Reformer R1000H

MAINTENANCE AND REPAIR

MECHANICAL MAINTENANCE

Repair

The repair/replacement of the following parts can be made by the owner's qualified personnel:

- Procedure for replacement of hydraulic oil filter and **PRESSURE FILTER**
- Replacement of gaskets in Ø150 hydraulic cylinder
- Tool set replacement
- Replacement of wear plates on Press- and eject pistons
- Changing air filter
- Changing hydraulic pump
- Changing hydraulic oil at hydraulic station
- Hopper cleans out and machine thaw up.
- Replacing diverter cylinder
- Replacing hammer on hopper.

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

Terms of Warranty

In order to comply with the terms of the warranty, and for safety reasons, repairs other than those stated above require relevant tools and equipment and therefore must always be made either by a Cold Jet technician or by the owner's 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.

LOCK-OUT/TAG-OUT SEQUENCE

Identify all devices and power sources that must be disconnected.

Electrical Cabinet. Cut the power using the input disconnecting switch.

Add sign on machine prohibiting reconnection. After ensuring that no one is exposed and to check that the power sources disconnection was made correctly, press the activation buttons that control the operation of the isolated section to make sure that the disconnection was efficient. After this check then active e-stop.
After performing the above operations, the machine will be in lock-out/tag-out and the work may be performed without risk of an unexpected start-up.

If the process involves more than one person

In the steps shown in the above sections, if there is more than one person involved, each person involved will lock-out and tag-out the power-cutting devices. No one may remove it, except the person adding the lock-out and tag-out. The equipment will not be connected while there is a lock-out and/or tag-out.

Return the machine to its normal operating condition

Reconnection may be made after performing the repair, maintenance, connection or other operations and once the equipment is prepared for use.
Inspect the work area and rest of the machine affected by the lock-out/tag-out, to ensure that no one is exposed. Remove additional protections, if any. Remove all tag-outs and other lock-outs. Reconnect all switches that were disconnected and reset the e-stop. The machine is now in service again for normal production


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TABLE FOR MECHANICAL MAINTENANCE

Inspections to be carried out every start up:

When the R1000H has been started up, it must be checked that all heaters are working properly, see on touch panel display for all the heat values. Before production is started, check physically that the chambers and the other items in fact are heated up.

Inspections to be carried out every week:

Hydraulic station
Inspect for oil leakages, Check hoses, fittings, valves and connections for leakages. Reseal if necessary.
Check the oil level, in the sight glass, on the hydraulic tank side. Refill if necessary.

Inspections to be carried out every 400 hours / 3 months:

The racks on the ejectors must be lubricated with grease.

Check the oil. Drain a small quantity of oil – 1 dl – from the hydraulic tank. Inspect the oil visually. If the oil is not clear, bright and light yellow it must be changed. Get a particle analysis of the oil if in doubt about the contamination degree.

Spare part package:
Cold Jet recommend the owner to have a spare part package in stock either the standard package or the complete package, so repairs can be made quickly and with a very little loss of production time.

Spare part package complete Cold Jet Part no. 504950
Spare part package standard Cold Jet Part no. 504949

This table includes all the service intervals from 0 hours to 20000 hours.
For each service interval there will be listed which procedures is necessary to perform and the Cold Jet article no. for spare parts package.

Table 1. Table for mechanical maintenance Reformer R1000H

Service interval hours / month	Procedure no.	Cold Jet article no. Spare parts package.
2000 Hours / 12 Months	1, 6, 10	504948
4000 Hours / 24 Months	4	*) See tables below

Tables for Tools wear par

515272 TOOLING SET, SINGLE SLICE, 250MM X 125MM, BRONZE, R1000H		
QTY	**PART NO**	**DESCRIPTION**
4	515277	WEAR PLATE, SINGLE SLICE, 250 X 125MM, R1000H
8	515281	WEAR PLATE, SINGLE SLICE, 250 X 125MM, BRONZE, R1000H
8	515282	WEAR PLATE, SINGLE SLICE, 250 X 125MM, BRONZE, R1000H

515303 TOOLING SET, SINGLE SLICE, 210MM X 125MM, BRONZE, R1000H		
QTY	**PART NO**	**DESCRIPTION**
4	515307	WEAR PLATE, SINGLE SLICE, 210 X125MM, R1000H
8	515311	WEAR PLATE, SINGLE SLICE, 210 X 125MM, BRONZE, R1000H
8	515282	WEAR PLATE, SINGLE SLICE, 250 X 125MM, BRONZE, R1000H

515319 TOOLING SET, SINGLE SLICE, 150MM X 150MM, BRONZE, R1000H		
QTY	**PART NO**	**DESCRIPTION**
4	515323	WEAR PLATE, SINGLE SLICE, 150 X 150MM, R1000H
16	515327	WEAR PLATE, SINGLE SLICE, 150 X 150MM, BRONZE, R1000H

515549 TOOLING SET, SINGLE SLICE, 155MM X 140MM, BRONZE, R1000H		
QTY	**PART NO**	**DESCRIPTION**
4	515551	WEAR PLATE, SINGLE SLICE, 155 X 140MM, R1000H
8	515555	WEAR PLATE, SINGLE SLICE, 155 X 140MM, BRONZE, R1000H
8	515556	WEAR PLATE, SINGLE SLICE, 155 X 140MM, BRONZE, R1000H

515337 TOOLING SET, DUAL SLICE, 125MM X 125MM, BRONZE, R1000H		
QTY	**PART NO**	**DESCRIPTION**
8	515340	WEAR PLATE, DUAL SLICE, 125 X 125MM, R1000H
32	515282	WEAR PLATE, SINGLE SLICE, 250 X 125MM, BRONZE, R1000H

515354 TOOLING SET, DUAL SLICE, 105MM X 125MM, BRONZE, R1000H		
QTY	**PART NO**	**DESCRIPTION**
8	515358	WEAR PLATE, DUAL SLICE, 105 X 125MM, R1000H
16	515282	WEAR PLATE, SINGLE SLICE, 250 X 125MM, BRONZE, R1000H
16	515362	WEAR PLATE, SINGLE SLICE, 105 X 125MM, BRONZE, R1000H

515568 TOOLING SET, DUAL SLICE, 100MM X 155MM, BRONZE, R1000H		
QTY	**PART NO**	**DESCRIPTION**
8	515572	WEAR PLATE, DUAL SLICE, 100 X 155MM, R1000H
16	515556	WEAR PLATE, SINGLE SLICE, 155 X 140 MM, BRONZE, R1000H
16	515576	WEAR PLATE, DUAL SLICE, 100 X 155 MM, BRONZE, R1000H

2E1149 TOOLING SET, DUAL SLICE, 125 X 150 MM, REFORMER SERIES		
QTY	**PART NO**	**DESCRIPTION**
8	3E2935	WEAR PLATE, DUAL SLICE, 125 X 150 MM, BRONZE
16	515327	WEAR PLATE, SINGLE SLICE, 150 X 150 MM, BRONZE, R1000H
16	515282	WEAR PLATE, SINGLE SLICE, 250 X 125 MM, BRONZE, R1000H


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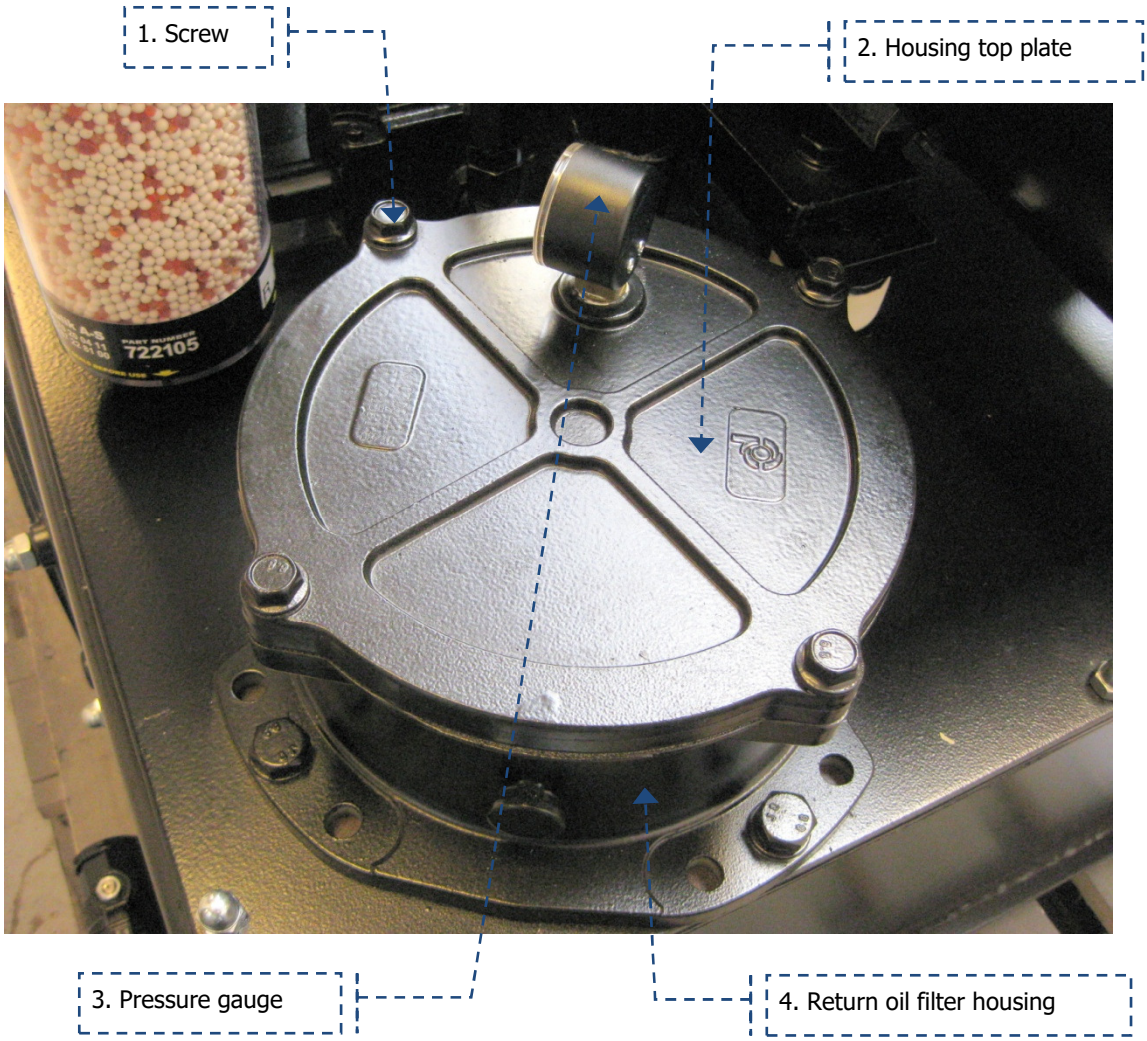
PROCEDURES FOR MAINTENANCE AND REPAIR

This table includes all the procedures for maintenance and repair. It is based on 8 hours production pr. Day and 20 production days pr. Month. This is equal to 1000 hours pr. 6 months and 2000 hours pr. 12 months.
After locating procedure numbers in the table for service interval, you must find the procedure numbers in the table below which will lead to detailed procedures on pages in the appendix.

Procedure no.	Procedure description	Service interval Hours.
1	**Procedure for replacement of hydraulic oil filter and pressure filter**	2000
2	**Procedure for Replacement of gaskets in Ø150 hydraulic cylinder**	6000
13	**Procedures for tool set replacement**	2000
84	**Procedures for replacement of wear plates on Press- and eject pistons**	2000
85	**Procedure for replacement of Ø150 hydraulic cylinder**	10000
86	**Procedure for changing air filter**	1000 then every 2000
0	**PROCEDURE FOR CHANGING HYDRAULIC PUMP REXROTH**	10000
88	**Procedure for changing hydraulic oil hydraulic station**	2000
9	Procedure for hopper clean out and machine thaw up	24-48
10	Procedure for replacing diverter cylinder	2000
11	Procedure for replacing hammer on hopper	2000

Servomotor, gears and ball bearings estimated durability approx. 30000 hours.
Pneumatic air cylinders estimated durability approx. 15000 hours.

1. PROCEDURE FOR REPLACEMENT OF HYDRAULIC OIL FILTER AND PRESSURE FILTER



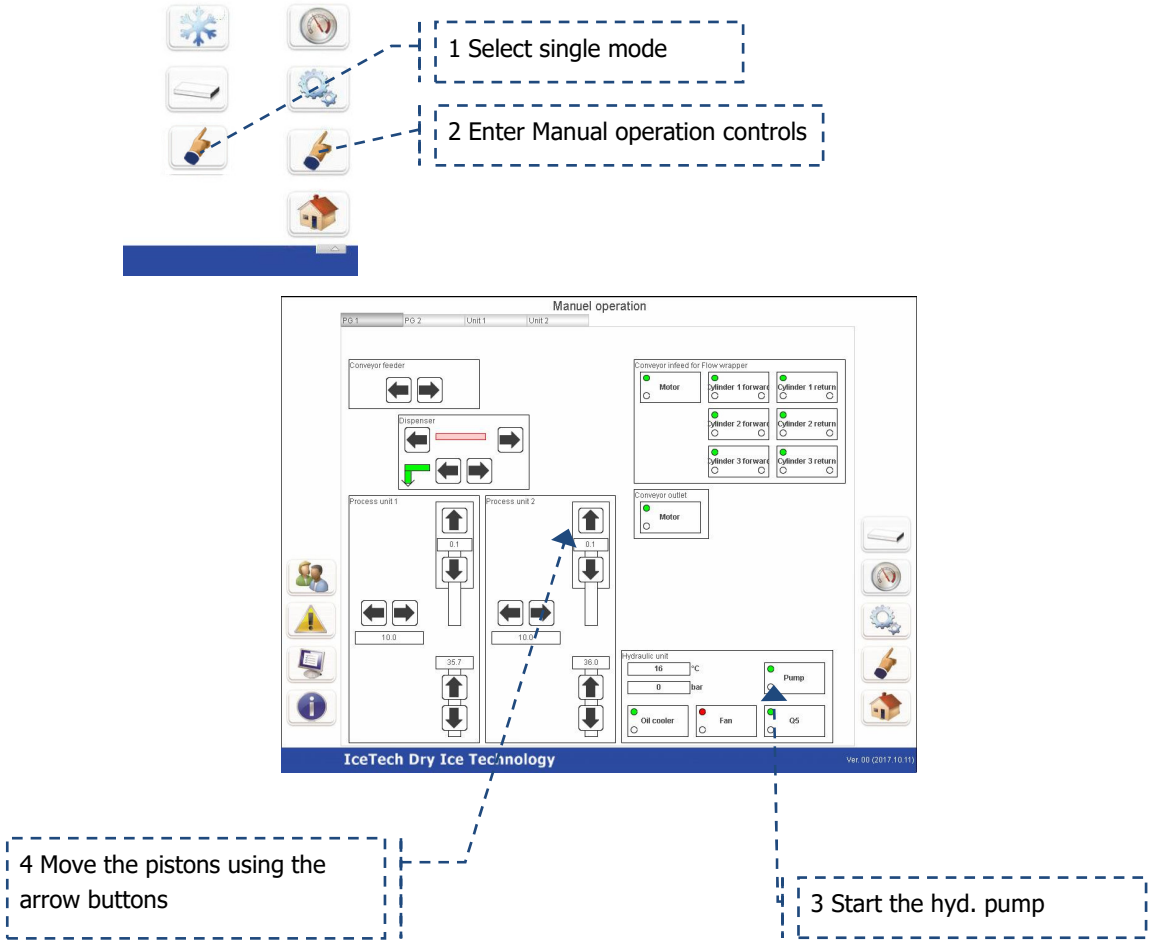
During this operation it's important to activate the emergency stop button!

Procedure step by step

1. Dismount the 4 screws [1] from the return oil filter housing [4].
2. Remove the housing top plate [2].
3. Take out the return oil filter cartridge and replace it with a new one. Be careful not to make any damage while replacing it into the housing.
4. Assemble again by placing the housing top plate [2] on top of the return oil filter housing [4].
5. Mount the 4 screws [1] again tightening evenly and firmly.

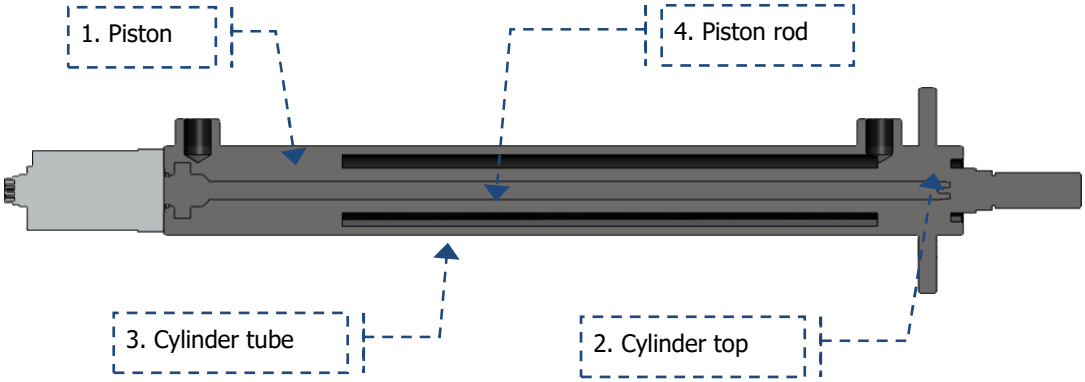
BEFORE STARTING PRODUCTION THE HYDRAULIC STATION SHOULD BE CHECKED IN SINGLE MODE!

Operating in single mode control



Check that there are no leaks on the hydraulic station.

2. PROCEDURE FOR REPLACEMENT OF GASKETS IN Ø150 HYDRAULIC CYLINDER



During this operation it's important to activate the emergency stop button!

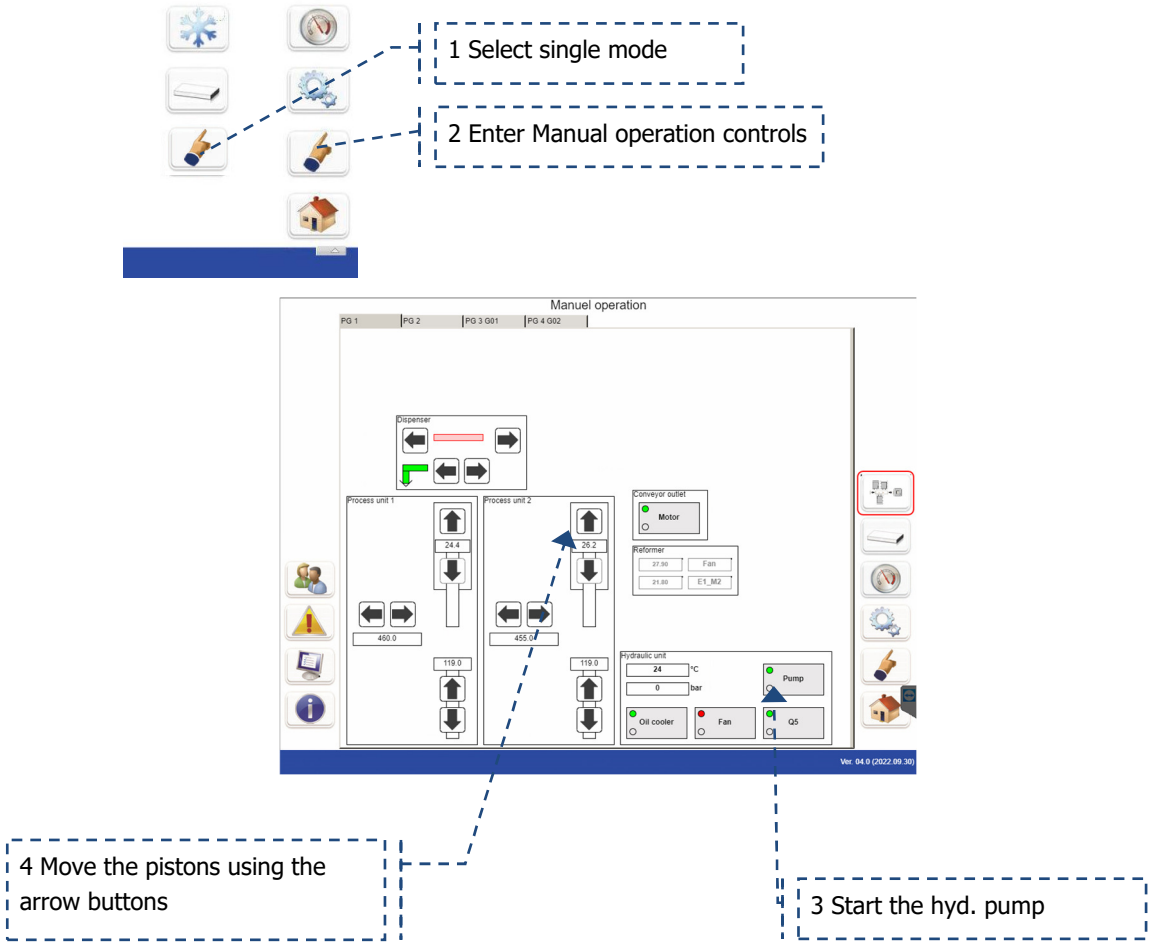
Important! For operators' safety the hydraulic cylinder must be disconnected from the hydraulic system before dismounting.

Procedure step by step

1. The hydraulic cylinder has to be emptied for oil.
2. Cylinder top [2] is dismounted and screwed out of the cylinder tube [3].
3. Piston [1], cylinder top [2] and piston rod cylinder top [4] are pulled out of the cylinder tube [3].
4. Remove old gaskets and seals on piston [1] without damaging the surfaces.
5. By careful heating of the piston [1] to app. 220° Celsius it can be loosened from the piston rod [4].
6. The cylinder top [2] can now be pulled of the piston rod [4].
7. Remove old gaskets and seals on cylinder top [2] without damaging the surfaces.
8. Clean all the parts and check if there is any damage Damaged parts has to be replaced.
9. Mount the new gaskets and seals on cylinder top [2] and lubricate with a little hydraulic oil. Be careful not to damage the gaskets/seals do not use any tools with sharp edges.
10. The cylinder top [2] is pulled back on the piston rod [4].
11. The thread on piston rod [4] and in the piston [1] has to be clean and oil free. Use Loctite 270 on the thread and screw the piston [1] back on the piston rod [4]. Clean for any leftovers of Loctite 270.
12. Gaskets and seals are mounted on the piston [1]. Lubricate with hydraulic oil. Be careful not to damage the gaskets/seals do not use any tools with sharp edges.
13. Piston [1], cylinder top [2] and piston rod cylinder top [4] are put back in the cylinder tube. The cylinder top [2] is screwed back in the cylinder tube [3].
14. The hydraulic cylinder has to be checked for any leaks and is then ready to be mounted on the machine again.

BEFORE STARTING PRODUCTION THE HYDRAULIC MOTION SHOULD BE CHECKED IN SINGLE MODE!

Operating in single mode control



Check once again that there are no leaks both connections and piston rod seals.

The operation is complete.

3. PROCEDURES FOR TOOL SET REPLACEMENT

Changing the Compression Piston

There are two options for changing the compression piston: *single slice* and *multi slice*. Please follow the instructions that correspond with your machine.

Single Slice

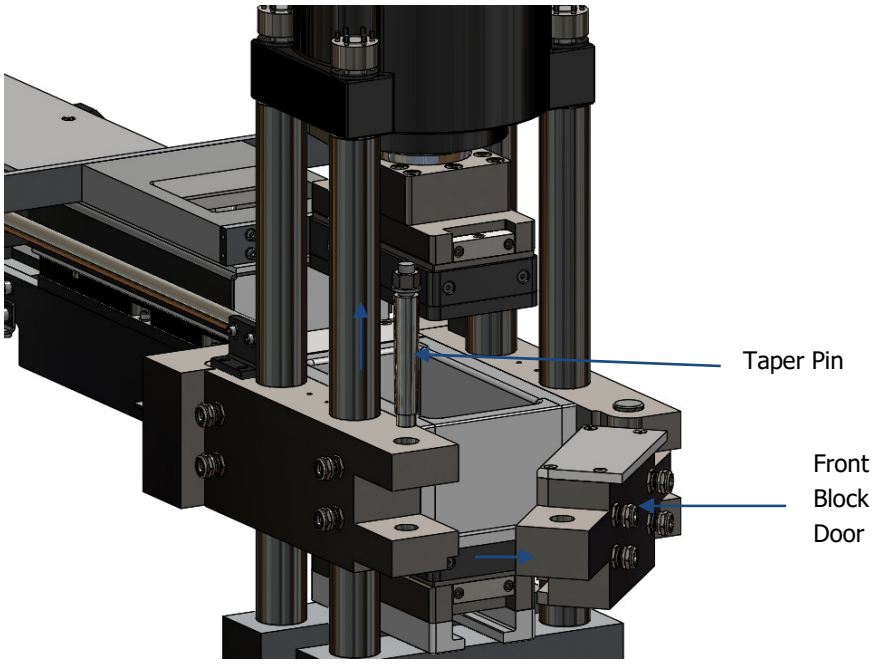
Before you begin this procedure, ensure you have the following tools:

- adjustable wrench or 24mm open-ended wrench
- rubber mallet
- 6 and 8 mm Allen wrench

To change the compression piston:

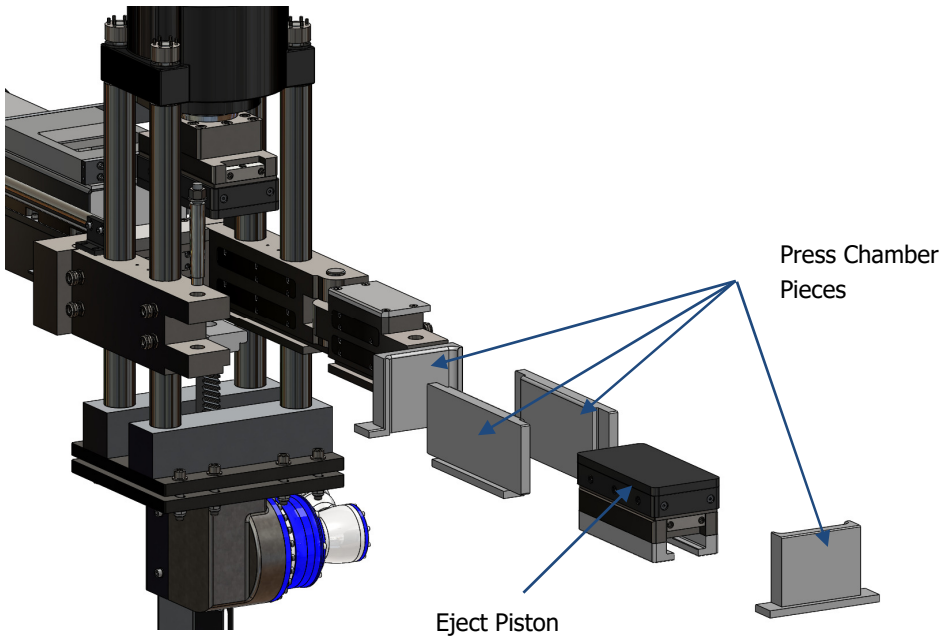
1 Remove the taper pin.
   - Remove the taper pin by turning the nut until the pin extends and can be pulled out manually, or use a rubber mallet to tap the pin upward from the bottom until the pin extends and can be pulled out manually.

2 Open the front block door.
   - The door opens to the right.



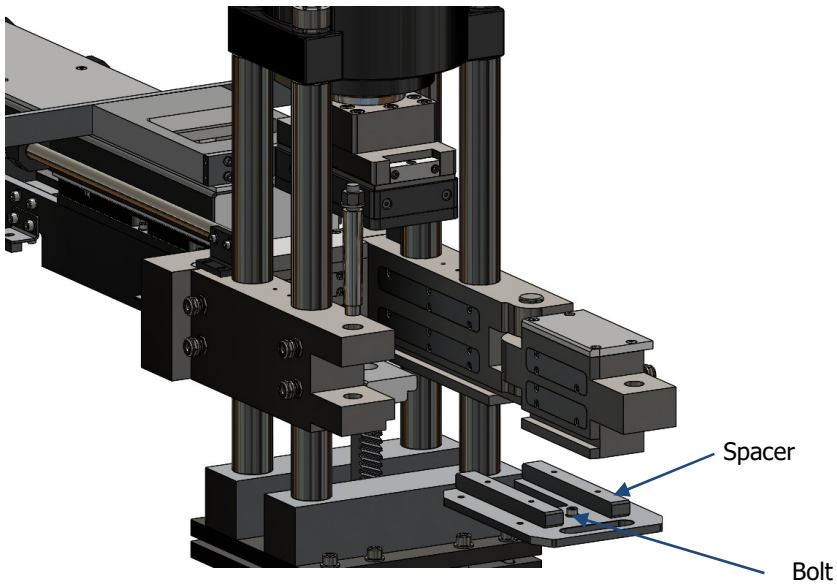
3 Remove the four press chamber pieces and the eject piston.

⚠ The compression piston is heavy.

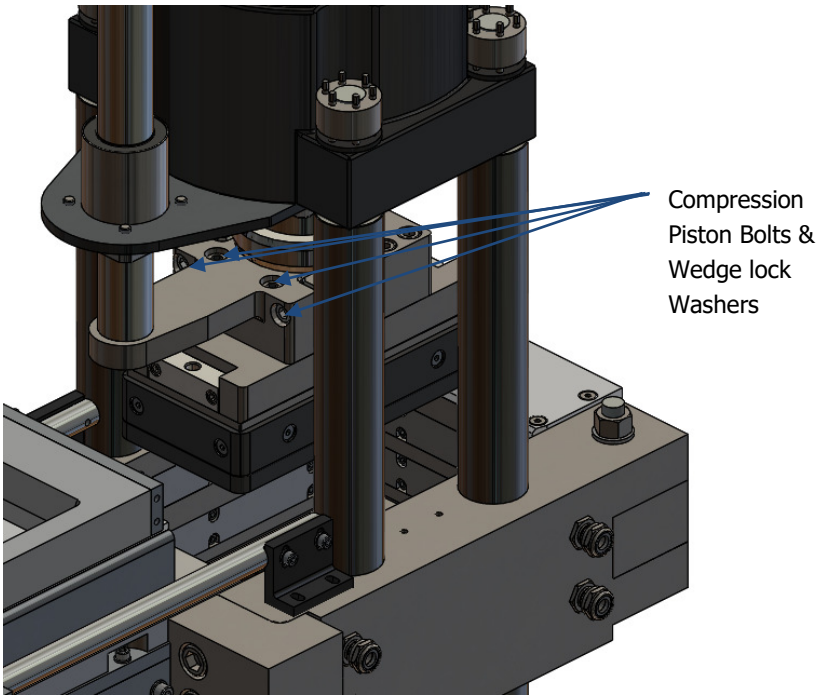


4 If necessary, exchange spacers.

Using a 6mm Allen Wrench to remove the bolt fixating the spacer.

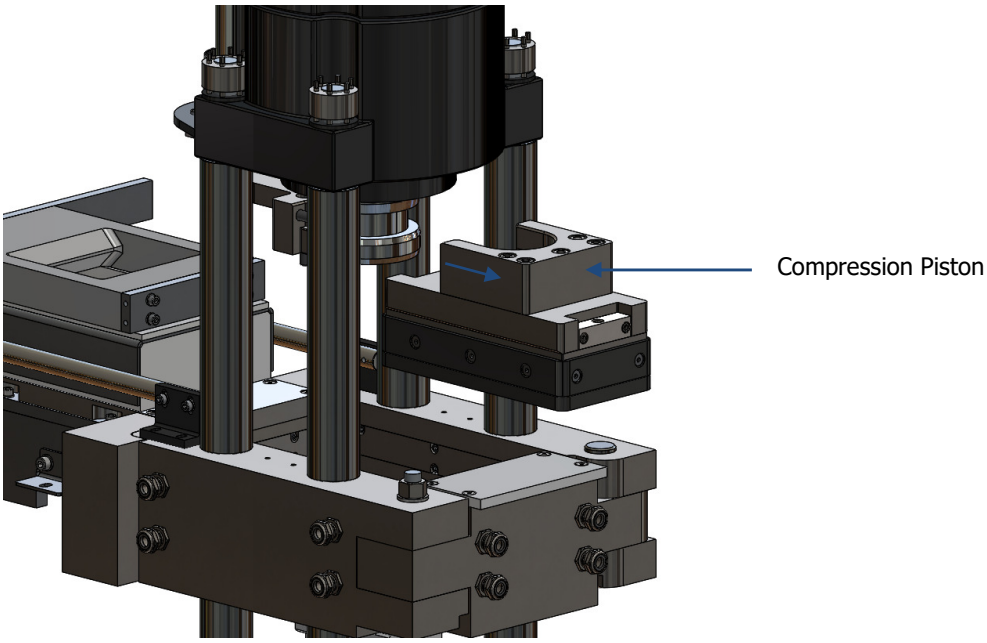


5 Using an 8mm Allen wrench, remove the four compression piston bolts & wedge lock washers.



6 Slide out the compression piston.

⚠ The compression piston is heavy.



1 Install the new compression piston by sliding it back then lifting it up into place over the cylinder rod.
2 Install the two compression piston bolts with wedge lock washers and tighten to 5 ft.-lbs (6.8 N-m).
3 Install the new rear back chamber piece then the 2 chamber side plates.
4 Install the new eject piston.
5 Install the new front chamber piece.
6 Close the front block door.
7 Install the taper pin by tapping downward with a rubber mallet until the pin protrudes out the bottom of the chamber walls.

Multi Slice

Before you begin this procedure, ensure you have the following tools:

- adjustable wrench or 24mm open-ended wrench
- rubber mallet
- and 8 mm Allen wrench

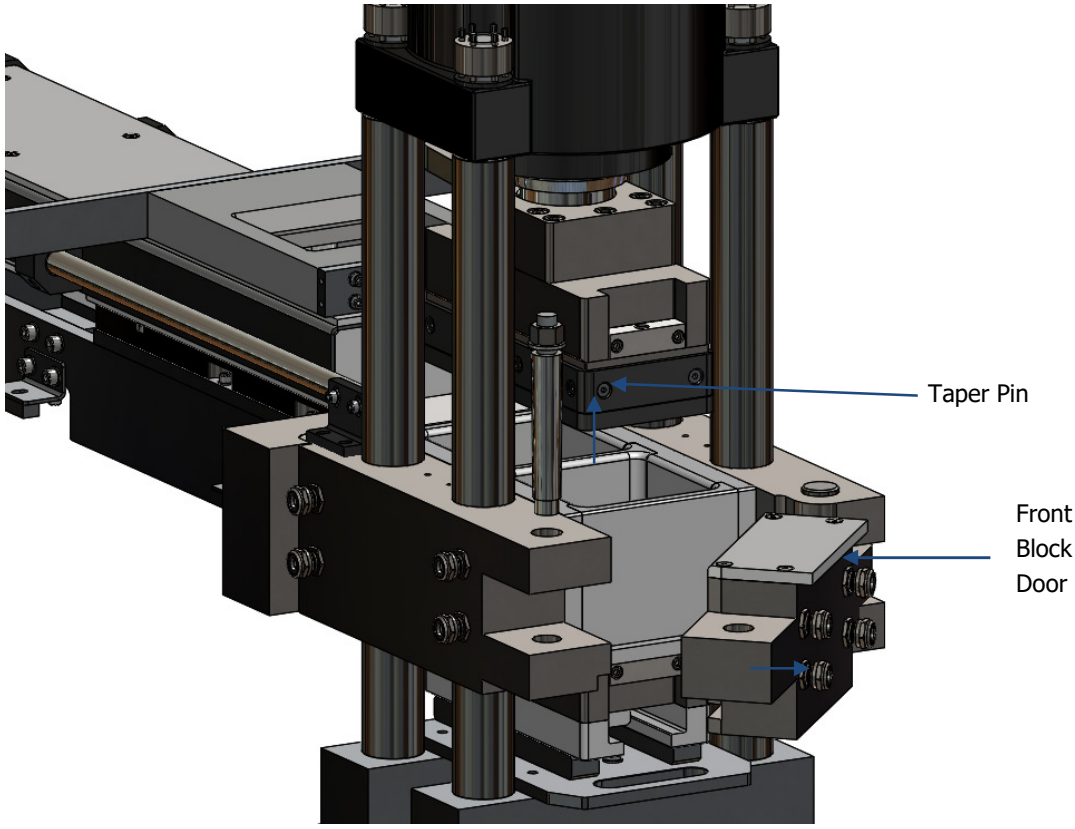
To change the compression piston:

1 Remove the taper pin.

- Remove the taper pin by turning the nut until the pin extends and can be pulled out manually, or use a rubber mallet to tap the pin upward from the bottom until the pin extends and can be pulled out manually.

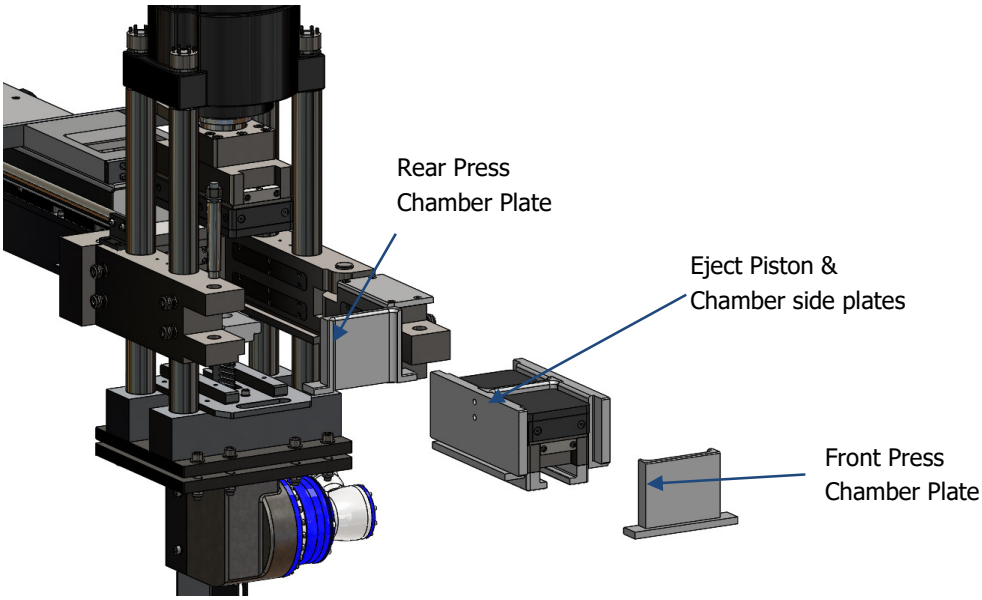
2 Open the front block door.

- The door opens to the right.

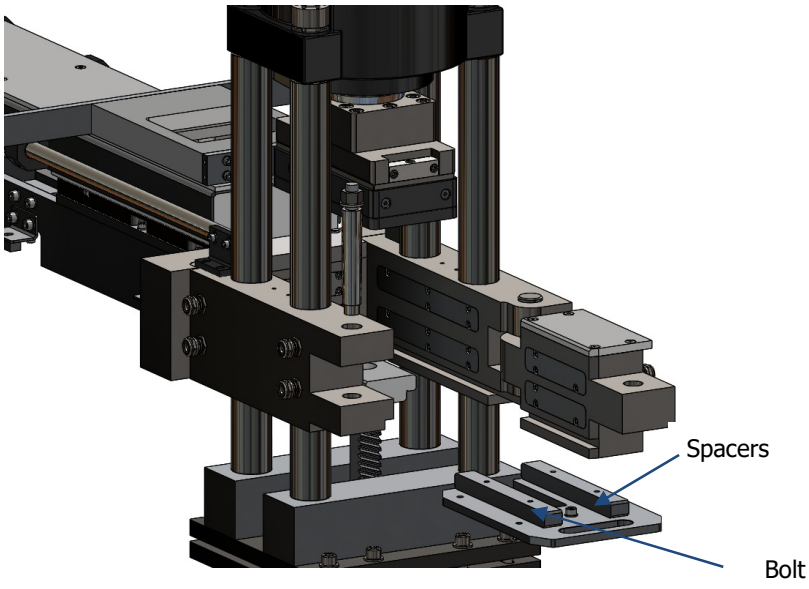


3 First, remove the front press chamber plate and then the eject piston & chamber side plates together. The chamber sides and eject piston will slide out as one unit. Next, remove the rear press chamber plate.

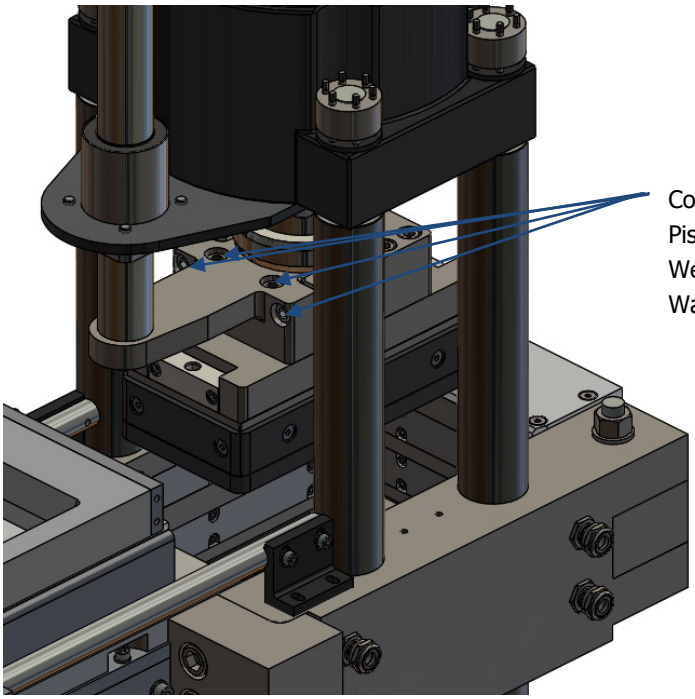
⚠ Use caution and keep the parts engaged during removal!



4 If necessary, exchange spacers.
Using a 6mm Allen Wrench to remove the bolt fixating the spacer.

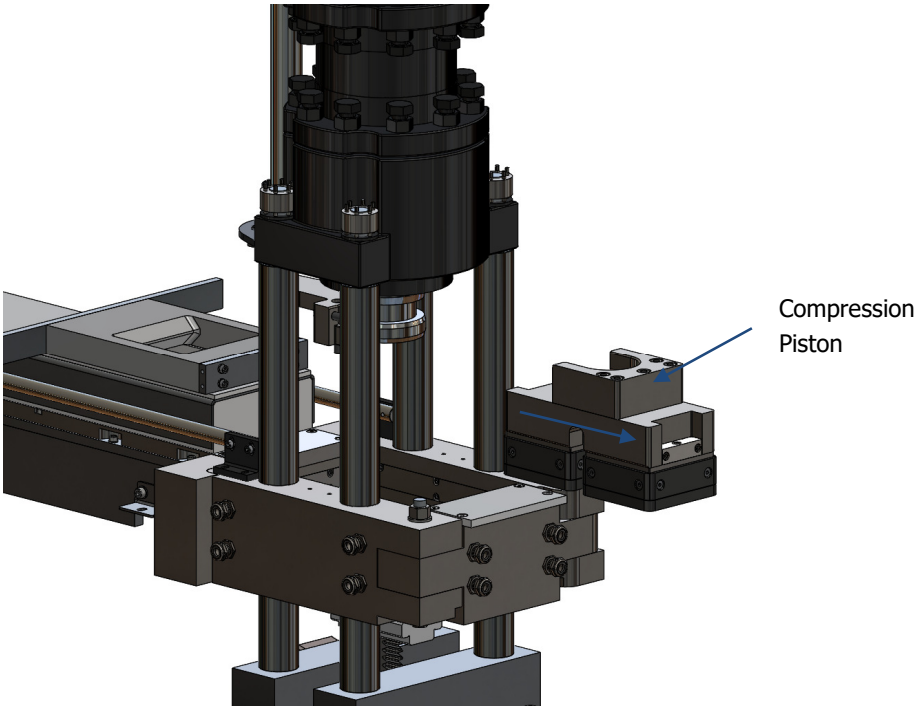


5 Using an 8mm Allen wrench, remove the four compression piston bolts & wedge lock washers.



6 Slide out the compression piston.

⚠ The compression piston is heavy.

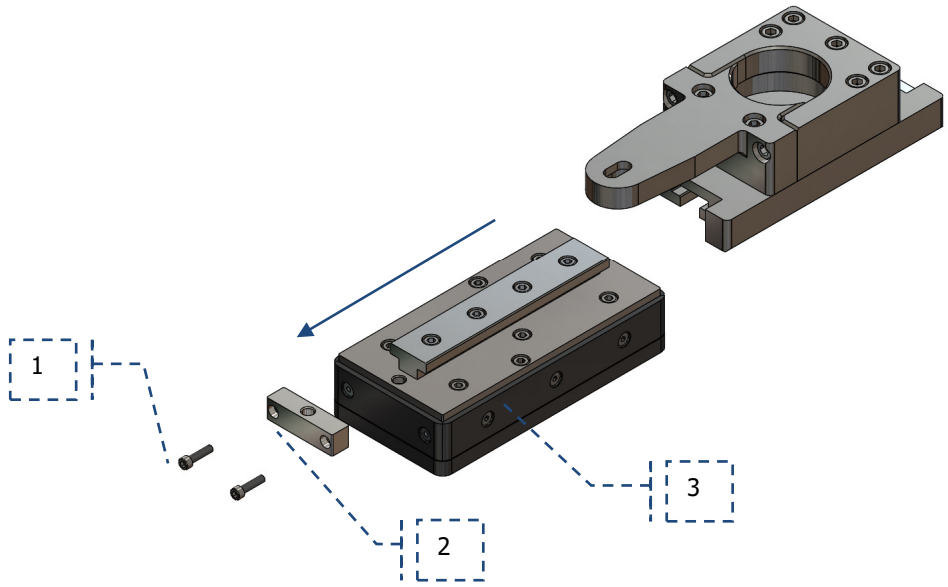


1 Install the new Compression Piston by sliding it back into place over the cylinder rod.
2 Install the four compression piston bolts with wedge lock washers and tighten to 12.5 ft.-lbs (17 N-m).
3 Install the New rear chamber plate.
4 Install the new eject piston & chamber side plates together as one unit.
5 Install the new front chamber plate.
6 Close the front block door.
7 Install the taper pin by tapping downward with a rubber mallet until the pin protrudes out the bottom of the chamber walls.
8 Close all guard panel doors before machine operation.

4. PROCEDURES FOR REPLACEMENT OF WEAR PLATES ON PRESS- AND EJECT PISTONS

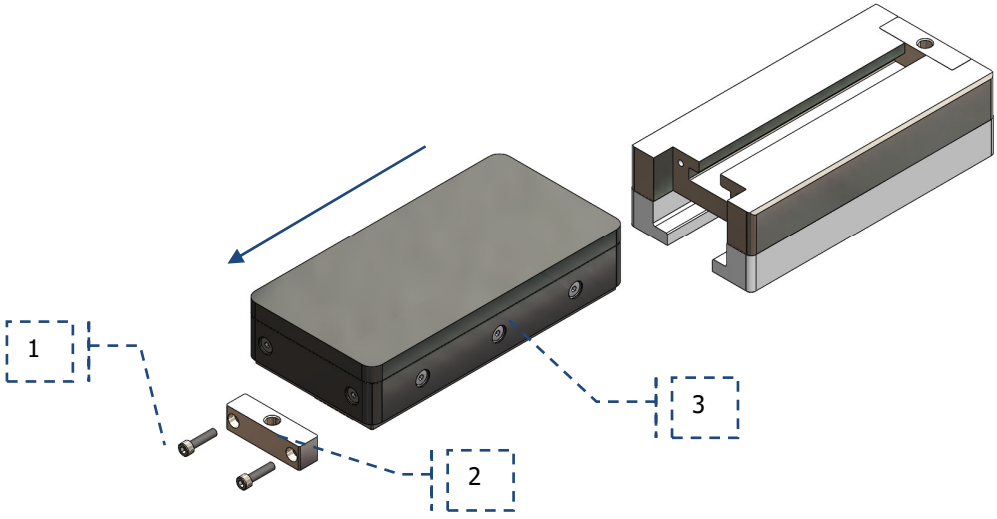
Press piston

To replace the wear plates on the press piston Loosen the two bolts [1] using a 5mm Allen wrench and remove the fixation bracket [2] and slide out the press piston [3].



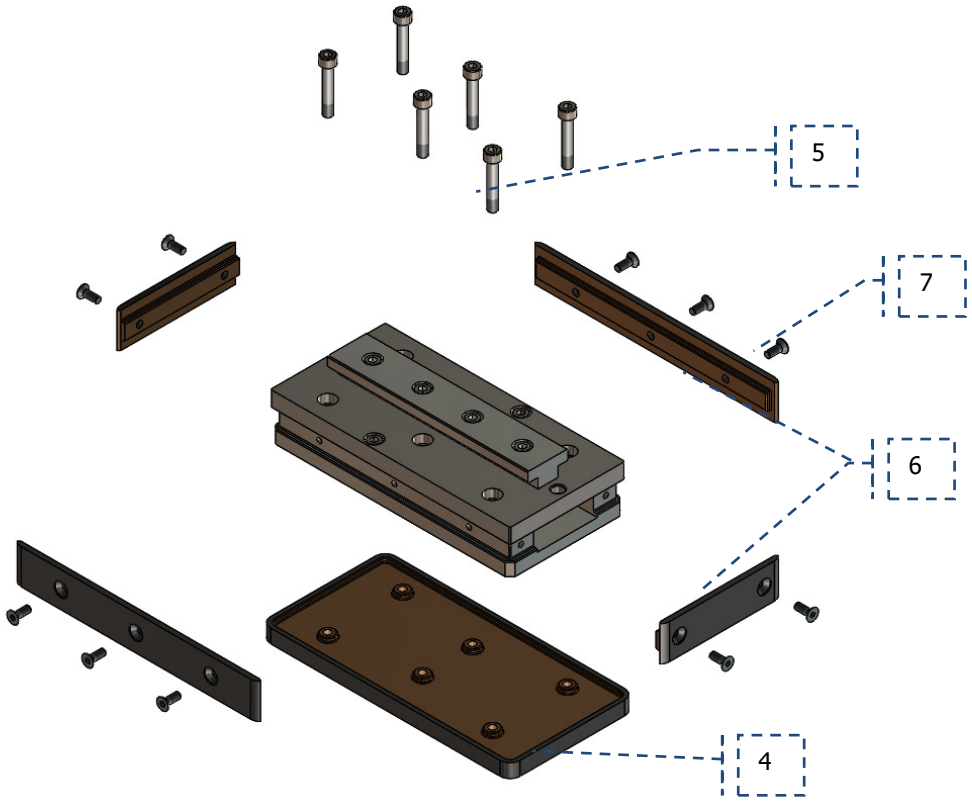
Eject piston

To replace the wear plates on the press piston Loosen the two bolts [1] using a 5mm Allen wrench and remove the fixation bracket [2] and slide out the eject piston [3].



Replace wear parts

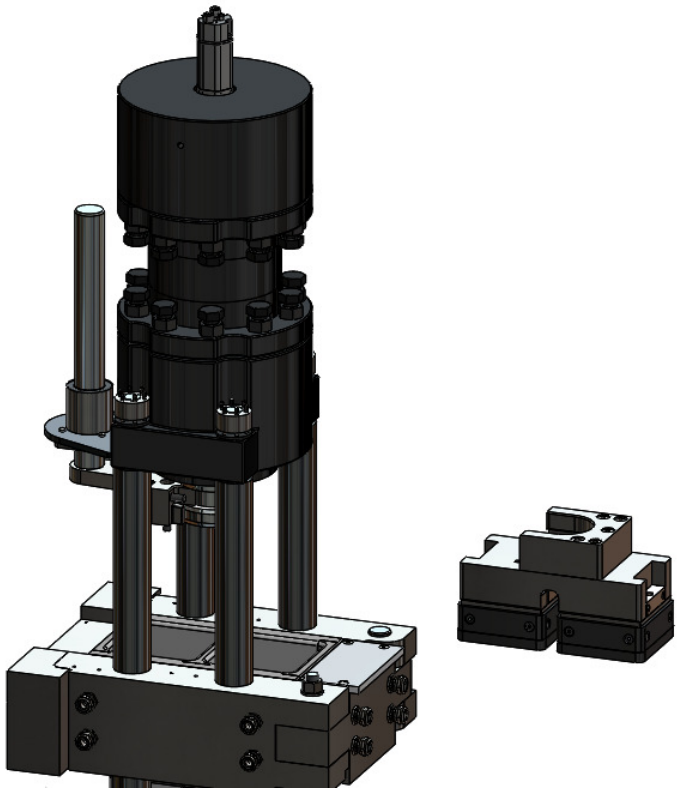
To remove the end plate [4], loosen the 6 screws [5] using a 6mm Allen wrench. The side plates [6] are removed by loosening the screws on the side [7] using a 4mm Allen wrench. Replace the worn parts and reassemble the press piston.



It’s important that the screws on the piston are secured by using low/medium strength threadlocker.

Reinstall the pistons as described in the procedure for tool set replacement.

5. PROCEDURE FOR REPLACEMENT OF Ø150 HYDRAULIC CYLINDER

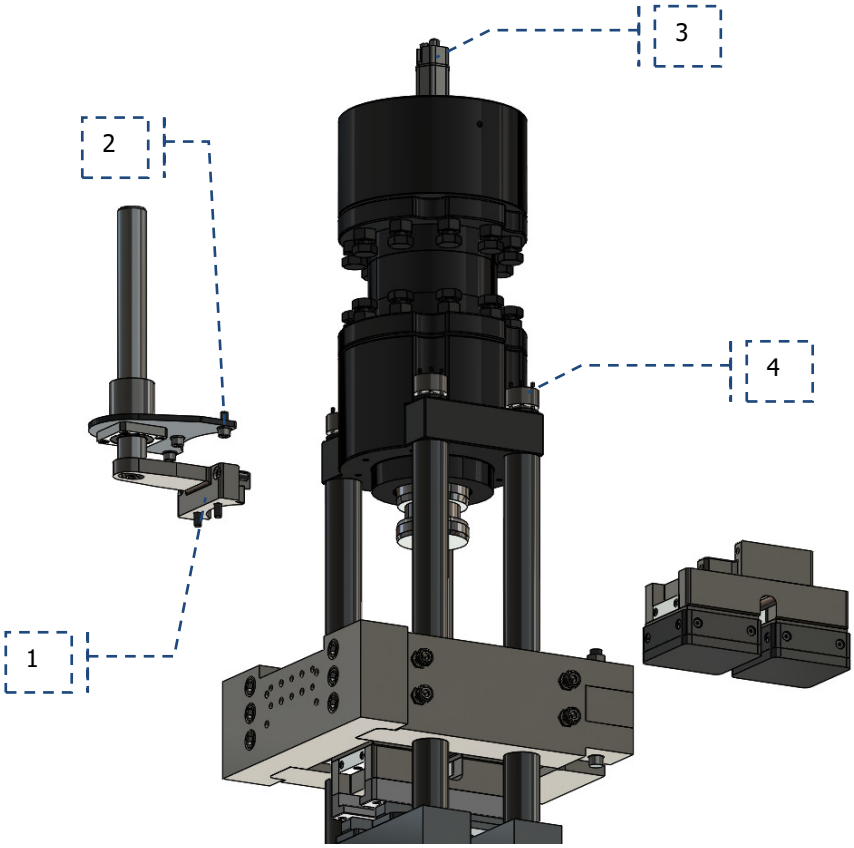


Remove the press piston and console

First thing to do is to remove the press piston by following the procedure for tool set replacement.

During this operation it's important to activate the emergency stop button!

Remove the rotation guard [1] by loosening the three bolts [2] using an 8mm Allen wrench.



Remove the cables for the linear encoder [3] and loosen the encoder using a 46mm wrench.

Replace the hydraulic cylinder

Support the hydraulic cylinder with a hoist or a forklift, and make sure that it's possible to lift it out of the machine frame. Remove and plug the hydraulic hoses**.** The hydraulic cylinder is removed by loosening the 4 super bolts [4].

Hoist the new cylinder in and place standing on the upper bracket. Tighten the 4 pcs. super bolts loosely, and make sure that the cylinder is level and in line with the press chamber. Final alignments are to be made after installing the press piston. Fit the rotation guard and torque tighten the three bolts [2] to 20,3 Nm. Reinstall the press piston. Reconnect the hydraulic hoses and plug in the linear encoder.

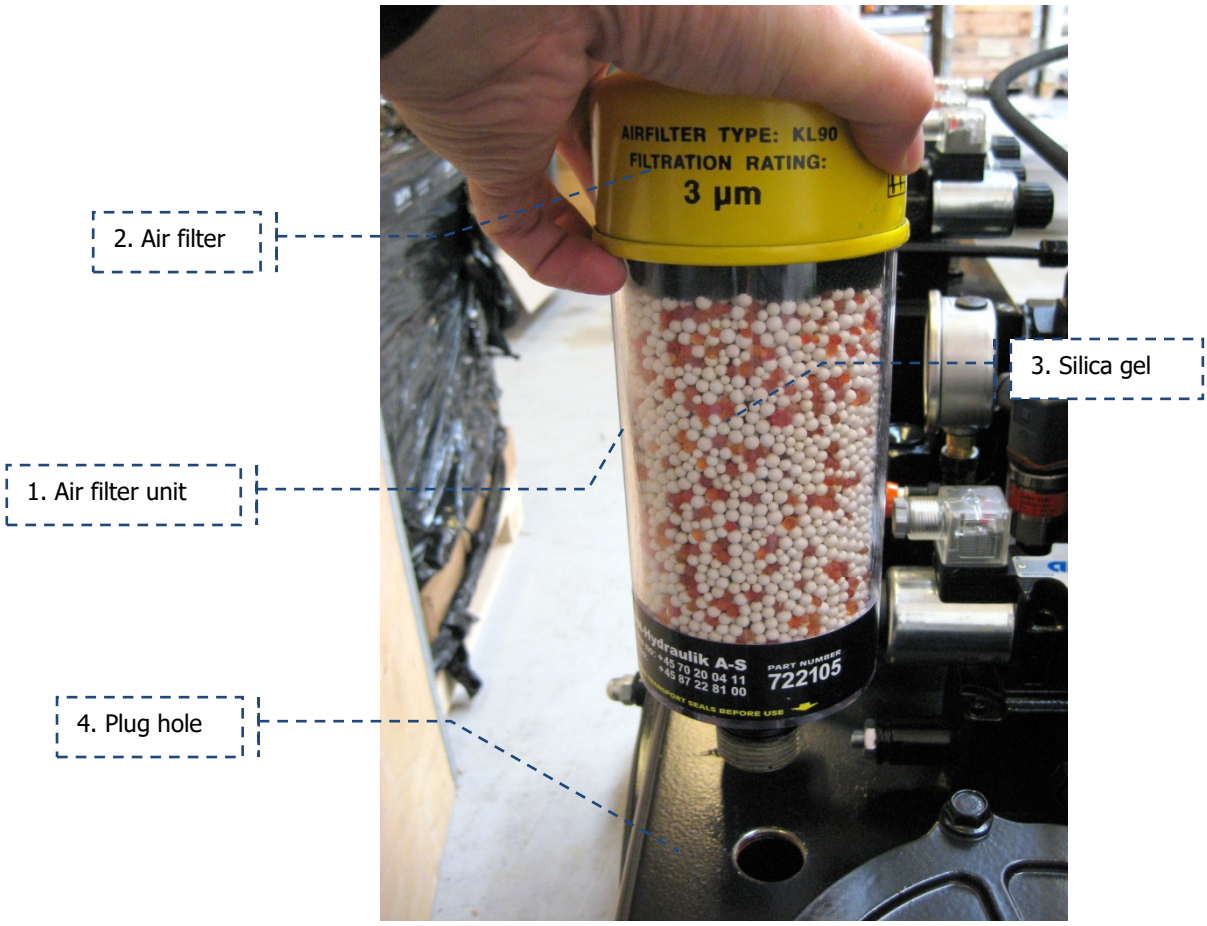
Drive the piston a bit into the chamber. With little force it should be possible to move the piston in all directions. The super bolts [4] should then be tightened according to following procedure:

APPLY GREASE (4A0001) BOTH ENDS AND TORQUE AS SHOWN IN SUPERBOLT CATALOG (PG 27-28) 9 FT-LBS (12.2NM) ON ALL 4 NUTS, THEN 18 FT-LBS (24.4NM) ON ALL 4 NUTS, THEN 27 FT-LBS (36.6NM) ON ALL 4 NUTS

Refill the hydraulic oil if necessary. Before resuming production it's important to check the offset on the linear encoder.

BEFORE STARTING PRODUCTION THE HYDRAULIC MOTION SHOULD BE CHECKED IN MANUAL MODE!

6. PROCEDURE FOR CHANGING AIR FILTER

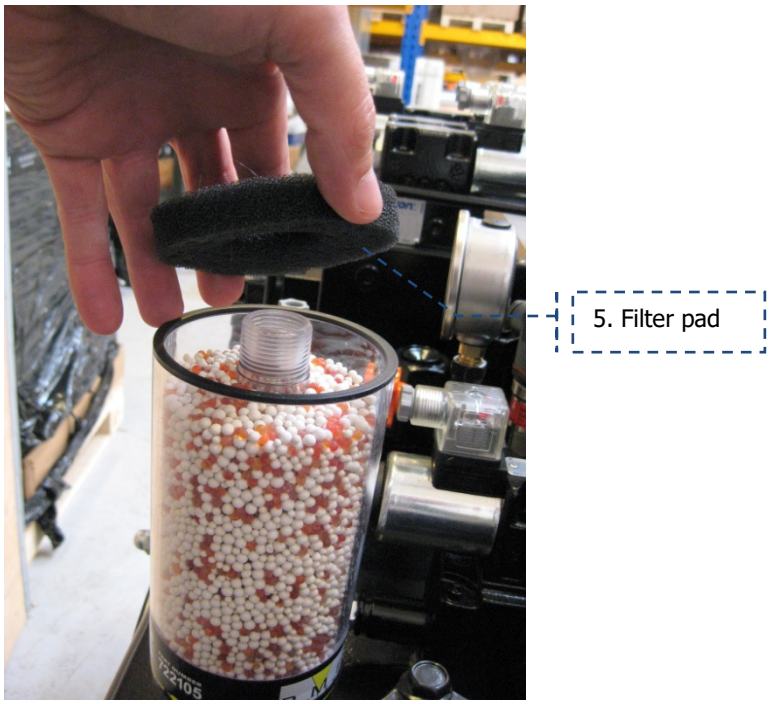


During this operation it's important to activate the emergency stop button!

Procedure step by step

Unscrew the air filter unit [1] from plug holes [4] in hydraulic station.

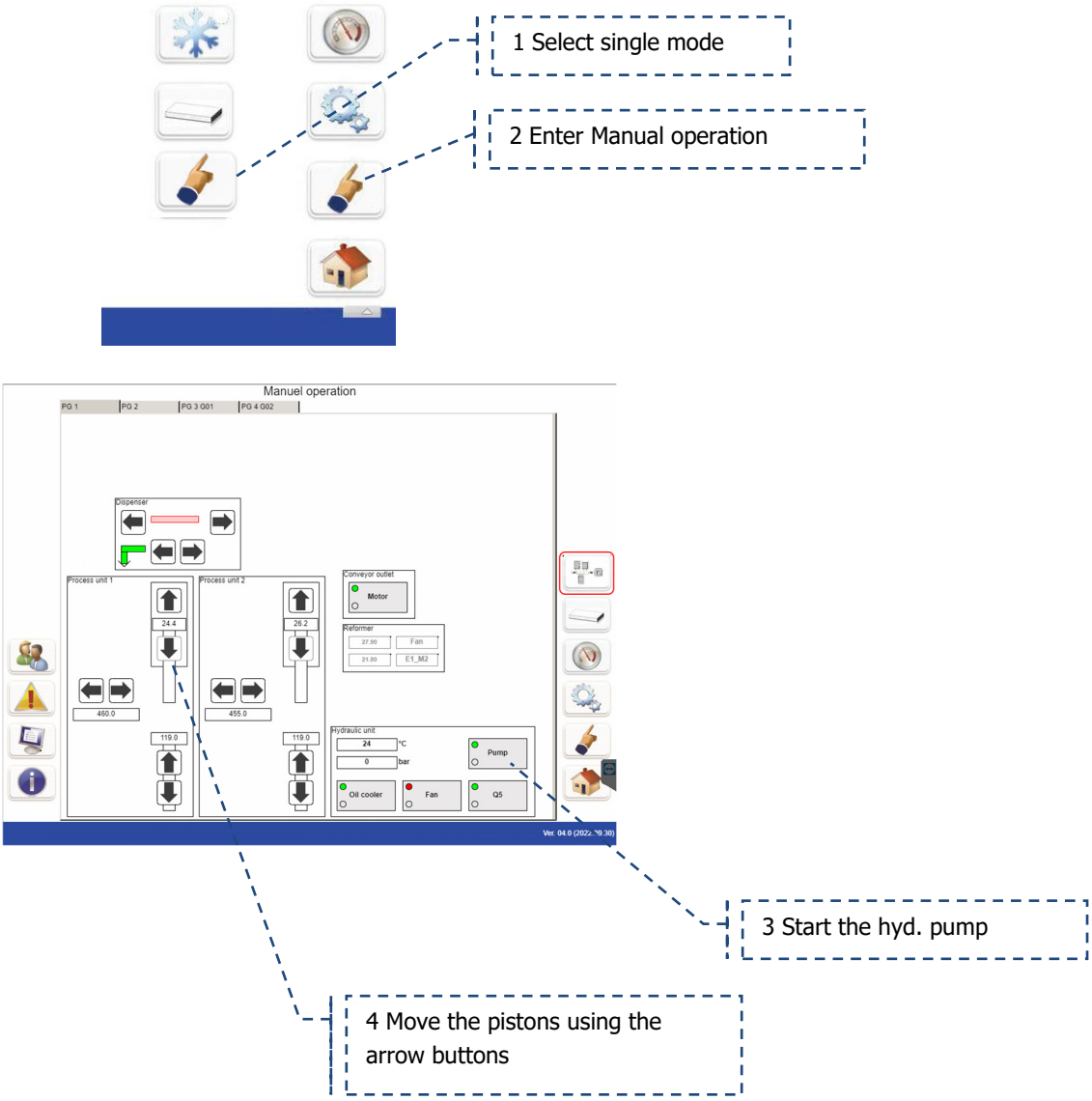
Unscrew the yellow air filter [2].



Pull out this air filter pad **[**5**]**.
Pour out the silica gel **[**3**]** and replace with new silica gel.
Replace the air filter pad **[**5**]**.
Mount a new air filter **[**2**]**.
Assemble the air filter unit and screw it into the plug holes **[**4**]** again.

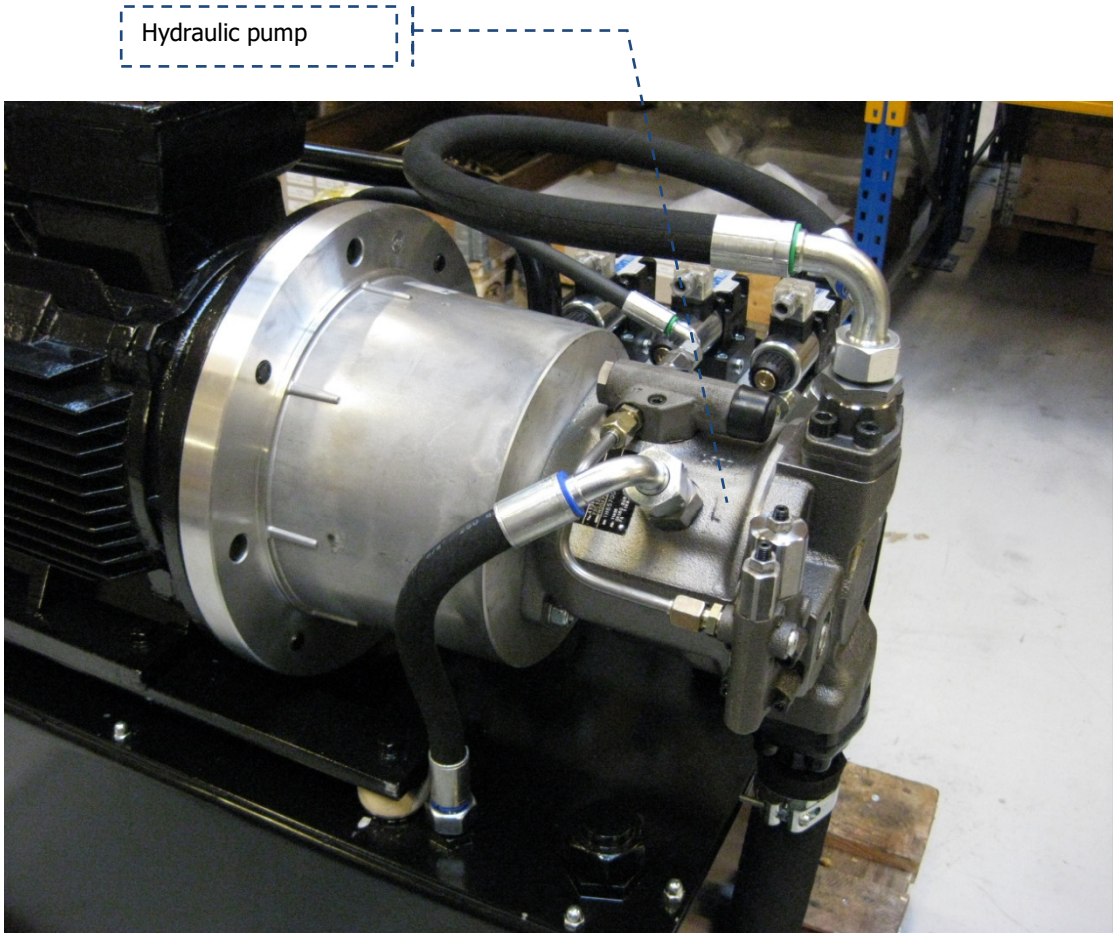
BEFORE STARTING PRODUCTION THE HYDRAULIC STATION SHOULD BE CHECKED IN SINGLE MODE!

Operating in single mode control



Check that there are no leaks on the hydraulic station.

7. PROCEDURE FOR CHANGING HYDRAULIC PUMP REXROTH



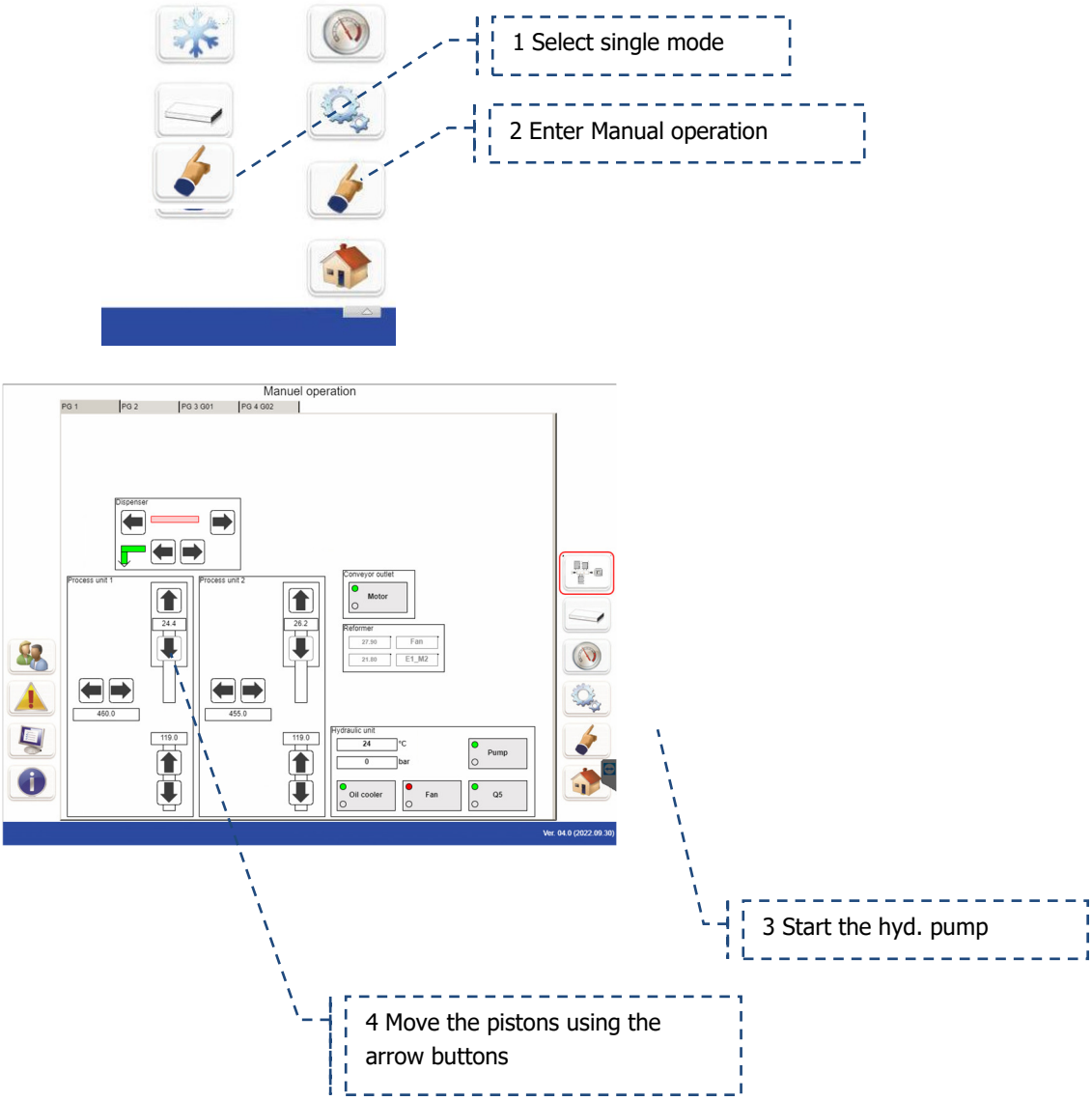
During this operation it's important to activate the emergency stop button!

Changing or repairing the hydraulic pump

This operation is only to be carried out by Cold Jet service technician or by a Cold Jet approved company such as Bosch / Rexroth.
The owner's qualified personnel who have been trained by Cold Jet in the repair and maintenance of Cold Jet dry ice production machines and accessories can in special repair cases such as this be allowed by Cold Jet to carry out this repair procedure.

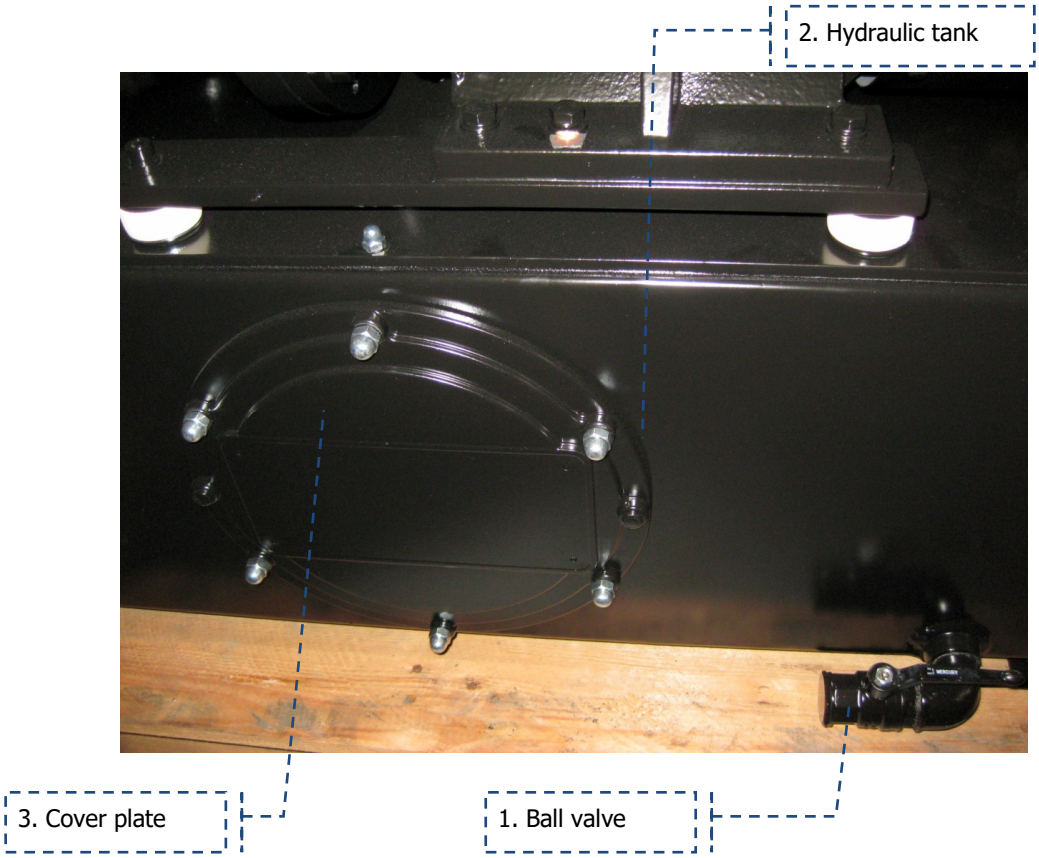
BEFORE STARTING PRODUCTION THE HYDRAULIC STATION SHOULD BE CHECKED IN SINGLE MODE!

Operating in single mode control



Check that there are no leaks on the hydraulic station.

8. PROCEDURE FOR CHANGING HYDRAULIC OIL HYDRAULIC STATION



During this operation it's important to activate the emergency stop button!

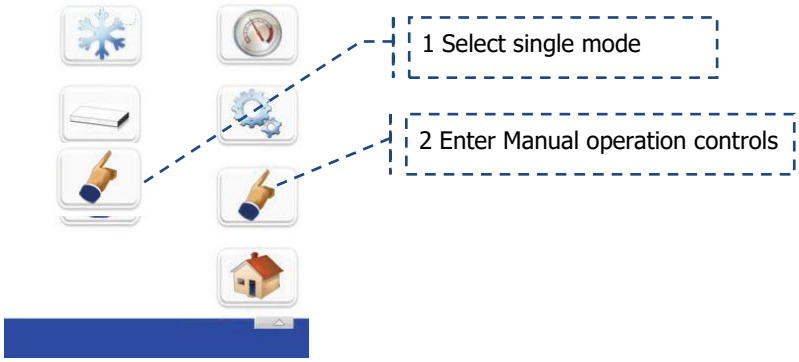
Procedure step by step

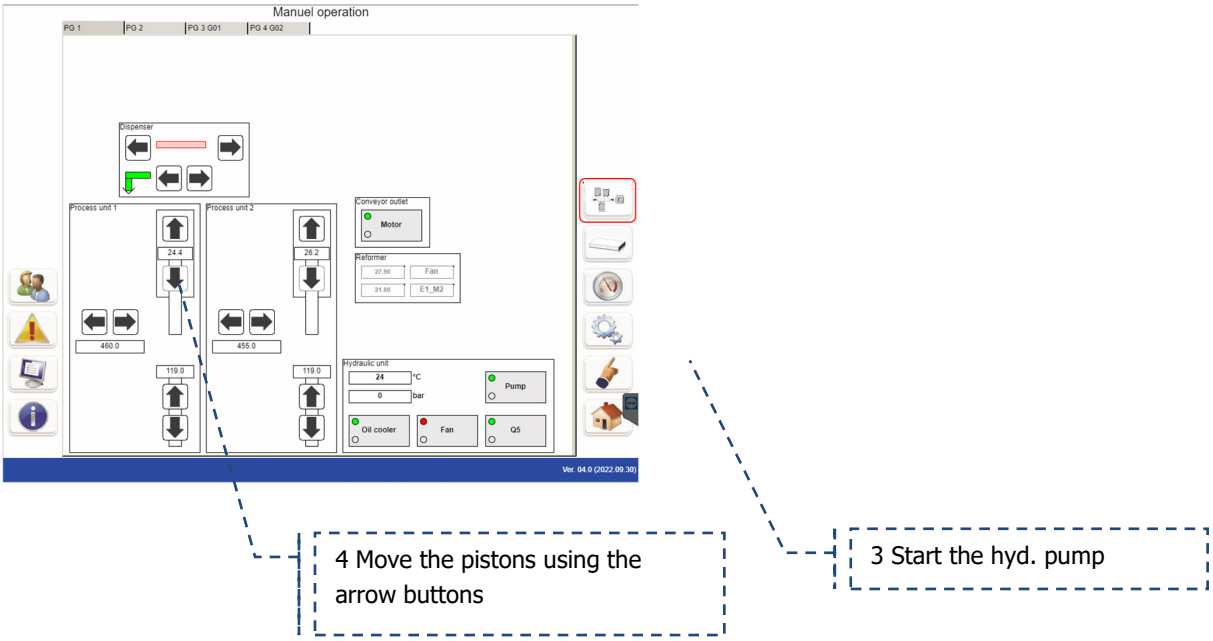
1. Remove the oil. Drain out off this ball valve [1]. The used oil must be deposited at an approved station for environmental waste.
2. Clean the hydraulic tank [2] inside by removing the cover plate [3] on the tank side.
3. Reassemble the hydraulic tank.
4. Put (270 Litres R1000H) "DTE Mobil FM 46 approved for food manufacturing" in the hydraulic tank.

Notice: If there are no demand for oil approved for food manufacturing, this oil can be used DTE 10 XL 46.

BEFORE STARTING PRODUCTION THE HYDRAULIC STATION SHOULD BE CHECKED IN SINGLE MODE!

Operating in single mode control





Check that there are no leaks on the hydraulic station.

The operation is complete.

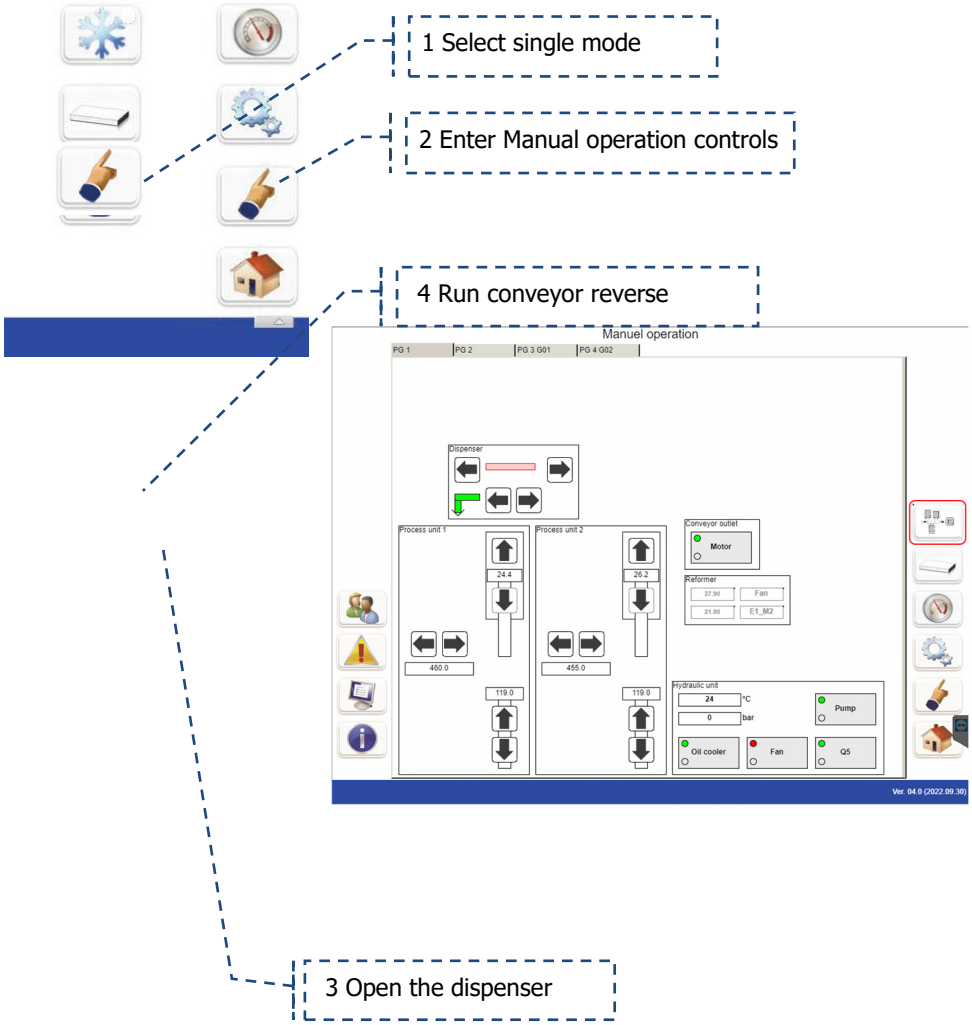
9. PROCEDURE FOR HOPPER CLEAN OUT AND MACHINE THAW UP

Hopper clean out

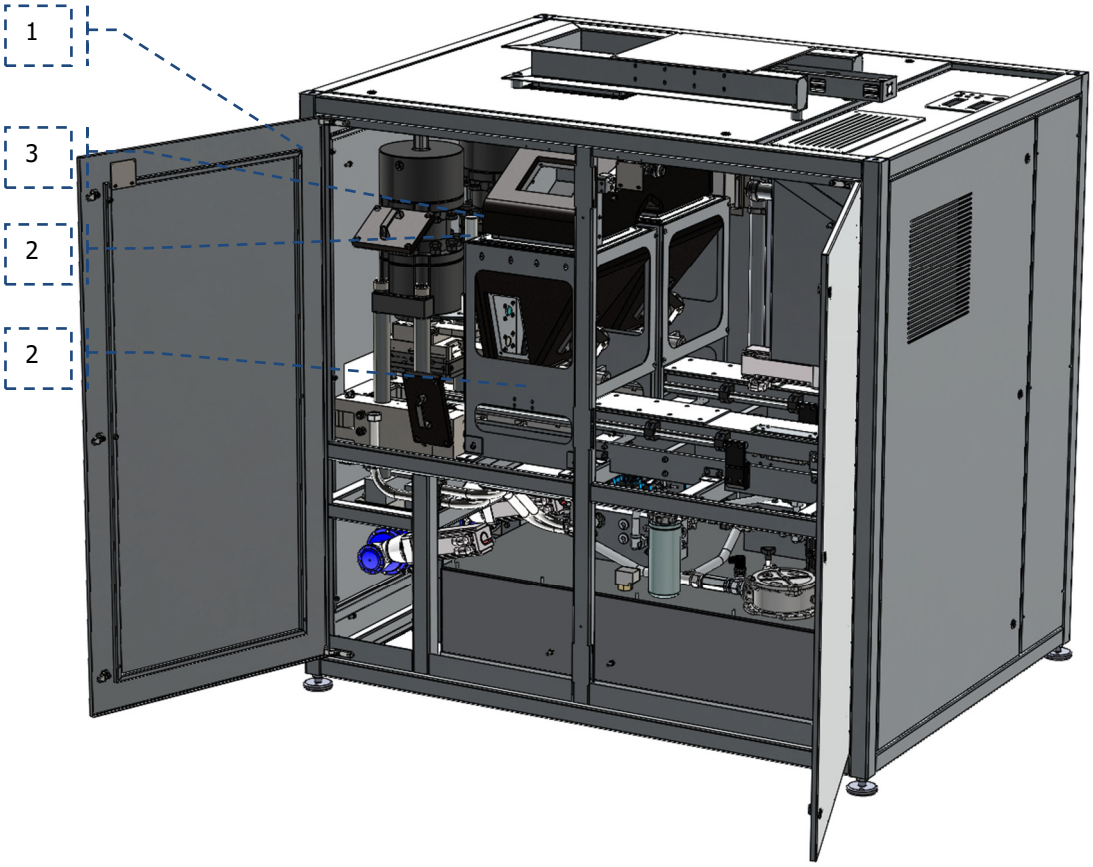
During production water ice will build up in the hopper over time depending on system setup and production continuity. To clean out the hoppers the reformer must be shut down. Make sure that the hoppers are empty by checking sensor status on the manual operation page.

When hoppers are empty, open the shutter in manual operation to avoid water build up on the shutter plate. Run the conveyor reverse to remove any water build up on the conveyor belt for at least 15 minutes before proceeding with the hopper clean out.

Operating in single mode control



Open the side doors [1] to access the hopper doors. When doors are heated up to approx. 20°C (68°F) loosen the 4 screws [2] on each door and remove the doors [3].



Remove any ice buildup in the hoppers and on the grid on top of the hoppers. Blow dry the diverter and the hoppers by using air at temperatures not higher than 40°C (104°F). When the hoppers are dry re-install the doors.

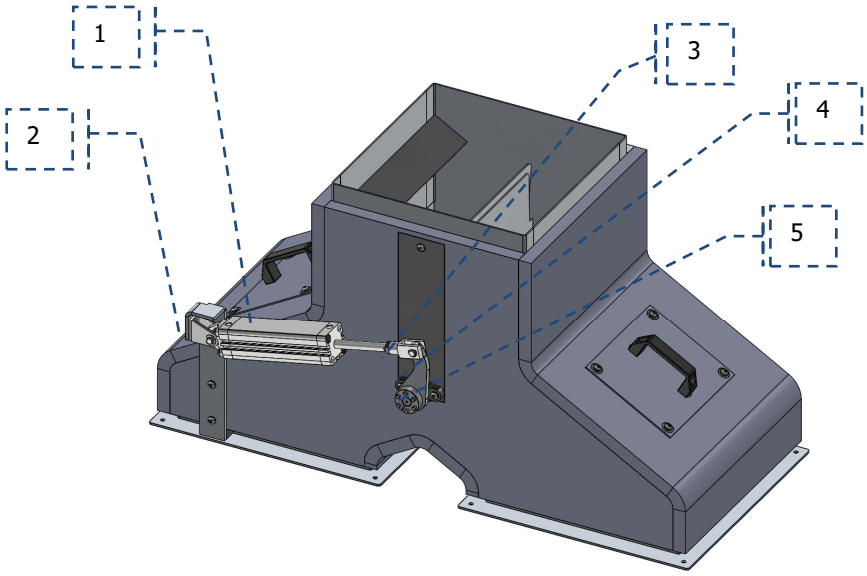
Machine thaw up

While cleaning out the hoppers it's recommended remove any buildup of water ice on tools, shuttles and ejectors. This can be done by blow drying using air at temperatures not higher than 40°C (104°F).

To complete the maintenance task close the doors and reset alarms before resuming production. This procedure is estimated to take no more than 2 hours and should be performed every 24 - 48 hours of continuous production depending on ambient temperature and humidity.

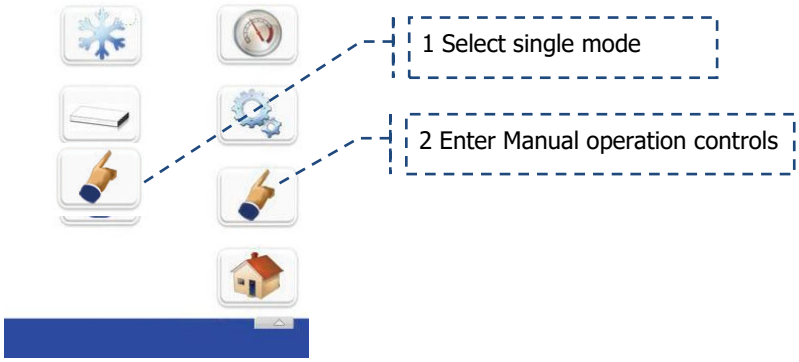
10. PROCEDURE FOR REPLACING DIVERTER CYLINDER

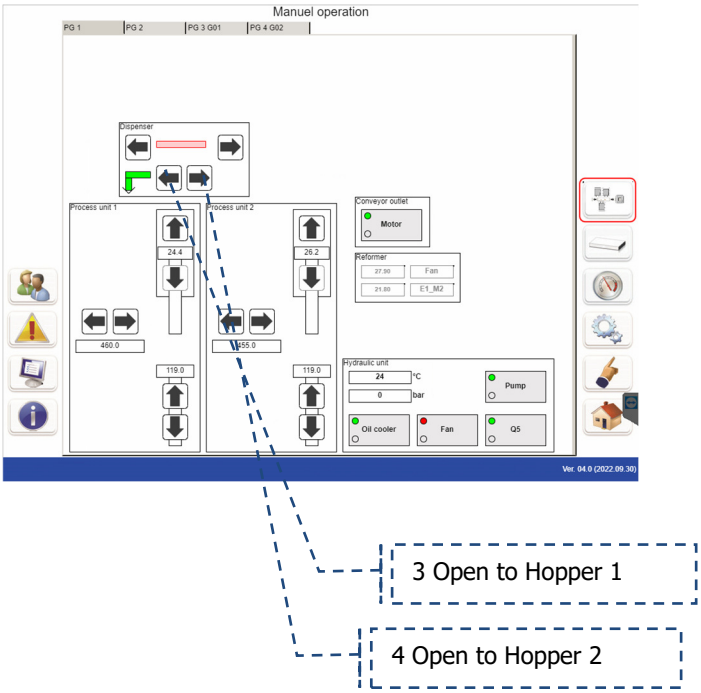
Before changing the diverter cylinder **[**1**]** make sure that R1000H is in E-stop state or shut down and that pneumatic air is disconnected. Remove air hoses and disconnect reed sensors. Loosen the 6 screws on the taper bush **[**5**]** and the 2 screws on the foot mount **[**2**]** for the pneumatic cylinder **[**1**]**. Pull the entire cylinder assembly off and replace with new parts from stock. Slide the taper bush **[**5**]** on the diverter plate shaft and install the foot mount **[**2**]** on the bracket. Adjust the cylinder plus stroke and diverter plate so there are a few millimeter gap between the hopper wall and the diverter plate. Check the return position of the cylinder that there also is a few millimeter gap on the opposite side between the hopper wall and the diverter plate. Tighten the taper bush. Connect reed sensors and check the adjustment of the reed sensors.



After installing the new diverter cylinder check the operation in single mode:

Operating in single mode control





3 Open to Hopper 1

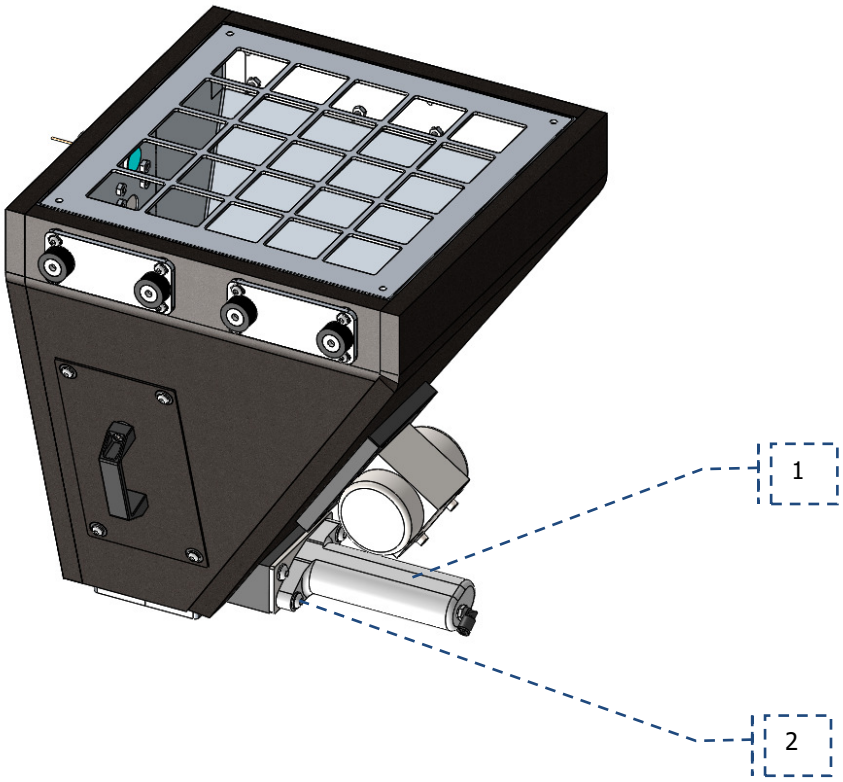
4 Open to Hopper 2

Make sure that the diverter is switching to the selected side and that the green arrow (showing the reed signal) also is pointing towards the selected side.

11. PROCEDURE FOR REPLACING HAMMER ON HOPPER

Before replacing the pneumatic hammer make sure that R1000H is in E-stop state or shut down and that pneumatic air is disconnected. Remove air hoses. Loosen the screws **[**2**]** holding the hammer **[**1**]** and replace the hammer **[**1**]** and reconnect the air supply.

Note!
Components on the hopper are fixed using thread locker. Use heating on the screws/nuts to easier loosen the components. Make sure to re-apply thread locker when assembling components on the hopper.



Make sure that the hammer is functioning properly after this operation.

TREMS OF WARRANTY

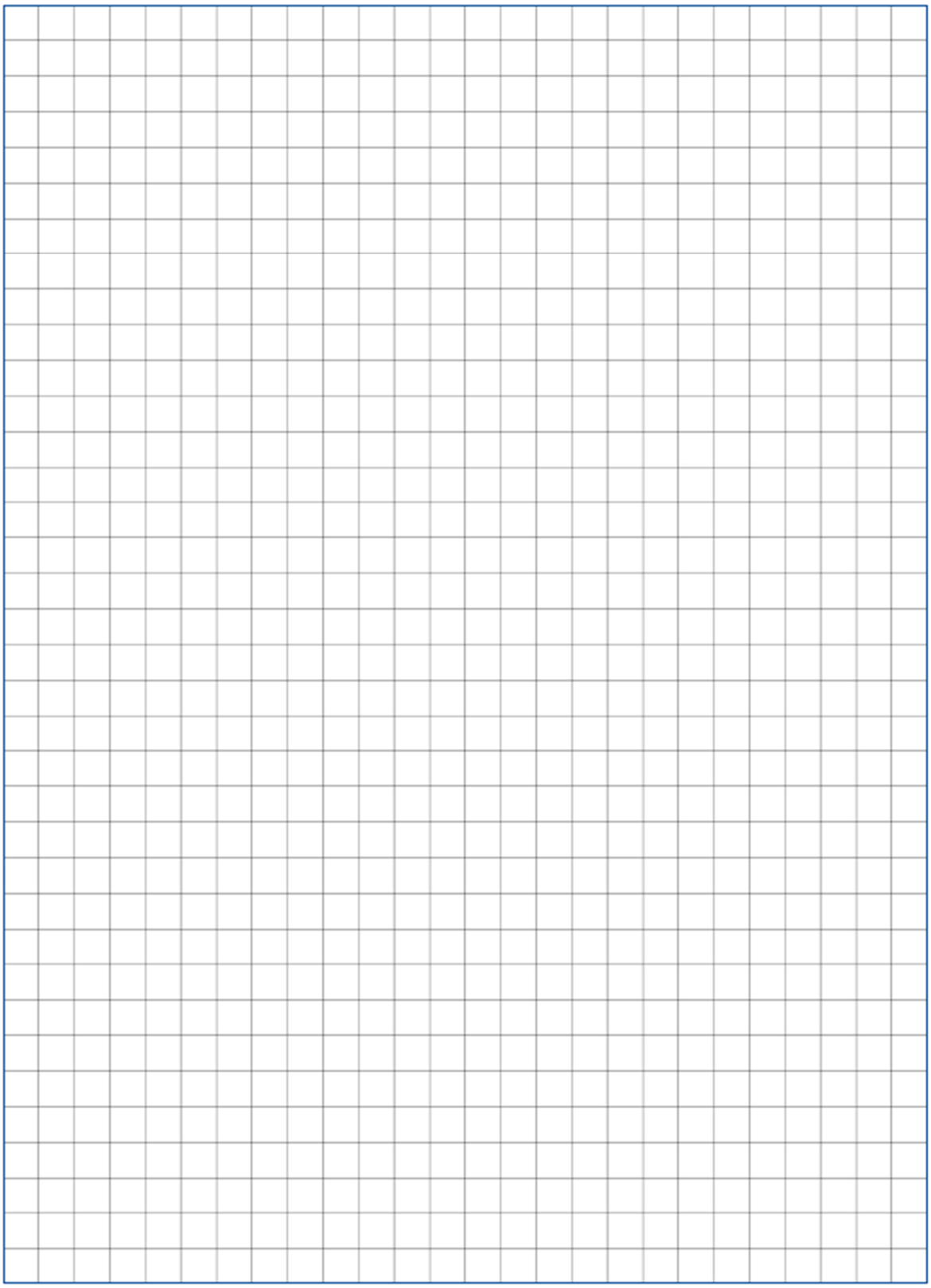
In order to comply with the terms of the warranty, and for safety reasons, repairs other than those stated above require relevant tools and equipment and therefore must always be made either by a Cold Jet technician or by the owner's qualified personnel who has been trained by Cold Jet in the repair 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.

NOTES



CONTACT INFORMATION

Find the customer support and technical services contact information for your region in the table below.

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