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7.2.4 Brake arms

7.2.4-1 Brake arms - check function

Machine status	Production
SPC reference	580060-010V

- a) On both brake arms, check that the belt (1) is intact and that it brakes the hub (3) when the arm is lowered. Change as required.
- b) Make sure that the arm follows the strip tension.
- c) If required:
 - Make sure that the roller (4) is intact and that it rotates and slides freely.
 - Make sure that the roller (5) is intact and that it rotates freely.
 Change or clean the rollers as required.
- d) Make sure that the brake arm is easy to turn. If not, remove the circlip (2) and the washer. Remove the arm and press out the bushing from the arm. Change the bushing and assemble in the reverse order.

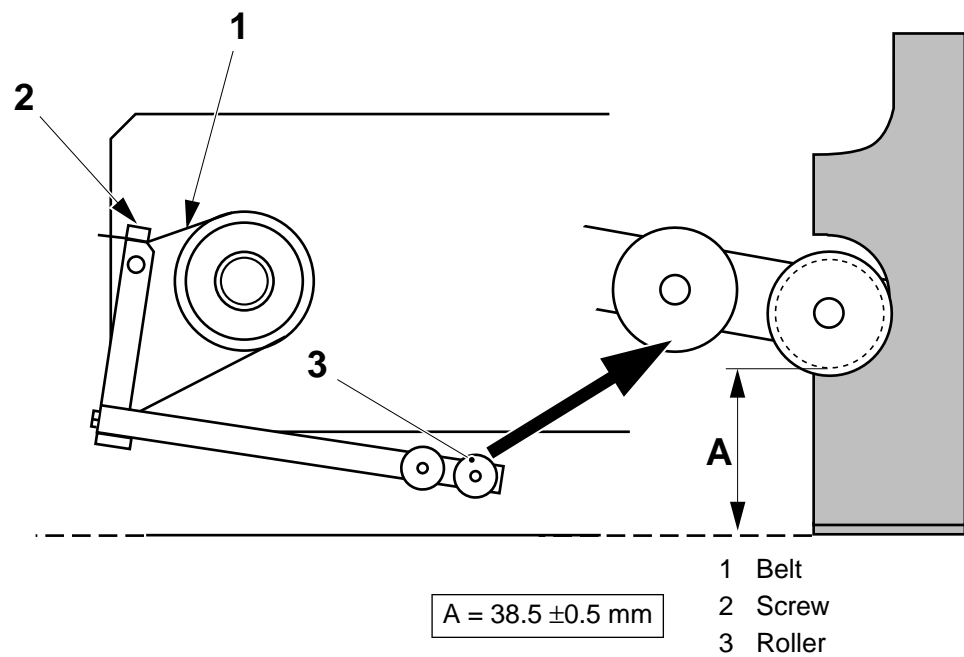


- e) If required, set the brake arm, see 7.2.4-2 *Brake arms - set belt tension*.

7.2.4-2 Brake arms - set belt tension

Tools - template	TP No. 79983
SPC reference	580060-010V

- Place the template on the plate under the brake arm roller (3), so that the roller rests on the template as illustrated (distance A between the plate and the point where the roller touches the template).
- Loosen the screw (2), tension the belt (1) and tighten the screw (2).
- Repeat the setting on the other brake arm.



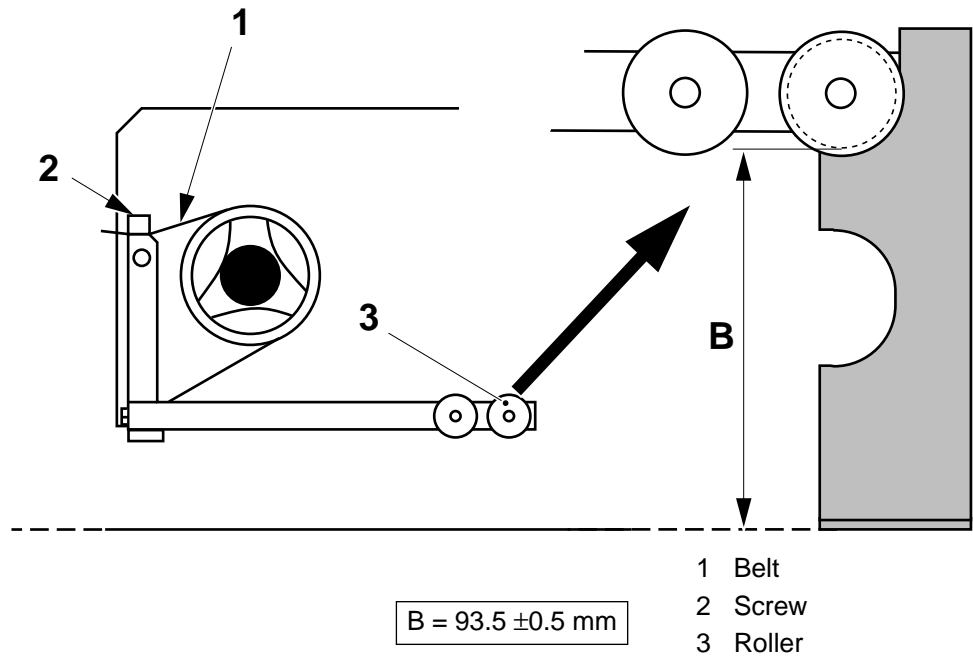
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Jumbo hub

- Lift the brake arm so that the roller (3) rests on the template as illustrated (distance B between the plate and the point where the roller touches the template).
- Loosen the screw (2) tension the belt (1) and tighten the screw (2).
- Repeat the setting on the other brake arm.



7.2.5 Hub standard

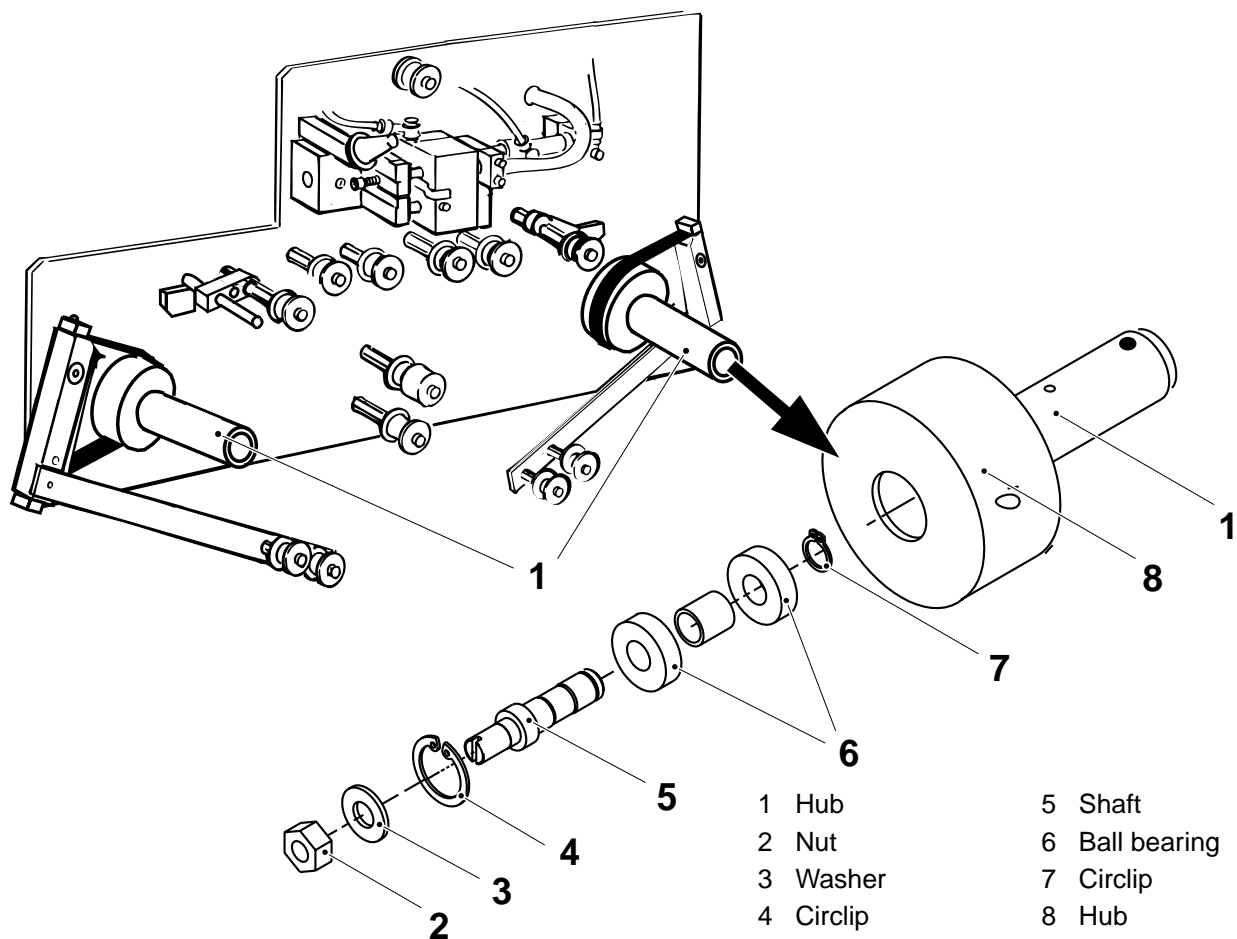
7.2.5-1 Hub standard - check

Consumables - locking fluid	TP No. 90157-16
SPC reference	580062-010V

Check that the hubs (1) rotate freely.

If required change the ball bearings as follows.

- a) Unscrew the nut (2) and remove the washer (3).
- b) Remove the circlip (4) and pull out the shaft (5) from the hub (8).
- c) Remove the circlip (7) and change the ball bearings (6).
- d) Assemble in the reverse order.



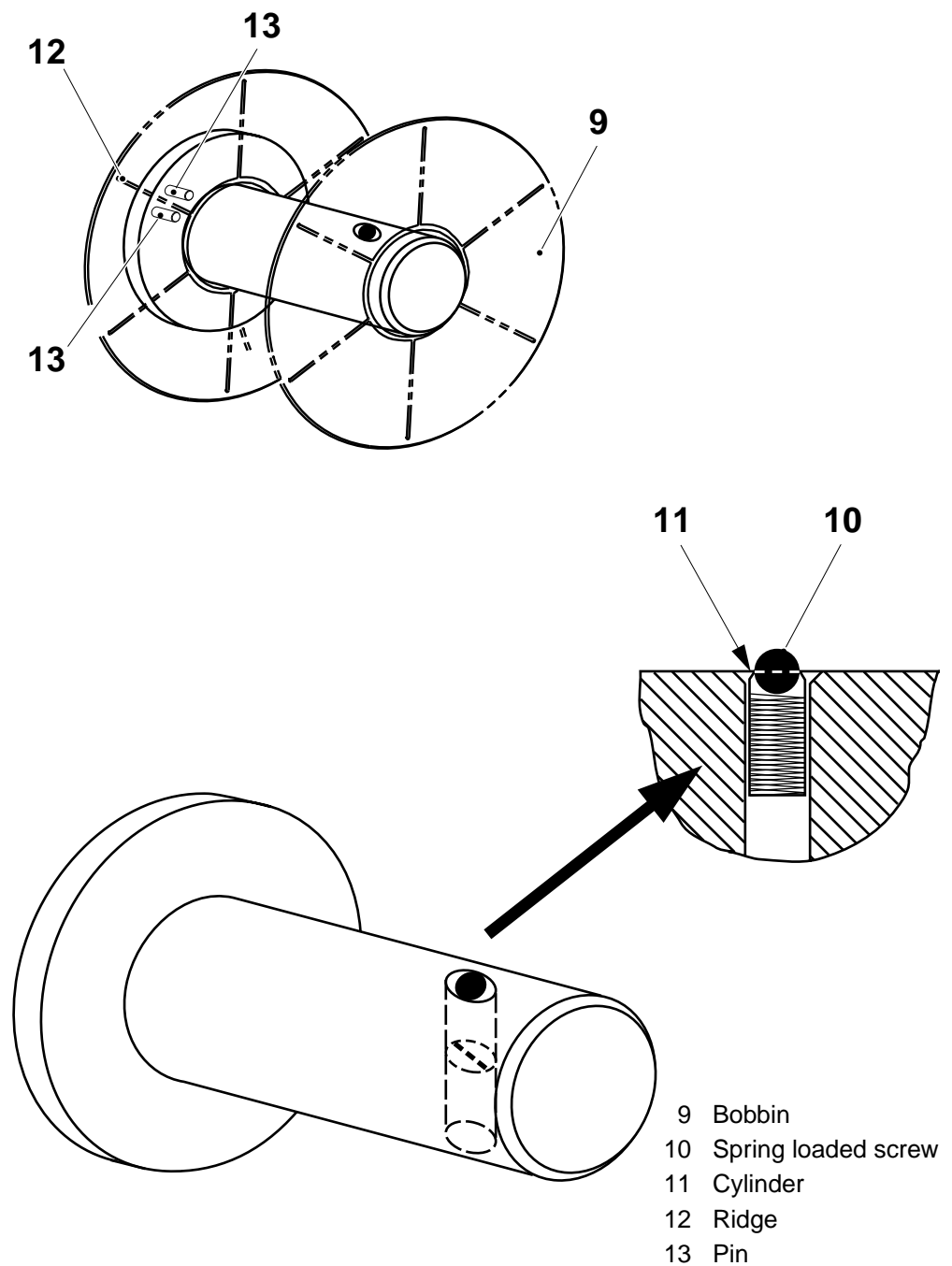
(Cont'd)

(Cont'd)

Fit the bobbins (9) on the hubs and check that they are properly locked by the spring loaded screws (10).

If required, adjust as follows.

- a) Unscrew the spring loaded screw from the hub hole.
- b) Change the spring loaded screw and fit it with locking fluid.
- c) Set the spring loaded screw so that the top of its cylinder (11) is in level with the hub.



7.3 Splicing magazine

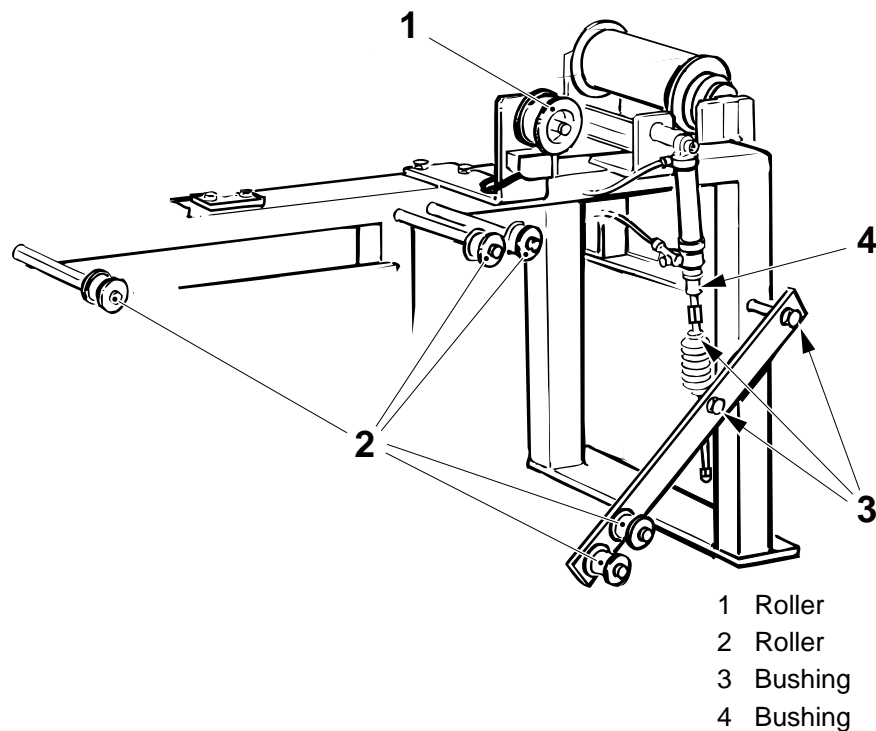
SPC reference	580044-010V
---------------	-------------

7.3-1 Splicing magazine - check

Machine status	Preheating I
SPC reference	580044-010V

Check that the rollers (1) and (2) are clean and rotate freely. Clean or change as required.

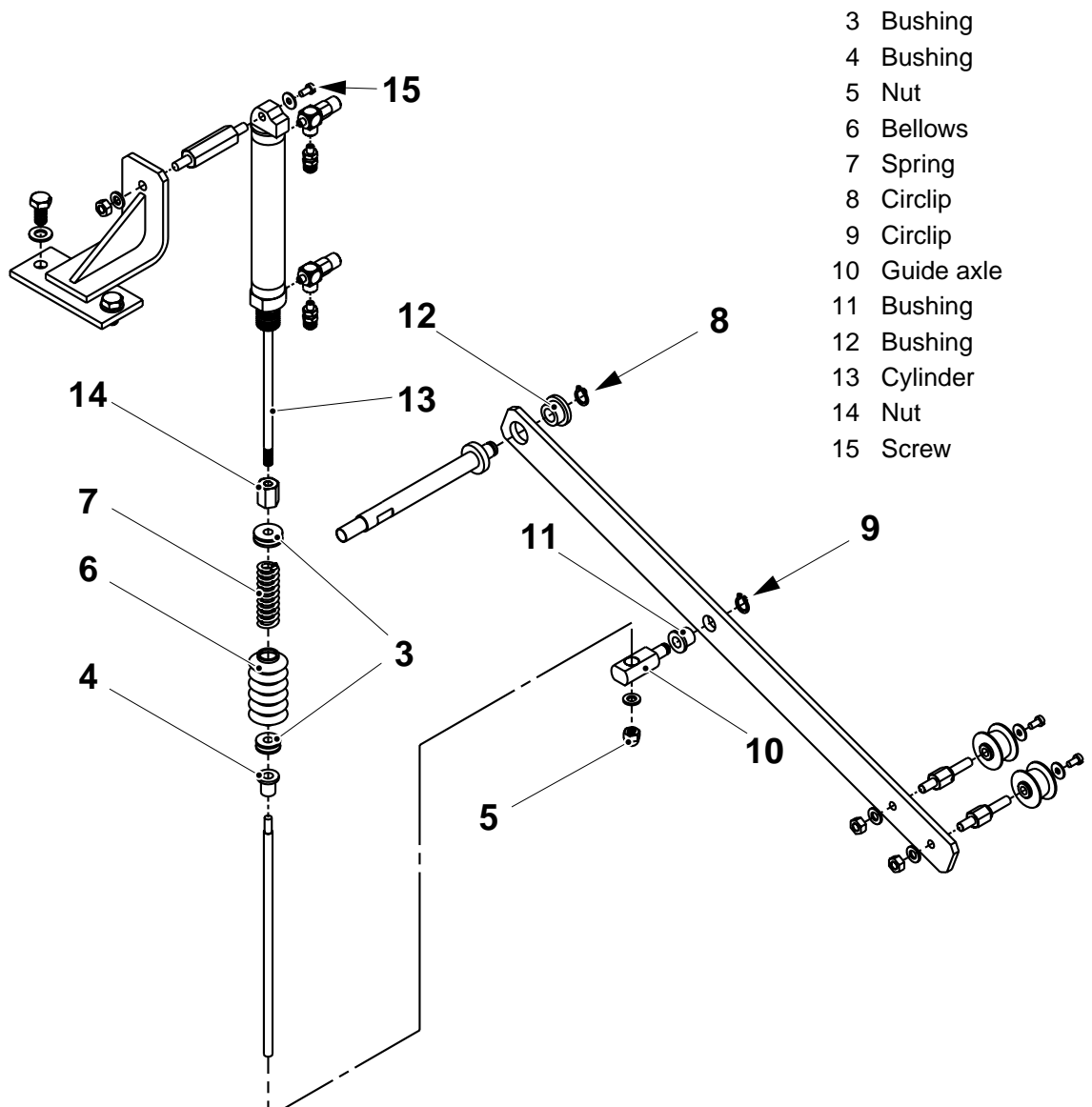
Check that the bushings (3) and (4) are clean and intact. Clean the bushings or change them as follows.



(Cont'd)

(Cont'd)

- a) Unscrew the nut (5) and remove the washer.
- b) Remove the bellows (6), the spring (7) and change the bushings (3) and (4). Change the spring as required.
- c) Remove the circlips (8) and (9).
- d) Remove the guide axle (10) and change the bushings (11) and (12).
- e) Assemble in the reverse order.
- f) Check that the cylinder piston (13) moves freely. If required, unscrew the nut (14), disconnect the air connections, unscrew the screw (15) and change the cylinder.
- g) Assemble in the reverse order.



- | | |
|----|------------|
| 3 | Bushing |
| 4 | Bushing |
| 5 | Nut |
| 6 | Bellows |
| 7 | Spring |
| 8 | Circlip |
| 9 | Circlip |
| 10 | Guide axle |
| 11 | Bushing |
| 12 | Bushing |
| 13 | Cylinder |
| 14 | Nut |
| 15 | Screw |

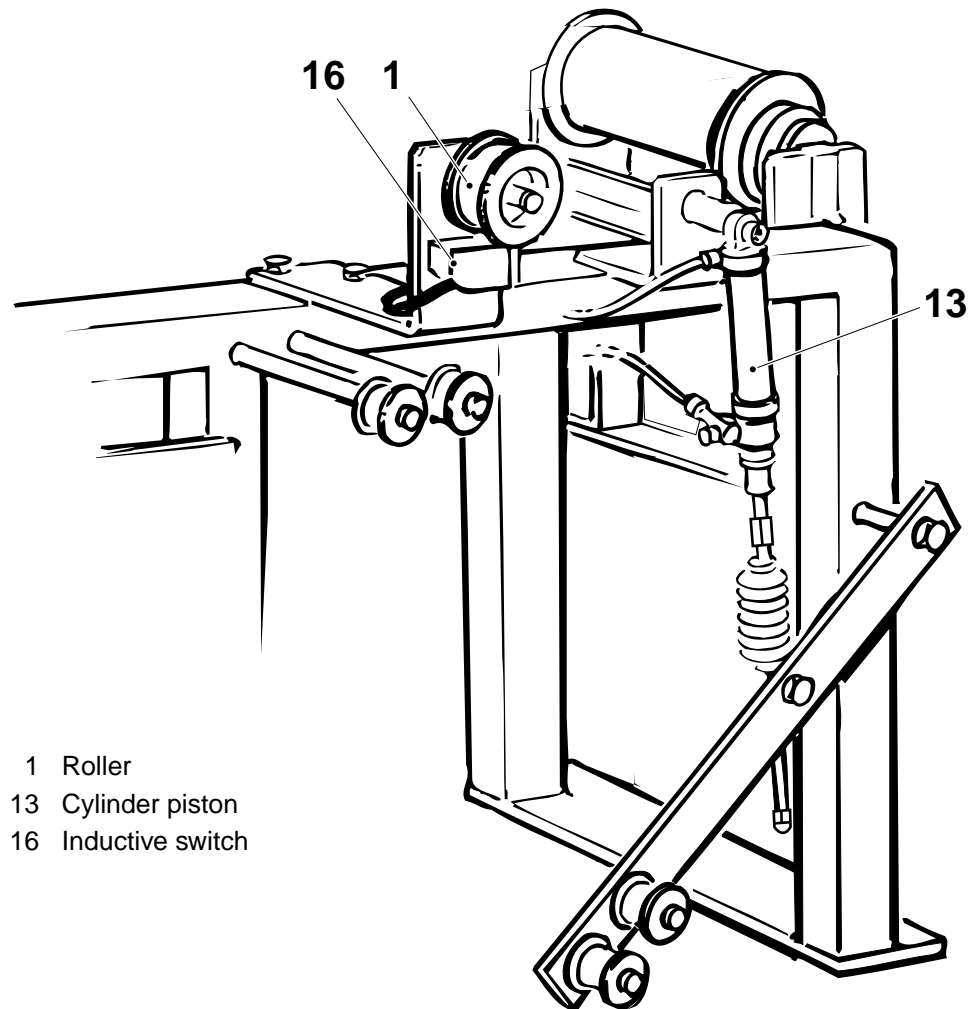
(Cont'd)

(Cont'd)

Check the distance between the inductive switch (16) and the tinplate on the roller (1). The distance must be 1 ± 0.5 mm.

Make a manual splice and check that the cylinder piston (13) retracts after 1 - 2 seconds and that the piston goes from fully retracted to fully extended in 10 - 15 seconds.

If required, set the inductive switch and the cylinder, see 7.3-2 *Splicing magazine - set*.



- 1 Roller
- 13 Cylinder piston
- 16 Inductive switch

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7.3-2 Splicing magazine - set

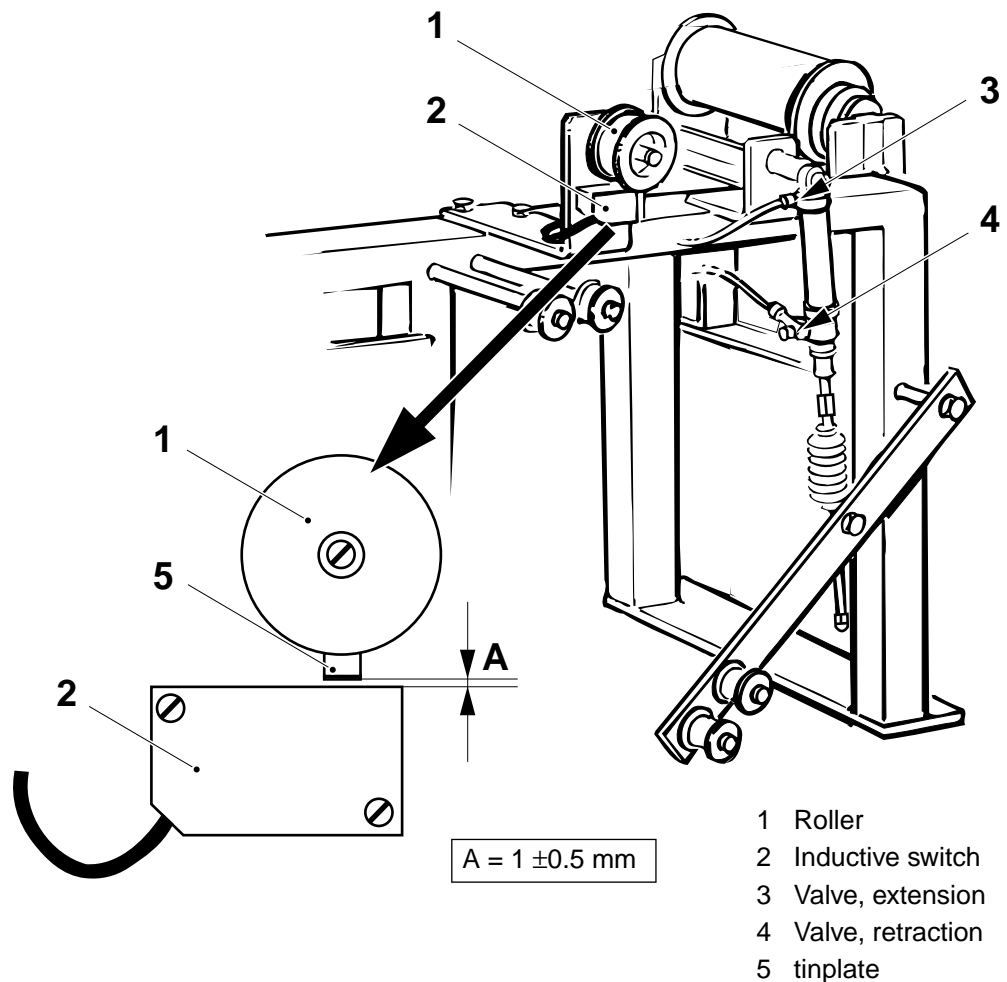
Machine status	Preheating I
SPC reference	580044-010V

Cylinder

- Push the **Manual strip splice**.
- The cylinder piston should retract 1 - 2 seconds after the splice signal.
If required, adjust on the valve (3).
- The cylinder piston should go from fully retracted to fully extended 10 - 15 seconds after the splice. If required, adjust on the valve (4).

Inductive switch

Set distance A, between the inductive switch (1) and the tin plate (5) on the roller (1), by shifting the inductive switch (2).



7.4 Doors

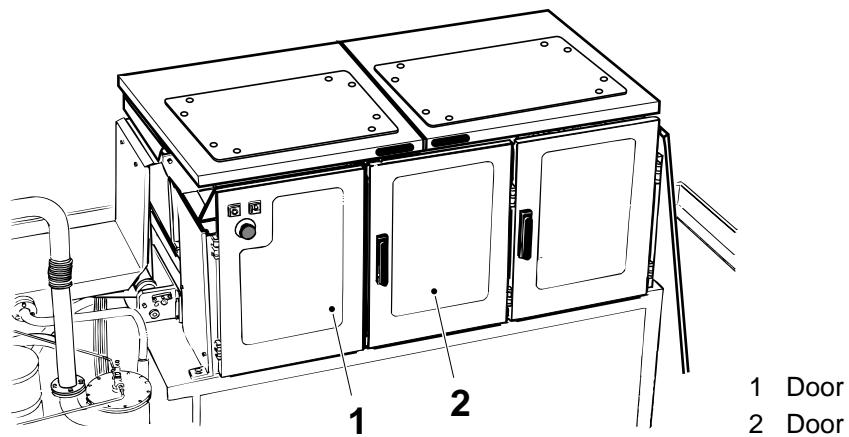
SPC reference	580332-010V
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7.4.1 Key safety switches

7.4.1-1 Key safety switches - check function

Machine status	Preheating I
SPC reference	580332-010V

- Open the door (2), push the **Manual strip splice** button and check that the splice function is blocked.
- Open the door (1), close the door (2), push the **Manual strip splice** button and check that the splice function is blocked.
- Close the doors, push the **Manual strip splice** button and check that the splice function is active.
- If the function is not correct, make sure that the switches are intact. Change the switches as required.



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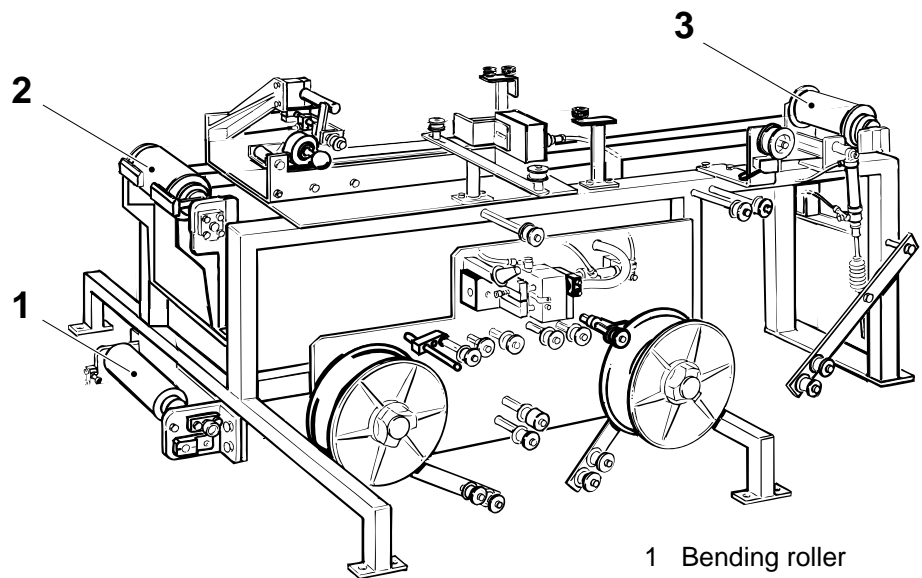
7.5 Bending rollers

SPC reference	580047-010V 752627-010V 581148-010V
---------------	-------------------------------------------

7.5-1 Bending rollers - check rotation

SPC reference	580047-010V 752627-010V 581148-010V
---------------	-------------------------------------------

- a) Check that the bending rollers (1), (2) and (3) rotate freely.
- b) If required, overhaul as follows.



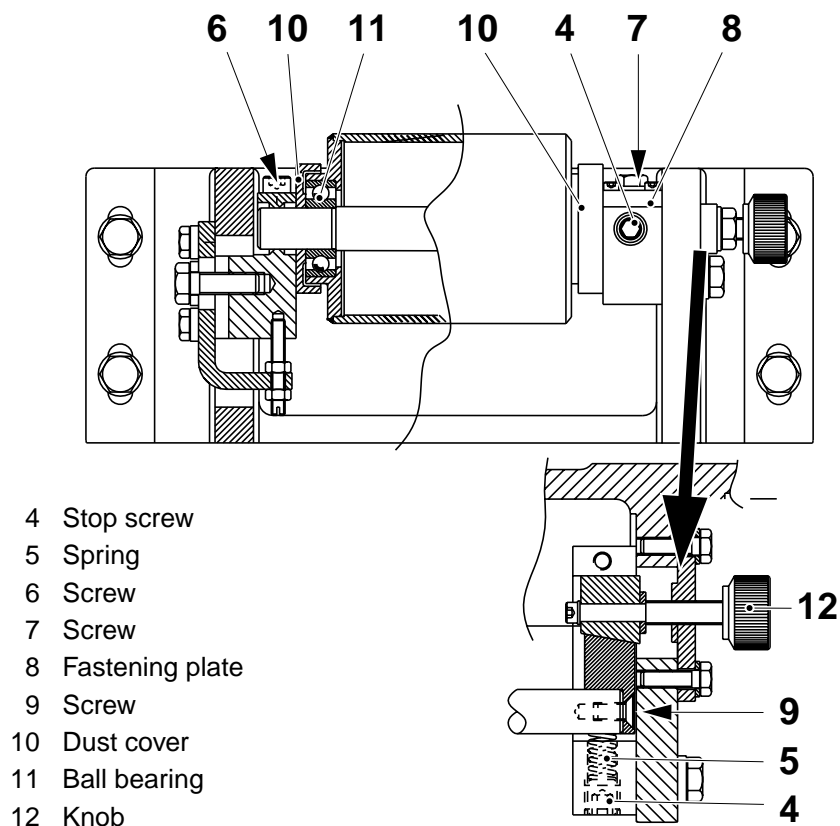
- 1 Bending roller
- 2 Bending roller, front
- 3 Bending roller, rear

(Cont'd)

*(Cont'd)***Bending roller**

SPC reference	580047-010V
---------------	-------------

- a) Unscrew the stop screw (4) and remove the spring (5).
- b) Unscrew the screws (6) and (7) and remove the washers and the fastening plate (8).
- c) Unscrew the screw (9) and change the dust covers (10) and the ball bearings (11).
- d) Assemble in the reverse order.
- e) Screw in the knob (12) to end position. Screw in the stop screw (4) to stop and then screw out the knob to its initial position.



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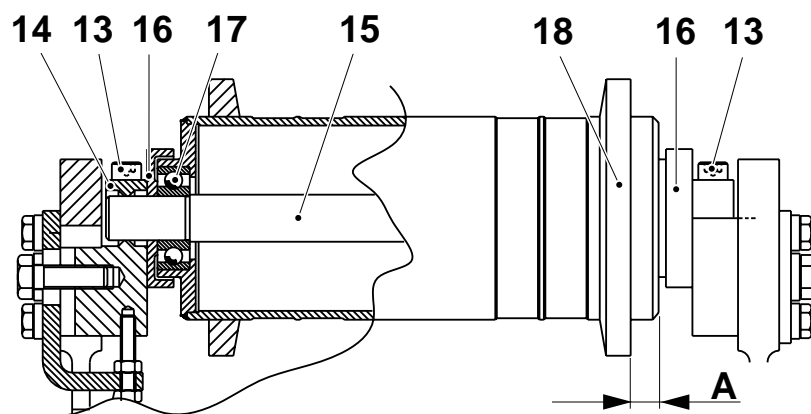
(Cont'd)

(Cont'd)

Bending roller, rear and front

SPC reference	752627-010V 581148-010V
---------------	----------------------------

- Unscrew the screws (13), remove the caps (14) and the bending roller.
- Pull out the shaft (15).
- Change the dust covers (16) and the ball bearings (17).
- Assemble in the reverse order.
- Set distance A between the flange (18) and the edge of the roller on both sides. Loosen the stop screw and shift the flange to adjust.



Package	A ± 0.5 (mm)
100 B	35.5
125 S	35.5
160 S	29.5
180 B	9.5
200 B	9.5
200 M	22.5
200 S	29.5
236 B	9.5
250 B	9.5
250 S	22.5
284 B	9.5
300 S	9.5
330 S	10.5

- 13 Screw
- 14 Cap
- 15 Shaft
- 16 Dust cover
- 17 Ball bearing
- 18 Flange

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8.1 Draining

8.1.1 Draining methods

To drain certain circuits, the solenoid valves controlling them must be energised. This can be done in two ways:

- electronically (using a PC)
- by manually bridging terminals in the electrical cabinet

The following is needed for the electronic procedure:

- Portable PC running GE Fanuc LM90 software, V 6.0 or later
- GE Fanuc PLC serial cable, TP No. 90031-300
- EM

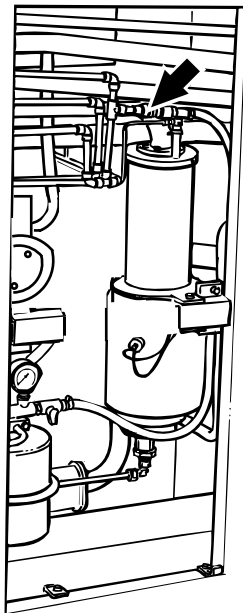
The following is needed for the manual bridging procedure:

- EM
- Piece of cable, approx. 2 metres in length

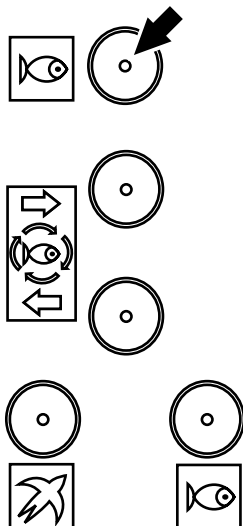
8 Disassembly and removal

8.1.2 Preparations

- a) Disconnect the rapid coupling to the pressure accumulator, located above the separator.



- b) Leave the compressed air supply to the machine connected, and connect a second compressed air supply line to the cold water inlet.



Note! If the compressed air circuit is de-pressurised, it will not be possible to perform the following procedure.

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(Cont'd)

Caution! If it is not possible to adjust the supply pressure of the second air supply, open all the valves listed below very slowly to avoid pressure surges.

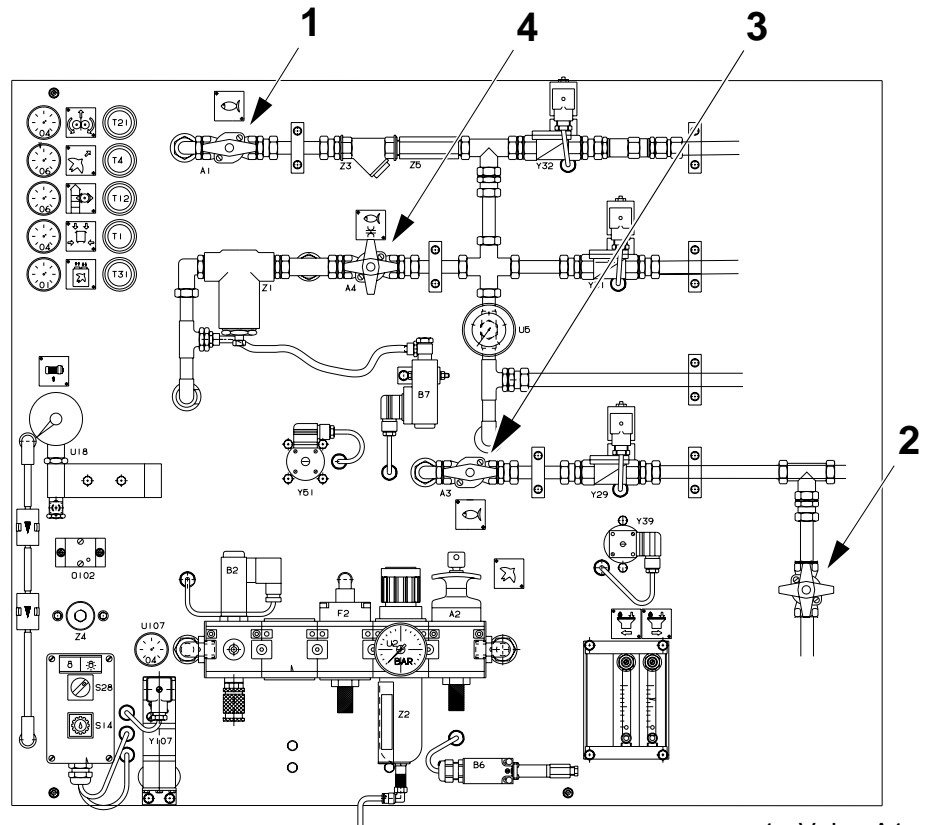
- c) Adjust the compressed air supply pressure to approx. 4 bar.
- d) Make sure that no **Emergency stops** are engaged, all doors with microswitches are closed, and no error conditions are present. Turn on the main power switch and step up to step **Preheating I**.

e) **Either:**

On a machine with standard cooling system make sure that all the water valves A1 (1), A2 (2), A3 (3), and A4 (4) are **open**;

or:

On a machine with recirculated cooling water, make sure that water valves A1 (1) and A3 (3) are **open** and water valves A2 (2) and A4 (4) are **closed**.



- 1 Valve A1
- 2 Valve A2
- 3 Valve A3
- 4 Valve A4

(Cont'd)

(Cont'd)



WARNING!

Risk of injury and damage!

Make sure that water expelled under pressure cannot cause damage or injury.

- f) Position a splash guard and warning notices in front of the connection panel if possible.

8.1.3 Draining procedure

If a portable PC running GE Fanuc LM90 software V 6.0 or later is available, connect it to the PLC using the GE Fanuc PLC serial cable, TP No. 90031-300. See the *EM* for further details.

Caution! When bridging two terminals, connect the cable to the control terminal first and then to the power terminal. Take care not to cause short circuits.

If the solenoids have to be energised manually, connect the piece of cable to the +24 VDC power terminal XL.11.30 for all the bridging operations. See the *EM* for further details.

The force symbol on the operator panel lights when an output is forced on, and goes out when the output is forced off again.

The following instructions list the PLC outputs. The control terminals for the manual procedure are shown in brackets.

Water gun circuit

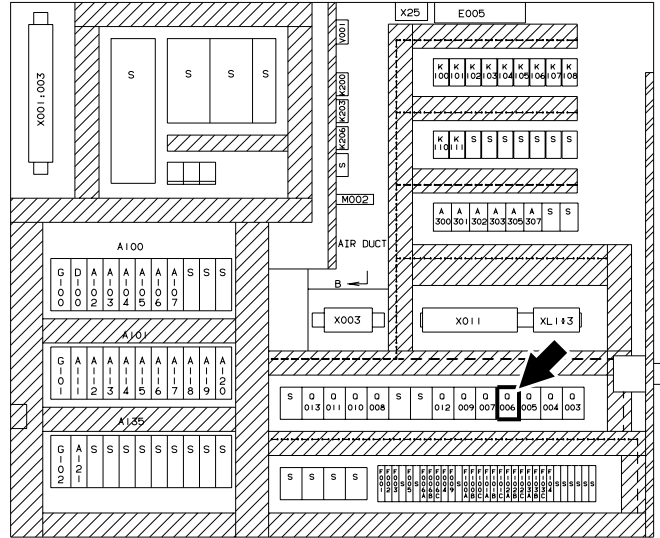
Operate the water gun until only dry air comes out.

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(Cont'd)

Compressor circuit (solenoid valve Y32)

- a) Open (switch off) contact breaker Q006 to prevent the compressor motor starting up.



- b) Force PLC output Q19 on from the PC. (Control terminal X1.414.)
- c) Wait for 5 - 10 seconds and force the output off again.

Final folder sprinkler circuit (solenoid valve Y31)

- a) Force PLC output Q72 on from the PC. (Control terminal X1.412.)
- b) Wait for 5 - 10 seconds and force the output off again.

Tube flusher circuit (solenoid valve Y39)

- a) Force PLC output Q76 on from the PC. (Control terminal X1.416.)
- b) Wait for 5 - 10 seconds and force the output off again.

(Cont'd)

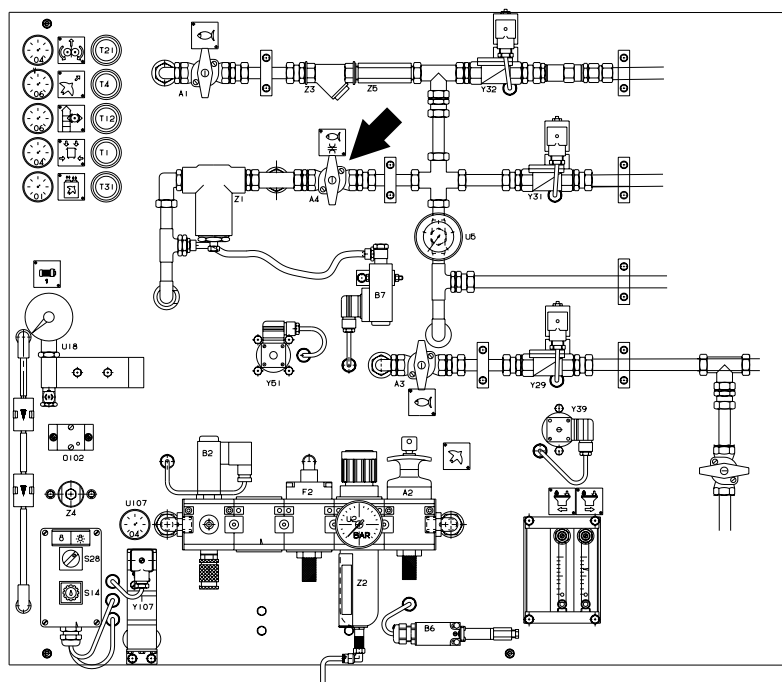
8 Disassembly and removal

(Cont'd)

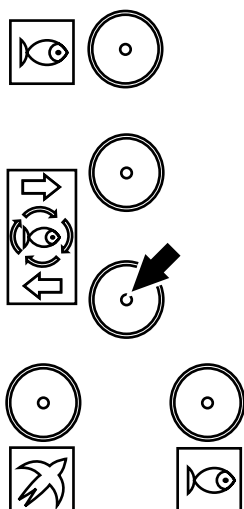
Cooling water circuit (solenoid valve Y33) (standard cooling system)

For machines **with recirculated cooling water**, see below. For machines **with standard cooling system**, proceed as follows.

- Force PLC output Q73 on from the PC. (Control terminal X1.372.)
- Wait until all the water from the cooling circuit drains to the cleaning tray under the final folder.
- Close valve A4.



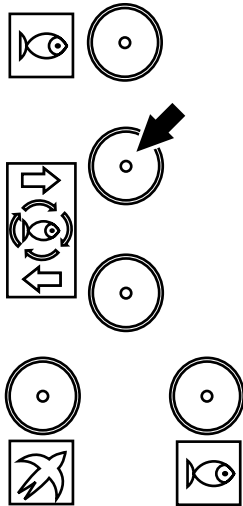
- Remove the recirculated cooling water outlet plug.



(Cont'd)

(Cont'd)

- e) Open valve A4 again.
- f) Wait until only dry air comes out of the recirculated cooling water outlet.
- g) Close valve A4 again.
- h) Fit the recirculated cooling water outlet plug.
- i) Remove the recirculated cooling water inlet plug.



- j) Open valve A4 again.
- k) Wait until only dry air comes out of the recirculated cooling water inlet and force output Q73 off again.
- l) Fit the recirculated cooling water inlet plug.
- m) Remove the compressed air connection from the cold water inlet and fit the cold water inlet plug.

(Cont'd)

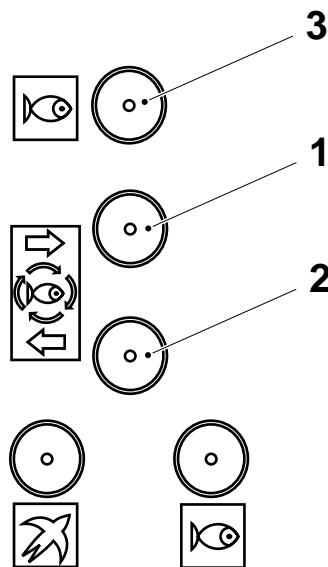
8 Disassembly and removal

(Cont'd)

Cooling water circuit (solenoid valve Y33) (recirculated cooling water)

For machines **with standard cooling system**, see above. For machines **with recirculated cooling water**, proceed as follows.

- Remove the recirculated cooling water inlet and outlet connections (1) and (2).
- Remove the compressed air supply line from the cold water inlet (3) and connect it to the recirculated cooling water inlet (1).
- Fit the cold water inlet plug (3).



- 1 Recirculated cooling water inlet
- 2 Recirculated cooling water outlet
- 3 Cold water inlet

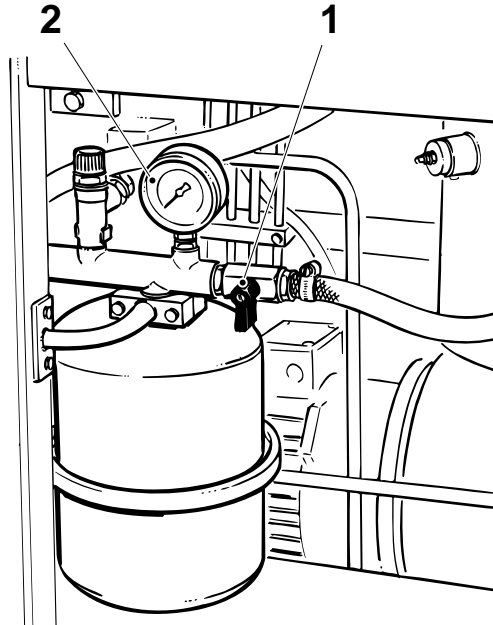
- Force PLC output Q73 on from the PC. (Control terminal X1.372.)
- Wait until only dry air comes out of the recirculated cooling water outlet and force output Q73 off again.
- Remove the compressed air connection from the recirculated cooling water inlet.
Fit the recirculated cooling water inlet plug.
- Fit the recirculated cooling water outlet plug.

(Cont'd)

(Cont'd)

Sterilisation bath

- a) Open the valve (1) on the pressure accumulator.
- b) Wait until the pressure on the gauge (2) drops to zero.



- 1 Valve
- 2 Gauge

(Cont'd)

8 Disassembly and removal

(Cont'd)

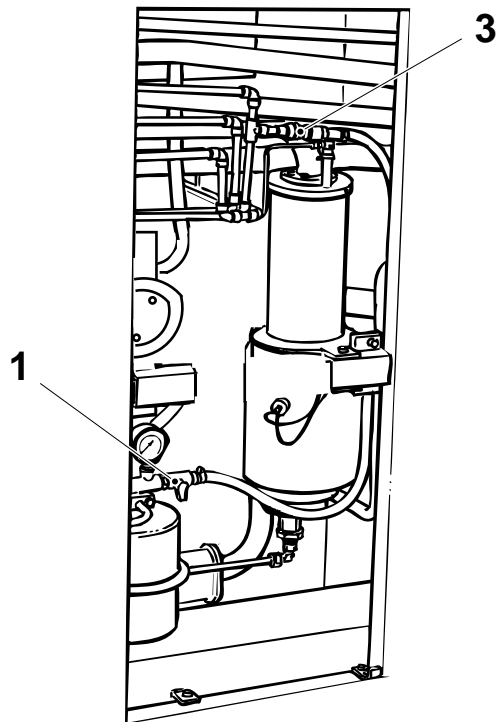
c) Wait for all the water to drain from the sterilisation bath.

Note! This may take a significant length of time since the water drains only under the effect of gravity.

d) Close the bleeder valve at the top of the sterilisation bath.

e) Connect the rapid coupling (3).

f) Close the valve (1) on the pressure accumulator.



- 1 Valve
- 3 Rapid coupling

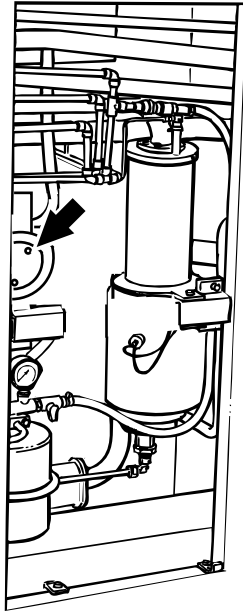
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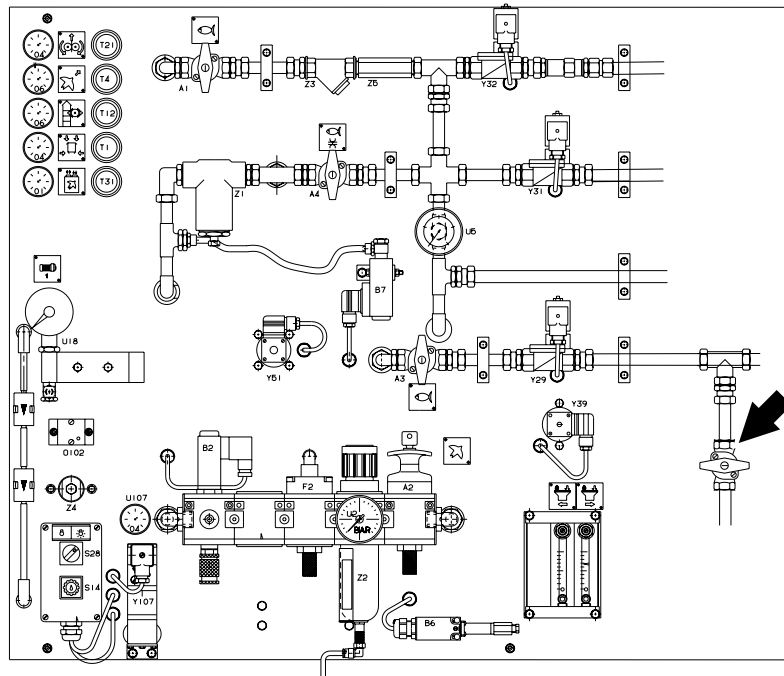
Sterilisation bath water pump (M17)

- Remove the flange from the pump and dry inside the pump.
- Fit the flange.



Hot water circuit (solenoid valve Y29)

- Close valve A2 (only machines with standard cooling system).

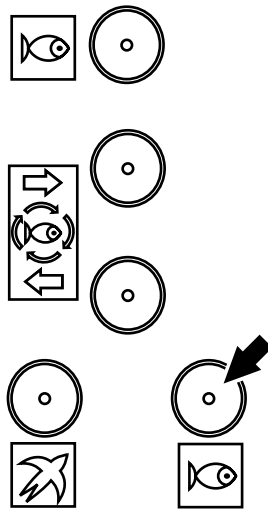


(Cont'd)

8 Disassembly and removal

(Cont'd)

- b) Connect the compressed air supply line to the hot water inlet.



- c) Force PLC output Q71 on from the PC. (Control terminal X1.410.)
d) Wait for 5 - 10 seconds and force the output off again.
e) Remove the compressed air supply line from the hot water inlet.
Fit the hot water inlet plug.

Cleaning system water circulation pump (M4)

- a) Force PLC output Q16 on from the PC. (Close contactor K008.)
b) Wait for 5 - 10 seconds and force the output off again.

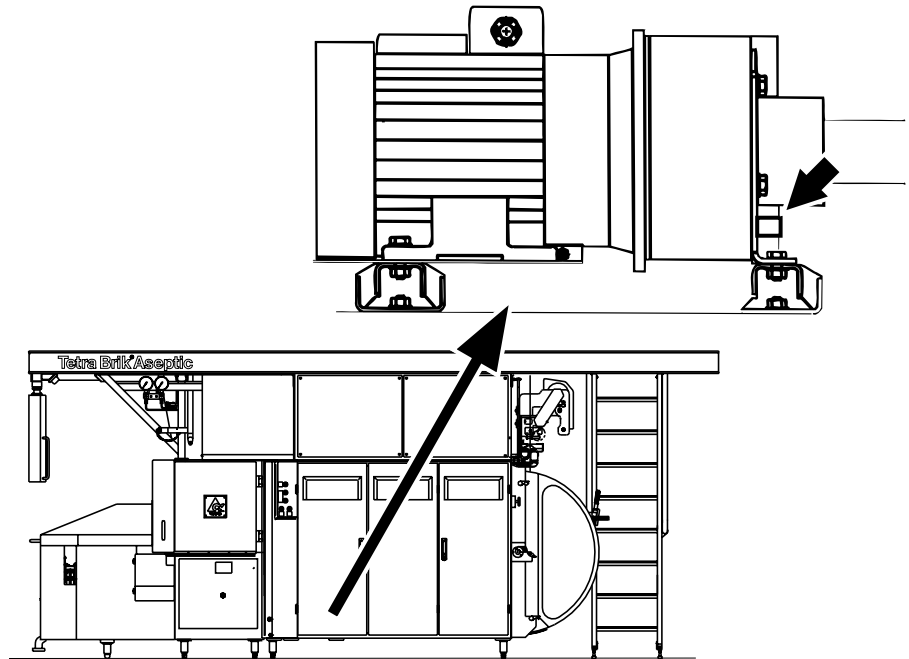
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Compressor (M7)

- a) Remove the drain plug from the bottom of the compressor flange.



- b) Wait for all the water to drain out and securely fit the plug.

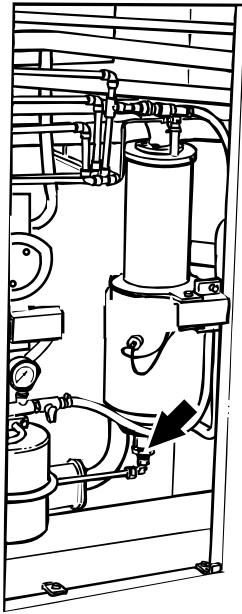
(Cont'd)

8 Disassembly and removal

(Cont'd)

Separator

- a) Unscrew the float chamber at the bottom of the separator.
- b) Drain off all the water and fit the float chamber.

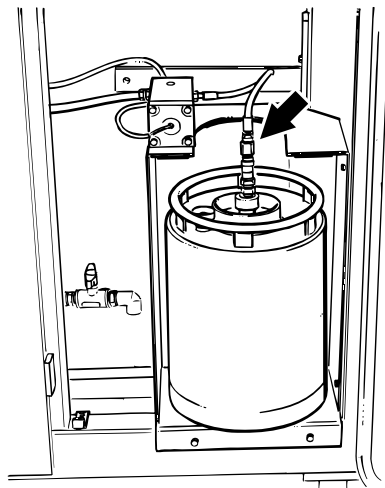


Peroxide tank

Hydrogen peroxide!

Follow the *Safety Precautions*.

- a) Disconnect and remove the hydrogen peroxide container.

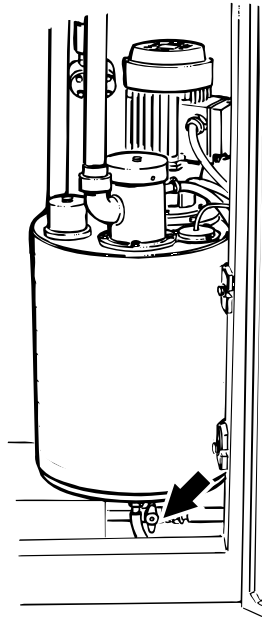


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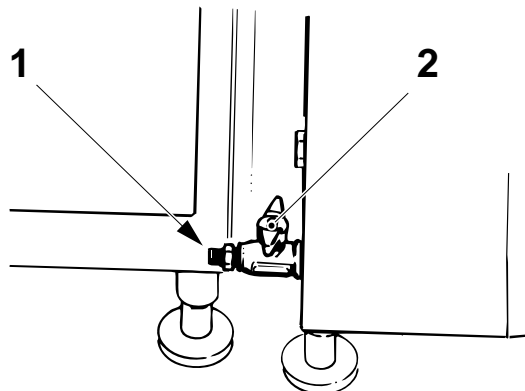
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(Cont'd)

- b) Open the drain valve under the hydrogen peroxide tank and wait for all the hydrogen peroxide to drain into the dilution tank (15 minutes).



- c) Force PLC output Q110 on from the PC. (Control terminal X1.246.)
d) Wait for 5 - 10 seconds and force the output off again.
e) Close the valve under the hydrogen peroxide tank.
f) Place a suitable container under the dilution tank drain outlet (1), open the drain valve (2) and drain the tank into the container for disposal in compliance with local regulations.



- 1 Drain outlet
2 Drain valve

(Cont'd)

8 Disassembly and removal

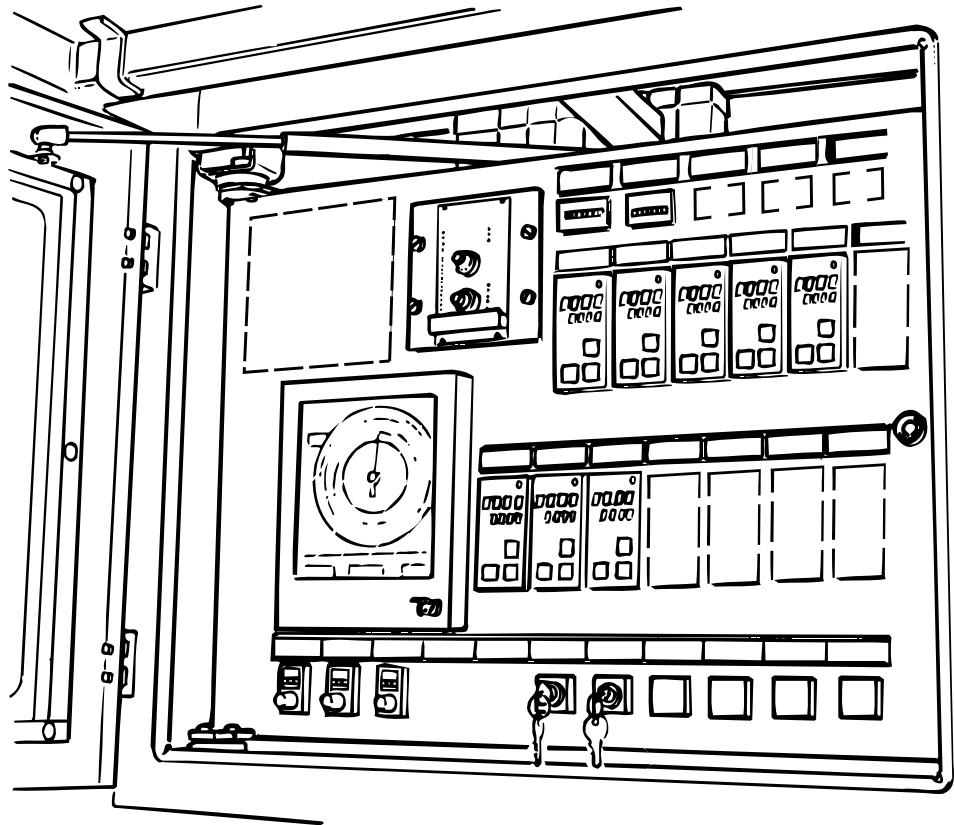
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Final checks

- a) Make sure that all the connections on the connections panel are plugged.
- b) Make sure that all cables used for the draining procedure (electronic procedure or bridge procedure) are disconnected.
- c) Make sure that all the valves on the valve panel, dilution tank, water and hydrogen peroxide circuits are set to the correct operating position.
- d) Make sure that the drain plug on the compressor is tight.
- e) Make sure that the separator float chamber is fitted and tight.
- f) Make sure that the flange of the sterilisation bath water pump is tight.

9 Electrical equipment

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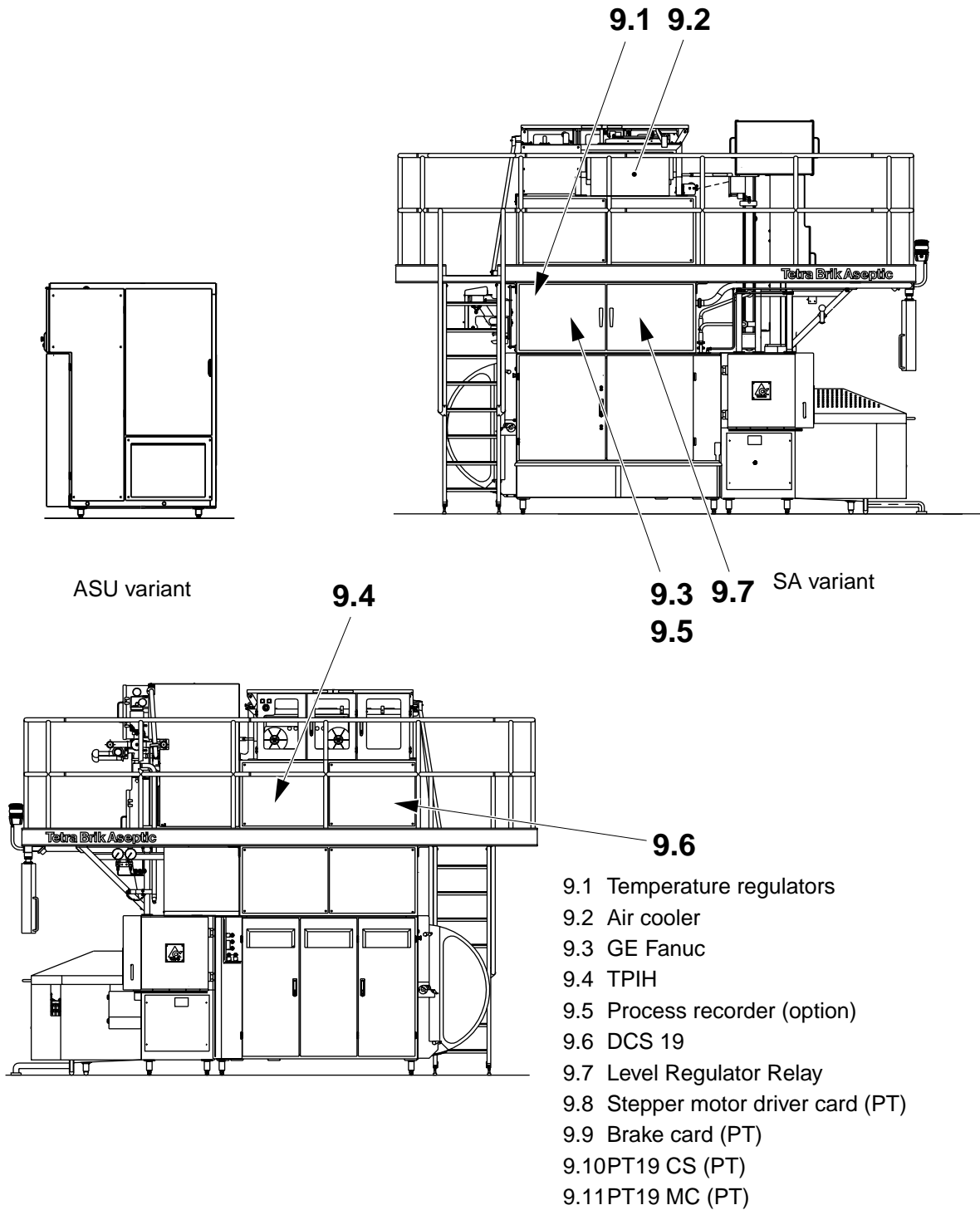


Note! The picture shows a basic configuration panel.

9 Electrical equipment

9-1 Electrical equipment - description

SPC reference 649452-010V

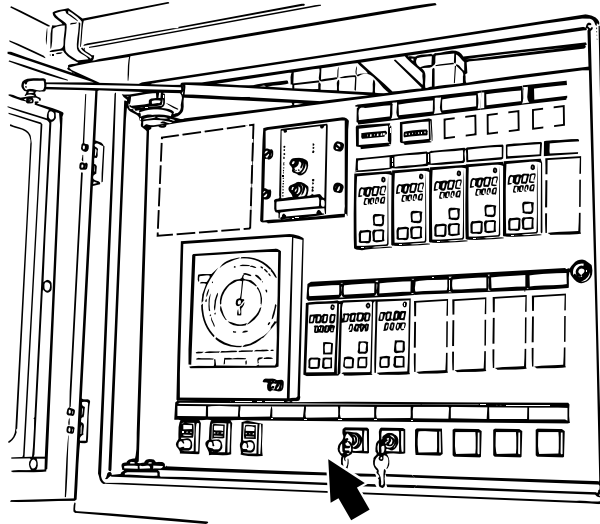


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9-2 PullTab position - set

Basic setting

Set the potentiometer to 500.



Final setting

In step **Production**, evaluate the PullTab position. If required, fine set on the potentiometer. To shift the PullTabs towards the top fin crease, turn the potentiometer counter-clockwise.

9.1 Temperature regulators

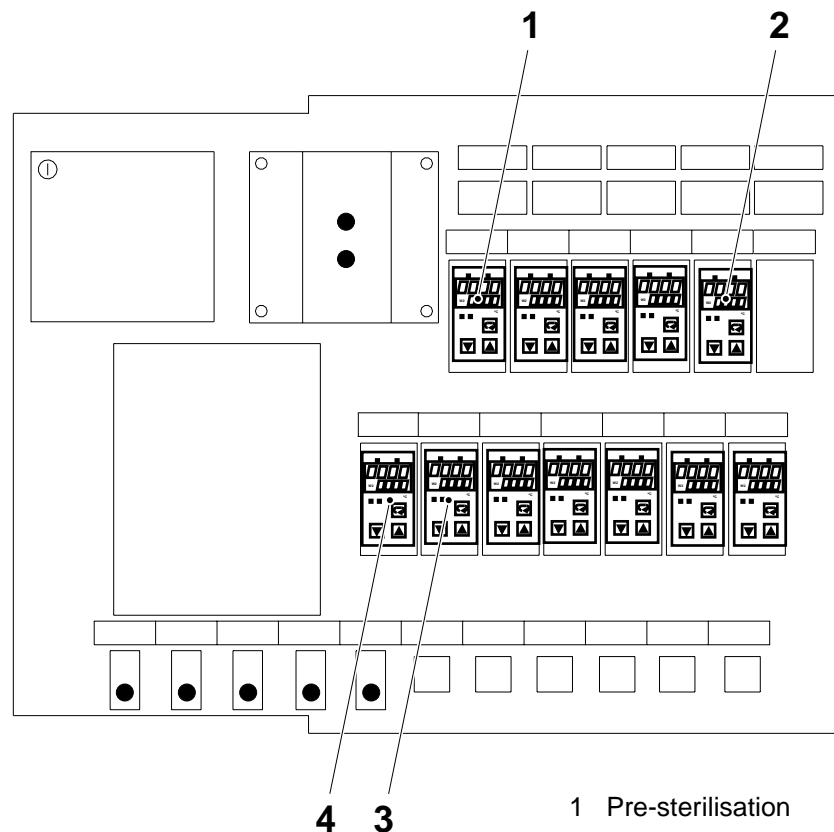
SP reference	90410-44 90410-51
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9.1-1 Temperature regulators - record values

Machine status	Power On
SP reference	90410-44 90410-51

Record the temperature settings of the following temperature regulators:

- pre-sterilisation (1)
- air knife (2)
- steam (3)
- sterilisation bath, peroxide (4)



- 1 Pre-sterilisation
- 2 Air knife
- 3 Steam
- 4 Sterilisation bath, peroxide

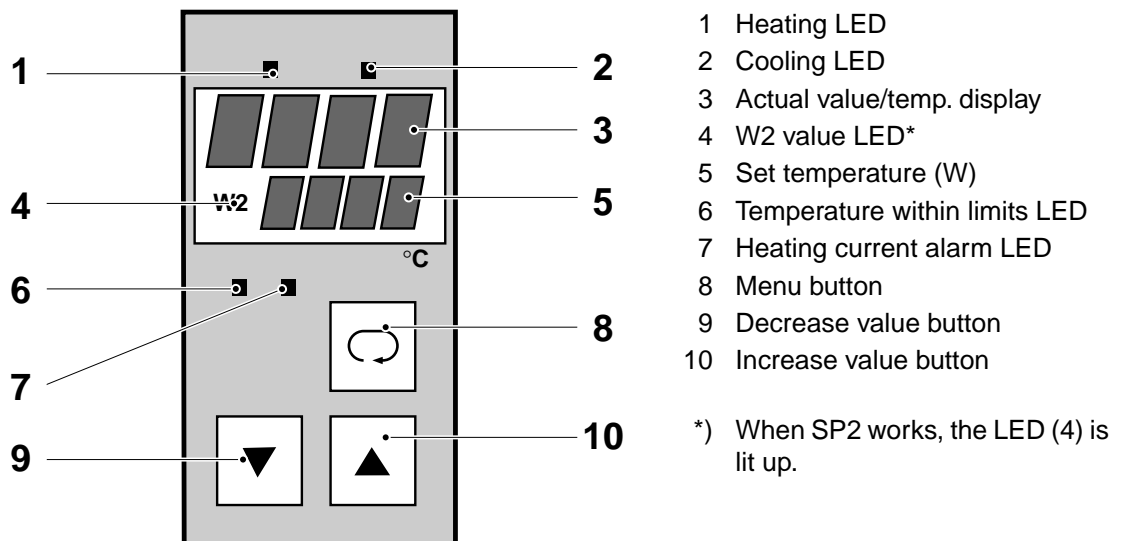
9.1-2 Temperature regulators - set

Machine status	Power On
Tool - Adhesive label	TP No. 90194-131
SP reference	90410-44 90410-51

The actual value/parameter is shown on the display (3).

To change values, press the button (10) or (9).

- Set the correct temperature **W** (5), see table below.
- Press the menu button (8) for three seconds to step to the parameter level.
- Remove the regulator from the housing and set the **Lock** bridge in **open** position (see the following page).
Fit back the regulator.
- Press the menu button several times until parameter **Loc** is displayed.
- For **90410-44**, set the **Loc** value to **0**.
For **90410-51**, set the **Loc** value to **0**.
- Press the menu button for five seconds to step to the configuration level.
Con1 and the configuration code **0230** should be displayed. Set the code, if required.
- Press the menu button once more. **Con2** and configuration code **0000** should be displayed. Set the code, if required.
- Press the menu button once to step to the operating level.

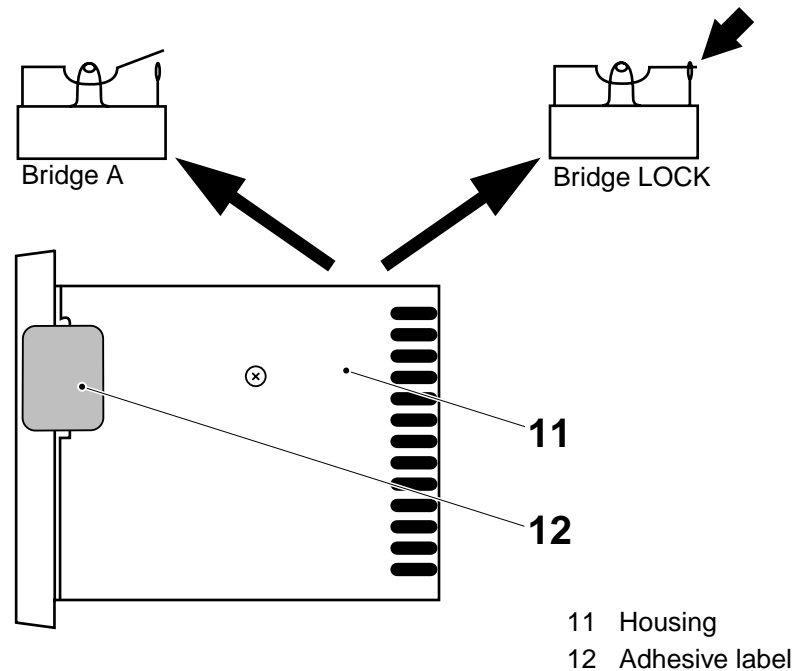


- 1 Heating LED
 - 2 Cooling LED
 - 3 Actual value/temp. display
 - 4 W2 value LED*
 - 5 Set temperature (W)
 - 6 Temperature within limits LED
 - 7 Heating current alarm LED
 - 8 Menu button
 - 9 Decrease value button
 - 10 Increase value button
- *) When SP2 works, the LED (4) is lit up.

(Cont'd)

(Cont'd)

- i) Press the menu button for three seconds to step to the parameter level. Set the correct values for the following parameters: **SP2, LCL1, LCH1, LCL2, LCH2, HCA, SPL,SPH, Pb1, ti, td, t1**. See table below.
- j) For **90410-44**, step to parameter **Loc** and set the value to **1**.
- k) For **90410-51**, step to parameter **Loc** and set the value to **4**.
- l) Pull out the regulator and set the **Lock** bridge in **closed** position (arrow).
- m) Dismount the complete regulator from the panel by removing the screws on the top and the bottom of the regulator.
- n) Put the adhesive label (12) over the edge of the regulator and it's housing (11).
- o) Fit back the complete regulator.
- p) When all settings are correct, press the **Menu** button for 3 seconds or wait for 30 seconds to returns to the operating level.



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Regulator	Des	W (°C)	SP2 (°C)	PT2 (min.)	LCL1 (°C)	LCH1 (°C)	LCL2 (°C)	LCH2 (°C)	HCA (A)	Loc	SPL (°C)	SPH (°C)	Pb1	ti	td	t1
	200	270	0	0	1	100	-	-	-	4/1	270	271	-	-	-	-
	201	77	85	0	10	12	10	10	-	4/1	75	85	0.1	1	1	0.4
	202	380*	280*	0	10	20	1	50	-	4/1	200	460	1.9	20	20	3.8
	203	360	400*	0	10	10	50	50	-	4/1	360	400	2.0	9	9	1.8
	204	125	0	0	10	10	-	-	-	4/1	125	126	-	-	-	-
	205	130	0	0	5	20	-	-	-	4/1	130	131	-	-	-	-
	206	74	0	0	4	10	-	-	-	4/1	74	75	-	-	-	-
	207	190*	0	0	20	20	-	-	-	4/1	150	250	0.5	8	8	1.7
	518	60	0	0	1	100	-	-	-	4	0	100	10.0	3	3	0.4
	209	155	0	0	15	10	-	-	-	4/1	130	180	1.5	8	8	1.5
	210	155	0	0	15	10	-	-	-	4/1	130	180	1.4	8	8	1.6
	211	210	0	0	15	10	-	-	-	4/1	170	220	1.6	8	8	1.6

Note! * (= basic setting of temperature).

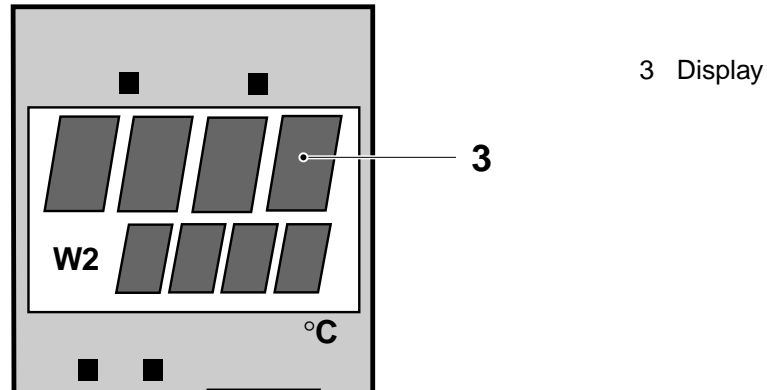
Note! Thermoregulators No. 209, 210, 211 are valid only for machines equipped with PT19.

Note! Thermoregulators No.518 is valid only for machines equipped with HI.

(Cont'd)

*(Cont'd)***Error signal**

In case of an error, an error code is displayed on the display (3). The error code is displayed until the error is acknowledged, or until its cause has been eliminated.



The following error signals can be displayed:

Code	Cause
FbF	Sensor break
POL	Wrong sensor polarity
AdF	Selftuning error

In case of problems with a temperature regulator, check all connections. Change temperature regulator as required, see *9.1-3 Temperature regulator - change*.

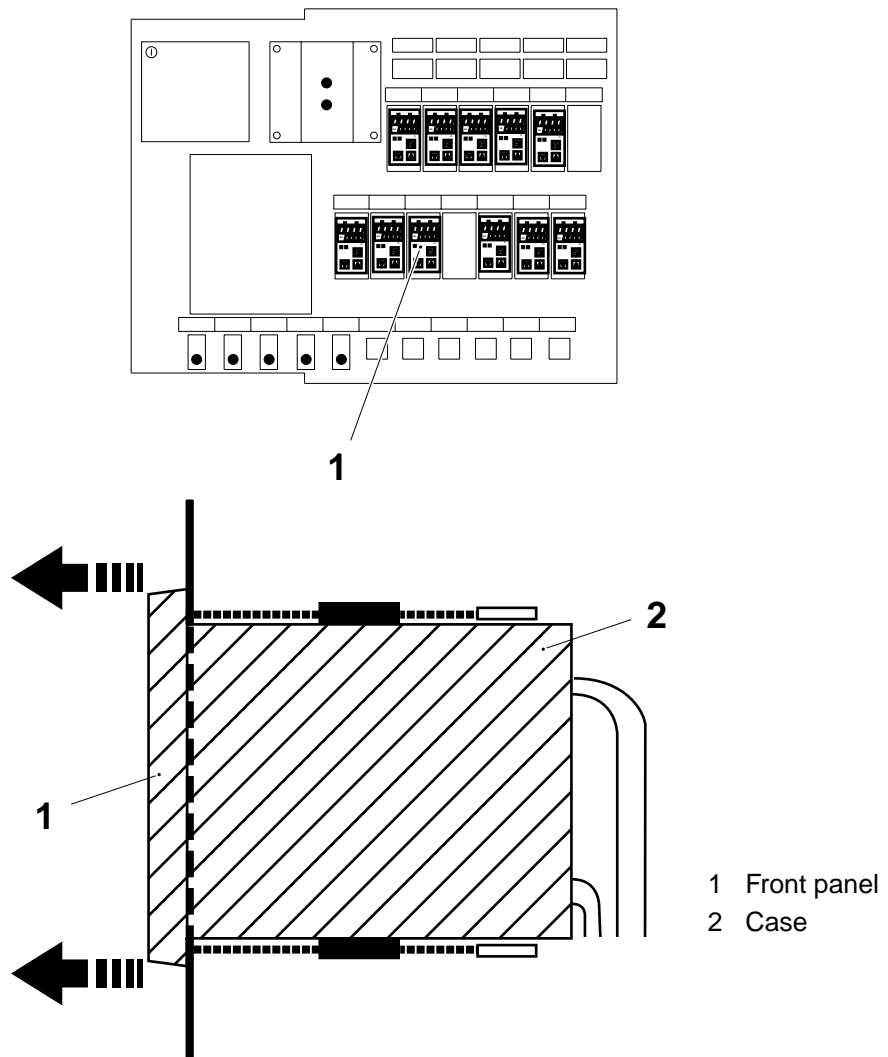
9.1-3 Temperature regulator - change

SP reference	90410-44 90410-51
--------------	----------------------

Get a grip of the front panel (1) and pull out the regulator from its case (2).

Change the regulator and calibrate it, see *9.1-4 Temperature regulators - calibrate*.

Set the thermoregulator, see *9.1-2 Temperature regulators - set*.



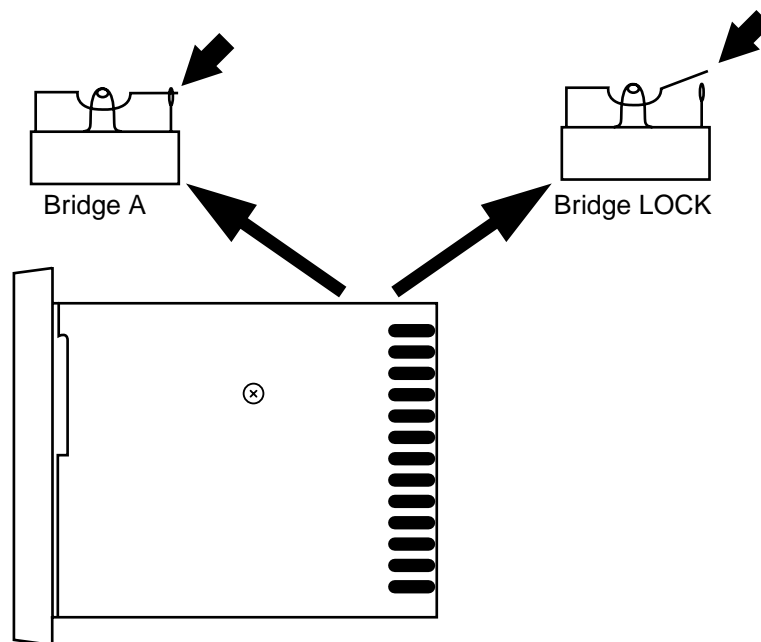
9.1-4 Temperature regulators - calibrate

Tool	
- calibrator	TP No. 90410-338
- extension wire	TP No. 90410-308
- adhesive label	TP No. 90194-131
SPC reference	90410-44 90410-51

Note! Before calibration, be sure the calibrator has already been set, see page 9.1-5 *Calibrator (Micromite II) - set.*

Calibration must be performed when a temperature regulator is changed or at least once a year.

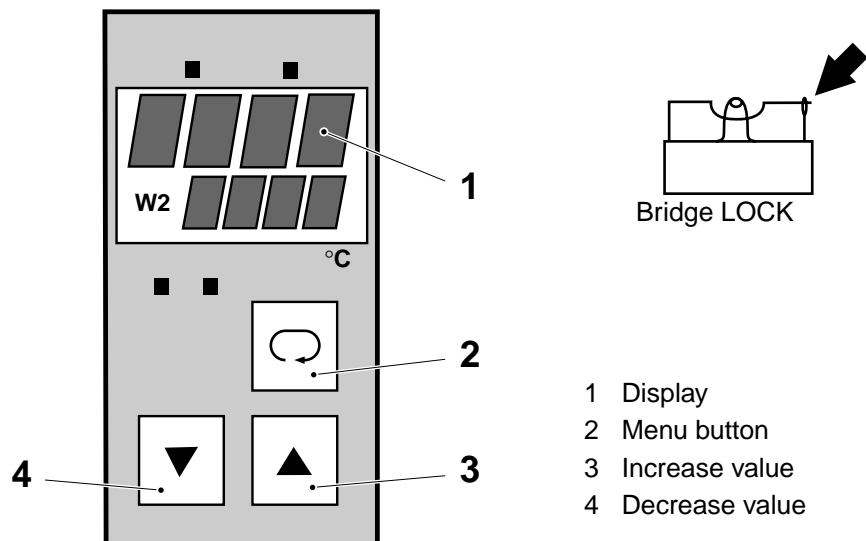
- Get a grip on the front panel of the temperature regulator and pull it out from the housing (9.1-3 *Temperature regulator - change*).
- Close the calibration bridge **A** (arrow) and open the **lock** bridge.
- Fit back the temperature regulator.
- Connect the micromite instrument as a replacement of the temperature sensor by means of the extension wire.



(Cont'd)

(Cont'd)

- e) The display (1) shows **CAL**.
- f) Let the temperature stabilize, select **Output 1** and set the value for **SP1**.
- g) Find in the Calibration certificate the deviation value for Micromite corresponding to **Output 1**.
- h) Check that the difference between the displayed value and the deviation value from Calibration certificate is within $\pm 1.4^{\circ}$ C. If not correct by means of the buttons (3) and (4). Press key **Menu** button (2) to store.
- i) Remove the regulator from the housing.
- j) Open the calibration bridge **A**.
- k) Fit back the regulator.
- l) Check all setting values according to the table, see 9.1-2 *Temperature regulators - set*.
- m) For **90410-44**, step to parameter **Loc** and set the value to **1**.
For **90410-51**, step to parameter **Loc** and set the value to **4**.
- n) Pull out the regulator and set the **Lock** bridge in **closed** position and fit back the regulator.
- o) Dismount the complete regulator from the panel by removing the screws on the top and the bottom of the regulator.

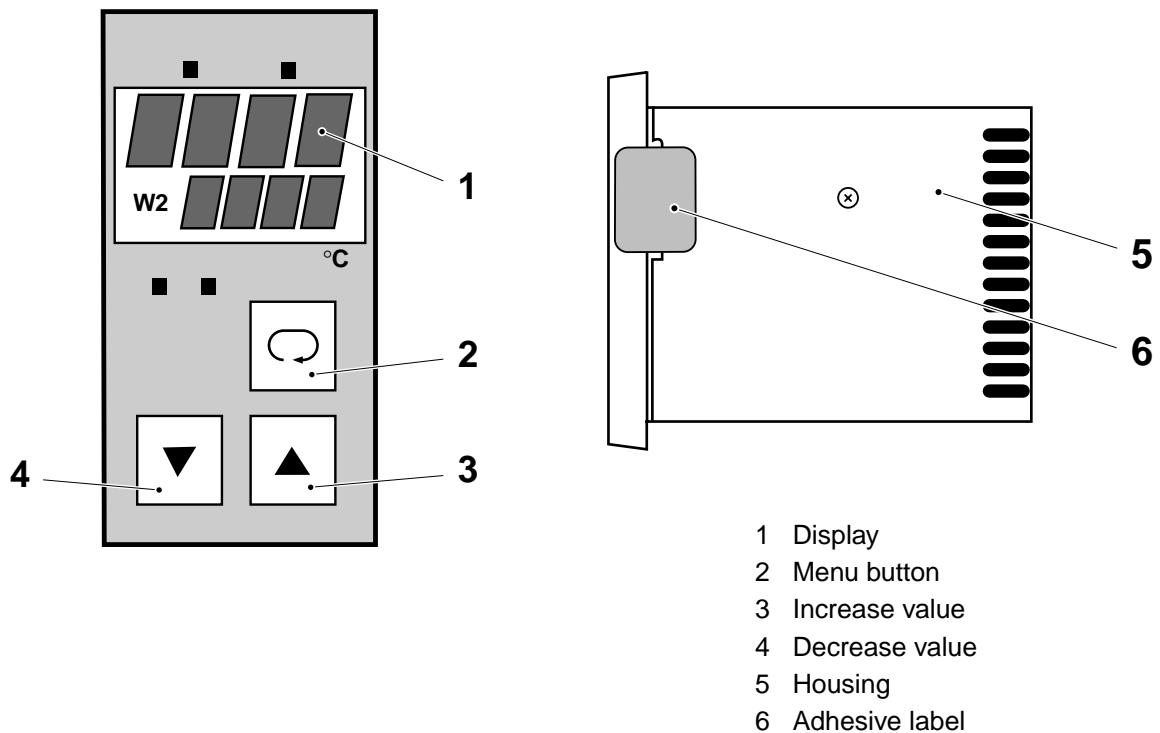
*(Cont'd)*

(Cont'd)

- p) Put the adhesive label (6) over the edge of the regulator and it's housing (5).
- q) Fit back the complete regulator.

Note! To cancel the calibration, repeat items from *a)* to *e)*. Press **Menu** button (2) and the **Increase value** button (3) simultaneously to set correction value to **0**. Continue with steps from *f)* to *h)*.

- r) Repeat on the other temperature regulators.
- s) Check the thermocouples, see *9.1.1-1 Thermocouple - check*.



9.1-5 Calibrator (Micromite II) - set

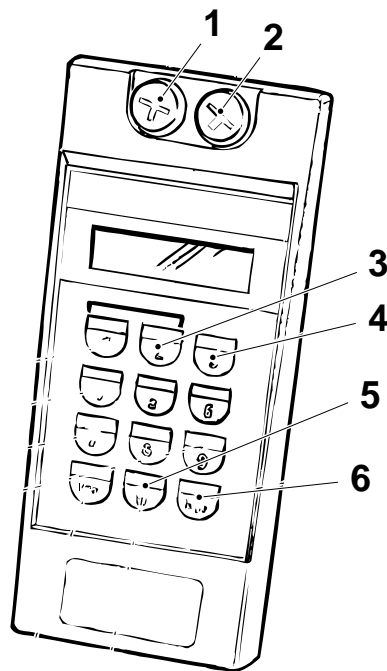
Tool - calibrator (Micromite II)	TP No. 90410-338
-------------------------------------	------------------

Thermocouple type and measuring unit

- Turn **On** mains power (at least 15 minute before setting).
- Connect the type K thermocouple to the + input (1) (yellow lead) and the - input (2) (red lead).
- Push the **On/Off** key (6) to switch on the instrument.

Caution! Make sure that the instrument is switched off in case the AC-adapter is to be disconnected or the batteries removed. Failure to do so will cause the instrument to lose the set-up information.

- Push the **F/C** key (4) to select “centigrade”.
- Push the **Select** key (5) and the **Sensor** key (3).



- 1 Input (+)
- 2 Input (-)
- 3 Sensor key
- 4 F/C key
- 5 Select key
- 6 On/Off key

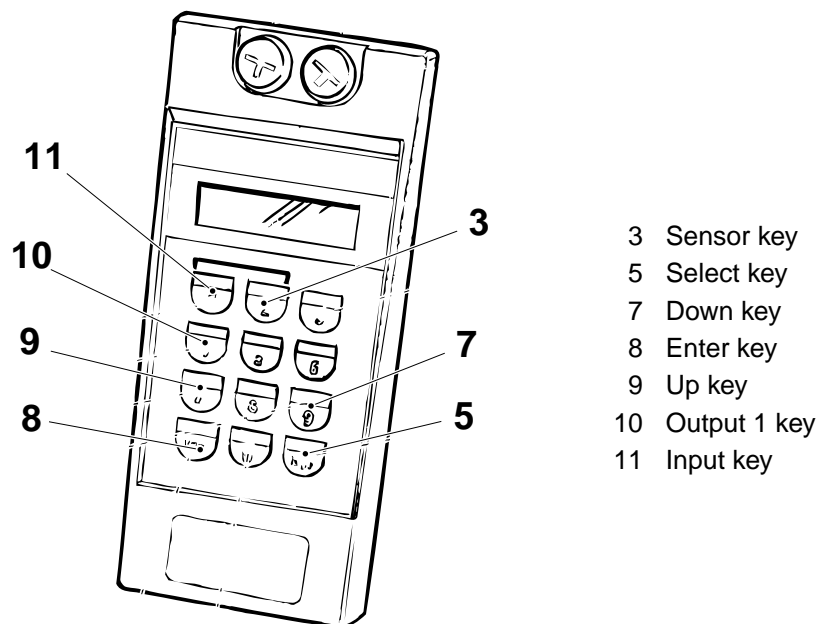
(Cont'd)

(Cont'd)

- f) Select the thermocouple type. Move the flashing cursor to the right or to the left by pushing the **Up** (9) or **Down** (7) keys.
- g) Push the **Enter** key (8) when the cursor is indicating **type K**.

Temperature output value

- a) Push the **Select** key (5) and the **Output 1** key (10) to set the output temperature. Use the numeric keys to type in the temperature value and push the **Enter** key. To clear an output value, simultaneously push the **Input** key (11) and the **Sensor** key (3).



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9.1.1 Thermocouple

9.1.1-1 Thermocouple - check

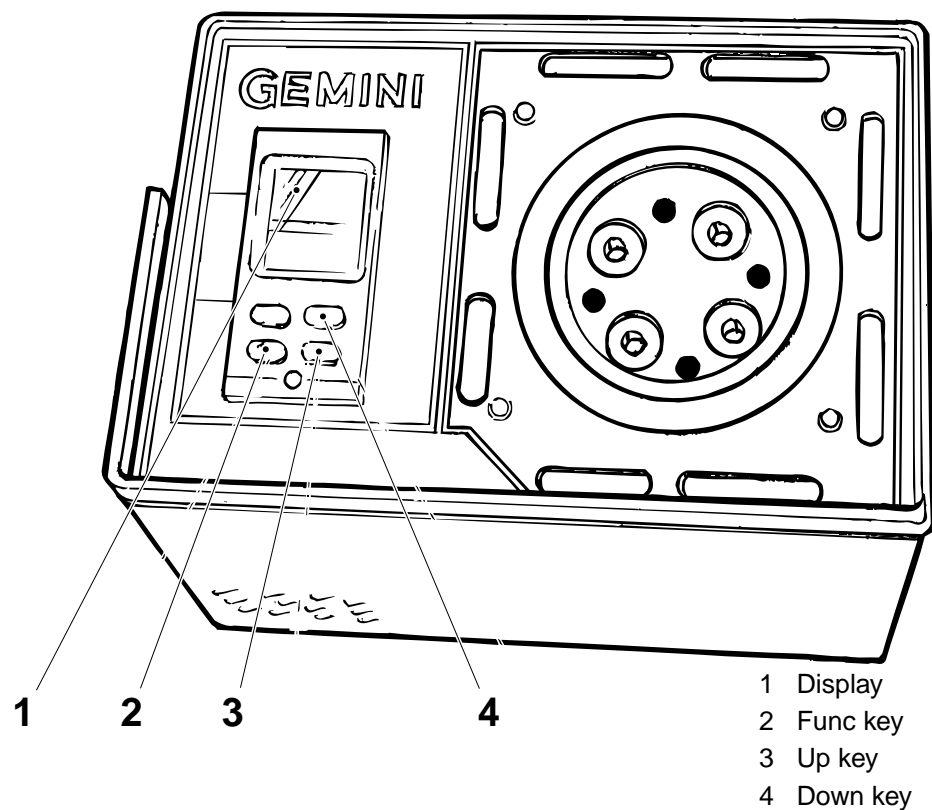
Tool - calibration oven -extension wire	TP No. 90410-337 TP No. 90410-309
SP reference	90410-44 90410-51

Note! The check must be performed when a temperature regulator is changed or at least once a year.

- a) Turn on the oven by connecting the mains plug.
- b) Push the **Func** key (2) to select Set-up mode (indicated by a flashing “SP” on the calibrator display(1)).
- c) Use the **Up** (3) or **Down** (4) keys to set the temperature value at **100°C**.

Note! Pushing the key once changes the value by 0.1°C. Pushing the key for at least two seconds to make the temperature value change more quickly.

- d) Push the **Func** key again to select **Run mode**.
The oven is now ready for measuring operations.



(Cont'd)

(Cont'd)

- e) Detach the machine thermocouple and place it in one of the cavities (5) in the oven.
- f) Place the calibrated thermocouple (to be found in the calibration kit) in an adjacent cavity of the oven (6).

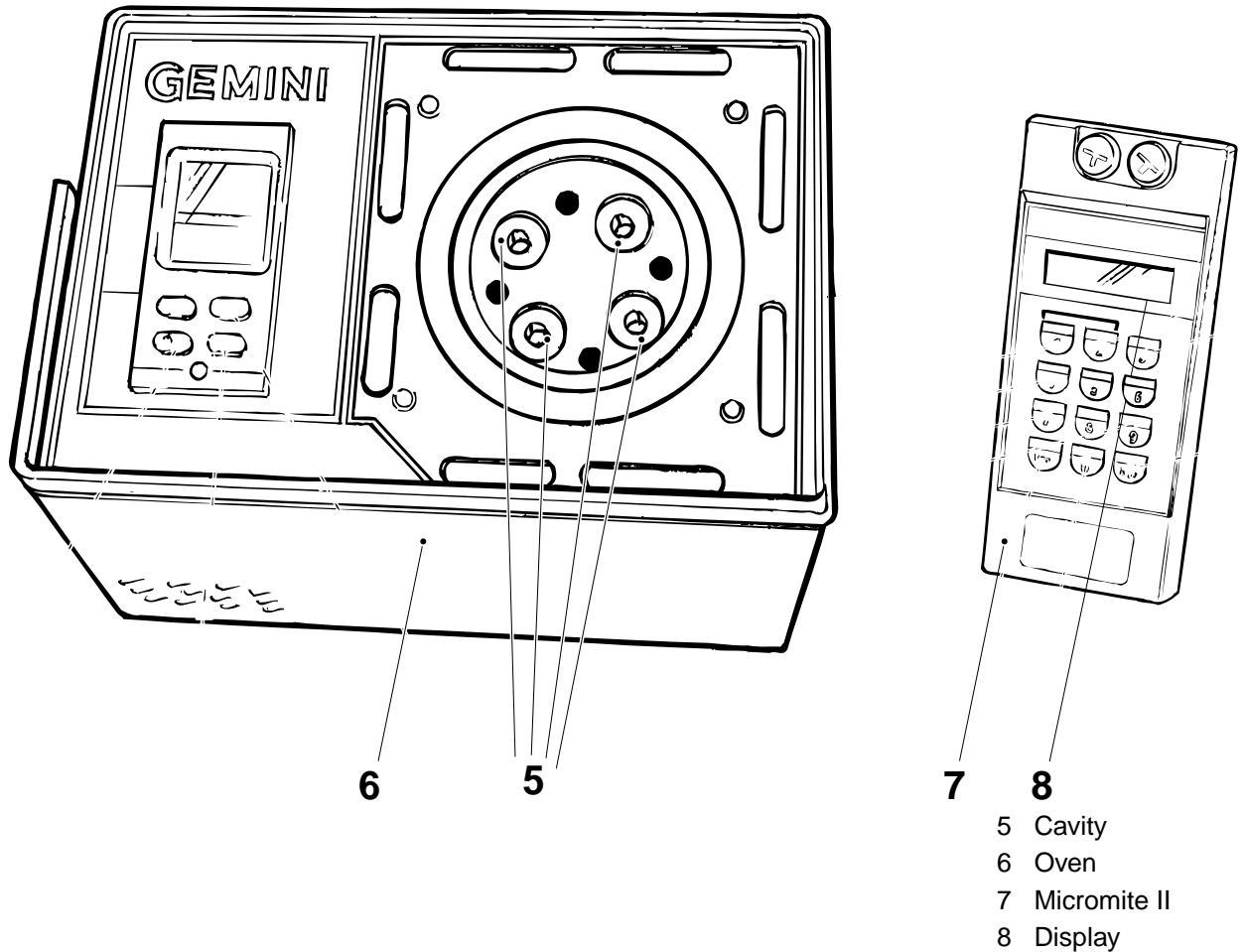
Note! Make sure that the two thermocouples are inserted equally deeply.

- g) Use the extension wire to connect the calibrator Micromite II (7) to the thermocouple from the machine. Note the temperature reading on the display (8) on the Micromite II (7).
- h) Connect the Micromite II (7) to the calibrated thermocouple. Note the temperature reading on the display (8).
- i) Find in the Pentronic Calibration Certificate the real correction value for the calibrated thermocouple (thermocouple fault plus Micromite II fault).

(Cont'd)

(Cont'd)

- j) If the value of the machine thermocouple from deviates by more than $\pm 1.1^{\circ}\text{C}$ from the value of the calibrated thermocouple, change the machine thermocouple.



- k) When measuring has been completed, let the oven stay switched on and cool it by setting the temperature value to 0. This cools down the oven more quickly.

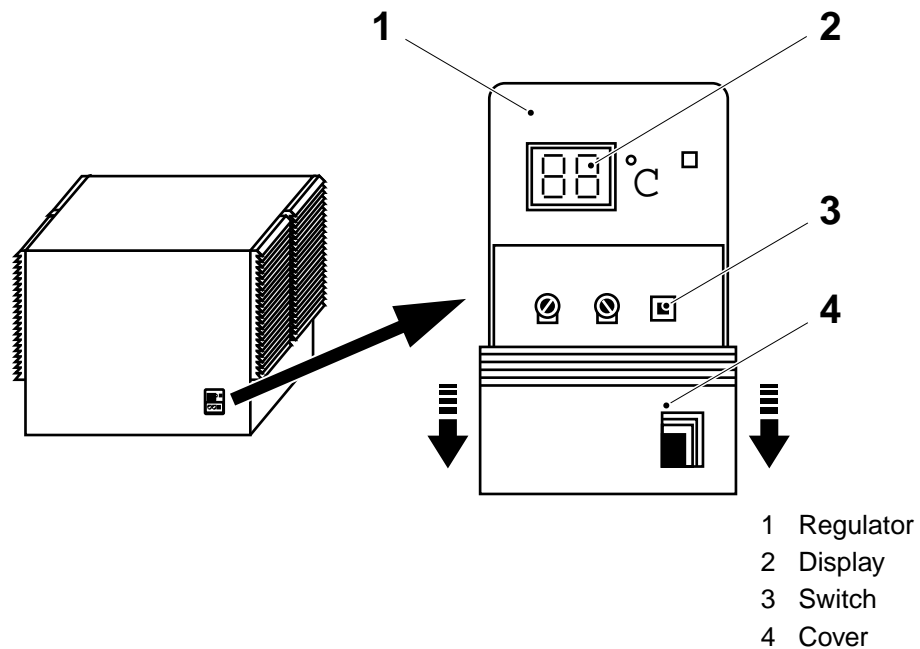
9.2 Air cooler

SP reference	90422-29
--------------	----------

9.2-1 Air cooler - check function

Machine status	Power On
SP reference	90422-29

- a) Read the actual temperature inside the electrical cabinet on the display (2). The temperature is to be **max 38°C**.
- b) Slide down and remove the cover (4) of the regulator (1).
- c) Push the switch (3).
- d) The air cooler works for about 5 minutes. Check in the electrical cabinet that there is a cold flow from the top to the bottom.



(Cont'd)

(Cont'd)

If the cooler does not work, check the following:

- the overload protection **Q4** in the electrical cabinet
- the fuses inside the cooler (beside the regulator)

Fault messages

Note! For further information, see the specific manual supplied with the machine.

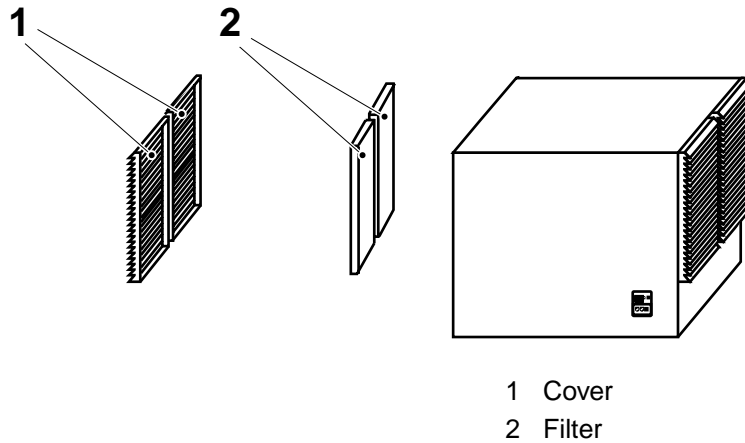
If the air cooler is malfunctioning, a fault message is shown on the display. The following codes may be shown:

Code	Fault	Cause	Action
01	Temp. inside cabinet too high	Too low cooling	Call cooling technician
		Consequence of faults 2 - 7	Call cooling technician
02	Evaporator	Start relay defect	Change relay
		Start capacitor defect	Change capacitor
		Evaporator defect	Call cooling technician
		Relay or internal wire defect	Change card
03	Low pressure sensor	Risk of ice formation	Set higher set point value
		Cooling media lacking	Call cooling technician
04	High pressure sensor	Ambient temperature too high	Limit passed
		Capacitor fouled	Clean
		Capacitor fan fouled	Clean
		E-valve defect (blocked)	Call cooling technician
		High pressure sensor defect	Call cooling technician
05	Condensation fan	Blocked or defect	Change
06	Evaporator fan	Blocked or defect	Change
07	Not in use	-	-
08	Temperature sensor	Wiring fault	Change
		Short circuit	Change
09	Wrong rotation direction, fan	Phase sequence fault	Change phases

9.2-2 Air cooler - check filters

Machine status	Power On
SP reference	90422-29

- a) Remove the covers (1) from the air cooler.
- b) Check the filters (2) for dirt or damages. Change if required.
- c) Assemble in the reverse order.



9.3 PLC

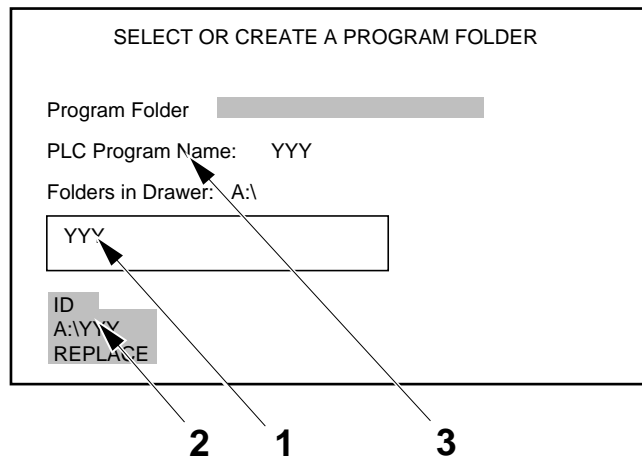
9.3-1 PLC - load program

Machine status	Power On
Tools - communication cable - AT compatible PC with diskette station	

Note! This instruction describes one way to store the PLC program from a diskette.

- a) Connect the communication cable between the PLC and the PC.
- b) Type **Im90** to enter the GE Fanuc PLC (Logicmaster 90 program).
- c) From the **Main menu**, press **F1... Logicmaster 90 Programmer Package**.
- d) The **SELECT OR CREATE A PROGRAM FOLDER** menu will be displayed.
- e) Type **A:** and press **<ENTER>**.
- f) Press **<ENTER>**.

Note! If the program has been installed previously, it will be shown where the row **PLC Program Name (3)**.



- 1 Program to be loaded (example)
- 2 Currently selected program folder (example)
- 3 PLC Program Name

(Cont'd)

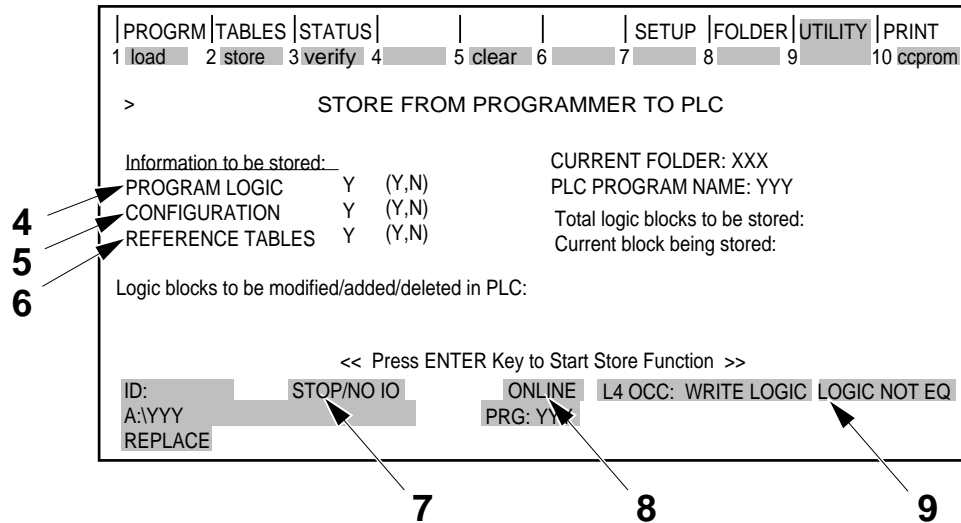
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(Cont'd)

- g) Type **N** when the row **Folder Found: back up its contents Y/N?**
- h) The **SERIES 90-30/90-20 PROGRAMMING SOFTWARE** menu will now be displayed.
- i) Press **F9... Utility: Load/Store/etc.**
- j) The **PROGRAM UTILITY FUNCTIONS** menu is displayed.
- k) Check that the status line (LM communication) shows **ONLINE** (8).
If not, press **Alt + M** until the status line shows **ONLINE**.
- l) Check that the status line (PLC status) shows **STOP** (7).
If not, press **Alt + R** until the status line shows **STOP**.
- m) Check that the status line shows **LOGIC NOT EQ** (9).

Note! If the status line shows **LOGIC EQUAL**, there is no need to load the program.

- n) Press **F2... Store from Programmer to PLC.**
- o) Select Y/N for the information to be stored (normal case):
 - Program logic (4), Y
 - Configuration (5), Y
 - Reference tables (6), Y
- p) Press <ENTER> to store.



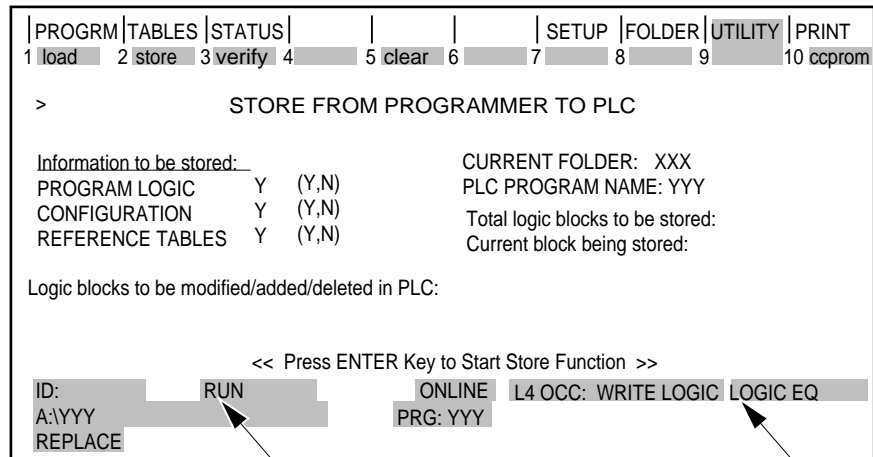
- 4 Program logic
- 5 Configuration
- 6 Reference tables
- 7 Status (STOP)
- 8 Status (ONLINE)
- 9 Status (LOGIC NOT EQ)

(Cont'd)

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(Cont'd)

- q) Type **Y** to answer “Program name in PLC does not match program name in folder; continue? (Y/N)”.
- r) Type **Y** to answer “Selected items will be overwritten; continue store in PLC? (Y/N)”. (Any other key will be taken as N.)
- s) When **Store complete** is displayed, the status line (9) should state **LOGIC EQUAL**.
- t) Press **Alt + R** until the status line shows **RUN** (7).



7

9

- 7 Status (RUN)
- 9 Status (LOGIC EQ)

- u) Press **<ESC>** and type **Y** to answer “Exit Logicmaster 90 Programmer Package? (Y/N)”.
- v) The program load is ready.
- w) To modify the program according to the volume adaption document see *9.3-2 PLC - change program step*.

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9.3-2 PLC - change program step

Machine status	Power On
Tools - communication cable - AT compatible PC with diskette station	

- a) Type **F1** to enter the program.
- b) Using the arrow keys choose **Block Declarations**. Type **F10** to expand the block.
- c) Using the arrow keys choose **BLK35**. Type **F10** to expand the block.
- d) Type new data according to volume adaption document 47820-90:xx. Type **F4** after each variation.

Note! Values on page 1 and 2 of the Volume adaption document are valid for 6000 p/h machines. Values on page 3 and 4 Volume adaption document are valid for 7500 p/h machines.

- e) Use the arrow keys to move through the addresses.

Note! If the machine is NOT equipped with Quick volume conversion kit or for the small volume for the Quick volume conversion kit, change the values from rung5 to rung9. Rungs from No. 10 and after are for the big volume. In general it is advisable to keep track of any rebuilding kit or other alterations of the program making a note in the comment rung (e.g. BLK Main rung 5). It is also advisable to keep copy of the original program folder and make changes on a renamed folder. Keep always an update diskette in the electrical cabinet of the machine.

9.3.1 PLC power supply unit

SP reference	90031-19
--------------	----------

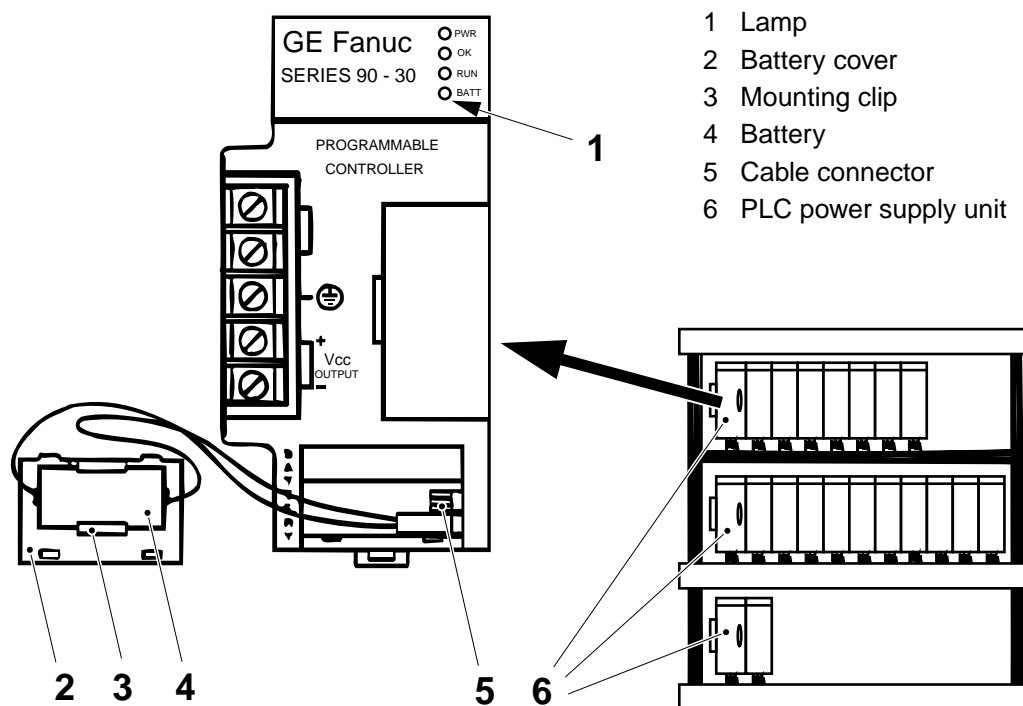
9.3.1-1 PLC power supply unit - change battery

Machine status	Power On
SP reference	90031-19

When the battery signal lamp (1) lights up, the battery (4) must be changed.

Change the battery as follows.

- a) Remove the battery cover (2).
- b) **First** fit the cable of the new battery on the cable connector (5) left free.
- c) **Secondly** remove the old battery cable and remove the battery from its mounting clip (3).
- d) Firmly insert the new battery into the mounting clip.
- e) Fit the battery cover.
- f) Repeat item a) - e) for the other power supply units (6).



9.4 TPIH system

9.4-1 TPIH system - description

Machine status	Production
Tools - test instrument	TP No. 68462

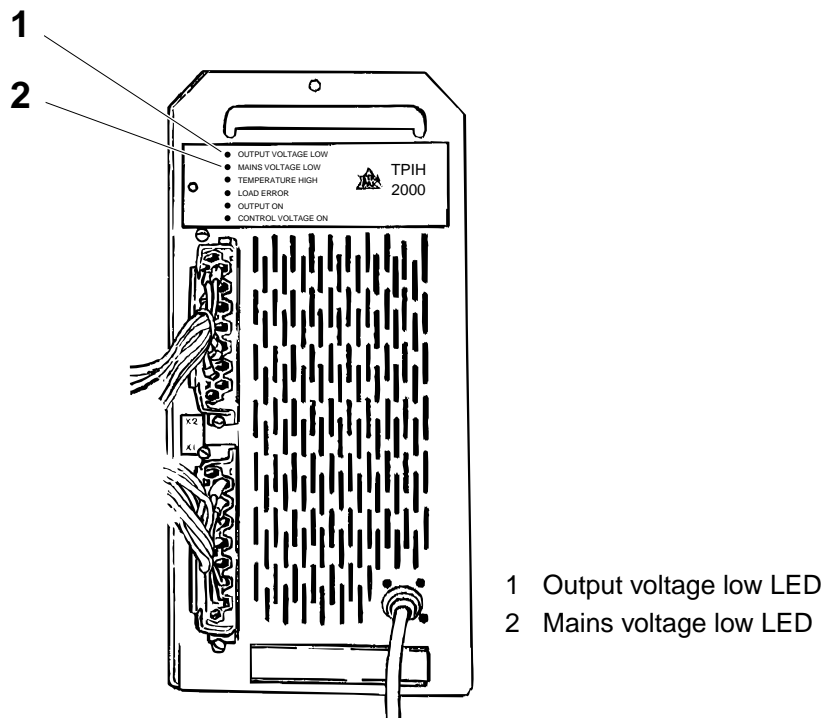
Output voltage low

If the output voltage low LED (1) lights up and this is the only LED that has lit up:

- the generator is faulty and must be replaced, or
- the +10 V DC to the potentiometer is missing, or
- the potentiometer setting is below the minimum value of 350, or
- the potentiometer is broken (the output voltage from the potentiometer does not follow the movement of the potentiometer slider)

Mains voltage low

If the LED (2) has lit up, at least one of the three phases is below 85% of nominal value and, as a consequence, the generator is not able to deliver the proper output power.



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(Cont'd)

(Cont'd)

Check the mains supply for any possible open fuse. If all three fuses are intact, the problem will disappear when the voltage rises above 85% again.

Temperature high

If the LED (3) has lit up, the temperature of the TPIH generator is too high due to that:

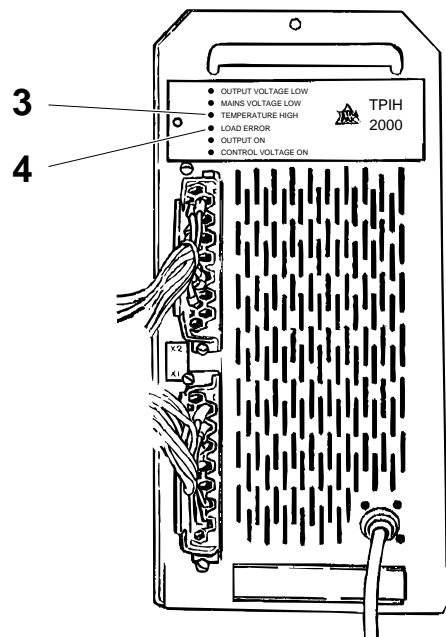
- the cooling fan inside the generator is not working
- the ambient temperature is above 50°C

Change the generator if the fan does not operate, see *9.4.3-1 TPIH generator - change*.

Load error

If the LED (4) has lit up, the generator is unable to transmit a pulse due to faulty load caused by:

- short circuit in coaxial cable, busbar, inductor or impedance transformer
- open circuit in coaxial cable, busbar, inductor or impedance transformer
- no pressure applied to the inductor
- wrong type of impedance transformer installed
- wrong type of inductor installed



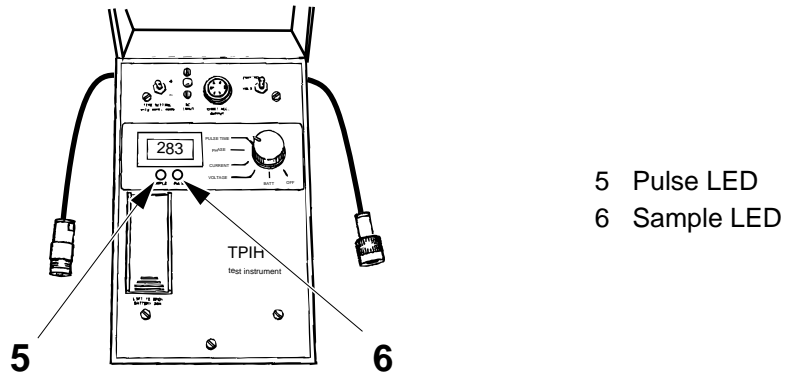
- 3 Temperature high LED
- 4 Load error LED

(Cont'd)

(Cont'd)

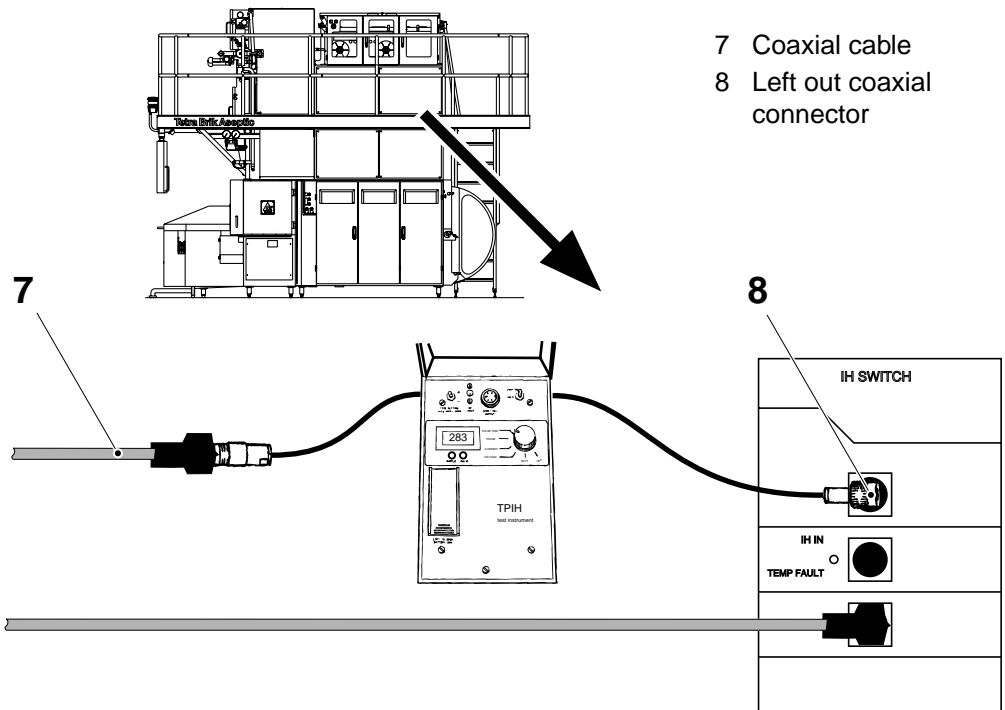
The origin of the load error may be located with the aid of the test instrument.

With a load problem only short pulses are delivered by the generator. During the entire pulse the sample LED (6) lights up, while the pulse LED (5) is off.



Proceed as follows:

- a) Make a **Short stop**.
- b) Connect the test instrument between the coaxial cable (7) and the left out coaxial connector (8) of the IH switch.
- c) Step up to step **Production**.



(Cont'd)

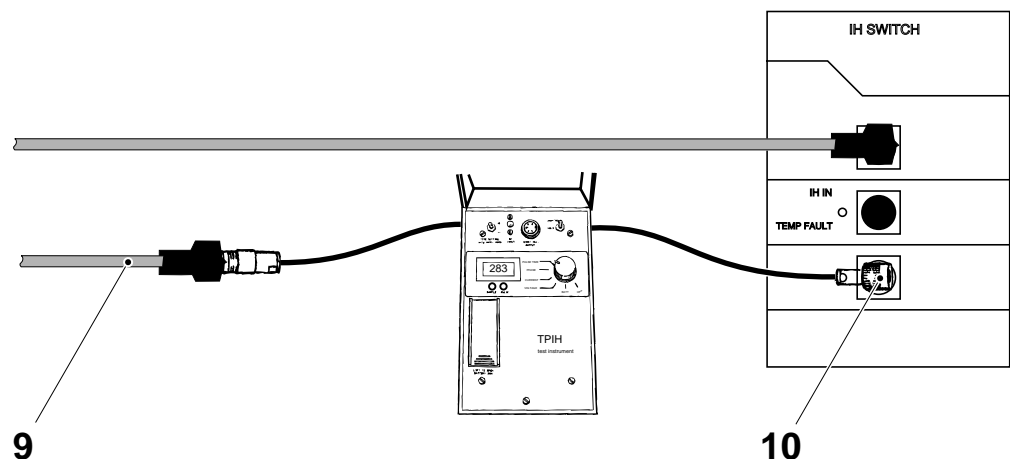
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(Cont'd)

- d) Measure the values of the voltage, current, phase angle, pulse time and compare with the values in the table.

Load examples	Phase angle	Voltage/Current
Optimal load	0°	50 Ω
Normal load	±15°	40 - 65 Ω
Short circuit in coaxial cable, contacts or primary of the IH transformer	pos ⁽³⁾	1 - 10 Ω ⁽¹⁾
Open circuit in coaxial cable, contacts or primary of the IH transformer	neg ⁽³⁾	200 - 2000 Ω ⁽²⁾
Short circuit in inductor, current rail or secondary of the IH transformer	pos	10 - 20 Ω
Open circuit in inductor, current rail or secondary of the IH transformer	neg	2 - 5 Ω
No packaging material on the inductor	neg	5 - 15 Ω

- Note!**
- 1) Greater value = greater distance between problem and instrument
 - 2) Smaller value = shorter distance between problem and instrument
 - 3) Greater phase difference = greater distance between problem and instrument
- e) Make a **Short stop**.
- f) Connect the test instrument between the coaxial cable (9) and the right out coaxial connector (10) of the IH switch.
- g) Step up to step **Production** and repeat item d).

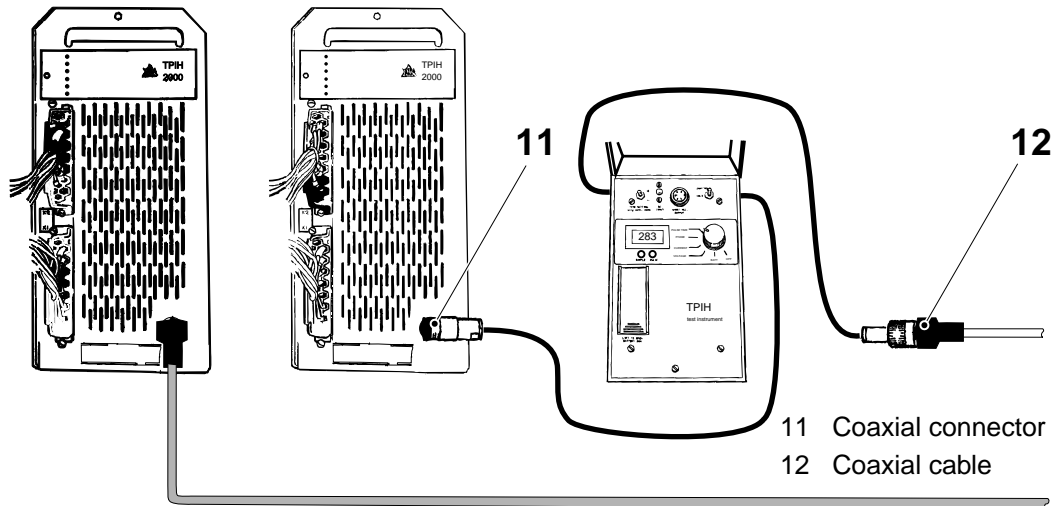


- 9 Coaxial cable
10 Right out coaxial connector

(Cont'd)

(Cont'd)

- h) Make a **Short stop**.
- i) Connect the test instrument between the coaxial cable (12) and the coaxial connector (11) of the TPIH generator.
- j) Step up to step **Production** and repeat item *d*).



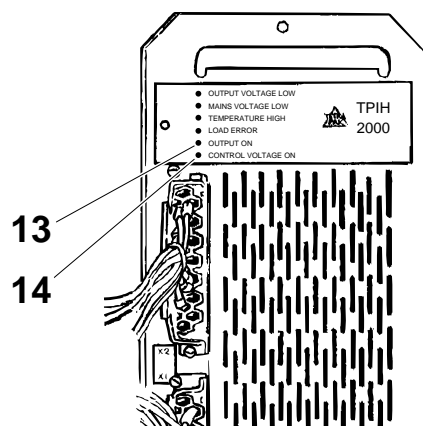
Output on

When the LED (13) lights up, a pulse is transmitted from the generator into a proper load. The entire generator system is operating perfectly.

Control voltage on

When the LED (14) lights up, 230 V is connected to the generator. Alarms are enabled.

Note! This does not check the three phase 400/230 V to the power supply.



- 13 Output on
- 14 Control voltage on

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9.4.1 TPIH cables

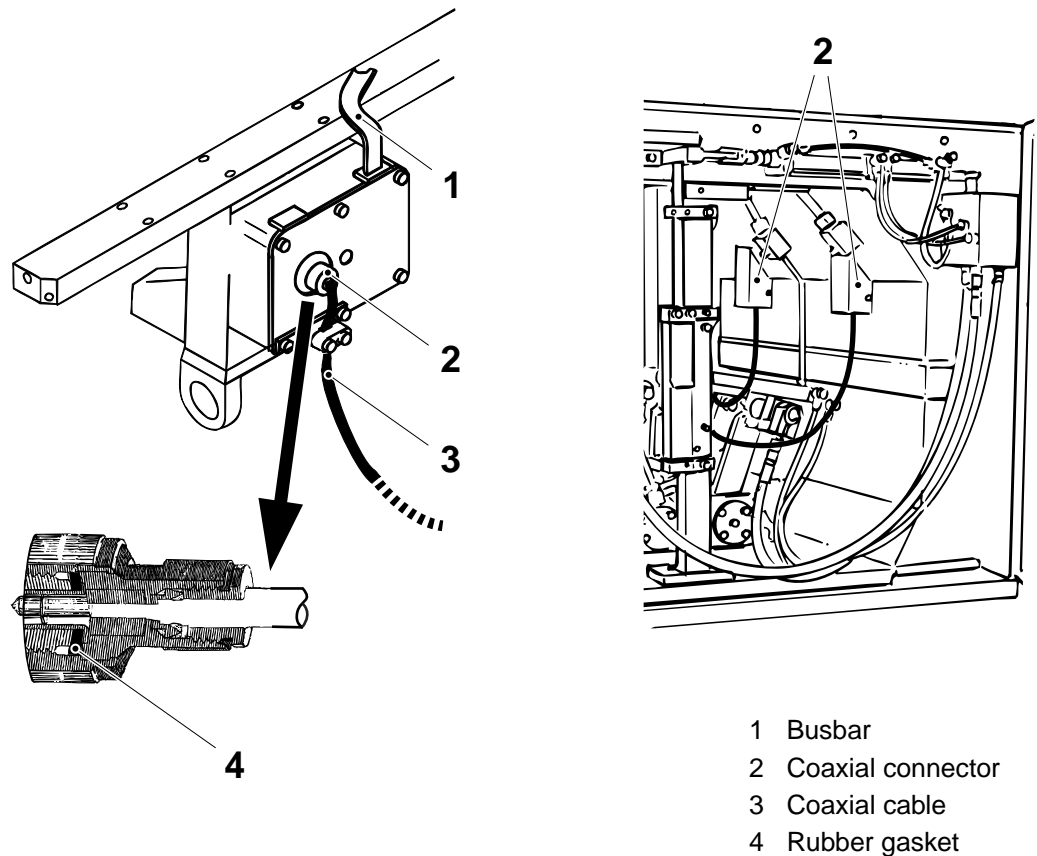
9.4.1-1 TPIH cables - check condition

SP reference	548770-8
--------------	----------

Check the following details for wear and/or damage:

- the coaxial connectors (2); make sure that there is no moisture between the male connector and the female connector
- the rubber gasket (4) in the male connectors; make sure that it seals properly (it should not be possible to turn the male connector easily)
- the coaxial cables (3); make sure that the cables are flexible and that there are no cracks where they bend
- the busbar (1); make sure that there are no signs of damage

Clean or change as required.

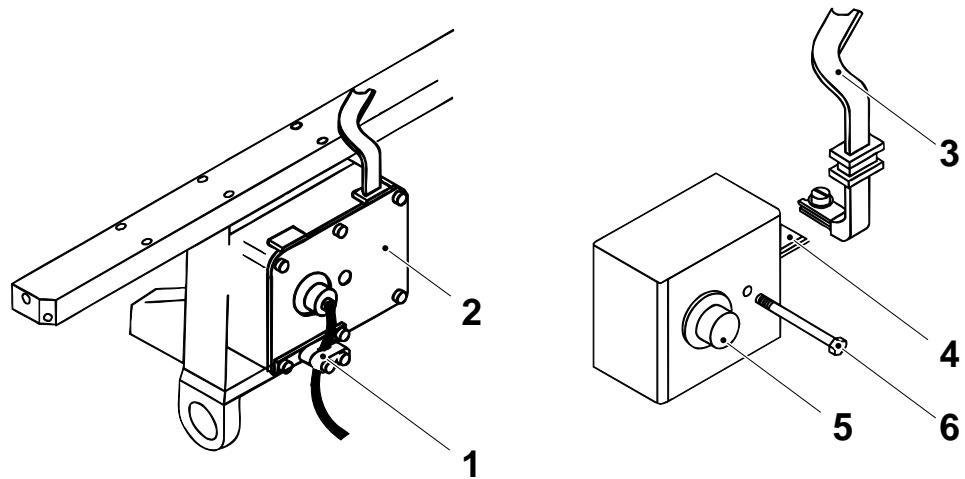


9.4.2 TPIH impedance transformer

9.4.2-1 TPIH impedance transformer - check

SP reference	67379-0101
--------------	------------

- a) Remove the clamp (1).
- b) Remove the coaxial cable from the impedance transformer.
- c) Unscrew the screws and remove the plate (2).
- d) Remove the busbar (3).
- e) Check that the impedance transformer is intact and clean. Pay particular attention to the coil (4) and the coaxial connector (5). Clean or change the impedance transformer as required.
- f) Unscrew the screw (6) to remove the impedance transformer.
- g) Assemble in the reverse order.



- 1 Clamp
- 2 Plate
- 3 Busbar
- 4 Coil
- 5 Coaxial connector
- 6 Screw

9.4.3 TPIH generator

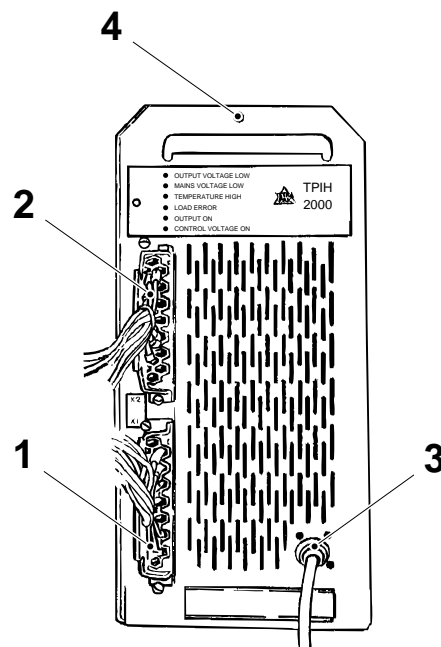
9.4.3-1 TPIH generator - change



SP reference	67600-501
--------------	-----------

- a) Make sure that the main power switch is **Off** and that it has been padlocked.
- b) Remove the connectors (1) and (2).
- c) Remove the coaxial connector (3).
- d) Unscrew the screw (4) and pull out the generator.
- e) Change the generator.
- f) Assemble in the reverse order.

Send the generator to the nearest Tetra Pak service station for service.



- 1 Connector X1
- 2 Connector X2
- 3 Coaxial connector
- 4 Screw

9.4.4 TPIH test instrument

9.4.4-1 TPIH test instrument - description

Tools - test instrument	TP No. 68462
----------------------------	--------------

The TPIH test instrument is used to check the available output power from the TPIH generator as well as the condition of the coaxial cable, the impedance transformer, the busbar and the inductor.

Connect it in series with the coaxial cable from the generator.

It simplifies the work, when trying to locate the origin of a problem.

The test instrument can be used for direct measurement of the following parameters:

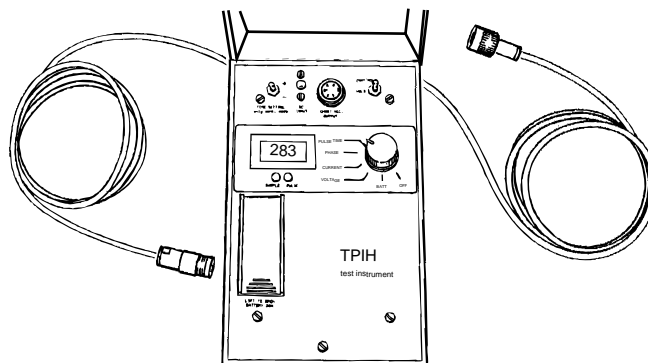
- HF voltage
- HF current
- phase shift voltage/current
- pulse duration

The results of these measurements can be used to calculate the available HF power.

One 9 V battery is used for the instrument and an automatic power-off function is used to minimise the battery consumption.

A test outlet permits connection of a printer, such as a Brush recorder. Print-outs of the HF voltage, HF current and the phase shift as a function of time are possible.

The instrument kit contains complete operating instructions as well as a printer cable and a battery eliminator.

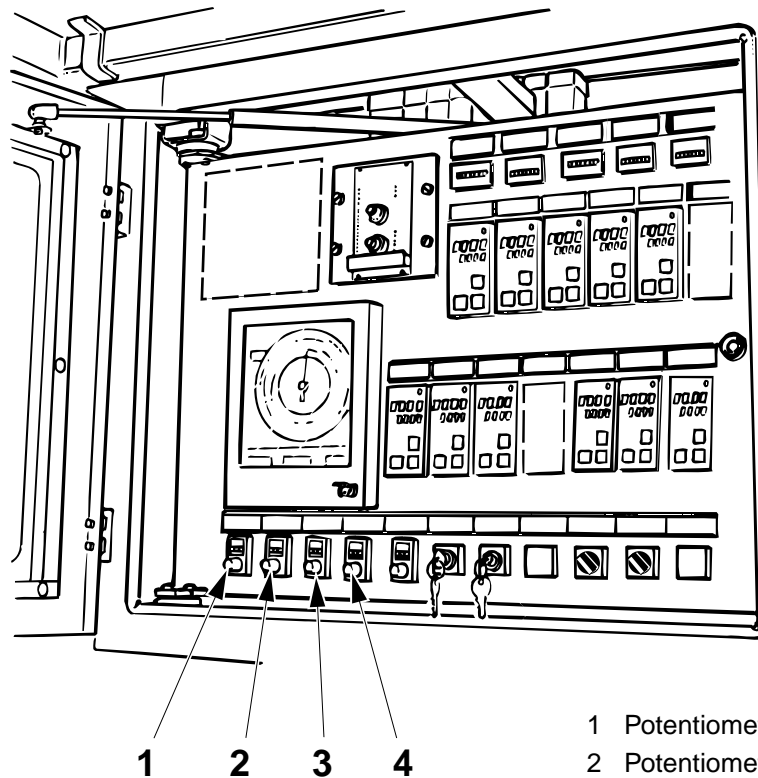


9.4.5 TPIH power

9.4.5-1 TPIH power - record setting

Record the values of the following potentiometers:

- LH TS power (1)
- RH TS power (2)
- SA power (3)
- Web splice power (4), ASU only



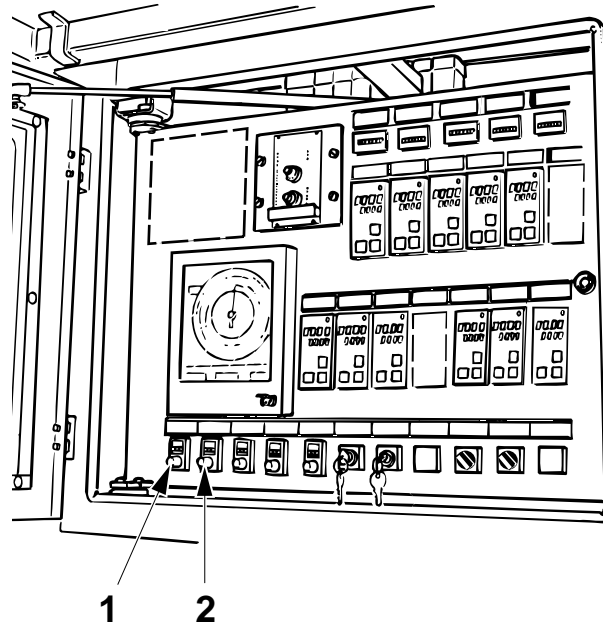
- 1 Potentiometer, LH TS power
- 2 Potentiometer, RH TS power
- 3 Potentiometer, SA power
- 4 Potentiometer, web splice power

9.4.5-2 TPIH power - set TS power

Basic setting

Set the power value for the LH and RH TS with the potentiometers, see table below.

Potentiometer (1) regulates the LH jaw pair and potentiometer (2) the RH jaw pair.



Package	Value
100 B	600
125 S	600
160 S	720
180 B	760
200 B	760
200 M	760
200 S	720
236 B	760
250 B	760
250 S	760
284 B	760
300 S	760
330 S	760

- 1 Potentiometer, LH TS power
- 2 Potentiometer, RH TS power

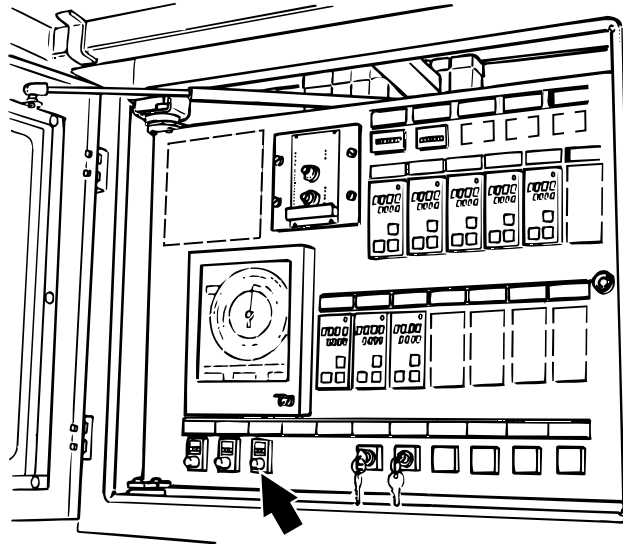
Final setting

In step **Production**, evaluate the TS sealing, see *OM section Package checks*. If required, fine set on the potentiometers.

9.4.5-3 TPIH power - set SA power

Basic setting

Set the power value for the SA sealing unit with the potentiometer, see table below.



Package	Value 7500 p/h	Value 6000 p/h
100 B	500	-
125 S	500	-
160 S	560	-
180 B	-	-
200 B	500	500
200 M	530	-
200 S	560	560
236 B	-	-
250 B	530	500
250 S	550	-
284 B	550	-
300 S	550	-
330 S	660	-

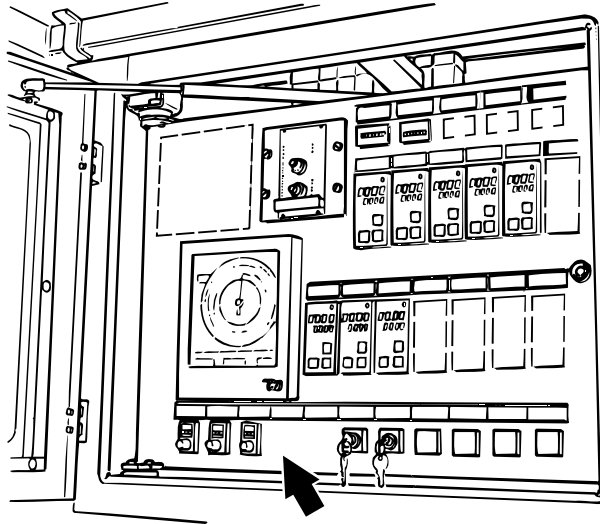
Final setting

In step **Production**, evaluate the SA sealing, see *OM section Package checks*. If required, fine set on the potentiometer.

9.4.5-4 TPIH power - set web splice power

Basic setting

Set the power value for the ASU sealing unit with the potentiometer to 900.



Final setting

Perform a manual splice.

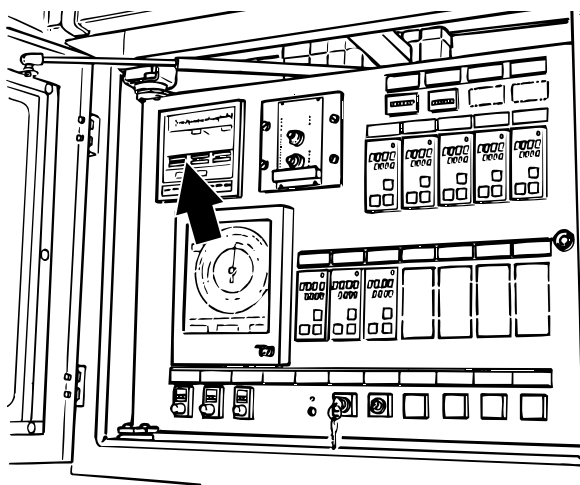
Pull the seal apart and examine it. If required, fine set on the potentiometer.

9.5 Process recorder

9.5-1 Process recorder - set

Note! The process recorder is an option.
For further information, see Yokogawa Program Manual, supplied with the recorder.

Caution! All changes in the process recorder program must be carried out by **skilled or instructed personnel only!** Changes should be carried out at a Tetra Pak service station.



To list the program parameters, push the **List** button.

Program the following parameters in the process recorder.

- Chart SP1 (F) 60 mm/h
- Chart SP2 (F) 60 mm/h

Channel No.	Range	Record span	Scale span	Unit
Ch 01	50 V	0.00 50.00	0.0 100.0	%
Ch 02	50 V	-1.40 35.00	0.0 100.0	%
Ch 03	50 V	-2.50 26.00	0.0 100.0	%
Ch 04	Type K	0.00 200.00	-	°C
Ch 05	Type K	0.00 200.00	-	°C
Ch 06	Type K	0.00 400.00	-	°C

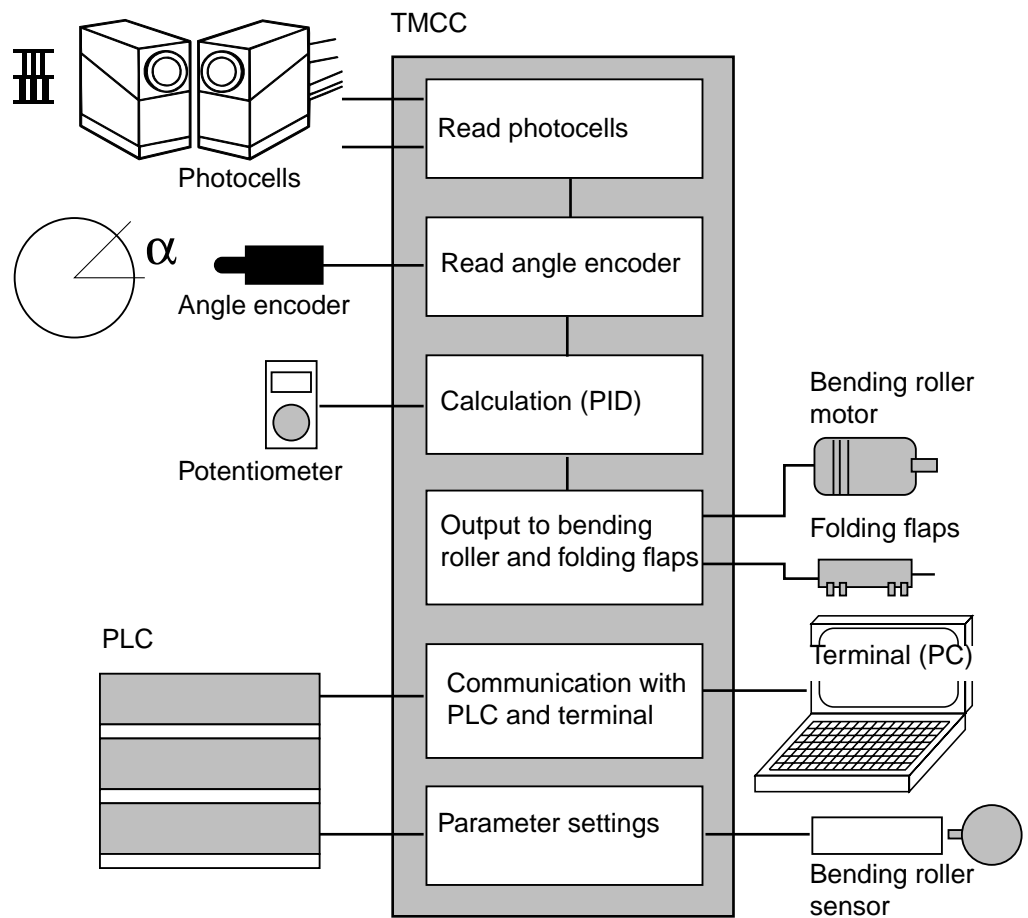
Note! The measuring range for the voltage channels is to be 35 (linear scaling).

9.6 DCS19

9.6-1 DCS19 - function description

DCS19 is a program that runs on a TMCC hardware. This program reads the angle encoder, the setting of the potentiometer; and decodes the register mark on the packaging material tube (bar code), which is registered by the photocells.

From these parameters, an output is calculated. This output decides the driven bending roller speed and the folding flap position.



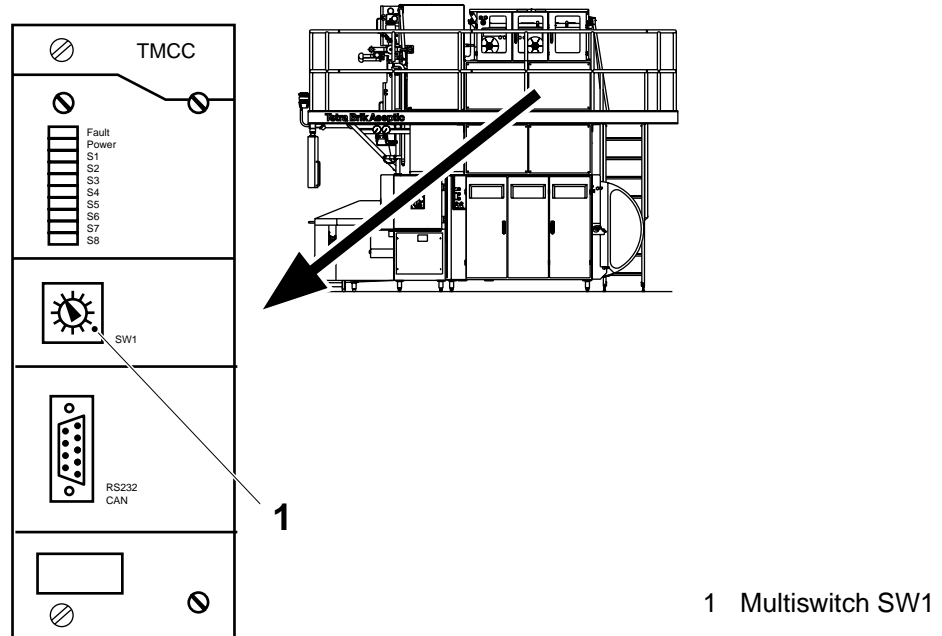
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TMCC multiswitch panel

The multiswitch panel **SW1** (1) is used both for setting the bending roller speed and for selecting one of the available formats for the diagnostic output.



1 Multiswitch SW1

SW1	Description	Function
0	Programming mode	Enables the download of the DCS19 program
1 to 7	Bending roller revs setting	Enables the bending roller speed setting
8 to D	Diagnostic output mode	Select the position of one of the available formats for diagnostic output. See table below.
E		Not used
F	Automatic bending roller speed setting	Same function of pos. 1 to 7 in automatic

(Cont'd)

2.2E0794H06.en

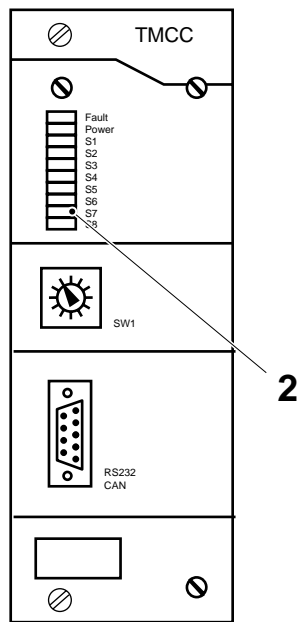
(Cont'd)

Note! In normal production mode the **SW1** should be set to position **8**.

SW1	Function	Output format
8	Normal position, outputs the calculated design error of every package.	0 to 10 V => -5 to + 5 mm design error
9	Outputs the average (mean) design error of the two last packages	0 to 10 V => -5 to + 5 mm design error
A	Outputs a filtered average design error	0 to 10 V => -5 to + 5 mm design error
B	Outputs the calculated output signal to the bending roller and air cylinder.	0 to 10 V => 0 to 255 range of output signal
C	Outputs a filter average of the output signals	0 to 10 V => 0 to 255 range of output signal
D	Outputs the design adjustment potentiometer setting.	0 to 10 V=> -5 to +5 mm adjustment range

TMCC front fanel LEDs

The LEDs on the TMCC panel (2) have the following functions in normal production mode.



LED	Function
FAULT	Not in use
POWER	Power supply to TMCC is correct
S1	Register mark detection
S2	Design correct
S3	Not in use
S4	Connection air cylinder ON
S5	LH side cylinder-air connection ON
S6	RH side cylinder-air connection ON
S7	Not in use
S8	Not in use

2 LEDs panel

(Cont'd)

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(Cont'd)

When the LEDs are flashing simultaneously this indicates a malfunction in the program. It is possible to find out the type of error by noticing which LED is not flashing:

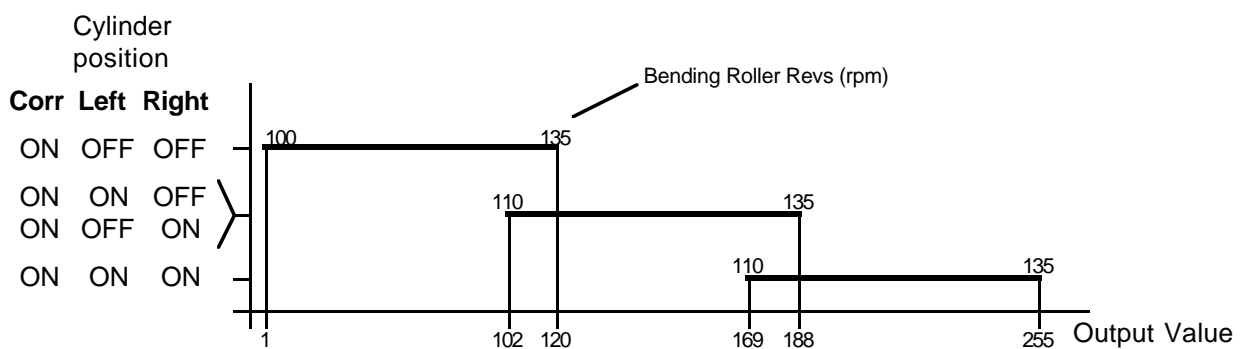
LED not flashing	Meaning
S1	Error in EEPROM writing. This error indicates that there may be a hardware problem when trying to store the bending roller revs manually or automatically.
S2	No bending roller sensor pulses. This can mean: - that the bending roller is not rotating - a wrong set or adjustment of a sensor - a bad condition between sensor and TMCC

Output signals

The PID algorithm calculates a new output value for every package. The calculated output value ranges from 0 to 255.

This value is converted into an analogue signal for the bending roller and three digital signals to the air valves controlling the folding flap air cylinders.

The bending roller signal overlaps the air cylinder positions (hysteresis) as below:



Output value = 0 sets the precorrection position of the air cylinders (= all OFF) and sets the pre step speed on the bending roller (set from the PLC).

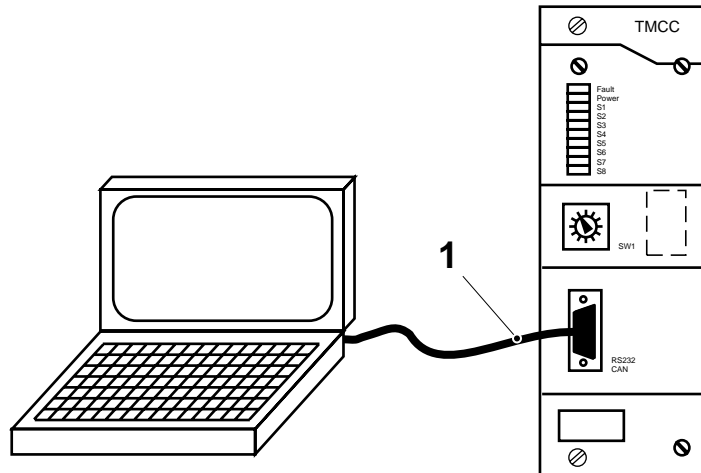
2.2B0794H06.en

9.6-2 DCS19 - basic set

Machine status	Production
Tools - communication cable - AT compatible PC with diskette station	RS 232-C

Connect the TMCC to the PC with the communication cable (1). Necessary connections are:

PC 9-pin female	TMCC 9-pin male
2	3
3	2
5	5



1 Communication cable

Configure the program to use, for example TIT or Windows terminal, as follows:

Baud rate	9600
Parity	None
Bits	8
Stopbits	1
Flow control	None

(Cont'd)

2.2E0794H06.en

(Cont'd)

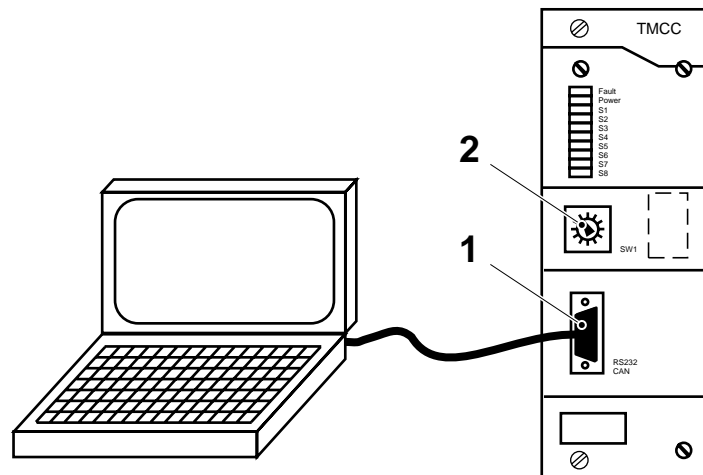
The commands and parameters, if any, to the DCS19 program is entered on the keyboard is executed when the **Return** key is entered. The functions described are available:

Code	Description																		
Annn	<p>Angle nnn The Production Angle (=machine angle) nnn is the new angle value, ranging from 0 to 255 decimal degrees. Normally the Production Angle is set from the PLC, but this command overrides the PLC setting. It may be used in test purpose to find the correct nominal Production Angler, which will later be set from the PLC.</p> <p>Note! The Design Adjustment Pot setting is added to this value. Example: A72 sets the Production Angle to 72 degrees (110 octal).</p>																		
E	Current encoder value, first hexadecimal Gray code, then converted to octal.																		
Fooo	<p>Force ooo Force outputs for bending roller speed and air cylinder position, to a certain value which is (ooo-1). F0 resets the forcing: F0 - Reset (disable) output force F1 - Force to Precorrection output F2 - Force to output = 1 ... F255 - Force to output = 254 (Output = 255 is not possible but since it is a small step in the upper region of the output range this has no practical meaning.)</p> <p>Note! This function is only available when the machine is running.</p>																		
Rn	<p>Reporting On/Off Enables and disables automatic reporting of design error and output value for every package. R0 - Disable reporting. R1 - Enable reporting.</p>																		
S	<p>Status Displays a list of parameters for test and service purposes:</p> <table border="1"> <tbody> <tr> <td>Design error mean (mm)</td> <td>filtered* value</td> </tr> <tr> <td>Output mean (0 - 255)</td> <td>filtered* value</td> </tr> <tr> <td>Machine speed (p/h)</td> <td>packages per hours</td> </tr> <tr> <td>Production angle const (dec.degr.)</td> <td>production angle set from PLC</td> </tr> <tr> <td>Production angle +pot (dec.degr.)</td> <td>production angle + design adjustment pot offset</td> </tr> <tr> <td>Pre corr bending roller speed (rpm)</td> <td>speed set from the PLC</td> </tr> <tr> <td>Max design OK (mm)</td> <td>max allowed design error</td> </tr> <tr> <td>Max revs, Min revs (V)</td> <td>voltages set on the bending roller output for maximum and minimum speed</td> </tr> <tr> <td>Pot voltage</td> <td>0 -10 V depending on the design adjustment pot position</td> </tr> </tbody> </table> <p>* = filter algorithm: 90%(old values) + 10%(new values)</p>	Design error mean (mm)	filtered* value	Output mean (0 - 255)	filtered* value	Machine speed (p/h)	packages per hours	Production angle const (dec.degr.)	production angle set from PLC	Production angle +pot (dec.degr.)	production angle + design adjustment pot offset	Pre corr bending roller speed (rpm)	speed set from the PLC	Max design OK (mm)	max allowed design error	Max revs, Min revs (V)	voltages set on the bending roller output for maximum and minimum speed	Pot voltage	0 -10 V depending on the design adjustment pot position
Design error mean (mm)	filtered* value																		
Output mean (0 - 255)	filtered* value																		
Machine speed (p/h)	packages per hours																		
Production angle const (dec.degr.)	production angle set from PLC																		
Production angle +pot (dec.degr.)	production angle + design adjustment pot offset																		
Pre corr bending roller speed (rpm)	speed set from the PLC																		
Max design OK (mm)	max allowed design error																		
Max revs, Min revs (V)	voltages set on the bending roller output for maximum and minimum speed																		
Pot voltage	0 -10 V depending on the design adjustment pot position																		

9.6-3 DCS19 - program download

Machine status	Production
Tools - communication cable - AT compatible PC with diskette station	RS 232-C

- Connect the communication cable between the PC and the TMCC connector (1).
- Set the front panel switch **SW1** (2) to position **0**.



- Communication cable
- Front panel switch SW1

- Insert the program diskette marked **47 835-x01** (x corresponds to the current program revision) into the PC diskette station.
- Enter command **A:TMCC <ENTER>** to start the download program **TMCC.EXE**.
- When the program menu appears, enter the communication port in use (normally **1**).
- A directory will appear. Press **<HOME>** to select the **A:drive**.
- A list of the files on the diskette A will appear.

(Cont'd)

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- h) Press the RH **Arrow** key to select the **File** window.
- i) Select file **D47835.HEX** by means of the **Arrow** keys.
- j) When the first file is selected, press **F2**. The automatic download program starts. The download process may be monitored in the lower part of the screen.
- k) When all “faces” are filled, and the program has been downloaded without errors.
- l) Press **F10** to exit the **TMCC.EXE** download program.

Note! It is possible to apply a label (with the program number and LED functions) to the TMCC front panel, aligned with the row of LEDs.



- m) Set the TMCC front panel switch **SW1** to position **8**, production.
- n) Set the speed of the driven bending roller, see *1.6-4 Bending roller (driven) - set speed*.

9.7 Level regulator relay

9.7-1 Level regulator relay - description

The level regulator relay RM3 LA1 monitors the filling level of conducting liquids.

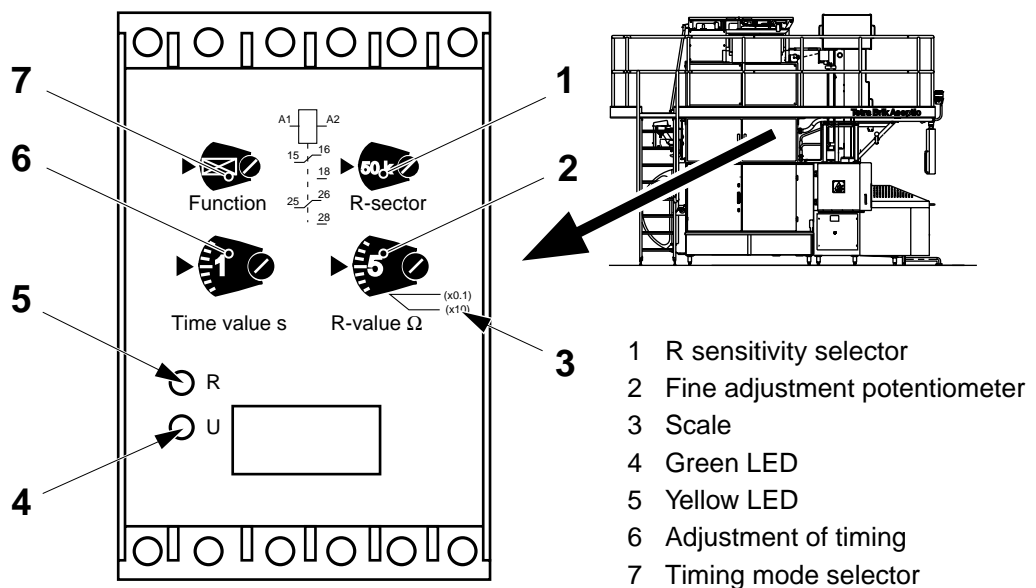
The recommended values are set on the potentiometers:

- Response sensitivity selector (1); sets the maximum value
- Fine adjustment of response sensitivity (2)
- Fine adjustment of timing (6)
- Timing mode selector (7); has two positions:
 - on **closing** of relay 
 - on **opening** of relay 

The yellow LED (5) lights up when the relay is **closed**.
 The green LED (4) lights up when the relay is in power **On** condition.

The scale (3) indicates the correction factor to use according to the R-sector in order to define the intermediate values. The displayed value on the potentiometer (2) shall be multiplied by the value in the table below, depending on the selector (1) setting.

Potentiometer (1) setting	Multiply display (2) value by
5 k	0.1
500 k	10
50 k	1









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9.7-2 Level regulator relay - set

Machine status	Power On
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Set the displays function using a screwdriver according to the following table:

	Description	Function	Time value (s)	Recommended values (k Ω)/pos.scale	R-sector
Cleaning tray level	A300		0	7 (7)	50 k
Spray tank level (max.-min.)	A301		0	7 (7)	50 k
Peroxide bath level	A302		0	7 (7)	50 k
Water separator level	A303		0	7 (7)	50 k
Bath water level	A305		0	7 (7)	50 k
Membrane leakages	A307		0	250 (25)	500 k

9.8 Stepper motor driver card (PT)

SP reference	68450-0101
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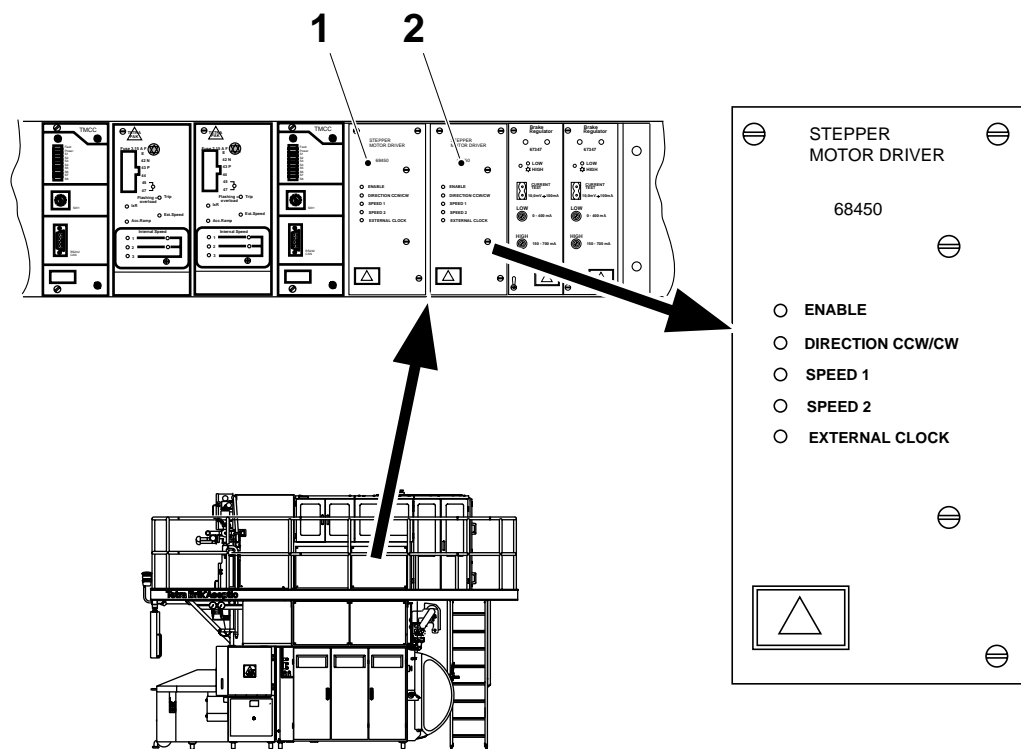
9.8-1 Stepper motor driver card (PT) - set

SP reference	68450-0101
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Set the multi switches **SW1** to **SW14** on the stepper motor driven cards, see table below, with the aid of a screw driver.

There are two stepper motor driver cards;

- the patch sealer driver card (1)
- the tab sealer driver card (2)



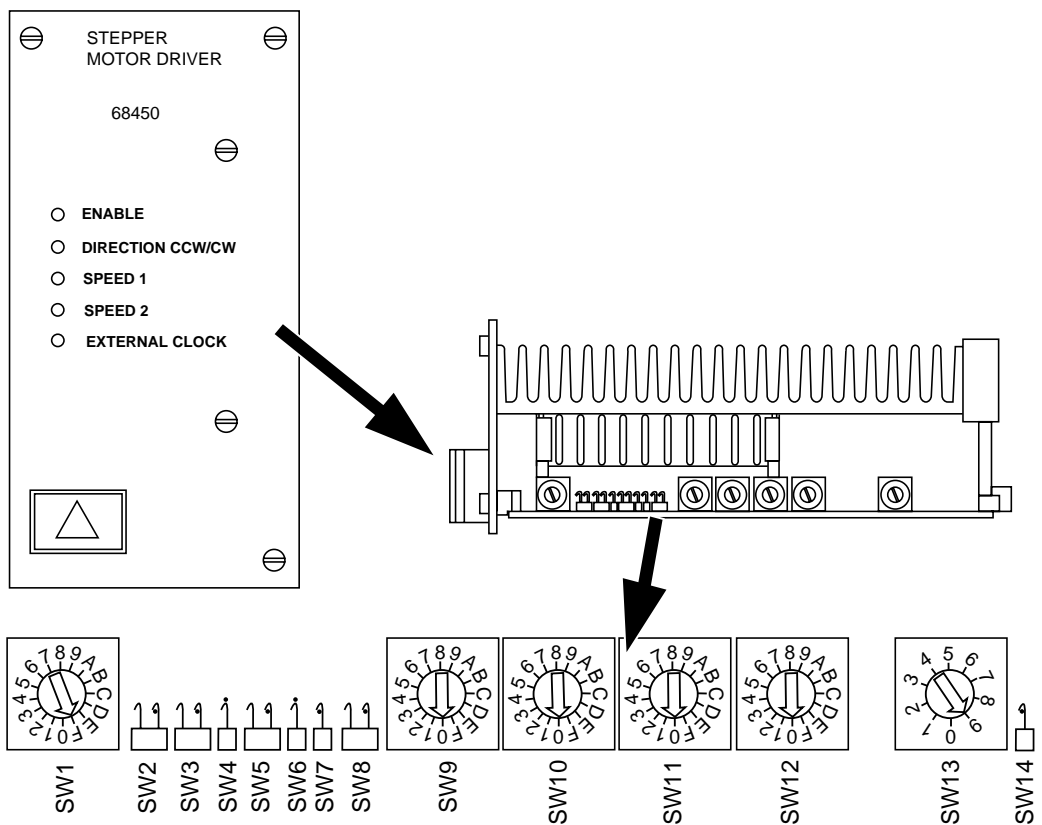
- 1 Patch pre sealer driver card
- 2 Tab sealer driver card

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Switch	Tab	Patch	Function
SW1	F	F	100% gain analog control
SW2	Right	Right	analog control in direct mode
SW3	Right	Right	analog control in direct mode
SW4	Open	Open	analog control in direct mode
SW5	Right	Right	no analog control of internal clock
SW6	Open	Open	no start/stop ramp speed 1
SW7	Closed	Closed	no start/stop ramp speed 2
SW8	Right	Right	external clock
SW9	0	0	clock rate speed 1
SW10	0	0	clock rate speed 2
SW11	0	0	clock rate speed 3
SW12	0	0	clock rate speed 4
SW13	9	9	2.5 A current
SW14	Closed	Closed	terminal 32 current input 0-20 mA



2.2B0794H08.en

9.9 Brake card (PT)

SP reference	67347-0101
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9.9-1 Brake card (PT) - set

Tools - tester	
SP reference	67347-0101

Basic setting

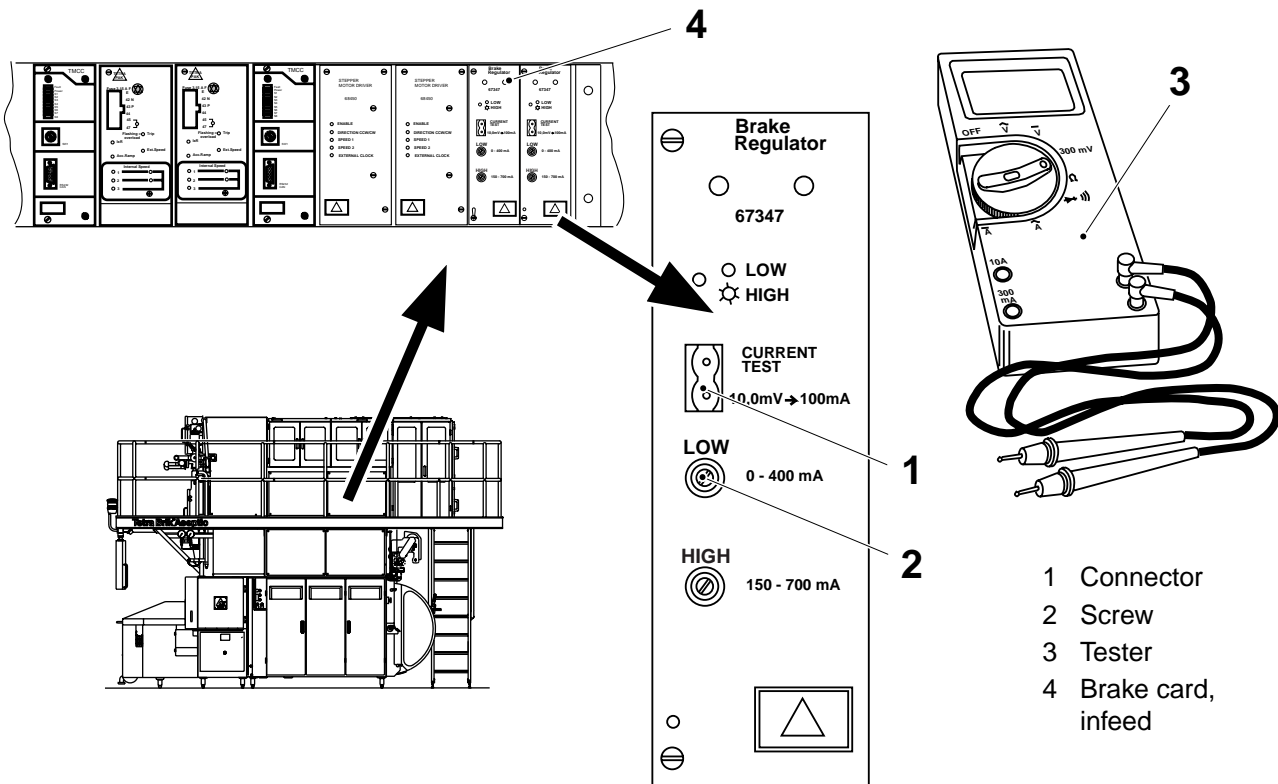
- Turn the screw (2) fully anti-clockwise.
- Switch **On** mains power.
- Connect the tester cable to the connector (1) on the brake card (4). Set the tester (3) to read mV.



Risk of serious damage to the clutch brake!

Do not set the value over 56 mA.

- Turn the screw (2) clockwise until the value shown on the tester is 30 mV.



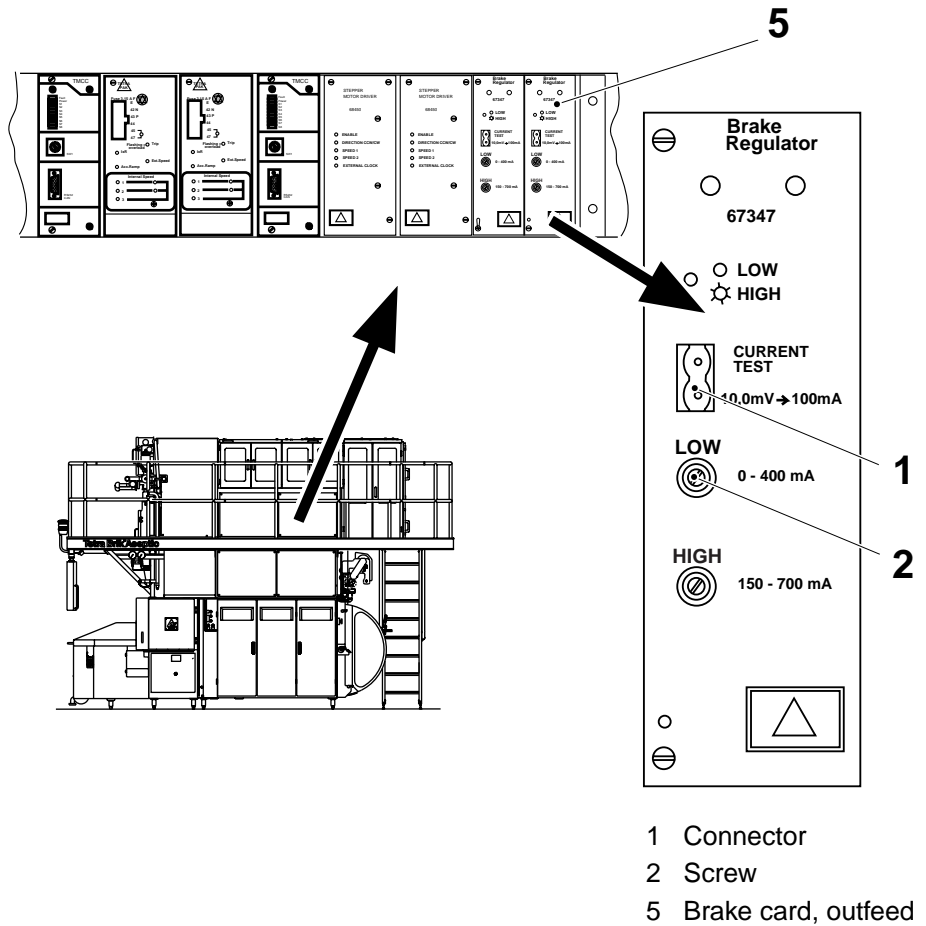
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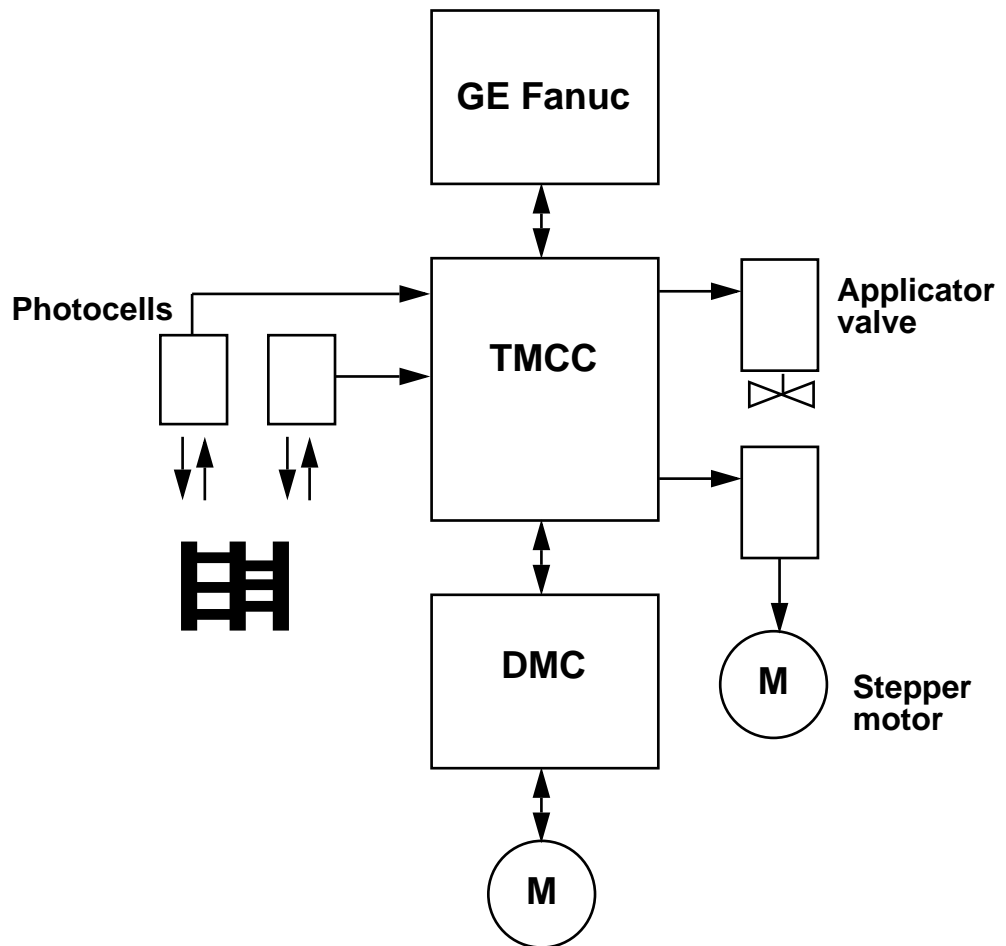
- e) Connect the tester cable to the connector (1) on the brake card (5).
- f) **Risk of serious damage to the clutch brake!**
Do not set the value over 56 mA.
Turn the screw (2) clockwise until the value shown on the tester is 15 mV.



9.10 PT19 CS

9.10-1 PT19 CS - function description

The PT19 control system can be illustrated as below, where the TMCC is the central part in the system, and all other parts in the system are connected to the TMCC.



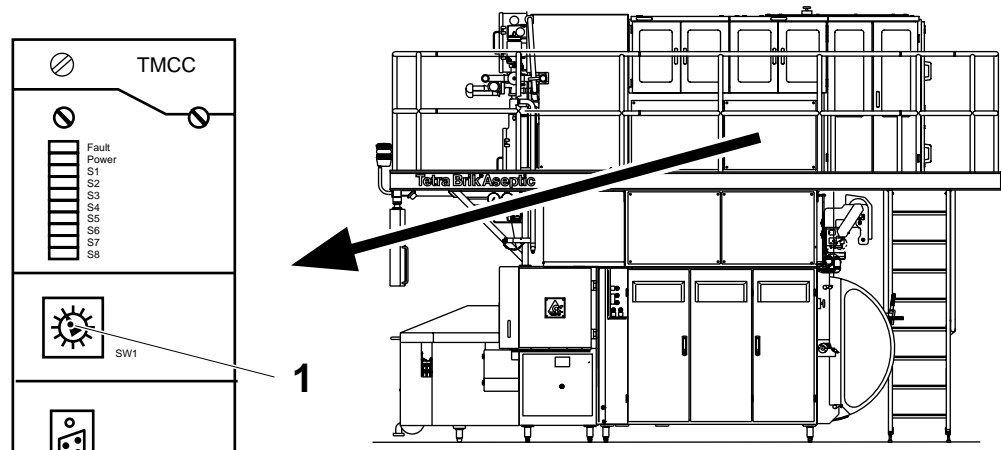
2.2E0794H10.en

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TMCC front panel switch

The front panel switch **SW1** (1) is used for selecting the package format that the machine is set up for. It defines the different station sequences. The table below show the relation between the switch position and the package format. In programming mode, the switch should be set to position **0**.



1 Switch SW1

Package	SW1
100 B	1
125 S	1
160 S	2
180 B	1
200 B	2
200 M	2
200 S	3
236 B	2
250 B	2
250 S	3
284 B	3
300 S	3
330 S	3

Note! To change volume set the selector switch to **0**. Then from **0** to the correct position within 5 seconds.

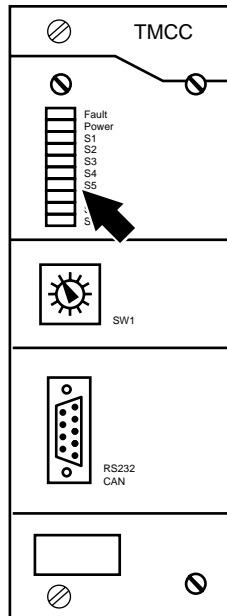
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TMCC front panel LEDs

The TMCC front panel LEDs (arrow) have the following meanings in normal production mode:



LED	Function
FAULT	Not used with this program
POWER	Power supply to the TMCC is correct
S1	Alarm bit 1: this is a 24V output to the PLC. This is the first bit of the alarm decode table*
S2	Alarm bit 2: 24V output to the PLC. This is the second bit of the alarm decode table*
S3	PT ready
S4	Servo motor move
S5	Decor OK
S6	Patch stepper motor pulse train
S7	Tab stepper motor pulse train

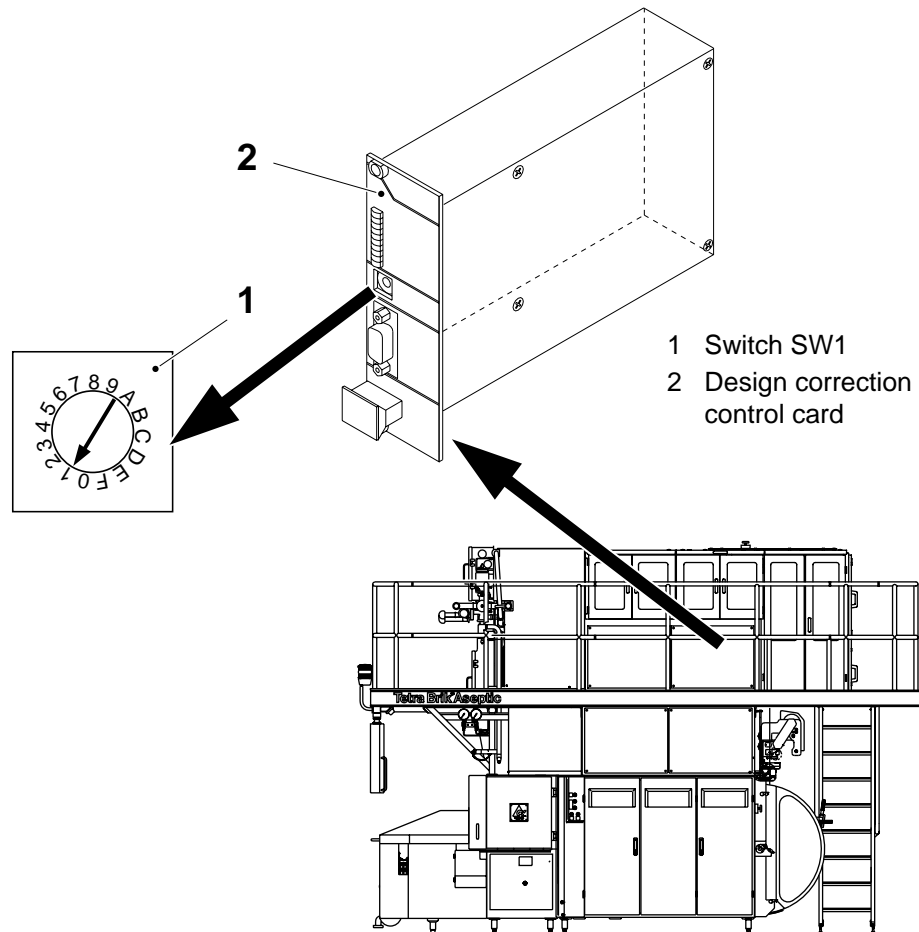
The alarm decode table below shows the most common fault signals:

	Bit 2	Bit 1
No alarm	1	1
Paper folder empty	1	0
Photocells fault	0	1
Patch missing	0	0

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9.10-2 PT19 CS - set TMCC control card

Set the front panel switch SW1 on the controller card (2) according to the package volume, see table on page 687.



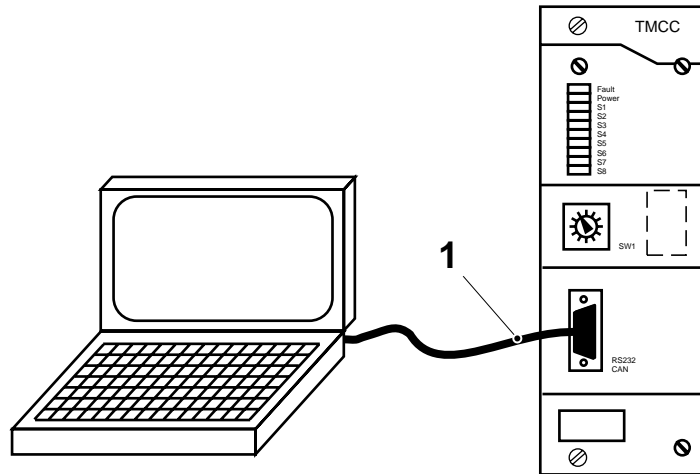
2.2B0794H10.en

9.10-3 PT19 CS - basic set

Machine status	Production
Tools - communication cable - AT compatible PC with diskette station	RS 232-C

Connect the TMCC to the PC with the communication cable (1). Necessary connections are:

PC 9-pin female	TMCC 9-pin male
2	3
3	2
5	5



1 Communication cable

Configure the program to use, for example TIT or Windows terminal, as follows:

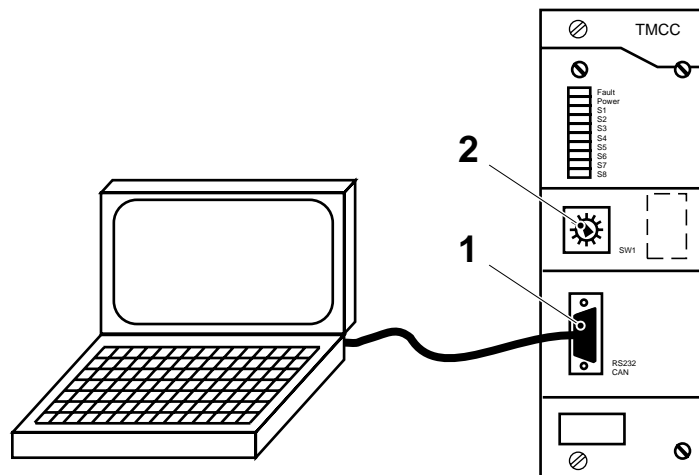
Baud rate	9600
Parity	None
Bits	8
Stop bits	1
Flow control	None

2.2E0794H10.en

9.10-4 PT19 CS - program download

Machine status	Production
Tools - communication cable - AT compatible PC with diskette station	RS 232-C

- Connect the cable between the PC and the TMCC front panel connector (1).
- Set the front panel switch **SW1** (2) to position **0**.



- TMCC connector
- Front panel switch SW1

- Insert the program diskette marked **42684-0201** into the PC diskette station.
- Enter command **A:TMCC <ENTER>** to start the download program **TMCC.EXE**.
- When the program menu appears enter the communication port in use (normally **1**).
- A directory will appear. Press **<HOME>** to select the **A:drive**.
- A list of the files on diskette A: will appear.
- Press the RH arrow key to select the **File** window.
- Select the file **D42684.201** by using the arrow keys.

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- j) When the file is selected press **F2**. The automatic download starts. The download process may be monitored in the lower part of the screen.
- k) When the new program is downloaded without errors, press the function key **F10** to exit the **TMCC.EXE** download program.

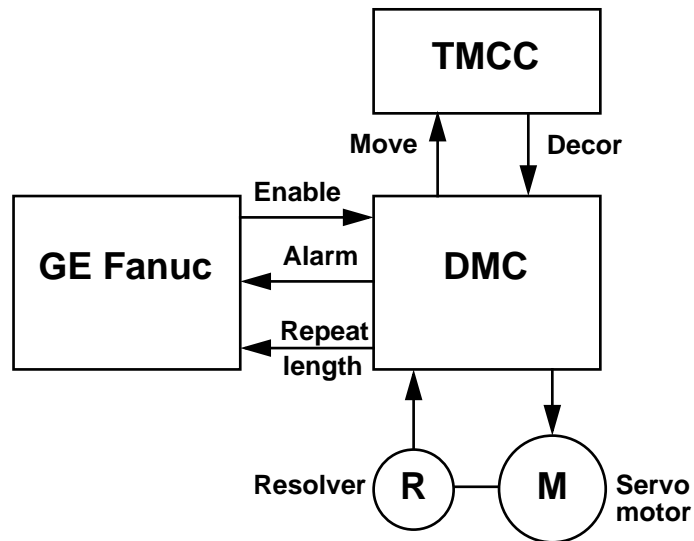
Note! It is possible to apply a label (with program number and LEDs function) to the TMCC front panel aligned with the row of LEDs.

- l) Set the TMCC front panel switch **SW1** to production position (depending on the volume) and the download procedure is finished.

9.11 PT19 MC

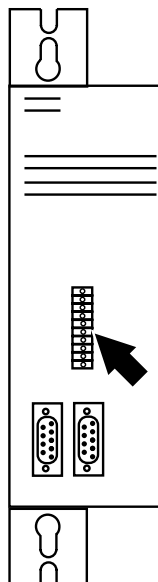
9.11-1 PT19 MC - description

The PT19 Motion Control can be illustrated as below, where the DMC gets the control signal from the TMCC and the Enable signal from the PLC. The main function of the DMC is to drive the Servo Motor regarding an established profile.



DMC front panel LEDs

The DMC front panel LEDs (arrow) have the following meaning:



Descr.	Function
1	Power On
2	CPU OK
3	Paper in position
4	SW enable
5	HD Enable
6	Not used
7	HD Fault
8	Position error
9	Resolver fault
10	Data received mismatch/Decor missing

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9.11-2 PT19 MC - basic set

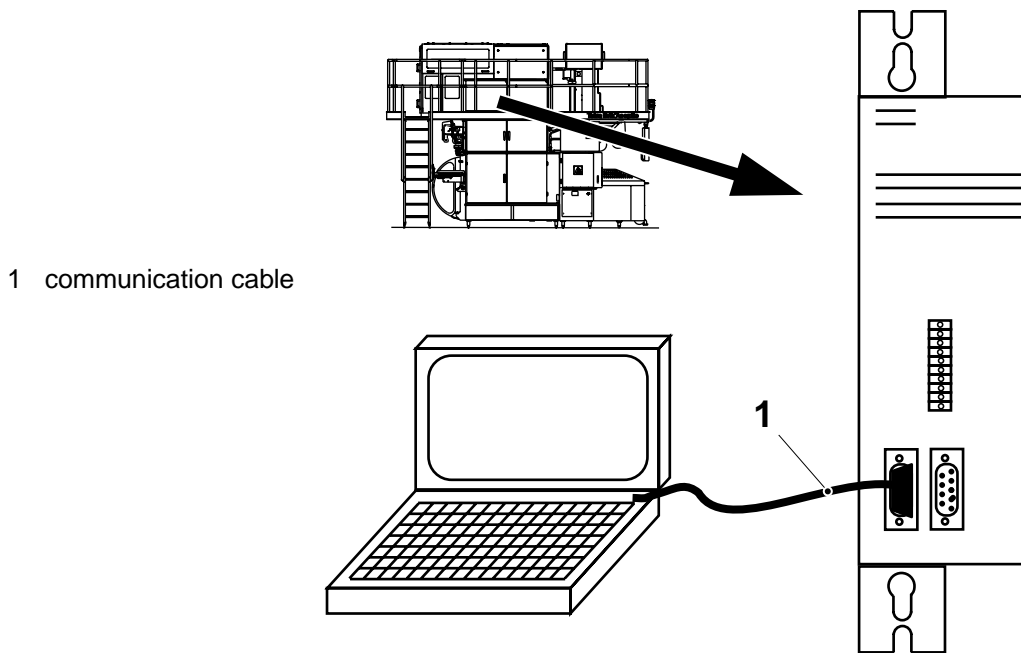
Machine status	Production
Tools - communication cable - AT compatible PC with diskette station	RS 232-C

Connect the DMC to the PC terminal with the cable (1).

Necessary connections are:

PC 9-pin female	DMC 15-pin High density male
2	3
3	2
5	7
	1 (*)

(*) shield connection



Configure the program to use, for example TIT or Windows terminal, as follows:

Baud rate	9600
Parity	None
Bits	8
Stopbits	1
Flow control	None

(Cont'd)

(Cont'd)

PC terminal communication

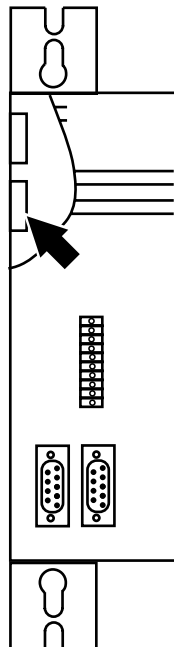
A PC with a terminal program can be used for test and service purposes. At start up through the serial interface it is possible to see the program number (R99). Each time that the repeat length is required to the PLC, the received value (R17) is send out on the screen. For positioning trouble shooting it is also possible to see different data by on line changing of the register R100 value.

R100 = 0	No display	Default state
R100 = 1	RD 1.RPos R24 REG. PosErr	Real position Movement (theoretical) Position error
R100 = 2	R31 R32 R33	Dekor position Real distance (*) Adjust distance (*)
R100 = 3	R24 R34 R33	Movement Move Average (*) Move Error (*)

(*) Value referred to the previous movement

For better performance of the system, keep R100 = 0 when there is no need of displaying data.

The PT19 MC program is resident on an EPROM (arrow). This should be programmed and assembled during machine production.

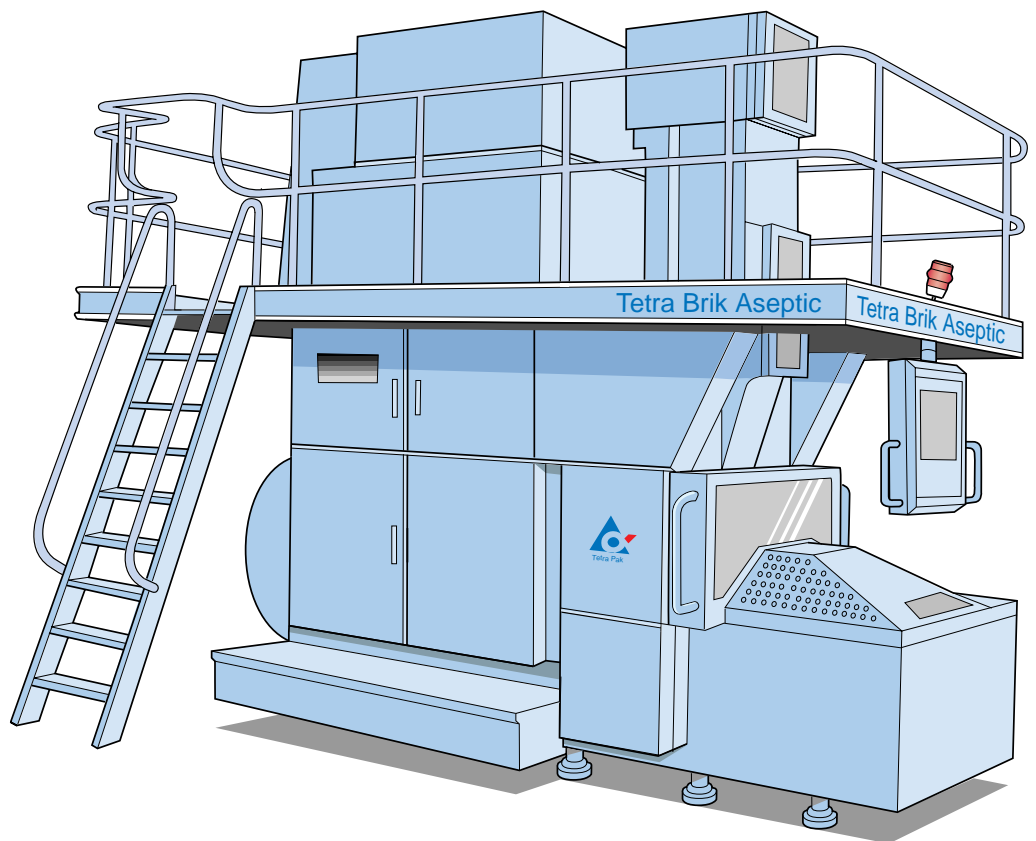


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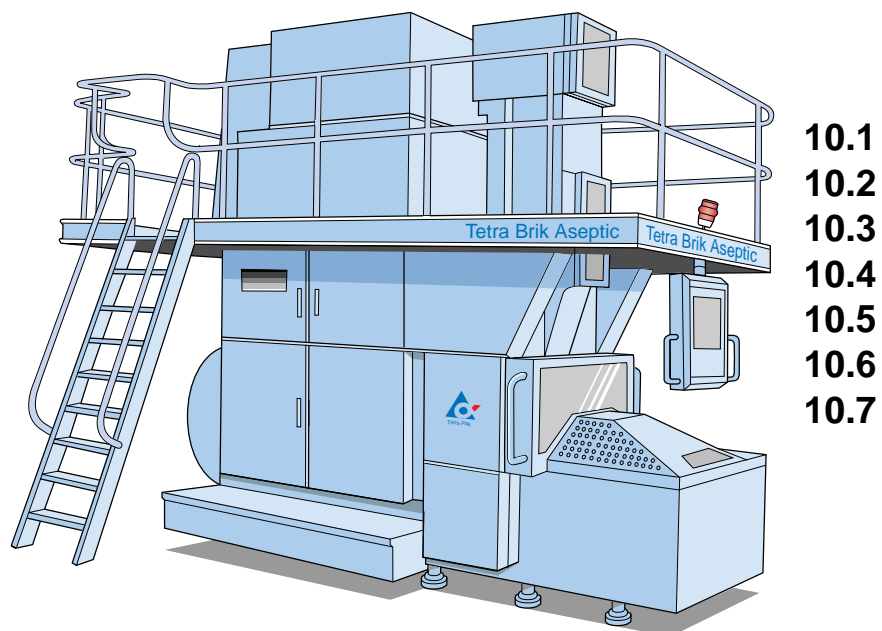
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10 General



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10-1 General - description



- 10.1 Technical data
- 10.2 Lubricants
- 10.3 Templates and tools
- 10.4 Conversion table, octal degrees
- 10.5 Passivation
- 10.6 External cleaning program
- 10.7 Safety functions

10.1 Technical data

Pressures	Unit	Value
Input air	MPa	0.60 - 0.70
Input cooling water	MPa	0.30 - 0.45
Input hot water	MPa	0.30 - 0.45
Input steam	kPa	170 – 200
Product pressure (depending on product and local conditions)	kPa (bar)	50 - 350 (0.5 - 3.5)
Product pressure, permitted variation during Production	kPa (bar)	±100 (1)
Sterile air	kPa	25 - 35
Calender rollers		
- 100 B, 125 S	MPa	0.23
- 160 S, 200 S	MPa	0.24
- 200 M, 250 S	MPa	0.26
- 180 B - 284 B, 300 S, 330 S	MPa	0.30
LS	kPa	2.7
LS short stop	kPa	2.0
Air to photocell unit and discharger	kPa	10
Jaw pressure		
- 100 B, 125 S	MPa	8.0 - 9.0
- 160 S, 200 S	MPa	8.6 - 9.6
- 200 M, 250 S	MPa	9.2 - 10.2
- 180 B - 284 B, 300 S, 330 S	MPa	10.0 - 11.0
Cutting pressure	MPa	8.0 - 9.0
Air to spray container	kPa	300
Design correction cylinders	kPa	200 - 300
Flap sealing	kPa	150 - 200
Pressure accumulator (water); cold machine, during start up	kPa (bar)	min. 50 (0.5)
Regulating valve, I/P transducer)		
- during preheating	kPa (bar)	10 (0.1)
- during sterilisation	kPa (bar)	200 (2.0)
- during cleaning	kPa (bar)	350 (3.5)
Web tension, ASU variant	MPa	0.04 - 0.06

(Cont'd)

(Cont'd)

Pressures	Unit	Value
PullTab unit		
- counter jaw	kPa (bar)	300 (3.0)
- cap sealing	kPa (bar)	300 (3.0)
- pivot rollers	kPa (bar)	400 (4.0)
- vacuum, LS strip splice	kPa (bar)	300 (3.0)
- incoming air	kPa (bar)	500 (5.0)

Pressure switches	Unit	Value
Sterile air	kPa	15
Input air	MPa	0.4

Temperatures	Unit	Value
Hot water	°C	60 - 75
Sterilisation bath, water Preheating	°C	85
Sterilisation bath, water	°C	76
Sterilisation bath, peroxide	°C	70
Air superheater	°C	360
Air superheater, Preheating	°C	400
LS sealed tube, (basic setting)	°C	260
LS sealing, (basic setting)	°C	320
Air knife	°C	125
Pre-sterilisation	°C	270
Input steam	°C	125 - 140
SA splice unit, (basic setting)	°C	190
Patch pre-sealer, PT19 variant	°C	150
Patch final-sealer, PT19 variant	°C	150
Tab sealer, PT19 variant	°C	200

(Cont'd)

(Cont'd)

Miscellaneous	Unit	Value
Cooling water, RH jaw pair	l/min	min 0.8
Cooling water, LH jaw pair	l/min	min 0.8
Hydrogen peroxide	% w/w	35
Black tape (tab/patch splice), PT19 variant	TP No.	90144-50
Black tape (missing tab/patch), PT19 variant	TP No.	90144-54
Red ink, PT19 variant	TP No.	90298-26
Noise declaration	See the Installation Manual for the concerned equipment	

10.2 Lubricants

The table below lists only a selection of lubricants with their respective designations.

Comparable lubricants from other suppliers may be selected with the aid of the lubricant specifications (document No in the table).

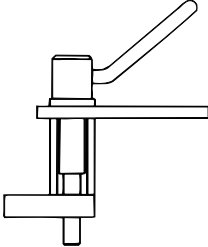
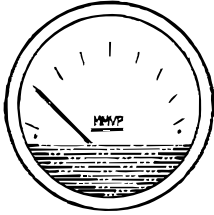
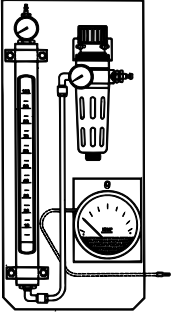

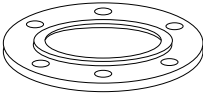
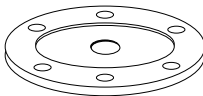
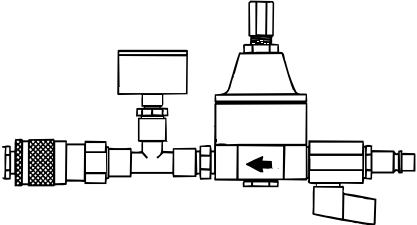
Lubricant specifications may be ordered from Technical Standardization, Tetra Pak ComTec AB, Ruben Rausings gata, S-221 86 LUND, Sweden.

Lubricant code	Document No	Material No (internal TP designation for material type)	Part No (used when ordering from Tetra Pak)	Example	
				Supplier	Product designation (9510)
A Motor oil	M 1251.122	51122-85	90 296-28	BP Esso Statoil Mobil Shell Caltex/ Texaco Optimol	Vanellus FE 10W-30 Essolube XD-3 10W-30 PowerWay D2 10W-30 Delwac 1400 Super 10W-30 Myrina TX 10W-30 Ursa LA 10W-30 Non Plus Ultra 10W-40
B High-pressure oil	M 1254.322	54322-220	90 296-73 90 296-78	BP Esso Statoil Mobil Shell Caltex/ Texaco Imperial Kluber Optimol	Energol GR-XP 220 Spartan EP 220 LoadWay EP 220 Mobilgear 630 Omala oil 220 Meropa Lubricant 220 Tribol ET 280-220 Lamora 220 Optigear 5150 VG 220
		54322-150	90 296-72	BP Esso Statoil Mobil Shell Caltex/ Texaco Imperial Kluber Optimol	Energol GR-XP 150 Spartan EP 150 LoadWay EP 150 Mobilgear 629 Omala oil 150 Meropa Lubricant 150 Tribol ET 280-150 Lamora 150 Optigear 5120 VG 150
		For use in production plant with start temperature below 5°C.			

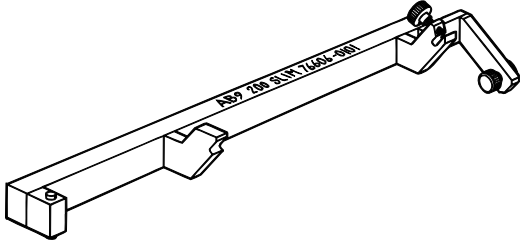
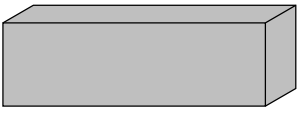
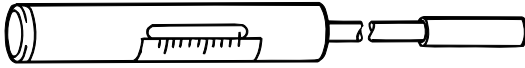
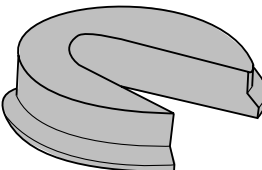
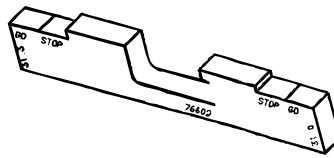
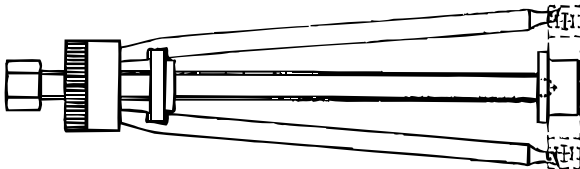
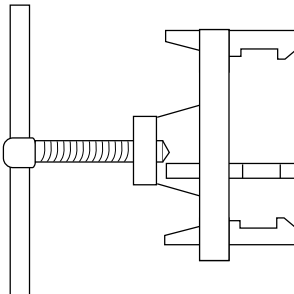
Lubricant code	Document No	Material No (internal TP designation for material type)	Part No (used when ordering from Tetra Pak)	Example	
				Supplier	Product designation (9510)
C Hydraulic oil	M 1252.122	52122-32	90 296-53	BP Esso Statoil Mobil Shell	Bartran HV 32 Univis N 32 HydraWay HV 32 DTE Oil 13 Tellus T 32
D Mist lubrication oil	M 1251-822	51822-37	90 296-80	BP Esso Statoil Mobil Shell Caltex/ Texaco	Autran GM-MP ATF Dextron TransWay DX II ATF 220 ATF Dextron II Texamatic fluid (DEXTRON II)
E Comp-ounded cylinder oil	M 1254.922	54922-460	90 296-77 90 296-2	BP Esso Statoil Mobil Shell Caltex/ Texaco	Energol AC-C460 Cyclesso TK 460 CylWay FZ 460 600W Super Cylinder Oil Valvata Oil J460 Vanguard Cylinder Oil
F Lithium grease, EP type	M 1255.115	55115-20	90 296-68	BP Esso Statoil Mobil Shell Kluber Optimol	Energrease LS EP 2 Esso MP Grease/ Beacon EP 2 UniWay EP 2 N Mobillux EP 2 Grease 1344 LiEP 2 Centoplex 2 EP Longtime PD 2
H High-pressure oil	M 1254.322	54322-320	90 296-75 90 296-76	BP Esso Statoil Mobil Shell Caltex/ Texaco Imperial Kluber Optimol	Energol GR-XP 320 Spartan EP 320 LoadWay EP 320 Mobilgear 632 Omala oil 320 Meropa Lubricant 320 Tribol ET 280-320 Lamora 320 Optigear 5180 VG 320

Lubricant code	Document No	Material No (internal TP designation for material type)	Part No (used when ordering from Tetra Pak)	Example	
				Supplier	Product designation (9510)
H High-pressure oil	M 1254.322	54322-220 For use in production plant with start temperature below 5°C.	90 296-73 90 296-78	BP Esso Statoil Mobil Shell Caltex/ Texaco Imperial Kluber Optimol	Energol GR-XP 220 Spartan EP 220 LoadWay EP 220 Mobilgear 630 Omala oil 220 Meropa Lubricant 220 Tribol ET 280-220 Lamora 220 Optigear 5150 VG 220
K Circulation oil	M 1254.942	54942-100	90 296-15	BP Esso Statoil Mobil Shell Caltex/ Texaco Imperial Kluber	Energol CS 100 Turbesso 100 TurbWay 100 DTE Oil Heavy Tellu Oil 100 Regal Oil R & O 100 Tribol 775 Crucolan 100
L Silicon grease	M 1255.322	55322-30	90 296-9	Dow Kluber	Dow Corning 7 compound Unisilikon L 250L
M Lithium grease, EP type	M 1255.112	55112-10	90 296-70	BP Esso Statoil Mobil Kluber Optimol	Energrease LS EP 1 Beacon EP 1 UniWay EP 1 Mobillux EP 1 Centoplex 1 EP Longtime PD 1
N PTFE grease	M1255.622	55622-20	90926-91	Sikema	Fluolub 175
O Lithium complex grease	M 1255.122	55122-30	90 269-61	BP Esso Statoil Imperial	Energrease LS 3 Unirex N3 UniWay HT-63 Molub-Alloy ET 860-220
P Synthetic compressor oil	M 1254.632	54632-68	90 296-54	BP Esso Statoil Mobil Shell Caltex/ Texaco	Energol RC-R68 Compressor oil 68 CompWay 68 Rarus 427 Corena Oil H68 Compressor oil VDL 68

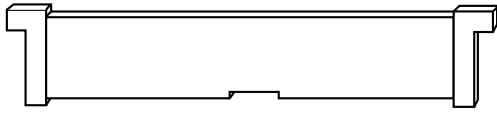

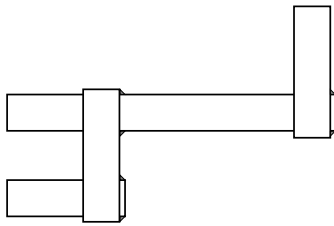
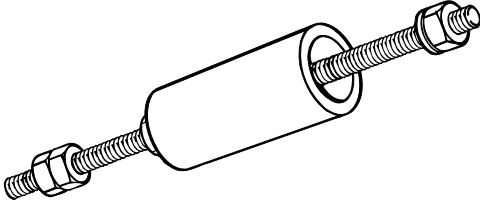
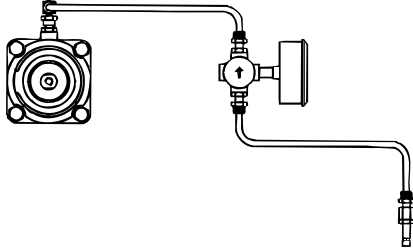

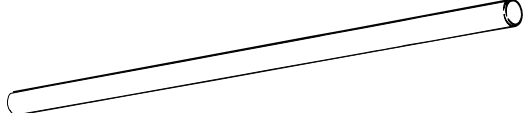
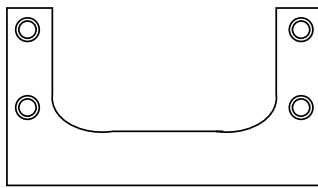
10.3 Templates and tools

Fig.	Description
	Tool TP No. 449969-101 1.2 Product valve
	Pressure gauge TP No. 90243-137 1.5 Aseptic chamber
	Test equipment TP No. 533014-101 1.5 Aseptic chamber
	Tachometer TP No. 90243-105 1.6 Bending roller (driven) 6.1 Paper magazine
	Flange TP No. 979952 1.8 Heat exchanger
	Flange TP No. 979951 1.8 Heat exchanger
	Hydrostatic test instrument TP No. 565536 1.8 Heat exchanger

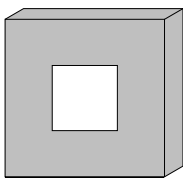
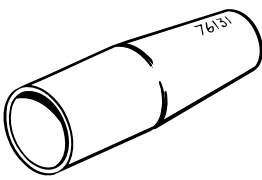
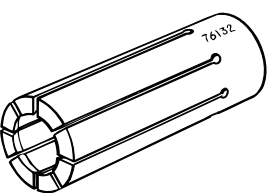
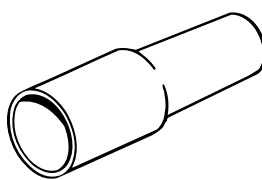
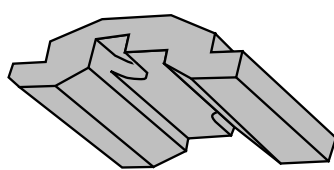
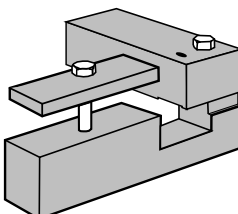
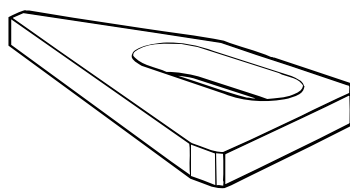
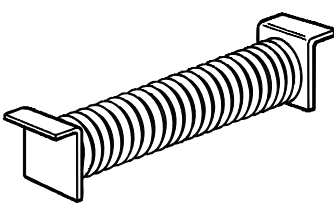
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Fig.	Description
	<p>Tool TP No. 76133-101 (100 B, 125 S) TP No. 76606-101 (160 S, 200 S) TP No. 76595-101 (180 B - 284 B, 300 S, 330 S) TP No. 590222-101 (200 M, 250 S) 1.14 Air nozzle (LS)</p>
	<p>Spirit level TP No. 90243-165 1.15 Level probe 2.2 Dating unit</p>
	<p>Dynamometer/Spring balance TP No. 74767-102 1.16 Filler pipe 3.1 Worm gear 3.8 Curve pack 5.15 Side feeder 6.6 Impulse transmitter</p>
	<p>Template TP No. 76187 (100 B, 125 S) TP No. 76188 (160 S, 200 S) TP No. 76398 (180 B - 284 B, 300 S, 330 S) TP No. 574453 (200 M, 250 S) 1.16 Filler pipe</p>
	<p>Template TP No. 76602 2.2 Dating unit</p>
	<p>Puller TP No. 76175 3.1 Worm gear</p>
	<p>Puller TP No. 979537-101 3.1 Worm gear</p>

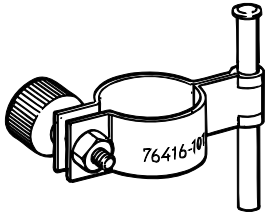
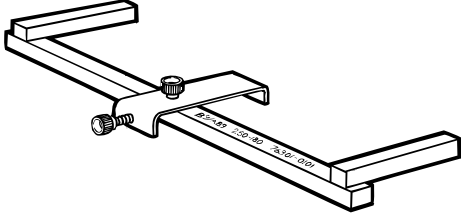
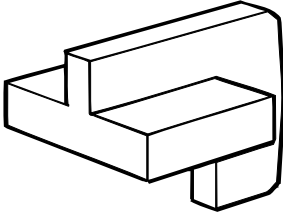
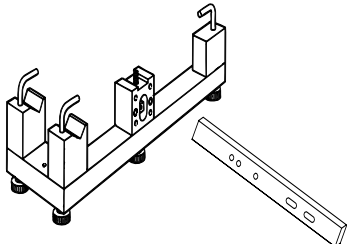
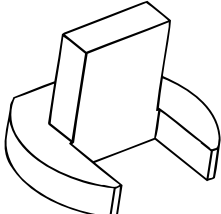
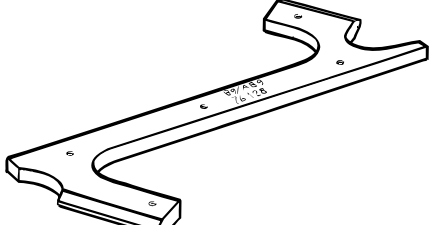
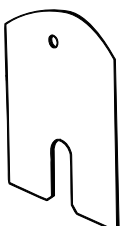
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Fig.	Description
	<p>Template TP No. 75453 3.1 Worm gear</p>
	<p>Spacer rod TP No. 75454 3.1 Worm gear</p>
	<p>Template TP No. 978421 3.1 Worm gear</p>
	<p>Extractor TP No. 77165 3.3 Link system</p>
	<p>Overload protection TP No. 563740-101 3.6 Disconnection link 5.12 Discharger</p>
	<p>Tool TP No. 77247 3.6 Disconnection link</p>
	<p>Guide pins TP No. 75451 3.8 Curve pack</p>
	<p>Template TP No. 76338 3.8 Curve pack</p>

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Fig.	Description
	<p>Spirit level TP No. 90243-163 3.8 Curve pack</p>
	<p>Assembly cone TP No. 76131 4.1 Cutting jaw</p>
	<p>Assembly tool TP No. 76132 4.1 Cutting jaw</p>
	<p>Calibration tool TP No. 78801 4.1 Cutting jaw</p>
	<p>Template TP No. 75945 4.2 Design correction device 4.7 Basic jaw system setting</p>
	<p>Template TP No. 75469-201 4.5 Volume curve piece 4.7 Basic jaw system setting</p>
	<p>Template TP No. 75931-9 (100 B, 125 S) TP No. 75931-8 (160 S) TP No. 75931-10 (200 S, 250 S) TP No. 75931-11 (200 B) TP No. 75931-5 (200 M, 250 B) TP No. 75931-12 (284 B, 300 S) TP No. 75931-14 (330 S) 4.7 Basic jaw system setting</p>
	<p>Spring TP No. 76304-101 4.7 Basic jaw system setting</p>

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Fig.	Description
	Measuring clamp TP No. 76416-101 <i>4.7 Basic jaw system setting</i>
	Template TP No. 76301-101 <i>4.7 Basic jaw system setting</i>
	Template TP No. 75943 (100 B, 125 S) TP No. 75944 (160 S, 200 S) TP No. 75939 (180 B - 284 B, 300 S, 330 S) TP No. 574455 (200 M, 250 S) <i>4.7 Basic jaw system setting</i>
	Yoke TP No. 76291-101 Ruler TP No. 76298 <i>4.7 Basic jaw system setting</i>
	Template TP No. 75937 (100 B, 125 S) TP No. 75176 (160 S, 200 S) TP No. 75936 (180 B - 200 B, 236 B, 250 B, 284 B, 300 S, 330 S) TP No. 574454 (200 M, 250 S) <i>4.7 Basic jaw system setting</i>
	Template TP No. 76128 <i>5.1 Station chain</i>
	Protection plate TP No. 79003 <i>5.3 Tension sprocket</i>

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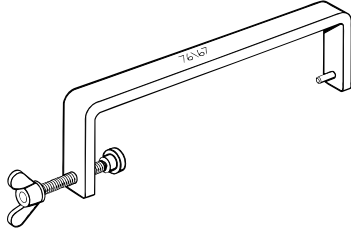
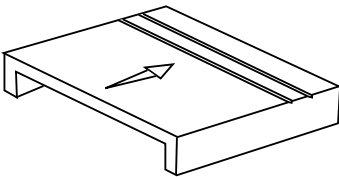
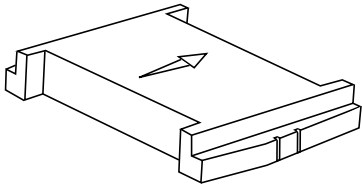
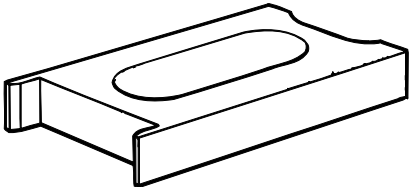
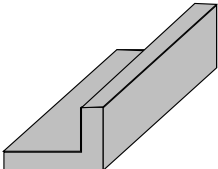
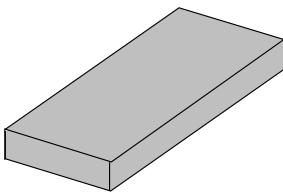
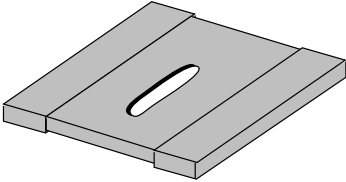
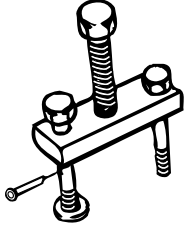
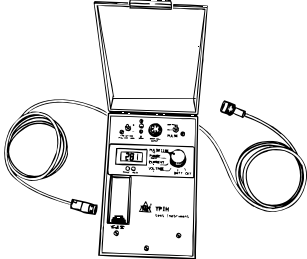
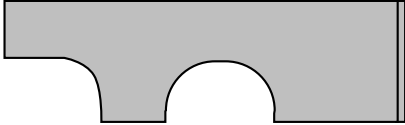
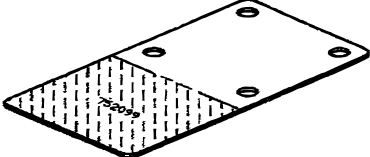
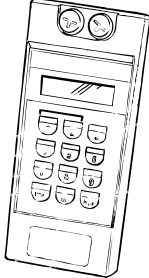
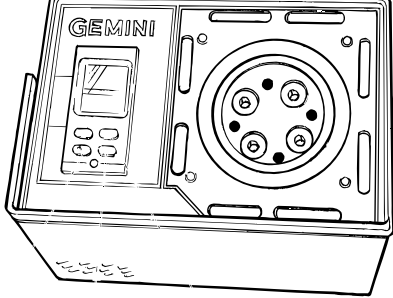
Fig.	Description
	Tool TP No. 90243-146 5.5 Pressure device 5.9 Pull-down device
	Locking clamp TP No. 76167 5.5 Pressure device 5.9 Pull-down device
	Template TP No. 590223 (100 B, 125 S) TP No. 590224 (180 B, 200 B - 284 B, 300 S, 330 S) TP No. 590245 (160 S, 200 S) TP No. 590246 (200 M, 250 S) 5.7 Element
	Template TP No. 590247 (100 B, 125 S) TP No. 590248 (180 B, 200 B - 284 B, 300 S, 330 S) TP No. 590249 (160 S, 200 S) TP No. 590250 (200 M, 250 S) 5.7 Element
	Template TP No. 76307-11 (100 B) TP No. 76307-5 (125 S) TP No. 76307-6 (160 S, 200 S) TP No. 76307-4 (180 B) TP No. 76307-3 (200 B) TP No. 76307-13 (200 M) TP No. 76307-2 (236 B) TP No. 76307-1 (250 B) TP No. 76307-9 (250 S) TP No. 76307-8 (284 B, 300 S) TP No. 76307-12 (330 S) 5.9 Pull-down device
	Template TP No. 79979 5.15 Side feeder
	Template TP No. 79980 (100 B, 125 S) TP No. 79981 (160 S, 200M, 200 S, 250 S) TP No. 79982 (180 B - 284 B, 300 S) TP No. 590512 (330 S) 5.15 Side feeder

Fig.	Description
	<p>Template TP No. 79978 <i>5.16 Discharge chute</i></p>
	<p>Extractor TP No. 74305-101 <i>6.5 Peroxide and sterile systems</i></p>
	<p>Test instrument TP No. 68462-101 <i>7.1 Strip applicator</i> <i>9.4 TPIH system</i></p>
	<p>Template TP No. 79983 <i>7.2 Strip magazine</i></p>
	<p>Sealing disc TP No. 752099 <i>10.5 Passivation</i></p>
	<p>Calibrator Micromite II TP No. 90410 338 <i>9.1-4 Temperature regulators - calibrate</i></p>
	<p>Gemini oven TP No 90410-337 <i>9.1.1-1 Thermocouple - check</i></p>

10.4 Conversion table, degrees

Oct	Dec	Mech	Oct	Dec	Mech	Oct	Dec	Mech	Oct	Dec	Mech
0	0	0.0	100	64	90.0	200	128	180.0	300	192	270.0
1	1	1.4	101	65	91.4	201	129	181.4	301	193	271.4
2	2	2.8	102	66	92.8	202	130	182.8	302	194	272.8
3	3	4.2	103	67	94.2	203	131	184.2	303	195	274.2
4	4	5.6	104	68	95.6	204	132	185.6	304	196	275.6
5	5	7.0	105	69	97.0	205	133	187.0	305	197	277.0
6	6	8.4	106	70	98.4	206	134	188.4	306	198	278.4
7	7	9.8	107	71	99.8	207	135	189.8	307	199	279.8
10	8	11.3	110	72	101.3	210	136	191.3	310	200	281.3
11	9	12.7	111	73	102.7	211	137	192.7	311	201	282.7
12	10	14.1	112	74	104.1	212	138	194.1	312	202	284.1
13	11	15.5	113	75	105.5	213	139	195.5	313	203	285.5
14	12	16.9	114	76	106.9	214	140	196.9	314	204	286.9
15	13	18.3	115	77	108.3	215	141	198.3	315	205	288.3
16	14	19.7	116	78	109.7	216	142	199.7	316	206	289.7
17	15	21.1	117	79	111.1	217	143	201.1	317	207	291.1
20	16	22.5	120	80	112.5	220	144	202.5	320	208	292.5
21	17	23.9	121	81	113.9	221	145	203.9	321	209	293.9
22	18	25.3	122	82	115.3	222	146	205.3	322	210	295.3
23	19	26.7	123	83	116.7	223	147	206.7	323	211	296.7
24	20	28.1	124	84	118.1	224	148	208.1	324	212	298.1
25	21	29.5	125	85	119.5	225	149	209.5	325	213	299.5
26	22	30.9	126	86	120.9	226	150	210.9	326	214	300.9
27	23	32.3	127	87	122.3	227	151	212.3	327	215	302.3
30	24	33.8	130	88	123.8	230	152	213.8	330	216	303.8
31	25	35.2	131	89	125.2	231	153	215.2	331	217	305.2
32	26	36.6	132	90	126.6	232	154	216.6	332	218	306.6
33	27	38.0	133	91	128.0	233	155	218.0	333	219	308.0
34	28	39.4	134	92	129.4	234	156	219.4	334	220	309.4
35	29	40.8	135	93	130.8	235	157	220.8	335	221	310.8
36	30	42.2	136	94	132.2	236	158	222.2	336	222	312.2
37	31	43.6	137	95	133.6	237	159	223.6	337	223	313.6
40	32	45.0	140	96	135.0	240	160	225.0	340	224	315.0
41	33	46.4	141	97	136.4	241	161	226.4	341	225	316.4
42	34	47.8	142	98	137.8	242	162	227.8	342	226	317.8
43	35	49.2	143	99	139.2	243	163	229.2	343	227	319.2
44	36	50.6	144	100	140.6	244	164	230.6	344	228	320.6
45	37	52.0	145	101	142.0	245	165	232.0	345	229	322.0
46	38	53.4	146	102	143.4	246	166	233.4	346	230	323.4
47	39	54.8	147	103	144.8	247	167	234.8	347	231	324.8
50	40	56.3	150	104	146.3	250	168	236.3	350	232	326.3
51	41	57.7	151	105	147.7	251	169	237.7	351	233	327.7
52	42	59.1	152	106	149.1	252	170	239.1	352	234	329.1
53	43	60.5	153	107	150.5	253	171	240.5	353	235	330.5
54	44	61.9	154	108	151.9	254	172	241.9	354	236	331.9
55	45	63.3	155	109	153.3	255	173	243.3	355	237	333.3
56	46	64.7	156	110	154.7	256	174	244.7	356	238	334.7
57	47	66.1	157	111	156.1	257	175	246.1	357	239	336.1
60	48	67.5	160	112	157.5	260	176	247.5	360	240	337.5
61	49	68.9	161	113	158.9	261	177	248.9	361	241	338.9
62	50	70.3	162	114	160.3	262	178	250.3	362	242	340.3
63	51	71.7	163	115	161.7	263	179	251.7	363	243	341.7
64	52	73.1	164	116	163.1	264	180	253.1	364	244	343.1
65	53	74.5	165	117	164.5	265	181	254.5	365	245	344.5
66	54	75.9	166	118	165.9	266	182	255.9	366	246	345.9
67	55	77.3	167	119	167.3	267	183	257.3	367	247	347.3
70	56	78.8	170	120	168.8	270	184	258.8	370	248	348.8
71	57	80.2	171	121	170.2	271	185	260.2	371	249	350.2
72	58	81.6	172	122	171.6	272	186	261.6	372	250	351.6
73	59	83.0	173	123	173.0	273	187	263.0	373	251	353.0
74	60	84.4	174	124	174.4	274	188	264.4	374	252	354.4
75	61	85.8	175	125	175.8	275	189	265.8	375	253	355.8
76	62	87.2	176	126	177.2	276	190	267.2	376	254	357.2
77	63	88.6	177	127	178.6	277	191	268.6	377	255	358.6

10.5 Passivation

Machine status	Mains power On
Tools - sealing disc - AT compatible PC	TP No. 752099
Consumables - drinking water - NaOH, 5% - HNO ₃ , 33%	approx 30 litres approx 30 litres approx 30 litres
SPC reference	648111-110V

In case the hydrogen peroxide system has been polluted, all internal surfaces in contact with the hydrogen peroxide must be treated with nitric acid in order to obtain a thin protective oxide film.

Passivation is to be carried out whenever service activities in the hydrogen peroxide system have taken place.

Preparations



Hydrogen peroxide!

Follow the *Safety precautions*.

- a) Clean the hydrogen peroxide filters and the filler filter of the hydrogen peroxide tank.
- b) Remove any dirt. If there are any stabiliser deposits on the calender rollers *1.3-1 Calender rollers - check rubber surfaces*. Change rollers as required.

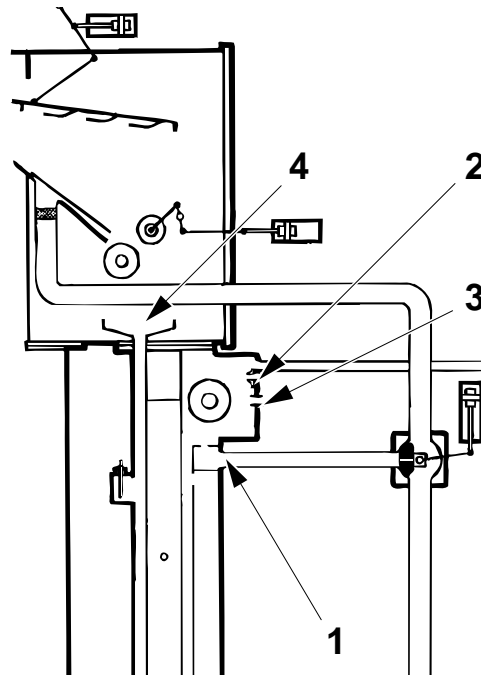
(Cont'd)

(Cont'd)

- c) Seal the suction valve pipe (1) at the connection with the bath by means of the sealing disc.

Note! In addition to the sealing disc, use packaging material and adhesive tape as sealing material.

- d) Seal the membrane valve (3), the packaging material web entry (2) into the bath and the passage (4) from the bath to the drying chamber.



- 1 Suction valve pipe
 2 Membrane valve
 3 Packaging material web entry
 4 Passage between bath and drying chamber

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Start with circulation of drinking water

- Empty the hydrogen peroxide tank and fill it with water.
- Set the circulation pump overload protection Q9, located behind the RH door of the electrical cabinet, in position **0**.
- With the aid of the PC, override output Q017 to activate the pump contactor K9.
- Override output Q067 to close the hydrogen peroxide valve.
- Override output Q078 to open the topping-up valve Y108.
- Start the circulation pump by changing the overload protection Q9 to position **1**.
- Let the water circulate for 10 minutes.
- Empty the hydrogen peroxide tank.
- Remove the overrides from outputs Q078, Q067 and Q017.

(Cont'd)

(Cont'd)**Proceed with degreasing****Chemical products!**Solvent. Follow the *Safety precautions*.

- a) Degerase the hydrogen peroxide system by means of approx 30 litres of 5% sodium hydroxide (NaOH) at room temperature.
- b) The water in the water bath (the water warming the hydrogen peroxide) **must** be at room temperature. The simplest way to achieve this is to change the water.
- c) Carry out degreasing in the same way as the circulation of water.. Degreasing is to go on for **two hours** with one minute interruption every 15 minutes.
- d) Thereafter, rinse with drinking water for at least 3 x 5 minutes, changing the water **every five** minutes. Check that the pH-value of the outcoming water is **not more** than 0.5 units higher than that of the incoming water. If required, rinse once more.

Finish with passivation**Chemical products!**Cleaning compound. Follow the *Safety precautions*.

- e) Passivate with approx 30 litres of 33% Nitric acid (HNO₃) at room temperature, in the same way as the degreasing.
- f) Rinse with drinking water until the pH value of the outcoming water is **not less** than 0.5 pH units lower than that of the incoming water. If required, rinse once more.
- g) After the last water rinse, rinse once more by circulating de-ionized or distilled water for five minutes.
- h) Remove the sealing disc and the rest of the material used for sealing purposes.
- i) Fill the tank with hydrogen peroxide. Test-run the machine and check the hydrogen peroxide concentration, see *OM*.

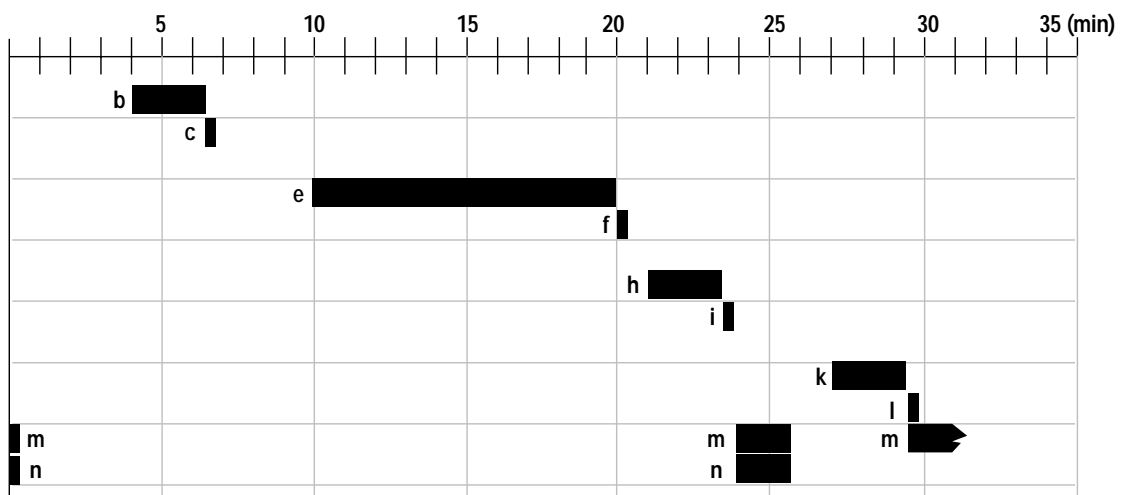
The machine is now ready for production

Caution! Check the hydrogen peroxide concentration at **intervals shorter than normal** during the first 24 hours after passivation.

10.6 External cleaning program

10.6-1 External cleaning program - diagram

Program		Quantity (l)	Approx. time (min)
a	Filling, hot water I	70 - 80	-
b	Rinsing, hot water I	-	2.3
c	Draining I	-	0.3
d	Filling, hot water II Dosing detergent	70 - 80 0.8	-
e	Cleaning	-	9.0
f	Draining II	-	0.3
g	Filling, hot water III	70 - 80	-
h	Rinsing, hot water II	-	2.3
i	Draining III	-	0.3
j	Filling, hot water IV	70 - 80	-
k	Rinsing, hot water III	-	2.3
l	Draining IV Lubrication (machine to Zero position)	-	0.3
m	Drainage valve open	-	-
n	Sprinkler open	-	-



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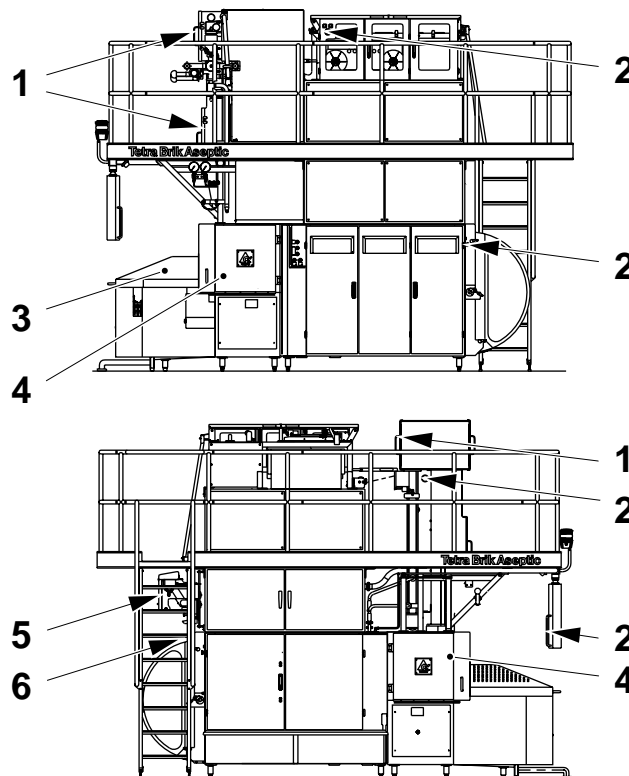
10.7 Safety functions

10.7-1 Safety functions SA variant - check

Machine status	Preheating II
----------------	---------------

Make sure that it is **not** possible to inch the machine when:

- any of the doors (1) of the aseptic chamber are opened
- any of the **Emergency stop** buttons (2) are pushed; make sure that the machine resets to **Zero** position
- the final folder cover (3) is opened
- any of the side doors (4) are opened
- the dating unit cover (5) is opened
- the paper magazine (6) is pulled out



SA variant

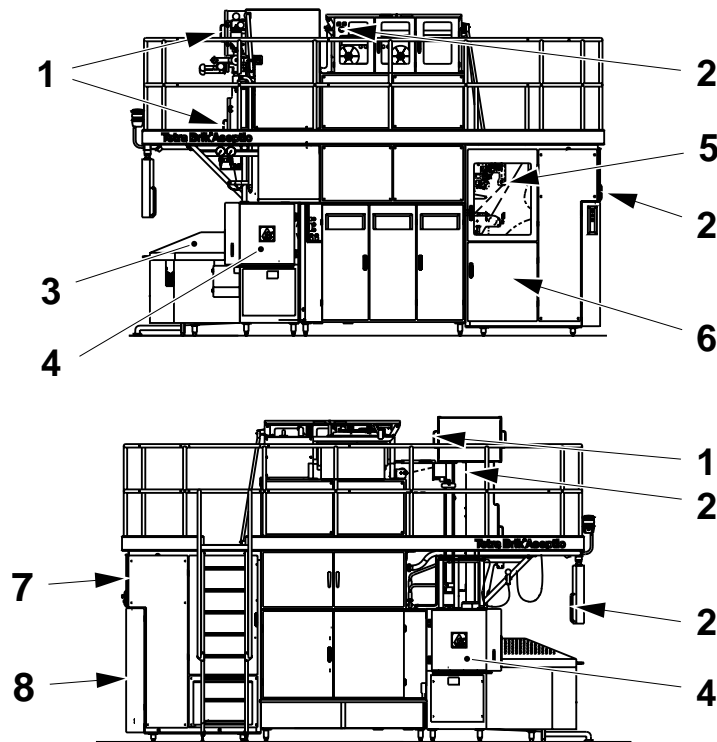
- 1 Aseptic chamber door
- 2 **Emergency stop** button
- 3 Final folder cover
- 4 Side cover
- 5 Dating unit cover
- 6 Paper magazine

10.7-2 Safety functions ASU variant - check

Machine status	Preheating II
----------------	---------------

Make sure that it is **not** possible to inch the machine when:

- any of the doors (1) of the aseptic chamber are opened
- any of the **Emergency stop** buttons (2) are pushed; make sure that the machine resets to **Zero** position
- the final folder cover (3) is opened
- any of the side doors (4) are opened
- the dating unit cover (5) is opened
- the paper magazine (6) is pulled out
- the door (3) of the web magazine is opened
- the door (7) of the ASU unit is opened
- the door (8) of the ASU unit behind the active reel is opened



ASU variant

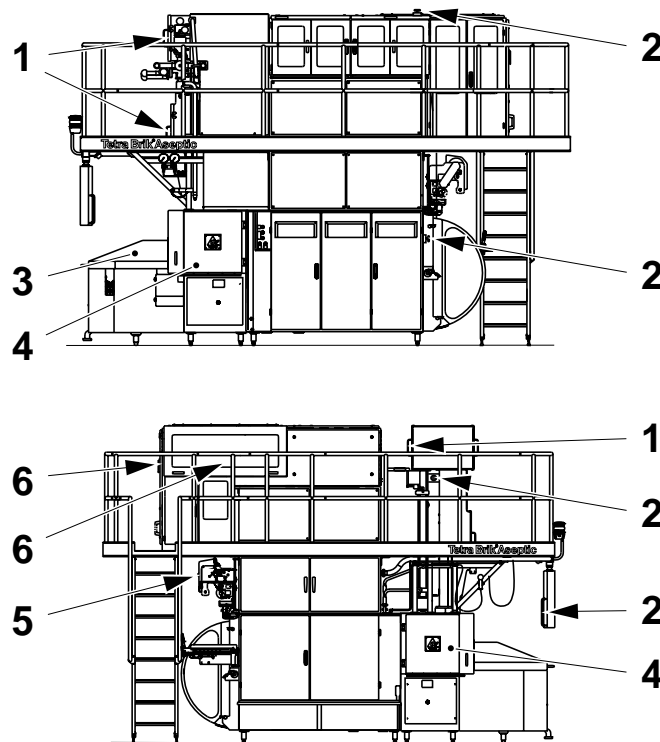
- 1 Aseptic chamber door
- 2 **Emergency stop** button
- 3 Final folder cover
- 4 Side cover
- 5 Dating unit cover
- 6 Web magazine door, ASU
- 7 ASU rear door
- 8 Packaging material reel door, ASU

10.7-3 Safety functions PT19 variant - check

Machine status	Preheating II
----------------	---------------

Make sure that it is **not** possible to inch the machine when:

- any of the doors (1) of the aseptic chamber are opened
- any of the **Emergency stop** buttons (2) are pushed; make sure that the machine resets to **Zero** position
- the final folder cover (3) is opened
- any of the side doors (4) are opened
- the dating unit cover (5) is opened
- the PullTab unit covers (6) are opened



PT19 variant

- 1 Aseptic chamber door
- 2 **Emergency stop** button
- 3 Final folder cover
- 4 Side cover
- 5 Dating unit cover
- 6 PullTab unit cover

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11 Checklist overview

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Checklist overview - description

This section of the MM, is intended for customers who do NOT use the **Tetra Pak Maintenance System (TPMS)**. The checklist overview contains all the check points for a specified machine type or equipment which are needed in order to keep the equipment in good condition. The following items can be found in the checklist:

- **MM code** – shows where you can find more information about the activity.
- **Unit/Component** – name of unit or component on which to perform the activity.
- **Activity** – action to be performed.
- **Interval (h)** – how often the activity should be performed in production hours.

Note! The checklist overview in this manual **may differ from the TPMS checklists** delivered by your local service station, due to the fact that TPMS checklists are continuously updated and adapted to local demands.

TPMS - description

The maintenance system used for equipment from Tetra Pak is called the **Tetra Pak Maintenance System (TPMS)**. If you are using TPMS, the checklists will be delivered directly from your local Tetra Pak service station.

The TPMS checklists are designed to match and keep pace with the ongoing development of new and existing equipment from Tetra Pak, and to meet the demands set by our customers for even higher efficiency and better economy.

Some of the advantages of TPMS are:

- TPMS maintains complete production lines.
- TPMS reduces down-time to a minimum each time maintenance is carried out.
- Updates of the maintenance schedule based on experience gained, improvements, modifications and specific customer requirements are issued.
- Recommendations regarding spare parts, rotation units, tools and templates, etc. are included.

The service life of each item in the equipment is predicted and all items are checked before they affect the efficiency of the equipment. This leads to different maintenance intervals for each item and the check list is unique for each maintenance occasion.

The results of the maintenance are sent back to the Tetra Pak service station. Statistics are evaluated regularly, giving a continuously updated maintenance system.

If you require further information regarding TPMS, please do not hesitate to contact your local Tetra Pak office.

11 Checklist overview

Checklist overview

MM code	Unit/Component	Activity	Interval (h)
	Pre-maintenance checks		
OM	Package- check package according to OM.		
	Check & Record	1000	
6.4.1-1	Valve plate- Sterile air pressure	Check & Record	1000
6.4.5-1	Flow meter- flows	Check & Record	1000
1.3-2	Calender roller	Check	1000
1-4	Superstructure- Pressures	Measure & Record	1000
1.6-3	Bending roller; Driven- Speed	Measure	1000
9.1-1	Temperature regulators	Check & Record	1000
10.1	Technical data- Settings	Check	1000
6.5.1-1	Compressor unit- Leaks / Vibrations	Check	1000
6.5.2-1	Peroxidetank; Pump- Noise and vibrations	Check	1000
6.8-4	Hydraulic system- Pressures	Check & Record	1000
6.8-5	Hydraulic system- Accumulator	Check	1000
1.13-2	Spray system- Leaks	Check	1000
6.5-1	Peroxide / Sterile air system- Leaks	Check	1000
	Superstructure		
1.5-1	Aseptic chamber- Sealing lip	Change	2000
1.5-2	Aseptic chamber- Support roller	Check	2000
1-3	Superstructure; Air nozzle LS / Hot air element LS SS	Check	500
1.13-1	Spray system- Filter	Clean	2000
1-2	Superstructure - Bending rollers	Check	500
1.1-2	Bath- Microswitches	Check	1000
1.1.1-2	Bath; Lower Bending roller- Bushings / Shaft	Change	2000
1.2.1-1	AP valve- Seals / Membranes	Change	1500
1.2.1-3	AP valve; C-cylinder- Seals	Change	3000
1.2.1-2	AP valve; A / B-cylinder- Seals	Change	4500
1.2.2-1	Regulator valve- Membranes	Change	500
1.1-1	Bath; Seal- Suction box	Check	2000
1.3-3	Calender roller- Bearings	Change	2000
1.3-1	Calender rollers- Rubber surfaces	Check	1000
1.7-1	Air knife	Check	2000
1.2-1	Product valve- Steam traps	Clean	1000
1.2-2	Product valve- Steam filter	Change	3000
1.16-1	Filler tube	Check	1000
1.15-2	Level probe- Filling pipe	Check	500
1.4.3-1	Upper tube support	Overhaul	3000
1.4.4-1	Movable forming ring	Overhaul	3000

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11 Checklist overview

MM code	Unit/Component	Activity	Interval (h)
1.4.5-1	Divided forming ring	Overhaul	3000
1.4.6-1	Lower forming ring	Overhaul	3000
1.17-1	Photocell unit	Check	1000
1.4.1-1	Tube support / Forming rings	Check	500
1.6-2	Bending roller; Driven- Carbon brush	Change	5000
1.6-1	Bending roller; Driven	Check	1000
1.8-1	Heat exchanger- Tightness	Check	3000
1.9-1	Heat exchanger Valve	Overhaul	6000
1.10-1	Air inlet Valve	Overhaul	6000
1.11-1	Change-over valve; Suction	Overhaul	7000
1.8.1-1	WEAC Valve	Overhaul	7000
	Machine body		
2.2.1-1	Ink unit	Overhaul	3000
	Drive unit		
3.1-8	Worm gear- Belt Tension	Check	1000
3.1-9	Worm gear- Oil	Change	9000
3.5-1	Crank- Mechanism / Microswitch	Check	1000
3.3-2	Link system- Arm Bearings	Check	1000
3.3-4	Link system; Slewing Bracket- Bearings	Check	1000
3.6-1	Disconnection link	Check	1000
3.4-1	Hold-down device- Timing belts	Check	1000
3.4-2	Hold-down device- Timing belts	Change	2000
3.3-1	Link system- Cam roller	Check	2000
3.2-1	Arm- Timing belt Rollers	Check	2000
3.4.1-1	Rocker arm- Bearing play	Check	3000
3.1-15	Worm gear; Clutch and brake gap	Check	2000
3.1-3	Worm gear; Clutch- Bearing	Change	8000
3.1-4	Worm gear- Bearing	Check	8000
3.1-6	Worm gear- V-belt	Change	2000
3.1-7	Worm gear- Timing belt	Change	8000
3.1-14	Worm gear- Oil level	Check	500
	Jaw system		
4.2-4	Design correction device	Lubricate	500
4.3-1	Pressure jaw- Pivot spring	Lubricate	500
4-2	Jaw system- Pressure jaw / Cutting jaw	Change	5000
4-3	Jaw system	Bleed	1000
4.4-1	Yoke- Sliders	Check	2000
4.4-3	Yoke- Plungers	Change	8000
4.4-4	Yoke	Overhaul	10000
4.2-1	Design correction device- Bracket / Link head	Change	2000
4.2-2	Design correction device- Cylinder	Change	1000
4.2-3	Design correction device- Condition	Check	1000
4.5-1	Volume curve piece	Check	1000

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11 Checklist overview

MM code	Unit/Component	Activity	Interval (h)
4.9-2	Volume flap	Check	1000
4.7-13	Folding flap mechanism	Check	1000
4.7-3	Jaw Gap	Check	1000
4.7-5	Non parallelity in movement	Check	1000
4.7-19	Catch lifter cams and rollers- Setting	Check	1000
4.3-3	Catch Pivot spring- Setting	Check	1000
4.3-4	Pressure jaw- Catch Clearance / Catch	Check	500
	Final Folder		
5.12-1	Discharger- Carriers	Check	1000
5.13-1	Cleaning system- Rotors / Nozzles / Pump	Check	1000
5.4-1	Indexing unit- Oil	Change	6000
5.12-2	Discharger- Oil	Change	6000
5.6-1	Worm gear- Oil	Change	6000
5-2	Final folder- Oil levels	Check	1000
5.1-1	Station chain	Change	6000
5.1-2	Station chain- Shafts	Turn	3000
5.11-1	Cantilever- Oil brushes	Change	6000
5.2-1	Drive wheel- Sprocket Surface	Check	6000
5.3-1	Tension sprocket- Sprocket Surface / Bearing	Check	6000
5.10-1	Guide- Rails / Plates	Check	6000
5.4-2	Indexing unit- Cut out torque	Check & Record	6000
5.8-1	Frame	Change	6000
5.5-1	Pressure device- Hydraulics	Overhaul	3000
5.9-1	Pull-down device- Hydraulics	Overhaul	3000
5-3	Final folder; Pressure device / Pull-down device	Bleed	1000
5.7-2	Element- Connections	Check	3000
5.12-3	Discharger- Duplex chain	Change	3000
5.12-6	Discharger- Bushings / Bearings	Overhaul	3000
5.17-1	Covering panel- Slider / Bearings	Change	3000
5.12-5	Discharger- Overload protection	Set	1000
5.17-2	Covering panel	Check	3000
5.15-1	Side feeder- Timing belts	Check	3000
5.15-2	Side feeder; Overload protection- Setting	Check	1000
	Service unit		
6.8-1	Hydraulic system- Oil tank	Clean	4000
6.8-2	Hydraulic system- Oil / Filter	Change	1000
6.8-3	Hydraulic system- Oil level / Filter Indicator	Check	250
6.6-2	Impulse transmitter- Timing belt	Change	8000
6.6-1	Impulse transmitter- Valve Clearance	Check	500
6.4.3-1	Air inlet group- Filter insert	Change	1000
6.4.1-2	Valve plate- Photocell Air filters	Check	500
6.4.2-1	Pressure regulator Group- Photocell Air pressure	Check	500

2.2B0794Z00.en

11 Checklist overview

MM code	Unit/Component	Activity	Interval (h)
6.5.5-1	Water circulation- Pressure	Check	1000
6.4.4-1	Cooling Water Valves- Water filter	Clean	1000
6.4.1-3	Valve plate- Spray Filter cartridge	Change	2000
6.1-2	Paper magazine- Function	Check	2000
6.1-1	Paper magazine- Bending rollers	Check	1000
6.1.2-1	Paper magazine; Bending roller; Motor- Carbon brush	Change	5000
6.1.2-2	Paper magazine; Bending roller- Belt	Change	2000
6.1.1-1	Brake	Check	1000
6.2-1	Cover- Bearing Block	Check	2500
6.3.1-1	Splicing device- Teflon tape / Teflon cloth	Check	1000
6.7-1	Central lubrication- Oil tank	Clean	5000
6.7-2	Central lubrication- Pressure	Check	1000
6.9-1	Paper reel trolley- Function	Check	500
6.6.1-1	Curve pack- Bearings	Check	7000
6.5.2-2	Peroxide tank- Pump	Change	2000
6.5-2	Peroxide / Sterile system- Safety lids	Check	1000
6.5.4-1	Scrubber- Filter	Delime	1000
6.5.3-1	Separator- Float	Check	3000
6.5.3-2	Separator- Filter	Clean	3000
6.5.6-1	Peroxide Cabinet- Function	Check	1000
6.10-3	Brake Cassette Unit- Ball bearing	Change	16000
6.10.2-1	Paper guide Plate- Wheel / Ball bearing	Change	16000
	Strip applicator (not valid for machines equipped with PullTab)		
7.1.3-1	Strip guide- Guide wheel / Bushings	Check	3000
7.2.4-1	Brake arm- Function	Check	1000
7.1.2-1	Pressure roller- Condition / Spring Force	Check	500
7.5-1	Bending rollers- Rotation	Check	2000
7.2.3-1	Splicing device- Function	Check	500
7.1.1-1	Splicing detector- Function	Check	500
7.2.1-1	Mounting sheet	Check	500
7.3-1	Splicing magazine	Check	500
	Electrical equipment		
9.4.1-1	IMPORTANT! Read SAFETY instructions in the MM: TPIH; Cables- Condition	Check	4000
9.4.2-1	TPIH Impedance transformer	Check	4000
9.3.1-1	PLC Power supply unit- Battery	Check	2000
9.2-1	Air cooler- Function	Check	1000
	Start-Up checks		
10.7-1	Safety functions SA variant	Check	1000
10.7-2	Safety functions ASU variant	Check	1000
10.7-3	Safety functions PT19 variant	Check	1000
7.1.4-1	Strip applicator- Inductor	Check	1000
2.1-1	Connection box- Sterile air pressure Switch	Check	1000

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11 Checklist overview

After-maintenance			
MM code	Unit/Component	Activity	Interval (h)
1.19-2	Filling system- first package.	Check	1000
	Package- check package according to OM.	Check	1000
1.12-1	Hot air element LS SS	Check	1000
6.4.1-1	Valve plate- Sterile air pressure	Check & Record	1000
1.3-2	Calender roller- Function	Check	1000
1-5	Superstructure- Pressures	Check	1000
1.14-2	LS nozzle- Pressure	Check & Record	1000
1.6-5	Bending roller- Speed	Check	1000
1.19-3	Filling system- Parameters	Check	1000
9.4.5-1	TPIH Power settings	Check & Record	1000
7.4.1-1	Key Safety switches- Function	Check	1000
	If pre-maintenance checks have not been done-do them now	Check	1000

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