DS500E & DS1000E – Mechanical maintenance

Repair

The repair/replacement of the following parts can be made by the owners qualified personnel:

- Lubrication of rack.
- Lubrication of linear block
- Relubrication of Electro cylinder.
- Cleaning / replacement of filters in dehumidifier.
- Replacement of cabinet air filters.
- Replacement of pneumatic filter cartridges.
- Replacement of filter in process unit.
- Replacement of CO_2 filter.
- Replacement of ball valve.
- Replacement of piston head.
- Replacement of seal unit.
- Replacement of toothed wheel.
- Replacement of toothed rack.
- Replacement of linear block.
- Replacement of linear rail.

When making repair/replacements, use only original Cold Jet spare parts

Terms of warranty

In order to comply with the terms of warranty, and for other safety reasons, repairs other than those stated above require relevant tools and equipment and therefore must always be made by either a Cold Jet technician or by the owners qualified personnel who has been trained by Cold Jet in the repair and maintenance of Cold Jet dry ice blasting and dry ice production machines and accessories. Beyond the necessary knowledge, the person concerned must have appropriate tools and equipment, as well as the auxiliary materials required, at his disposal.

The liability of the manufacturer under the terms of the CE endorsement as regards safety may become **invalid:**

- If repairs are made using non- Cold Jet spare parts.
- If repairs are made by unqualified personnel.
- If repairs are unsatisfactory due to lack of relevant tools and equipment.

In such cases, the liability of the manufacturer will be solely confined to any manufacturing faults/errors made prior to the machine being delivered and before repairs/replacements have been made.

Table for mechanical maintenance

Inspections to be carried out every week:

1. Inspect for CO_2 leakages, check hoses, fittings, valves, and connections for leakages. Reseal if necessary.
2. Inspect the racks for lubrication, lubricate if necessary.

Cold Jet recommends the owner to have a spare part package in stock, so repairs can be made quickly and with little loss of production time.

- Spare part package standard Cold Jet article no. 81729-001
- Spare part package extended Cold Jet article no. 81729-002

Cold Jet recommends the owner to these specials tool for the machine.

- 1 pc of piston guide, service procedure (CJ P/N 3Z0158)
- 1 pc of piston lift, service procedure (CJ P/N 3Z0183)
- 1 pc of lifting tool, process unit, DS1000E (CJ P/N 2Z0048)

The table below includes all service intervals from 0 hours to 20000 hours, 1 to 9 million cycles and from 12 to 120 months. Service must be performed at whatever values are reached first. For each service interval, the procedures to perform are listed along with Cold Jet article numbers for the service kits needed at that specific service. A service may require more than one service kit.

Service interval Hours/Cycles (million)/Months	Procedure no.	Cold Jet service kit(s) article numbers for DS1000E	Cold Jet service kit(s) article numbers for DS500E
2000 hours / 1 million cycles / 12 months	1, 2, 3	81726-001	81726-001
4000 hours / 2 million cycles / 24 months	1, 2, 3, 4, 5, 6, 7, 8,9	81726-001 81727-001	81726-001 81728-001
6000 hours / 3 million cycles / 36 months	1, 2, 3	81726-001	81726-001
8000 hours / 4 million cycles / 48 months	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,15	81726-001 81727-001 81727-002	81726-001 81728-001 81728-002
10000 hours / 5 million cycles / 60 months	1, 2, 3	81726-001	81726-001
12000 hours / 6 million cycles / 72 months	1, 2, 3, 4, 5, 6, 7, 8, 9	81726-001 81727-001	81726-001 81728-001
14000 hours / 7 million cycles / 84 months	1, 2, 3	81726-001	81726-001
16000 hours / 8 million cycles / 96 months	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	81726-001 81727-001 81727-002	81726-001 81728-001 81728-002
18000 hours / 9 million cycles / 108 months	1, 2, 3	81726-001	81726-001
20000 hours / 10 million cycles / 120 months	1, 2, 3, 4, 5, 6, 7, 8, 9	81726-001 81727-001	81726-001 81728-001

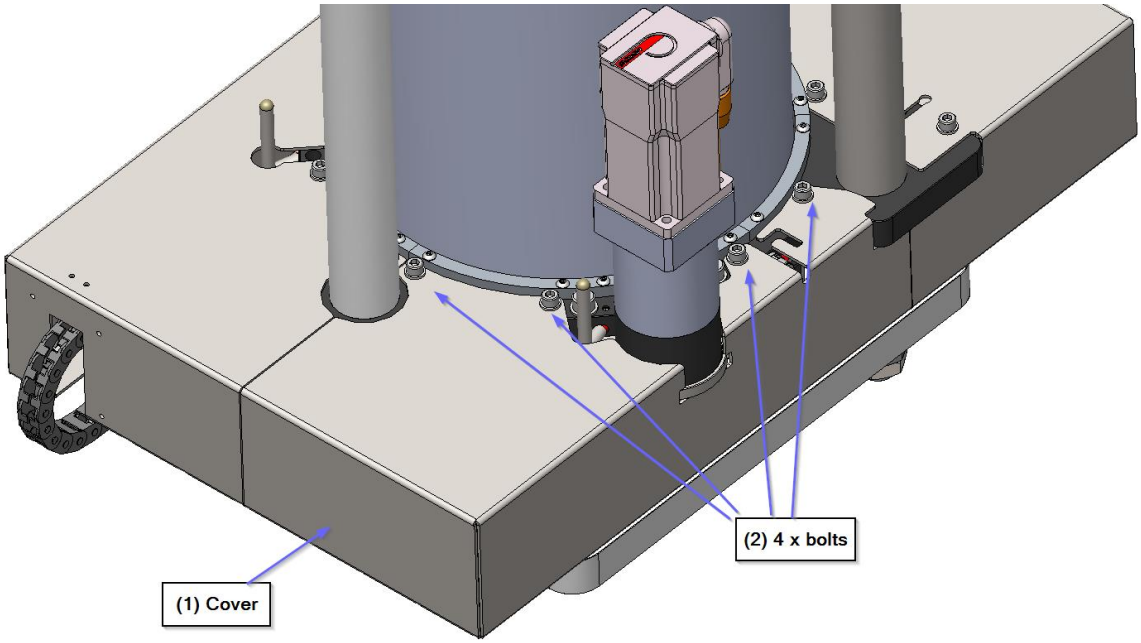
Procedures for maintenance

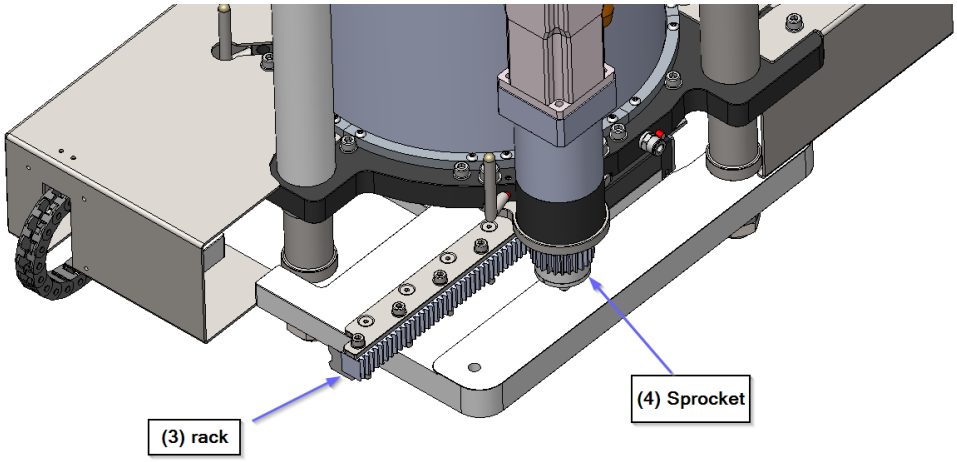
This table includes all relevant procedures for normal maintenance and repair.

After locating procedure numbers in the service intervals, the relevant procedure numbers can be found in the table below which leads to detailed procedures.

1. Procedure for lubricating rack.

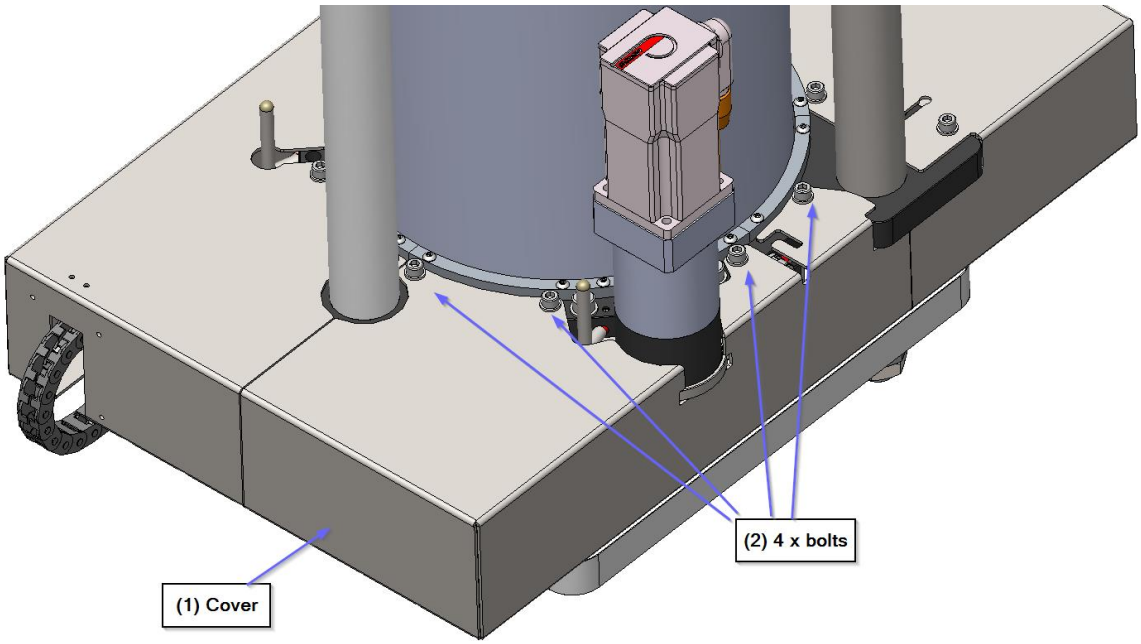
1. Perform lock-out tag-out of the machine before performing work.
2. Remove the cover on the process unit (1), by unscrewing 4 x bolts (2) shown in the image below.
3. Clean the rack and the sprocket.
4. Lubricate the rack with Aeroshell 7.
5. Check the function of the base plate by moving it back and forth.
6. Screw the cover back on process unit.
7. Do the above points on the remaining process units.

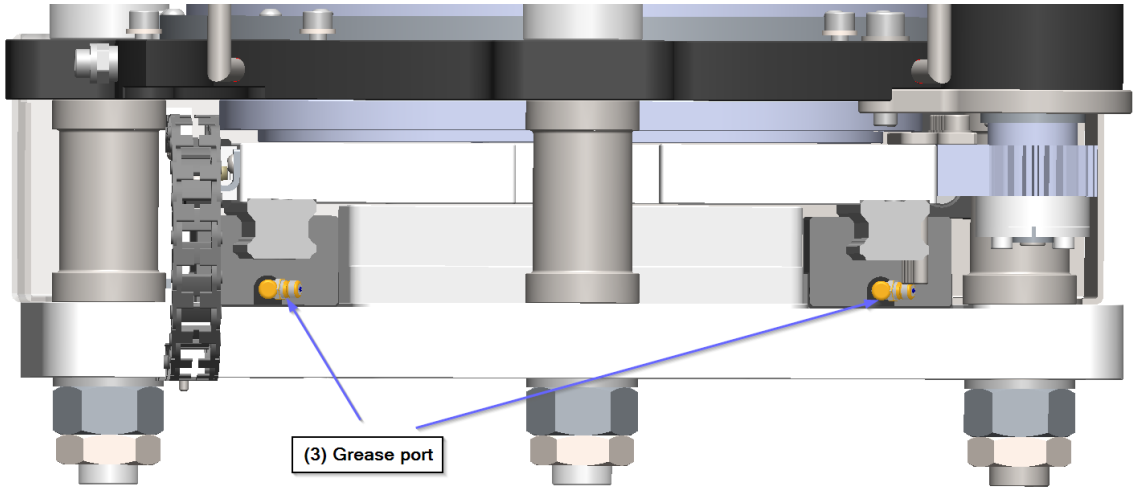




2. Procedure for lubricating of linear block.

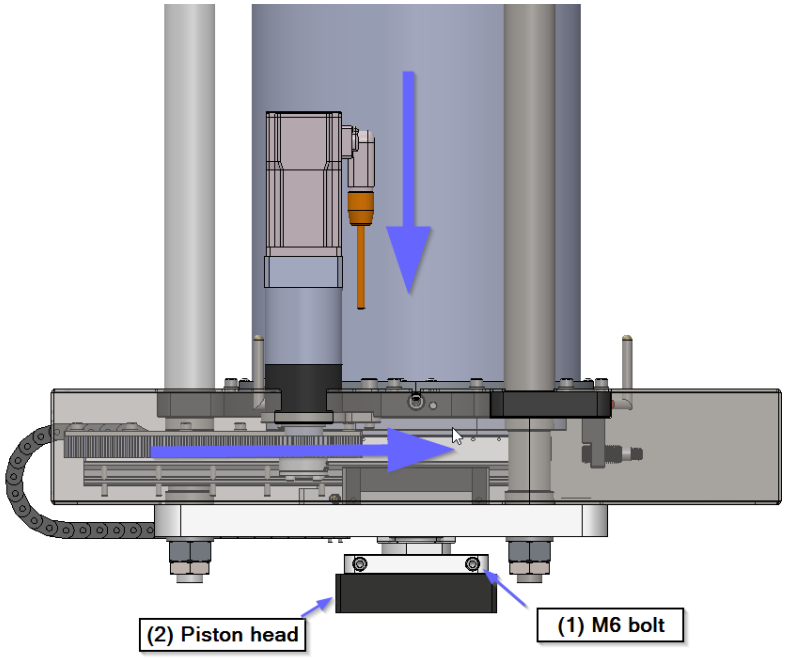
1. Perform lock-out tag-out of the machine before performing work.
2. Remove the cover on the process unit (1), by unscrewing 7 x bolts (2) shown in the image below.
3. Use a grease gun on the grease port to lubricate the linear block. Added grease to it come out of the block.
4. Lubricate the linear block with Aeroshell 7.
5. Check the function of the base plate by moving it back and forth.
6. Screw the cover back on process unit.
7. Do the above points on the remaining process units.





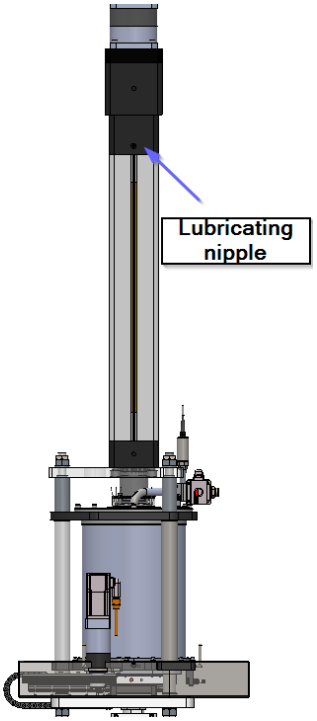
3. Procedure for relubrication of the Electro Cylinder

1. Perform lock-out tag-out of the machine before performing work.
2. Move the backplate in manual mode, so the eject opening is below the piston.
3. Move the cylinder out of the process unit.
4. Unscrew the two M6 bolts (1) and take the Piston head (2) off the cylinder.

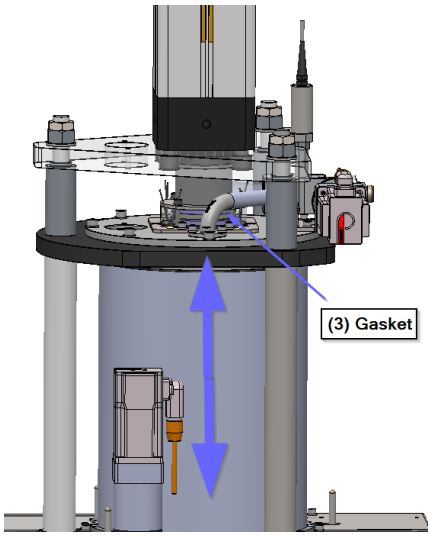


5. Move the cylinder to position 0,5 mm (0.2 in).
6. Lubricate the cylinder by placing the pipe perpendicular onto the lubricating nipple and press.

7. Use only 17 grams (0.04 pound) of Klüber NBU15 (CJ 4W0324).



8. For optimum distribution of the lubricant, a lubrication run must be performed after each lubrication procedure. To do this, move the screw nut once over the entire working stroke. **OBS** when the cylinder is moving through the two gaskets (3) not to damage them.



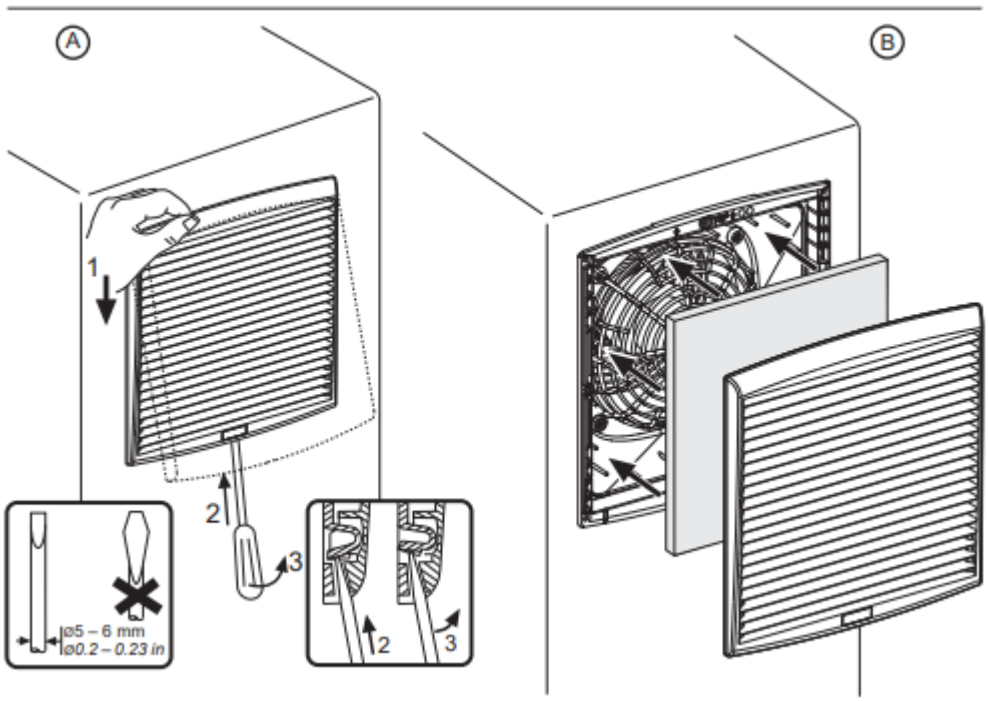
9. Move the cylinder out of the process unit.
10. Mount the piston head and tighten the two M6 bolts (2) to 8 Nm (5,9 ft-lbs).
11. Use the tool (CJ P/N 3Z0158) to make sure the press head gets back into the process unit without damaging it.

4. Replacement of Filters in dehumidifier

1. Perform lock-out tag-out procedure before performing work.
2. Locate the de-humidifier unit.
3. Pull out the filter holder (1).
4. Open the filter holder (2) and replace the filter.
5. Close the filter holder and insert it into the de-humidifier.
6. Push the filter frame down.
7. Pull the filter holder outwards and remove it from the unit.
8. Remove the old filter.
9. Insert the new filter.
10. Close the cover.

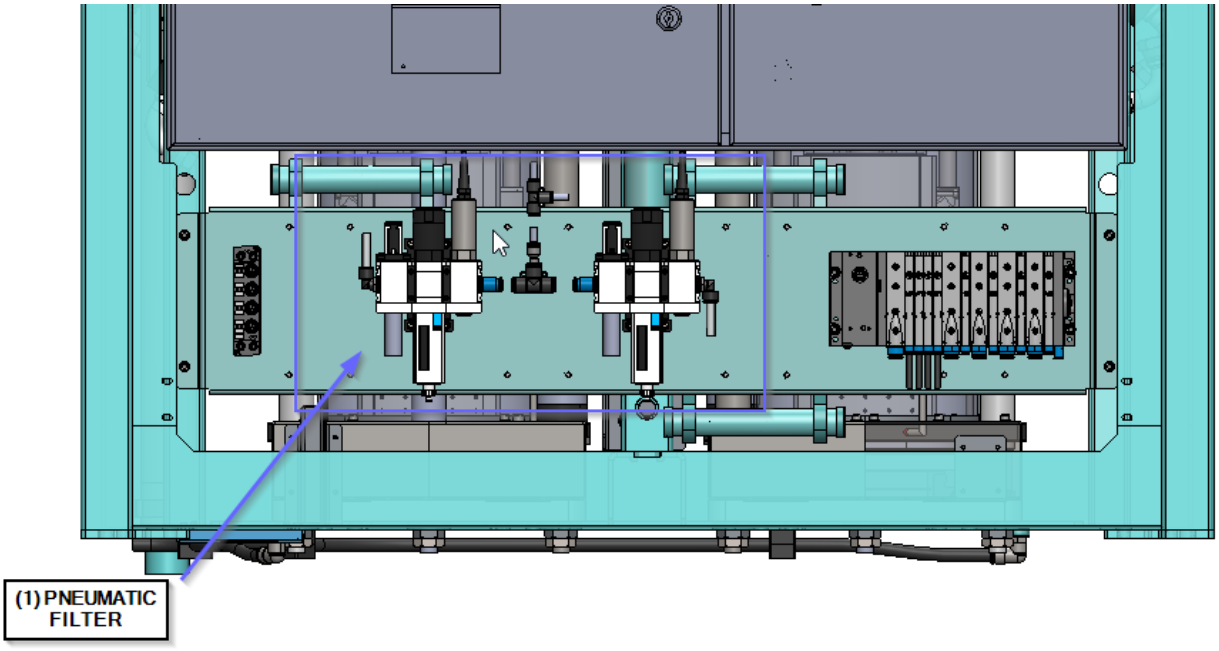
5. Replacement of cabinet fan filters

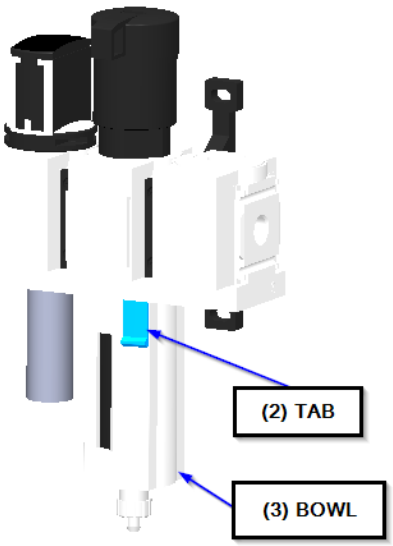
1. Locate the two fans and three outlets on the cabinet.
2. The procedure is the same for each of the five filters to be replaced.
3. Push down on the grate (1).
4. Insert a 5-6mm straight screwdriver into the slot at the bottom of the grate and push up on the tab (2).
5. Lever the screwdriver out (3) and remove the grate.
6. Replace the filter and snap the grate into place.



6. Replacement of pneumatic filter cartridge

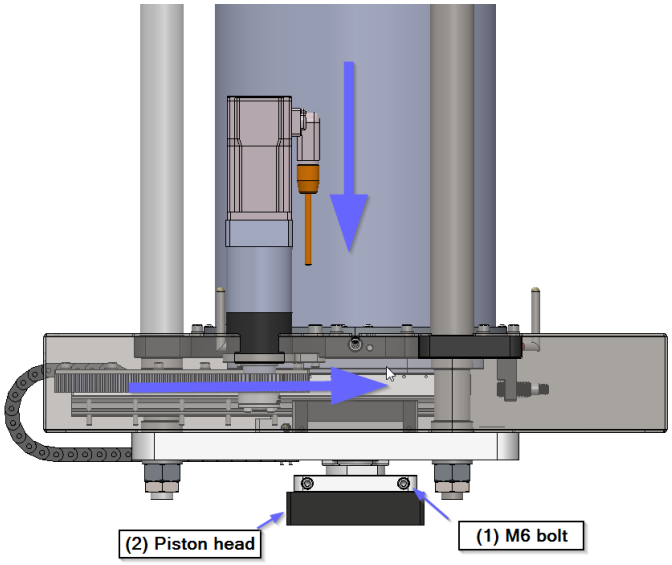
1. Perform lock-out tag-out procedure.
2. Locate the pneumatic filters (1).
3. Pull down on the tap (2).
4. Remove the bowl (3).
5. Remove and discard the old filter.
6. Insert a new filter in the bowl.
7. Re-install the bowl.



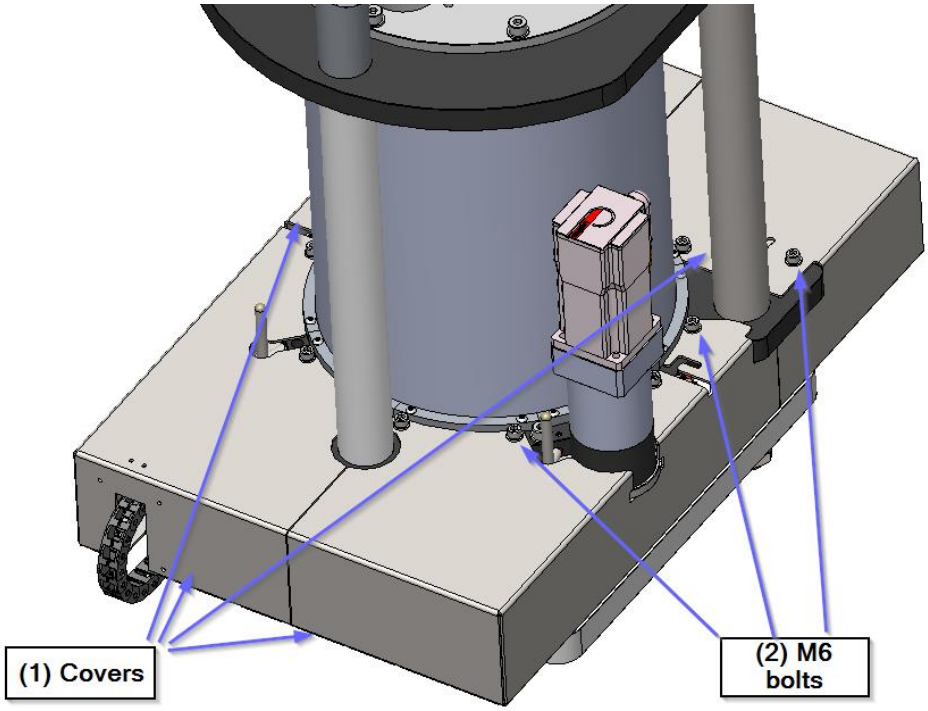


7. Replacement of filter in process unit

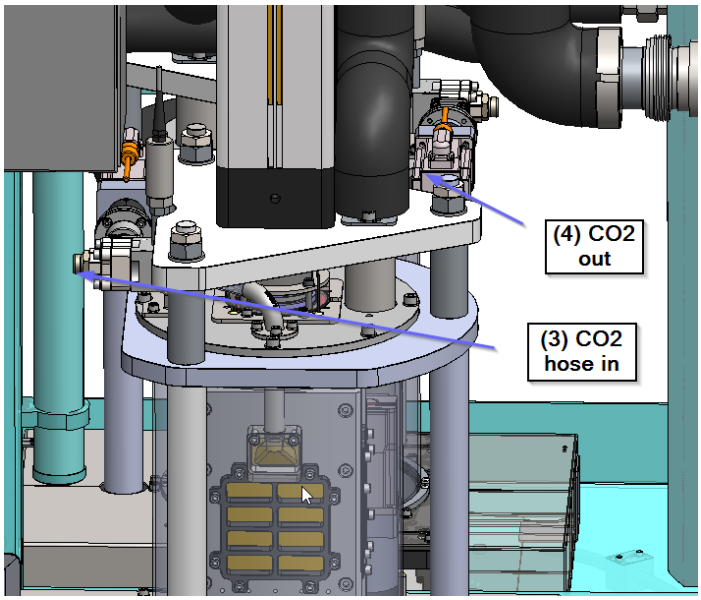
1. Perform lock-out tag-out of the machine before performing work.
2. Move the backplate in manual mode, so the cylinder can move out the bottom.
3. Move the cylinder out of the process unit.
4. Unscrew the two M6 bolts (1) and take the piston head (2) off the cylinder.



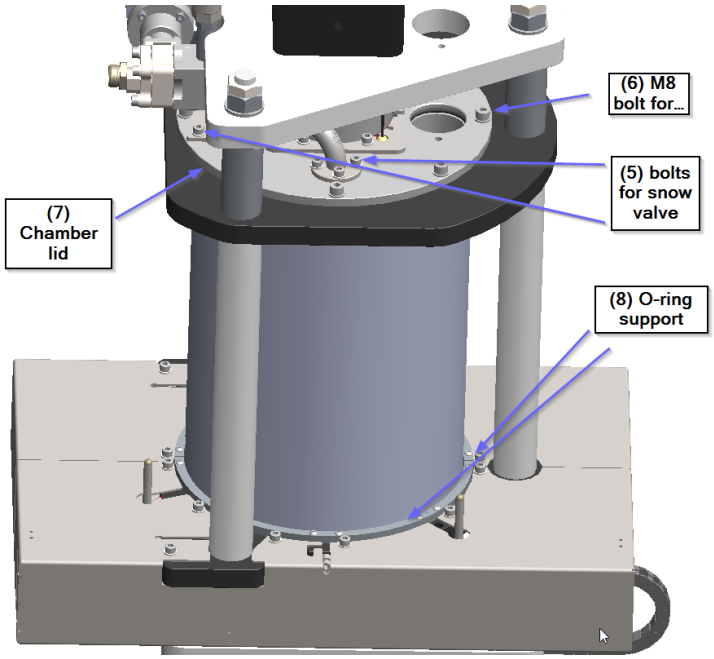
5. Install the piston lift tool on the electric cylinder.
6. Remove the covers on process unit (1), by unscrewing all M6 bolts (2) shown in the image below.



7. Remove the CO_2 hose (3) in and CO_2 out (4) of the process unit.

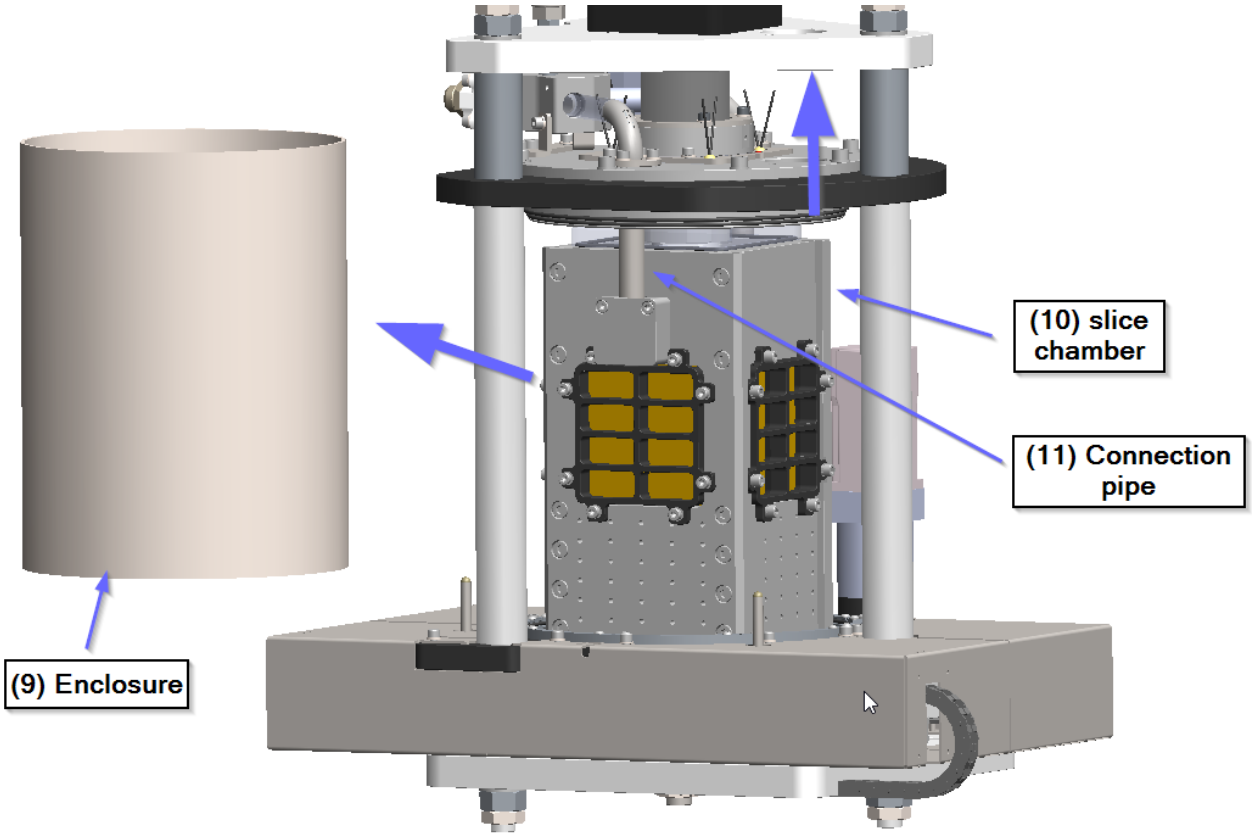


8. Remove the snow valve, by unscrewing the 10 x M6 bolts (5)
9. Remove all M8 bolts (6) on the chamber lid (7).
10. Remove all O-ring supports (8) by unscrewing all bolts.



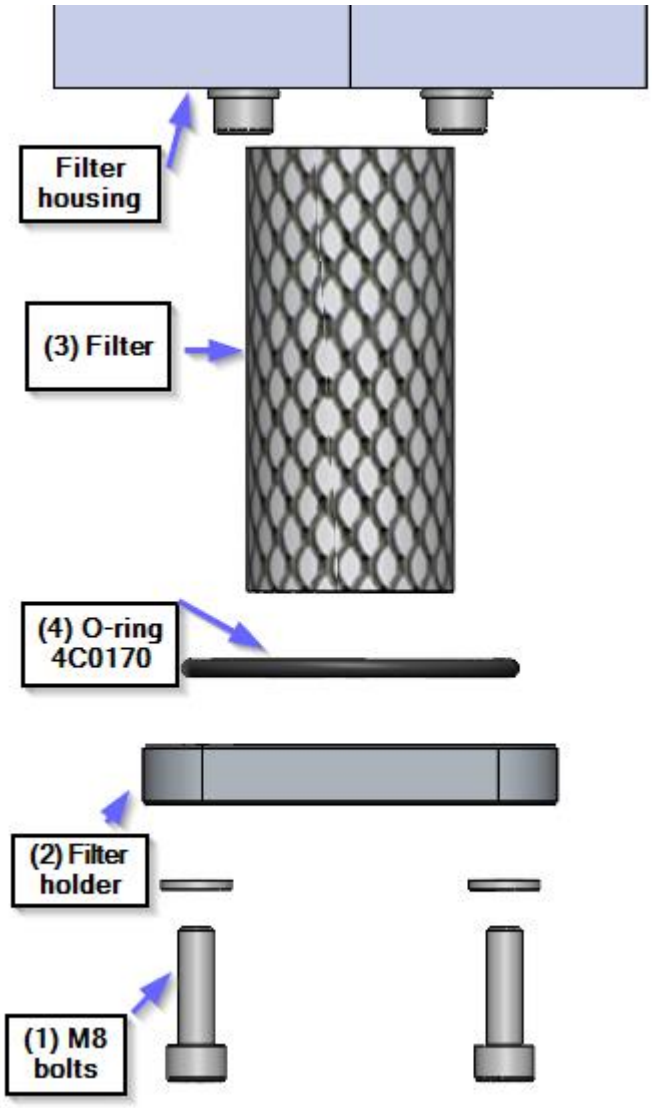
11. Lift the chamber lid by using the electric cylinder.
12. Remove the enclosure (9) and slice chamber (10) out of the process unit.
13. Replace the filter on the slice chamber.
14. Clean the threads and apply Anti-Seize Food Grade Compound on all bolts. Install the 32 x M6 bolts (3) and tighten to 8 Nm (5,9 ft-lbs).
15. Replace all O-rings and install enclosure (9) and slice chamber (10) into the process unit.
16. Lower the Chamber lid down – Ensure that the connection pipe (11) is getting into the chamber lid.

17. Install the snow valve. Clean the threads and apply Anti-Seize Food Grade Compound on all bolts. Install the 32 x M6 bolts (3) and tighten to 8 Nm (5,9 ft-lbs).
18. Clean the threads and apply Anti-Seize Food Grade Compound on all bolts on the chamber lid. The bolts must be tightened to 21 Nm (189 ft-lbs).
19. Install all O-ring supports – Ensure that the O-ring is pressed onto the enclosure and is not pinched.
20. Install the cover and tighten the bolts by hand.
21. Move the Electric cylinder out of the process unit and remove the tool.
22. Mount the piston head and tighten the two M6 bolts (2) to 8 Nm (5,9 ft-lbs).
23. Use the tool (CJ P/N 3Z0158) to ensure the press head enters the process unit without damaging it.



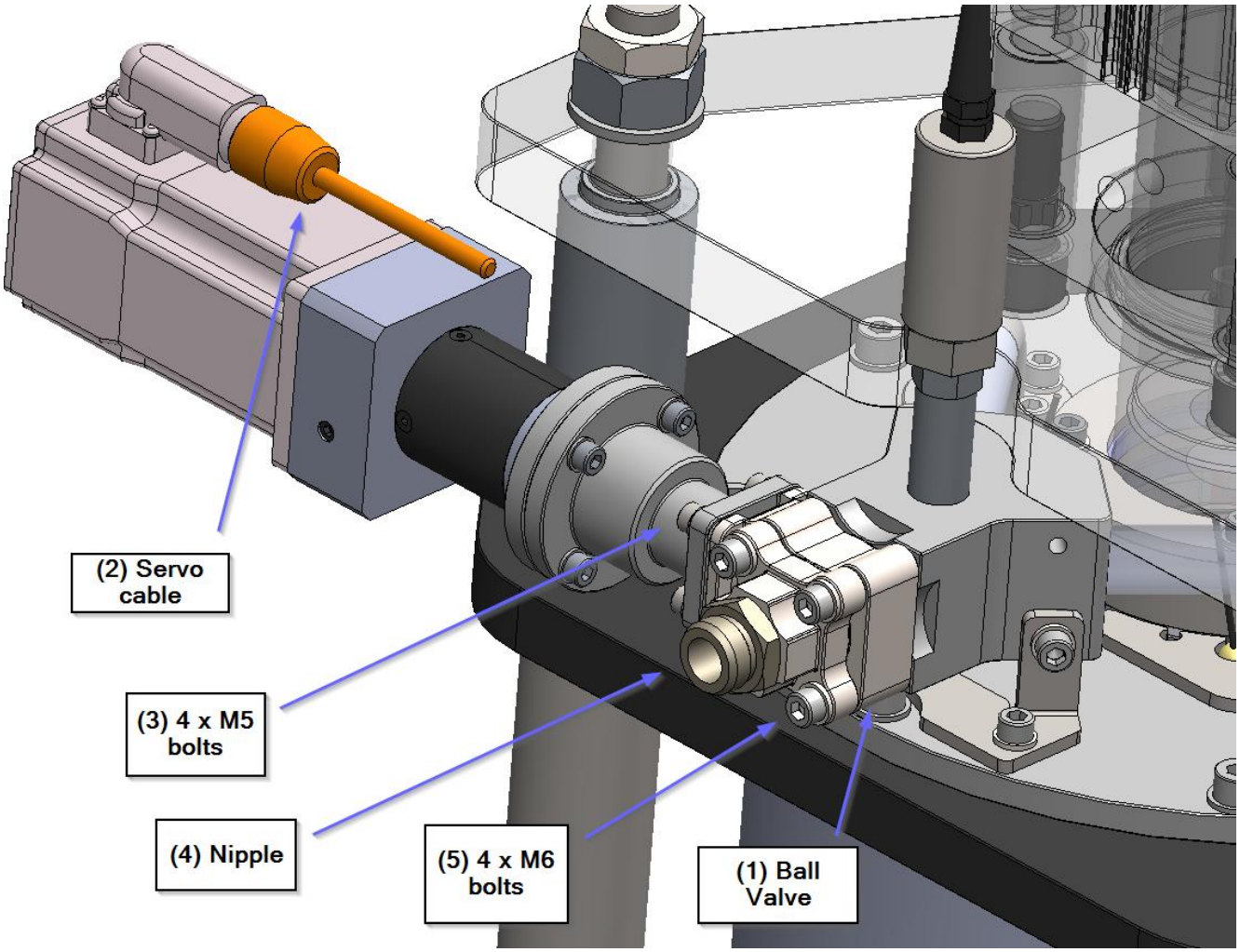
8. Replacement of CO_2 filter

1. Perform lock-out tag-out of the machine before performing work.
2. De-pressure the CO_2 line.
3. Locate the filter housing(s).
4. Remove the four M8 bolts (1).
5. Remove filter holder (2).
6. Remove filter (3).
7. Clean the filter housing (4) - It is important to be careful and not get any dust or dirt into the filter housing during this operation.
8. Replace the O-ring (4).
9. Assemble the filter housing. Mount the endplate on the filter housing. Clean the threads and apply Anti-Seize Food Grade Compound on all bolts. The bolts must be tightened to 21 Nm (189 ft-lbs).



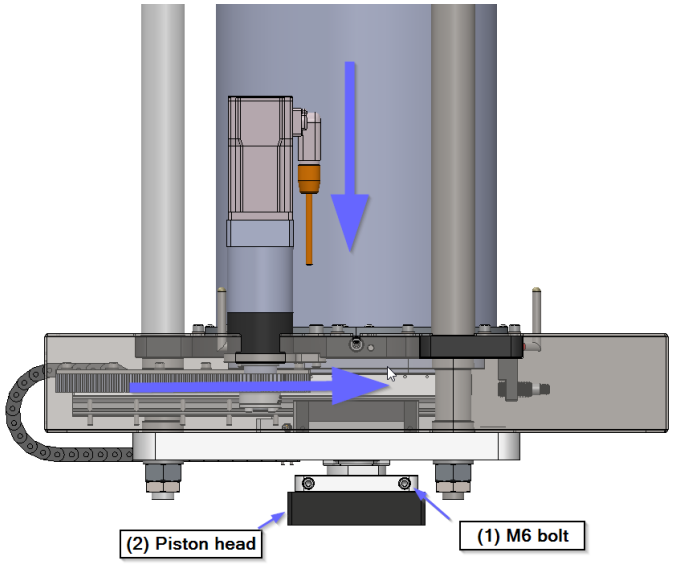
9. Replacement of ball valve

1. Perform lock-out tag-out procedure before starting work.
2. De-pressure the CO_2 line.
3. Locate the ball valve (1).
4. Unplug the servo cable (2).
5. Remove the 4 x M5 bolts **OBS:** Be careful not to rotate the servo shaft.
6. Remove the nipple (4).
7. Remove 4 x M6 bolts.
8. Install new Ball valve **OBS:** Ensure the direction of flow is correct.
9. Add tread sealing and install the nipple.
10. Clean the threads and apply Anti-Seize Food Grade Compound on all bolts. M6 bolts must be tightened to 8,8 Nm (78 ft-lbs). M5 bolts must be hand tightened.

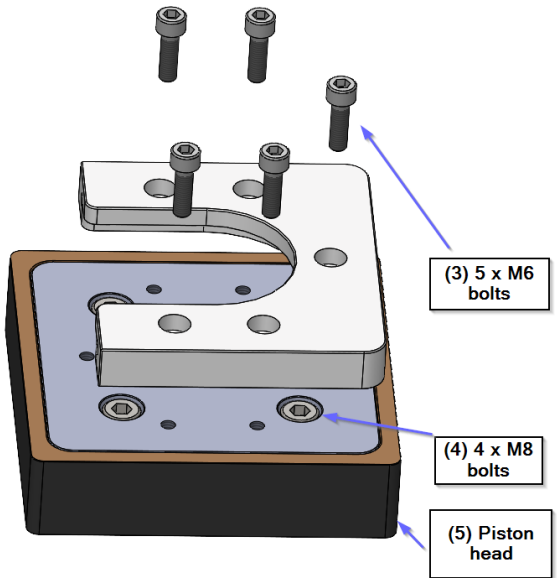


10. Replacement of piston head.

1. Perform lock-out tag-out of the machine before performing work.
2. Move the backplate in manual mode, so the cylinder can move out the bottom.
3. Move the cylinder out of the process unit.
4. Unscrew the two M6 bolts (1) and take the piston head (2) off the cylinder.



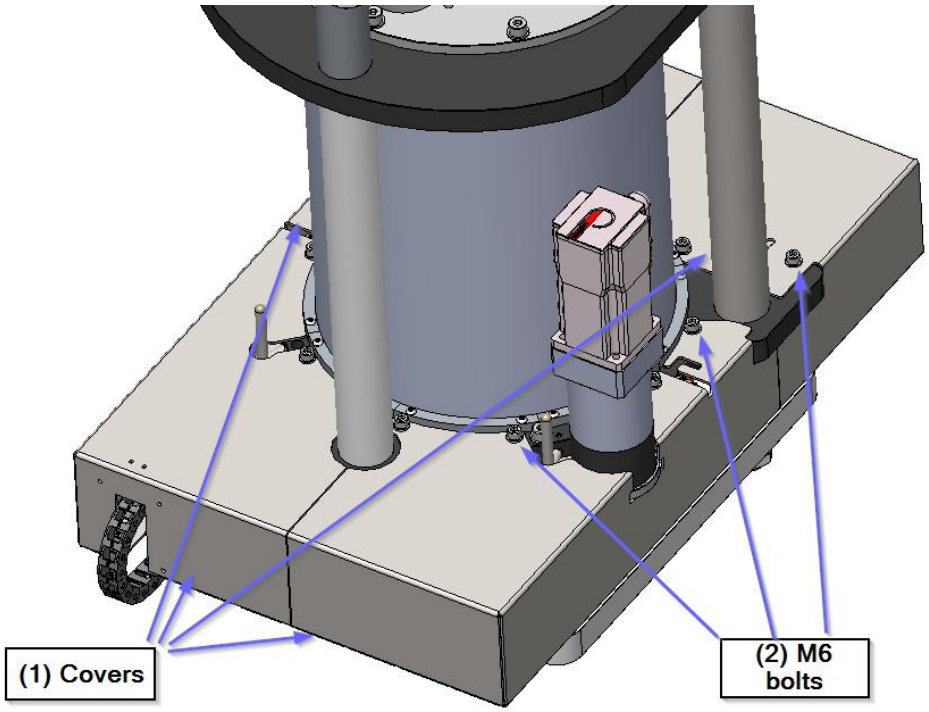
5. Unscrew the five M6 (3) bolt and the four M8 (4) bolts from the Piston head (5).



6. Clean the threads and apply Anti-Seize Food Grade Compound on all bolts. M6 bolts must be tightened to 8,8 Nm (78 ft-lbs). M8 bolts must be tightened to 21 Nm (189 ft-lbs).
7. Mount the piston head and tighten the two M6 bolts (2) to 8 Nm (5,9 ft-lbs).
8. Use the tool (CJ P/N 3Z0158) to make sure the Press head gets back into the process unit without damaging it.

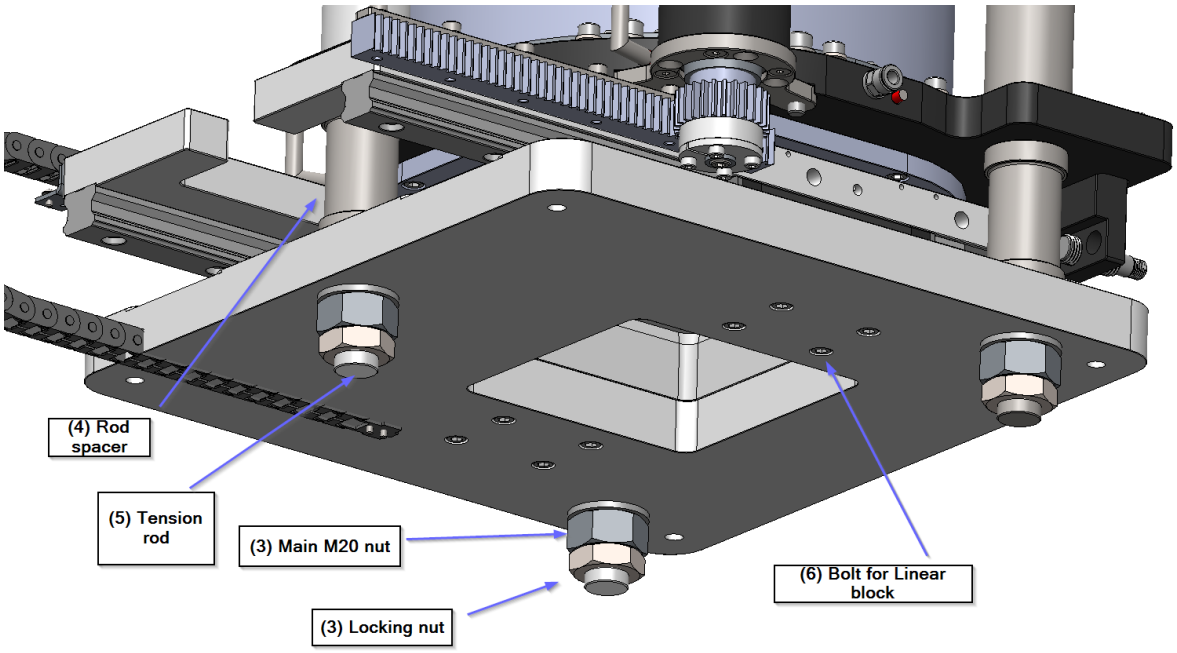
11. Replacement of seal unit.

1. Perform lock-out tag-out of the machine before performing work.
2. Remove the covers on the process unit (1), by unscrewing all M6 bolts (2) shown in the image below.

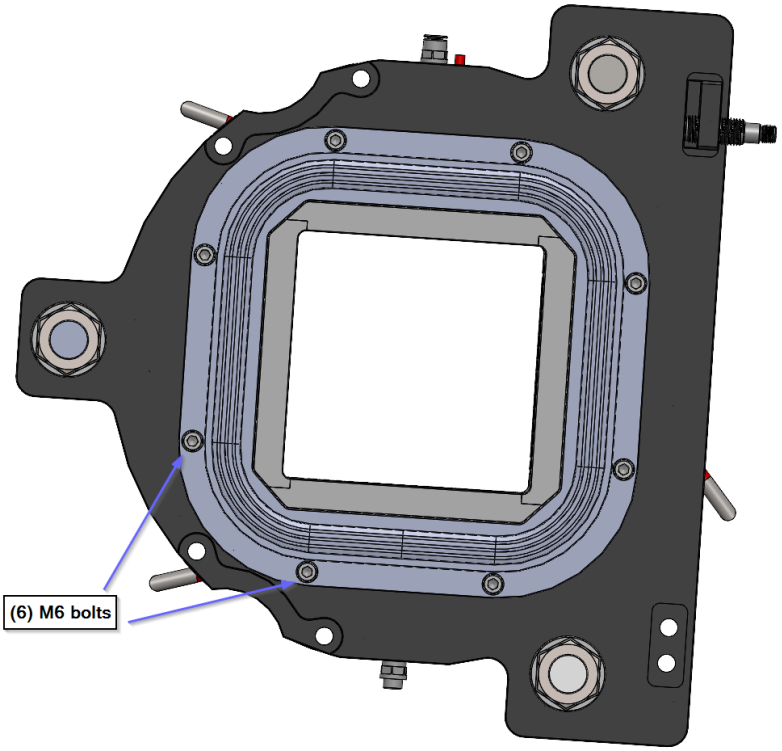


3. Unscrew the six M20 nuts (3), and lift the process unit 10 mm by using the tool (CJ P/N 2Z0048).

4. Lift the tension rod (5) and take out the rod spacer (4).



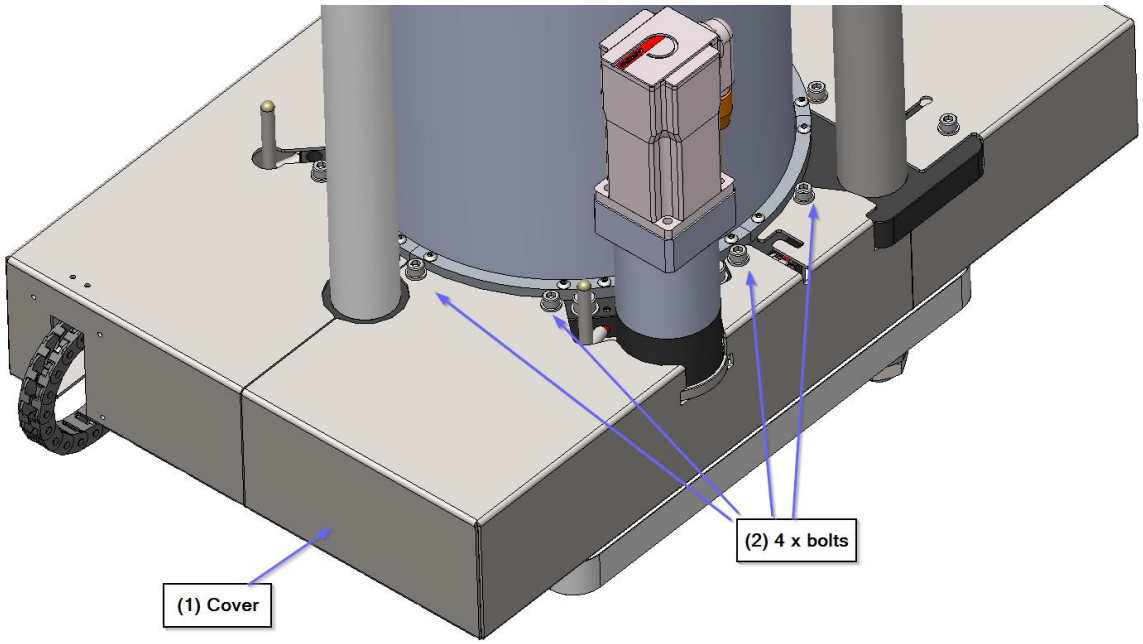
5. Move the backplate out of the Linear block and place away from the working area.
6. Remove the seal unit from the base plate by unscrewing the 8 x M6 bolts (6).



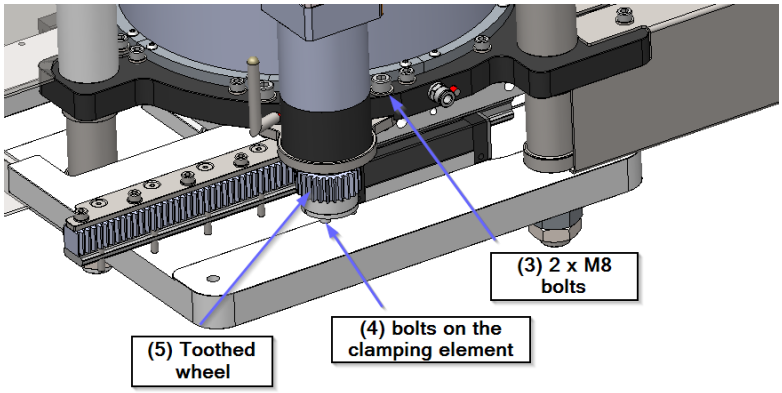
9. Replace the seal unit. Lubricate the O-rings on the seal unit. M6 bolts must be tightened to 8 Nm (5,9 ft-lbs).
7. Install the rod spacer (4) and tension rod (5).
8. Lower the process unit down.
9. Clean the thread and apply Anti-Seize Food Grade Compound on Tension rod. The M20 nuts must be tighten in the following way:
   a. Torque main nuts to 125 Nm (92 ft-lbs) cross tension three times.
   b. Torque main nuts to 370 Nm (273 ft-lbs) cross tension three times.
   c. Torque locking nuts to 100 Nm (74 ft-lbs) cross tension three times.
10. Install the cover and tighten the bolts by hand.

12. Replacement of toothed wheel

1. Perform lock-out tag-out of the machine before performing work.
2. Remove the cover on the process unit (1), by removing the 4 x bolts (2) shown in the image below.



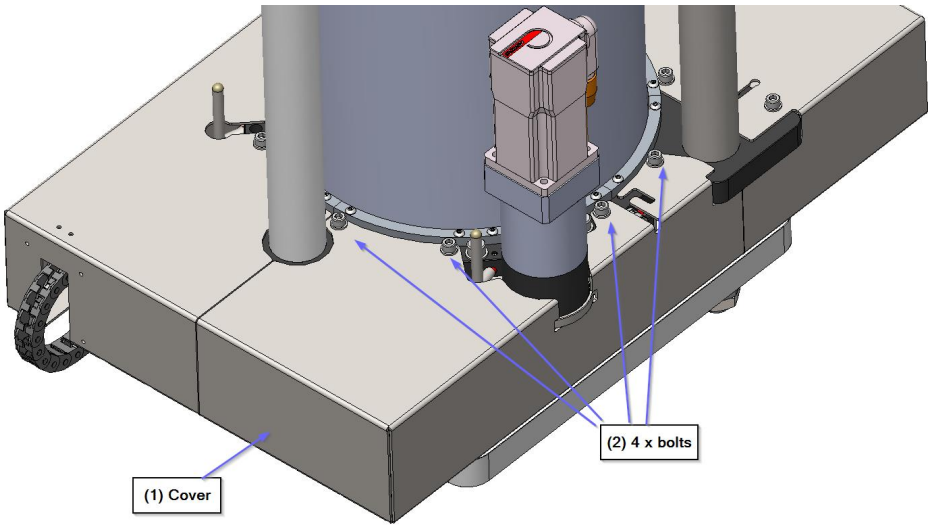
3. Move the backplate forward and remove the two M8 bolts (3).
4. Loosen the 4 bolts (4) on the clamping element.



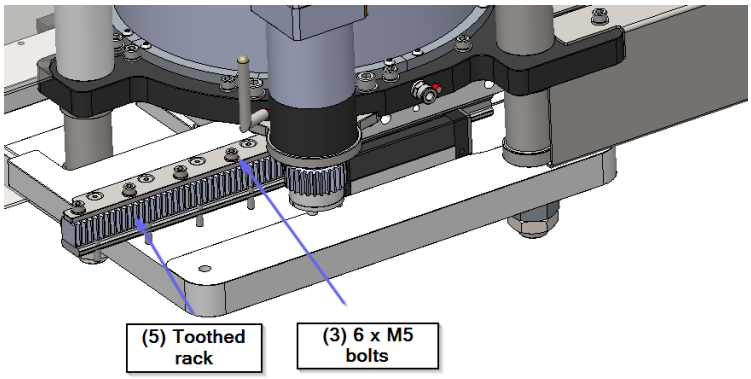
5. Replace the toothed wheel (5).
6. Install the clamping element, and tighten the 4 bolts (4) to 2,6 Nm (1,9 ft-lbs).
7. Clean the threads and apply Anti-Seize Food Grade Compound on all bolts. Install the two M8 bolts (3) and tighten to 21 Nm (18.9 ft-lbs).
8. Lubricate the rack and the toothed wheel with Aeroshell 7.
9. Install the cover and tighten the bolts by hand.

13. Replacement of toothed rack

1. Perform lock-out tag-out of the machine before performing work.
2. Remove the cover on the process unit (1), by removing 4 x bolts (2) shown in the image below.



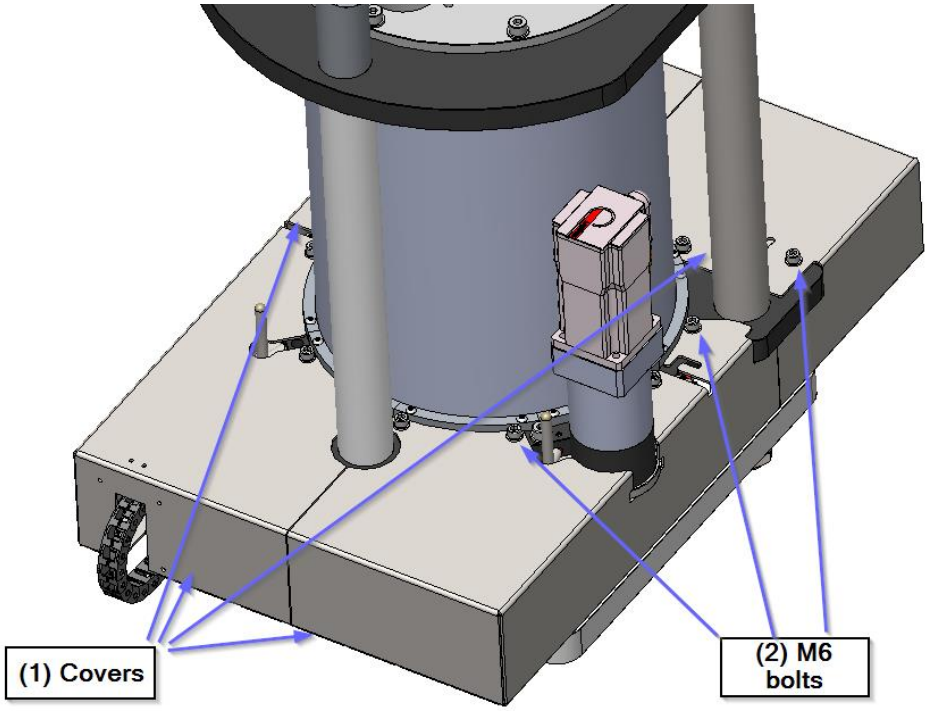
3. Move the backplate forward and unscrew the six M5 bolts (3).
4. Replace the toothed rack, clean the threads, and apply Anti-Seize Food Grade Compound on all bolts.
5. Install the six M5 bolts (3) and tighten to 13,7 Nm (45 ft-lbs).



6. Lubricate the rack and the toothed wheel with Aeroshell 7.
7. Install the cover and tighten the bolts by hand.

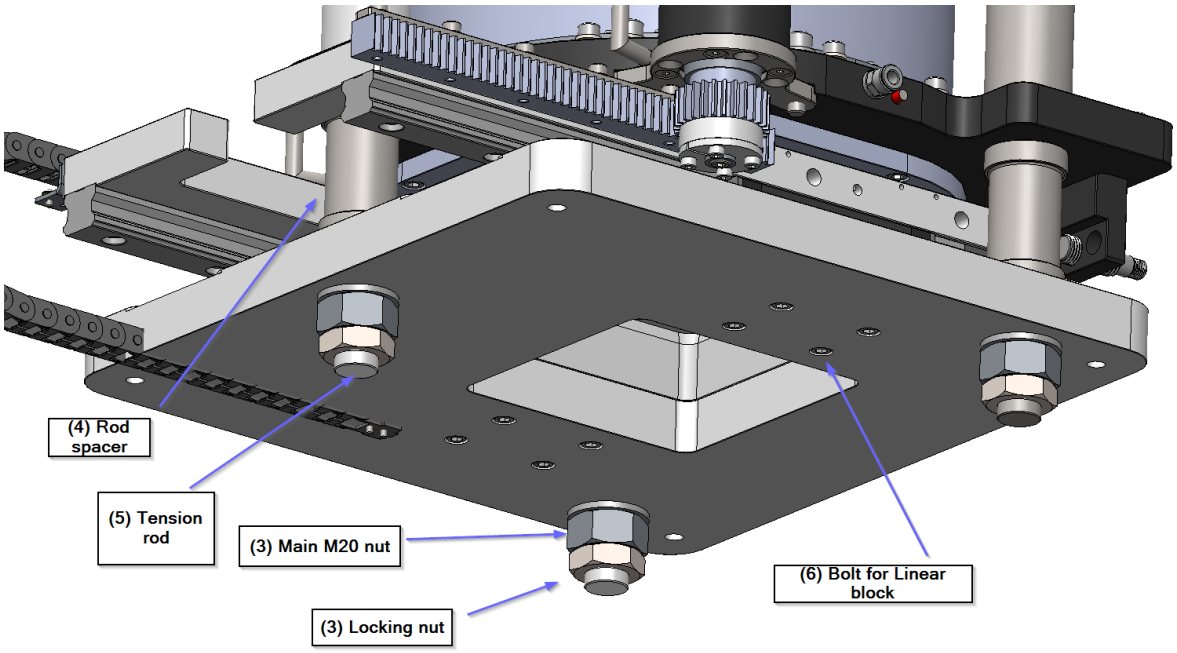
14. Replacement of linear block.

1. Perform lock-out tag-out of the machine before performing work.
2. Remove the covers on the process unit (1), by unscrewing all M6 bolts bolts (2) shown in the image below.



3. Unscrew the six M20 nut (3), and lift the process unit 10 mm by using the tool (CJ P/N 2Z0048).
4. Lift the Tension rod (5) out and remove the rod spacer (4).
5. Move the backplate out of the linear block and place away from the working area.

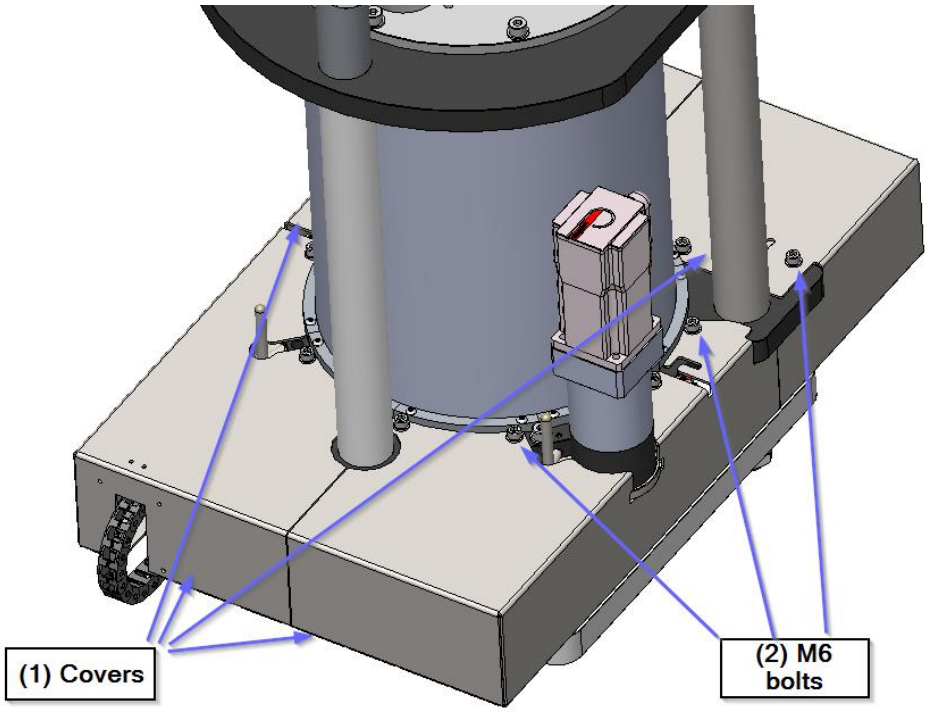
6. Unscrew the 8 x M6 bolt (6) and replace the linear block.



7. Clean the threads and apply Anti-Seize Food Grade Compound on all bolts, mounting the bolts loose in the linear block.
8. Place the linear rail on the linear block and be careful that the balls from the linear block does not fall out while the backplate is being pushed in.
9. Move the backplate back and forth and tighten the M6 bolts, ensuring that the back plate can move without resistance. The M6 bolts must be tightened to M6 bolts (6) to 8 Nm (5,9 ft-lbs).
10. Install the rod spacer (4) and tension rod (5).
11. Lower the process unit down.
12. Clean the threads and apply Anti-Seize Food Grade Compound on the tension rod. The M20 nut must be tightened in the following way:
    a. Torque main nuts to 125 Nm (92 ft-lbs) cross tension three times.
    b. Torque main nuts to 370 Nm (273 ft-lbs) cross tension three times.
    c. Torque locking nuts to 100 Nm (74 ft-lbs) cross tension three times.
13. Install the cover and tighten the bolts by hand.

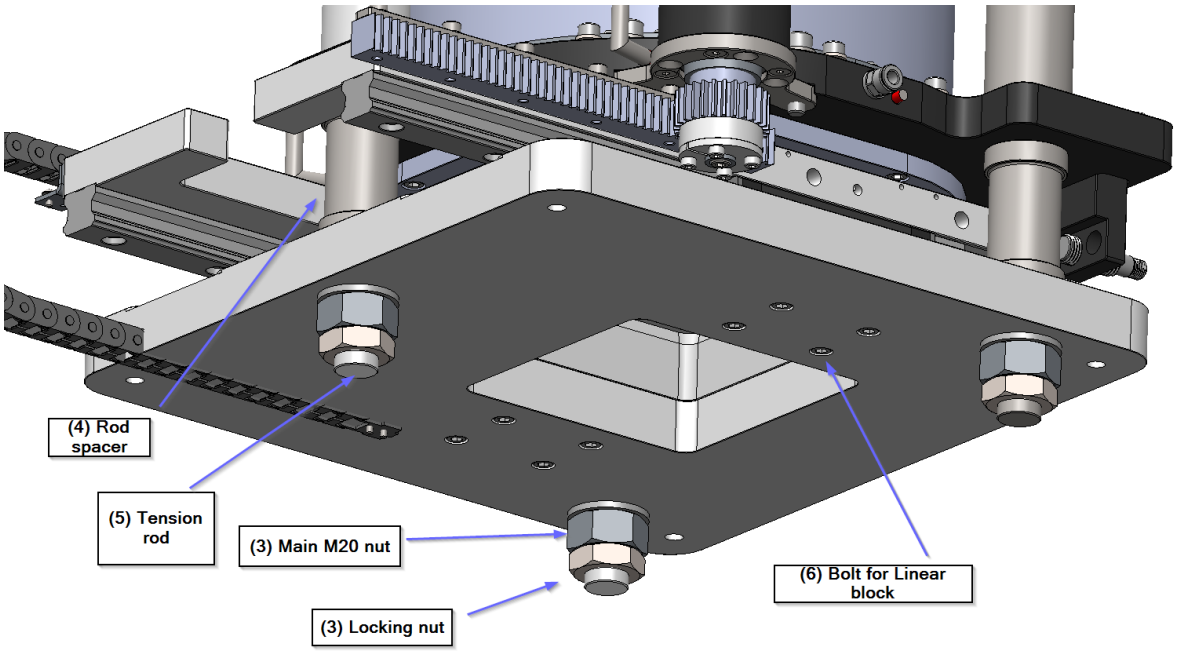
15. Replacement of linear rail.

1. Perform lock-out tag-out of the machine before performing work.
2. Remove the covers on the process unit (1), by removing all M6 bolts (2) shown in the image below.



3. Unscrew the six M20 nut (3), and lift the process unit 10 mm by using the tool (CJ P/N 2Z0048)
4. Lift the tension rod (5) and take out the rod spacer (4).
5. Move the backplate out of the linear block and place away from the working area.

6. Remove the linear rail from the backplate and install the new linear rails on the backplate.



7. Clean the threads and apply Anti-Seize Food Grade Compound on all bolts, mounting the bolts loose in the linear block.
8. Place the linear rail on the linear block and be careful that the balls from the linear block does not fall out while the backplate is being pushed in.
9. Move the backplate back and forth and tighten the M6 bolt, ensuring that the back plate can move without resistance. The M6 bolts must be tightened to M6 bolts (6) to 8 Nm (5,9 ft-lbs).
10. Install the rod spacer (4) and tension rod (5).
11. Lower the process unit down.
12. Clean the threads and apply Anti-Seize Food Grade Compound on the tension rod. The M20 nut must be tightened in the following way:
    a. Torque main nuts to 125 Nm (92 ft-lbs) cross tension three times.
    b. Torque main nuts to 370 Nm (273 ft-lbs) cross tension three times.
    c. Torque locking nuts to 100 Nm (74 ft-lbs) cross tension three times.
13. Install the cover and tighten the bolts by hand.

16. Torque table

This section will describe the torque for tightening different sizes and types of fasteners. If the fasteners are tightened without thread locking agent, it is recommended to apply an anti-seize food grade lubricant. If the bolts are tightened with a thread locking agent, the threads must be considered lubricated.

Torque Values for A2 and A4 Metric Stainless Steel Fasteners

Bolt Dia	Torque (N-m)		Torque (in-lbs / ft-lbs)	
(mm)	Dry	Lubricated	Dry	Lubricated
3	1.35	1.1	12 in-lbs	9.7 in-lbs
4	3	2.6	26.6	23
5	6.1	5.1	54	45.1
6	10.4	8.8	92.1	77.9
8	25.5	21.4	225.7	189.4
10	51	44	451.4	389.4
12	88	74	65 ft-lbs	55 ft-lbs
14	141	119	104	88
16	218	183	161	135
18	308	260	227	192
20	439	370	324	273
22	582	488	429	360
24	724	608	534	448

Torque Values for Zink plated Fasteners property class 8.8

Bolt	Torque (N-m)		Torque (in-lbs / ft-lbs)	
Dia (mm)	Dry	Lubricated	Dry	Lubricated
3	1.37	1.28	12.1 in-lbs	11.3 in-lbs
4	3.1	2.9	27.4	25.7
5	6.15	5.75	54.4	50.9
6	10.5	9.9	92.9	87.6
8	26	24	230	212.4
10	51	48	451.4	424.8
12	89	83	66 ft-lbs	61 ft-lbs
14	141	132	104	97
16	215	200	159	148
18	295	275	218	203
20	420	390	310	288
22	570	530	420	391
24	725	675	535	498

Torque Values for Zink plated Fasteners property class 10.9

Bolt	Torque (N-m)		Torque (in-lbs / ft-lbs)	
Dia (mm)	Dry	Lubricated	Dry	Lubricated
3	1.92	1.8	17 in-lbs	15.9 in-lbs
4	4.4	4.1	39	36.3
5	8.65	8.1	77	71.7
6	15	14	133	123.9
8	36	34	319	300.9
10	72	67	637	593
12	125	117	92 ft-lbs	86 ft-lbs
14	198	185	146	136
16	305	285	225	210
18	420	390	310	288
20	590	550	435	406
22	800	745	590	549
24	1020	950	752	701