3DGENCE INDUSTRY F340

MAINTENANCE ACTIVITIES

Contents

1. HOTENDS CLEANING

Recommended frequency: each time printing is finished.

Each time after printing completion, it is recommended to clean the hotends from molten/burnt material that may be on the outside of the nozzle.

Procedure for hotend cleaning:

1. Set the heatbed to a position that allows good access to the hotends with the option: *Manual Controls → Down.*
2. Warm up the T0 hotend with the option: *Menu → Tune → Temperatures → Tool 0* and use the +/- keys to set the desired temperature:
   - for the PRO module up to 265°C,
   - for the HF module up to 265°C,
   - for the HT module up to 320°C,
   - for HTmax module up to 400°C.
3. Warm up the T1 hotend with the option: *Menu → Tune → Temperatures → Tool 1* and use the +/- keys to set the desired temperature:
   - for the PRO module up to 220°C,
   - for the HF module up to 265°C,
   - for the HT module up 265°C,
   - for HTmax module up to 265°C.
4. Set the T0 hotend in the active position with the option: *Manual Controls → Tool 0 Select*.
5. Wear protective gloves.
6. Gently remove any molten/burnt material from the T0 nozzle with non-combustible material or tweezers.
7. Set the T1 hotend in the active position with the option: *Manual Controls → Tool 1 Select*.
8. Gently remove any molten/burnt material from the T1 nozzle with non-combustible material or tweezers.
9. After cleaning the hotends, turn off the heating with the option: Menu → Prepare → Cooldown.

2. HEATBED CLEANING

Recommended frequency: each time printing is finished.

A dirty or greasy printer heatbed can make printing difficult or completely impossible. It is recommended to clean the heatbed each time after printing is finished or before it is started. Clean the printer heatbed by following the instructions below.

The procedure for cleaning the heatbed:

1. Set the heatbed to a position that makes it possible to clean it with the option: *Manual Controls → Down*.
2. Switch off all heating elements of the printer. Allow to cool completely and reach the ambient temperature.
3. Turn the printer off using the main power switch, then disconnect the printer from the power source.
4. Wear protective gloves.
5. Clean the heatbed surface of any plastic residue with a spatula.
6. Clean the heatbed with a damp cloth and then wipe dry with a paper towel.
7. Degrease the heatbed with a cloth soaked in ethyl alcohol or isopropyl alcohol and wait for the alcohol to evaporate.

3. HETABED CALIBRATION

Recommended frequency:
- each time after the device has been relocated,
- in case of poor adhesion of the first print layer to the heatbed or an unevenly laid first layer,
- in the event of a collision between the hotend and the model.

The 3DGence INDUSTRY F340 printer features an advanced, ultra-sensitive automatic heatbed calibration system for easy operation. The following describes the procedure to follow to calibrate the printer heatbed correctly. The printer is calibrated prior to shipment, but during transport it may have been misaligned. Therefore, it is recommended that you perform the following actions to avoid print problems. The calibration procedure of the work platform is the same each time. There is no need to carry out calibration before each printing, just once every several dozen hours of printing or whenever problems with the adhesion of the first layer of the print arise.

Heatbed calibration procedure:
1. Remove dirt and residue material from the nozzles using the hotend cleaning procedure described above (Section 1) and from the heatbed (Section 2). The heatbed and hotends **must** be clean before calibration.
2. Make sure that the temperature of the hotends is below 50°C. When the hotends are heated, set the temperature below 50°C using the +/- buttons: *Menu → Tune → Temperatures*.
3. Home all printer axes with the option: *Menu → Prepare → Home All*.

NOTE: Observe the movement of all axes carefully. When the Z axis reaches the end position sensor (Fig. 1) and stops, use a feeler gage to check the distance between the nozzle and the heatbed. It should be approx. 0.8 to 1.5 mm. A longer distance can lead to interruption of heatbed scanning and an error will be displayed. If the distance is greater than 1.5 mm, adjust the distance manually. **To do this, loosen the adjustment screw (Fig. 1) and adjust the distance manually. Raising the Z axis cutter (Fig. 1) will increase the distance between the nozzle and the heatbed, lowering it brings the nozzle closer to the heatbed. Once set, slightly tighten the adjustment screw (fig.1) and check the nozzle position using a feeler gauge, after selecting the "Home Z" command, available from the Manual Controls menu.**

4. Calibrate the heatbed using *Menu → Calibration → Heatbed scan.* Calibration will take approx. 90 minutes

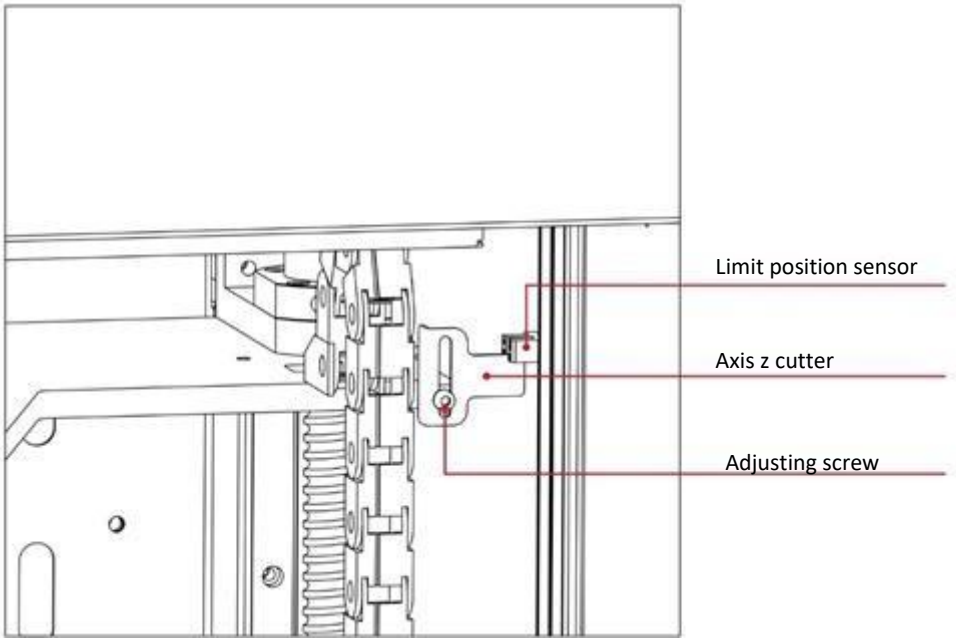

Fig. 1 End position sensor and Z axis cutter, located on the right hand side of the work platform

4. DIMENSIONAL CALIBRATION OF A PRINTED MODEL IN X AND Y AXES

Recommended frequency: each time the material type is changed to a different one.

The 3DGence INDUSTRY F340 printer is one of the few to feature a unique system of precise dimensional adjustment of a printed model. When printing with the use of materials with different thermal shrinkages, it may be necessary to make dimensional adjustments. For most printers, such adjustment can be very inconvenient or even impossible. Thanks to an innovative system, 3DGence INDUSTRY F340 allows you to easily and quickly make precise dimensional adjustments. The system using a single calibration print and some simple measurements allows you to achieve the accuracy of 0.02 mm.

NOTE: Each filament material has unique thermal shrinkage properties. For the most accurate results, such calibration should be carried out for the material which is to be used for printing.

Procedure for dimensional calibration of a printed model in X and Y axes:

1. Download the .stl model of the calibration solid Dimmension_Calibration.stl (Fig.2). The .stl model can be downloaded from www.3dgence/support in the tab Your files (the tab is available after you sign up and register your device).

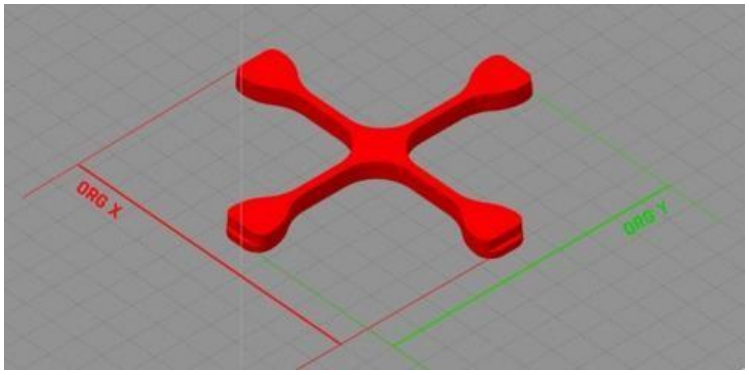

Fig. 2 Model Dimmension_Calibration.stl

2. After downloading the calibration model, prepare the .gcode file in the 3DGence Slicer software for the material you will use for printing.
3. Load filaments by selecting *Material Status* → *Load Filament* from the printer menu under the appropriate TOOL 0 or TOOL 1 extruder and follow the instructions on the printer display.
4. Start printing the calibration model.
5. Wait until the cooling process is complete after you finish printing. Remove the model carefully and wait approx. 5 minutes for the temperature to stabilise.
6. Place the printed item on a flat surface and measure the dimensions along the X and Y axes. The axes are marked on the model.
   Different tools can be used to measure the accuracy, but their accuracy must not be lower than 0.05 mm:
   - a calliper,
   - a micrometer,
   - a coordinate-measuring machine,
   - optical tools.

   The measuring point should be above the step located in the model. The step will make it easier to measure at the same height on both sides of the model (Fig. 3),
   Measure the X and Y axes 5 times each and take down the measurements. Discard the highest and lowest measurement in each group. Calculate the average of other dimensions for each axis (Fig. 4).

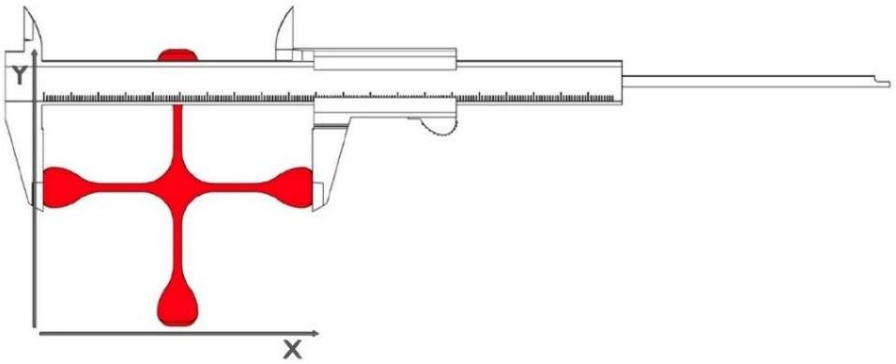

Fig. 3 Visualisation of the measurement by means of a calliper

MEASUREMENT:	X:	Y:
	100,08	100,07
	100,06	100,06
	100,05	100,08
	100,04	100,06
	100,05	100,05
AVERAGE:	100,05	100,06

Fig. 4 Heatbed of measurements for the X and Y axes

7. If the measurements are between 99.95 and 100.05 mm (tolerance of ±0.05 mm) and the difference between the X and Y axes is between 0 and 0.05 mm, the printer is calibrated correctly.
8. If the printed item does not meet the above guidelines, an adjustment must be made:
   - From the printer menu, select *Menu → Calibration → XY Calibration*.
   - In the Original X box and using the +/- button, enter the original dimension for the X axis according to the CAD design (100 mm in the X axis for the Dimmension_Calibration model downloaded from the manufacturer's website).
     If the compensation is for another model, enter a target value for a dimension in the X axis of the model according to the CAD design.
   - In the Print X box enter the measured dimension for the X axis using the +/- button.
   - In the Original Y box and using the +/- button, enter the original dimension for the Y axis according to the CAD design (100 mm in the Y axis for the Dimmension_Calibration model downloaded from the manufacturer's website).
     If the compensation is for another model, enter a target values for a dimension in the Y axis of the model according to the CAD design.
   - In the Print Y box enter the measured dimension for the Y axis using the +/- button.
   - Save the measurements by selecting the SAVE command.

9. Restart the print job, then repeat these steps until the printer is calibrated and the dimensions are between 99.95 and 100.05mm (tolerance of ±0.05mm) and the difference between the dimensions is between 0 and 0.05mm.

With this procedure, the next item printed for which calibration has been carried out will be printed with the material shrinkage compensation in the X and Y axes.

5. CALIBRATION OF OFFSET BETWEEN HOTENDS IN THE MODULE IN THE X, Y, Z AXES

Recommended frequency:

- each time after installing the module**,**
- each time after the device has been relocated,
- in the case of poor adhesion at the contact between two materials,
- in the event of a collision between the hotend and the model.

Z offset calibration:

The Z offset between the T0 hotend and the T1 hotend is a key parameter for high print quality. A correctly calibrated Z offset value allows you to obtain high quality surfaces between the raft and the base material and between the support and the base material.

The 3DGence INDUSTRY F340 printer enables automatic offset measurement in the Z axis. The measurement is carried out with the use of a strain gauge and consists in determining the difference between the height of the T0 and T1 hotends.

In order to carry out the measurement select: *Menu → Calibration → Printing Module → Measure T1 offset*.

Calibrating X,Y axes offsets:

To verify the offset in both axes, print the calibration model stored in the printer's memory (the procedure is described below). The model consists of two parts - part X (Fig. 5) and part Y (Fig. 6). Part X is used to set the offsets between the hotends in the X axis. Part Y is used to set the offsets between the hotends in the Y axis. Each part consists of two layers of material - the bottom layer printed with the supporting material (Fig. 5, white) and the top layer printed from the model material (Fig. 5, red). Each part of the model is built with 11 lines. The middle line is the 0.00 point. The lines to the right of the 0.00 point increment with the plus sign every 0.05mm within the range from 0.05mm to 0.25mm, and lines to the left from point 0.00 decrement with the minus sign every 0.05mm within the range from -0.05mm to -0.25mm (Fig. 5, 6). The printed symbols: "+" on the right and "- " on the left are helpful in determining the sign with which the read value must be entered into the printer (Fig. 5, 6). With correctly calibrated offsets on the centre line (point 0.00), the model material matches the support material both in the X axis and in the Y axis.

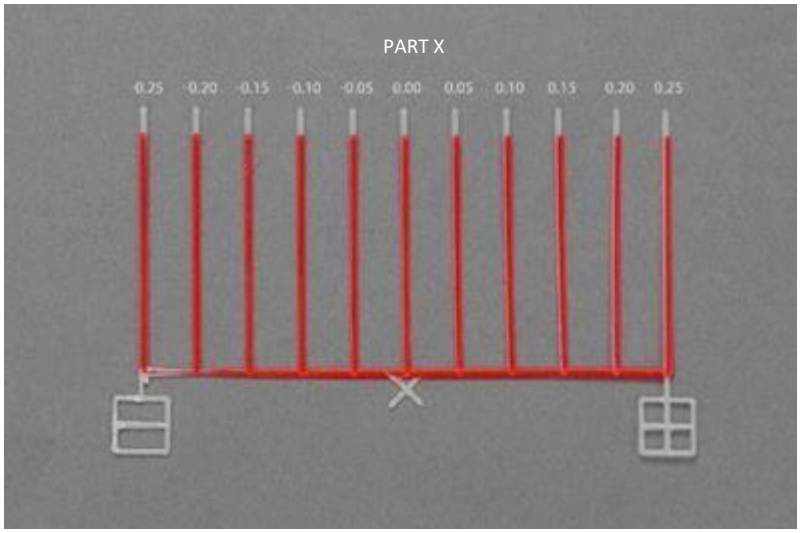

Fig. 5 Offset calibration model for the X axis

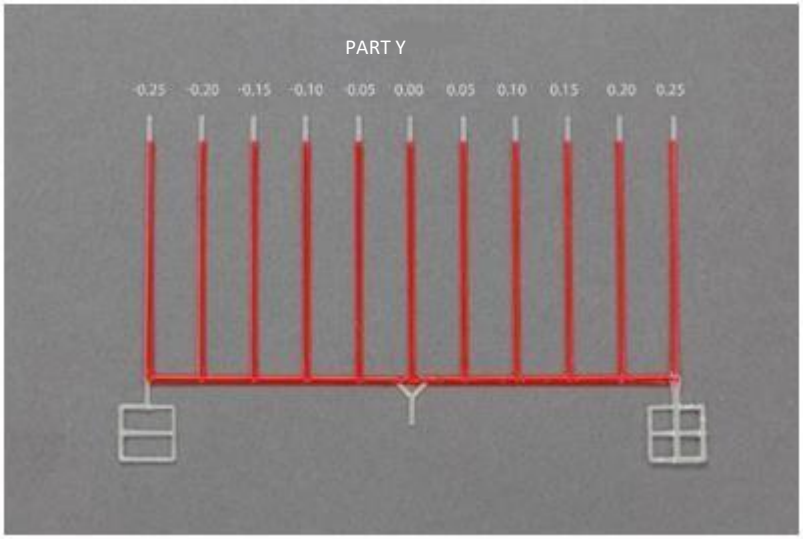

Fig. 6 Offset calibration model for the Y axis

Calibration procedure for offsets in the X, Y axes:

1. Load the model and support filament by selecting from the printer menu *Material Status → Load Filament* under the TOOL 0 and TOOL 1 extruder and follow the instructions on the display.
2. Print the calibration model stored in the printer memory by selecting *Menu → Calibration → Printing Module → Automatic XY Calibration* from the printer menu.
3. After printing the model, select the line on the display that best matches the model material with the support material in part X.
4. Select the *CONTINUE* button.
5. Select the line on the display that best matches the model material with the support material in part Y.
6. Select the *CONTINUE* button.
7. Confirm by pressing the *SAVE* button.
8. Reprint the model stored in the printer memory by selecting *Menu → Calibration → Printing Module → Automatic XY Calibration* from the printer menu and assess the calibration level of the offsets:
   - when the model material on the centre line (point 0.00) matches the support material both in the X axis and in the Y axis, the offsets of the double-hotend module are calibrated correctly.
   - when the model material on the centre line (point 0.00) fails to match the support material both in the X axis and in the Y axis, the offsets of the double-hotend module are not calibrated correctly. Recalibrate the offsets according to steps 2 - 7.

6. REGENERATION OF HOTENDS IN THE PRINTING MODULE

Recommended frequency:

- in the event of hotend blockage or significant changes in quality noticed on the printed items.

The service life of the printing module hotend is at least 1000 hours of module service.
Print module lifetime is at least 4000 hours of module service or 1 year.

If there's a problem with the print hotends or the print module, contact the 3DGence technical support via the request form at www.3dgence.com/support (the form is available after you sign up and register your device).

7. CLEANING THE EXTRUDER

Recommended frequency: every 2000 hours of printer operation or when blockage occurs.

Extruder cleaning procedure:

1. When filaments are loaded, unload them using the option: Material Status -> Unload filament and follow the instructions on the printer display. For more information, refer to the printer manual (Section III, item 4.2).
2. Remove the module from the printer using the option: *Menu → Prepare → Module change* and follow the instructions on the printer display. For more information, refer to the printer manual (Section VI, item 2).
3. When safe temperature has been reached, **turn off** the printer.
4. Open the top cover of the printer to allow free access to the extruder.
5. Remove the C-shaped lock (Fig. 7, step 1) from the connector.
6. Press the connector lock (Fig. 7, step 2) and simultaneously remove the supply pipe from the connector by pulling it up (Fig. 7, step 3).
7. Clean the extruder from residual material with compressed air.
8. Slide the supply tube back into the connector hole until it stops - about 2cm (Fig. 7, step 4), and then insert the C-shaped lock (Fig. 7, step 5).
9. Install the module in the printer. Refer to the printer's operating instructions (Section VI, item 2) for instructions on how to install the module.
10. Load filaments using the option: *Material Status → Load Filament* and follow the instructions on the printer display. For more information, refer to the printer manual (Section III, item 4.1).

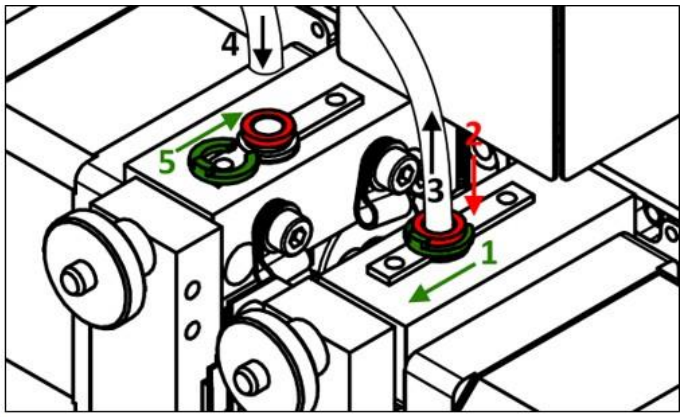

Fig. 7 Removing the supply tube from the extruder

8. CURTAIN REPLACEMENT

Recommended frequency:

- every two years or after 8,000 hours of printer service,
- in the case of damage.

When replacement is necessary due to damage or desirable for other reasons, please contact the 3DGence Technical Support to purchase new curtains.

Curtain replacement procedure:

1. Turn off the printer.
2. Open the front door of the printer.
3. Remove the right and left curtains. The curtains are fixed with magnets.
4. Install new curtains in place of the replaced ones. The curtains must be fixed with magnets.

9. REPLACE THE AIR FILTER ON THE REAR SIDE OF THE PRINTER

Recommended frequency: every six months or 2,000 hours of printer service.

The air filter on the back of the printer protects the user from harmful fumes and odours.
If you wish to replace it, please contact the 3DGence Technical Support to purchase a new filter.

Procedure for replacing the air filter on the rear side of the printer:

1. Turn the printer off and make sure you have access to the rear part of the printer.
2. Remove the filter housing by pulling it up (Fig. 8, step 1) and towards you (Fig. 8, step 2).
3. Remove the used air filter from the housing and insert a new one.
4. Replace the housing and the new filter on the printer following steps 1 and 2.

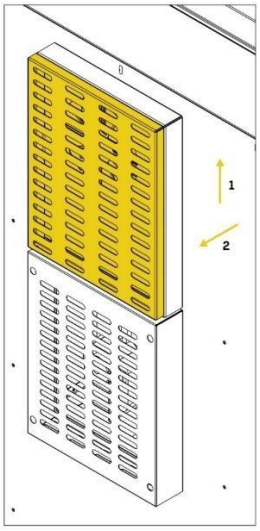

Fig. 8 Replacing the air filter

10. REPLACE THE AIR FILTER FROM THE TOP SIDE OF THE PRINTER

Recommended frequency: every year the printer is in service.

If you wish to replace it, please contact the 3DGence Technical Support to purchase a new filter.

Procedure for replacing the air filter from the top side of the printer:

1. Turn the printer off and make sure you have good access to the top cover of the printer.
2. Remove the 4 DIN7991-M5x12 screws fixing the top cover to the printer and put them aside (Fig. 9).

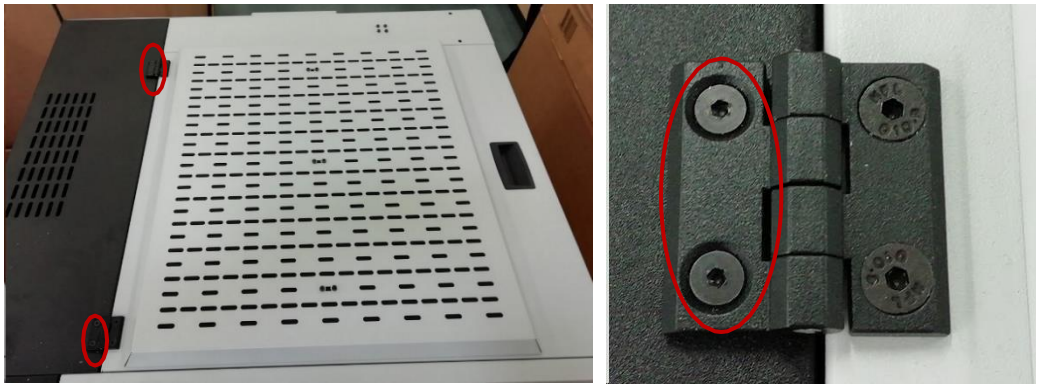

Fig. 9 Unscrew the 4 DIN7991-M5x12 screws fixing the top cover to the printer.

3. Remove the top cover from the printer and place on a flat surface as shown in the picture (Fig. 10).

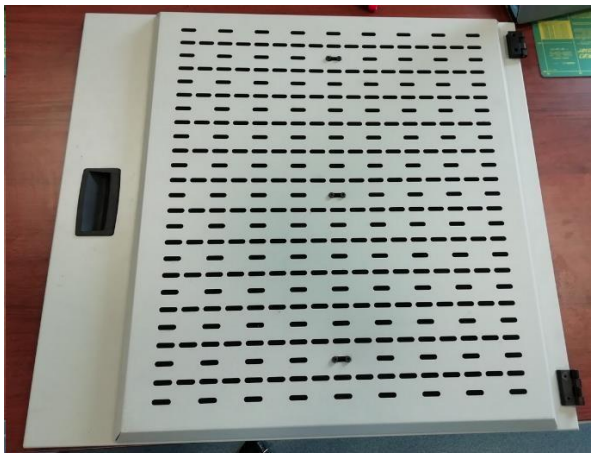

Fig. 10 Removing the top cover from the printer

4. Unscrew the 6 DIN7984-M4x6 screws from the top cover of the printer (Fig. 11). Put aside the DIN125-M4 screws and washers.

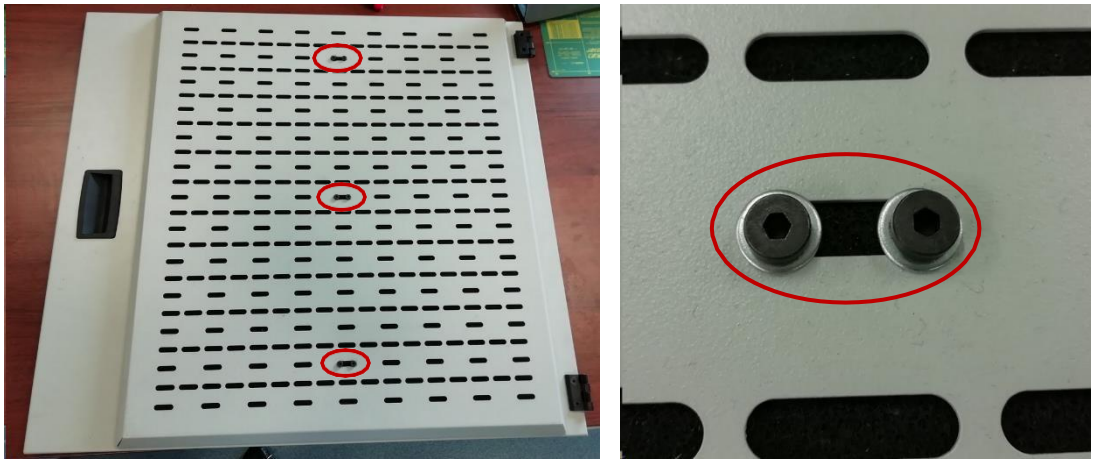

Fig. 11 Unscrewing 6 DIN7984-M4x6 screws from the top cover of the printer

5. Turn the top cover upside down as shown in the picture (Fig. 12).

Fig. 12 Reversing the top cover

6. Pry the sheet metal panel with a screwdriver or other suitable tool (as shown in the picture) and slide the sheet metal panel out from underneath the black housing spacers. The panel is flexible and can be bent (Fig. 13).

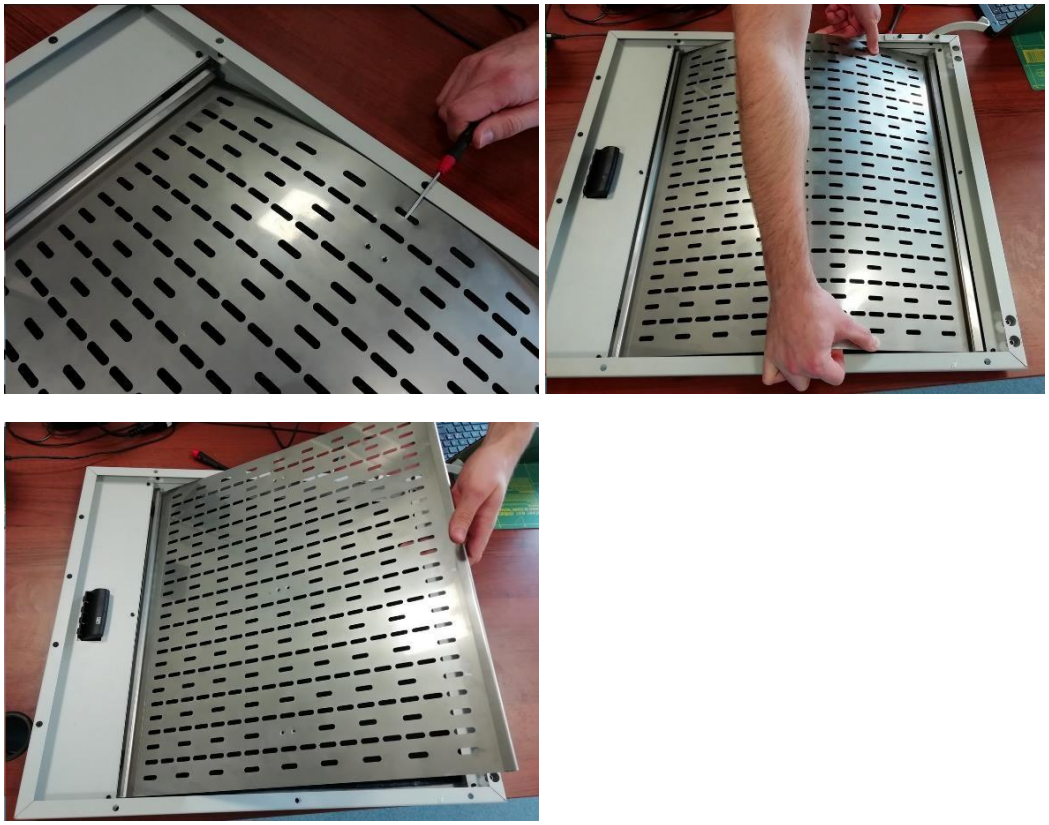

Fig. 13 Pulling the sheet metal panel from of the top cover

7. Put the sheet metal panel aside and remove the used filter (Fig. 14).

Fig. 14 Removing the used filter

8. Replace the old filter with a new one (Fig. 15).

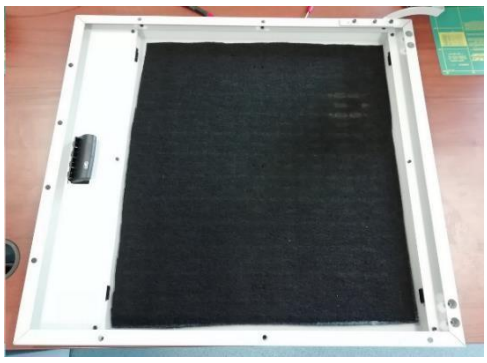

Fig. 15 Inserting a new filter

9. Slide the panel under two black spacers on one side of the printer and then bend the plate and slide it under two black spacers on the other side (Fig. 16).

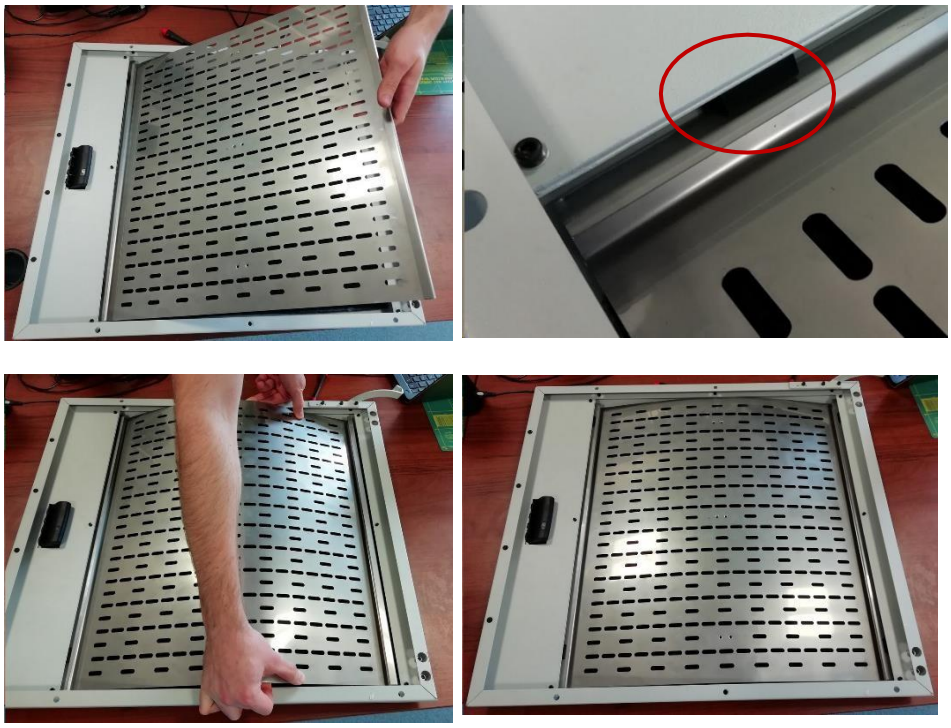

Fig. 16 Inserting the panel into the top cover

10. Place the top cover in the position as shown in the photo (Fig. 17).

Fig. 17 Placing the top cover

11. Use a sharp tool or a screwdriver to make a hole in the filter to screw the panel to the top cover (Fig. 18).

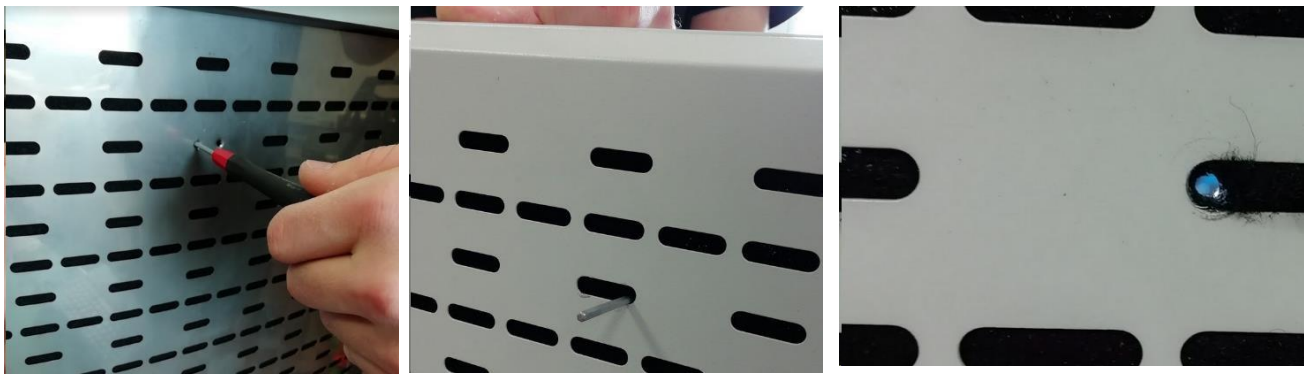

Fig. 18 Making holes in the filter

12. Tighten the DIN7984-M4x6 screw using a DIN125-M4 washer (Fig. 19).

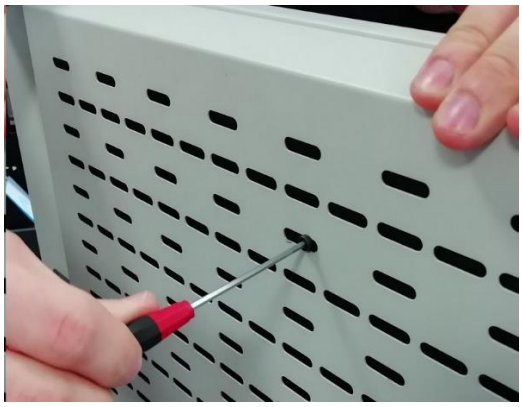

Fig. 19 Tightening the DIN7984-M4x6 screw

13. Repeat steps 11 and 12 for the next 5 screws (Fig. 20).

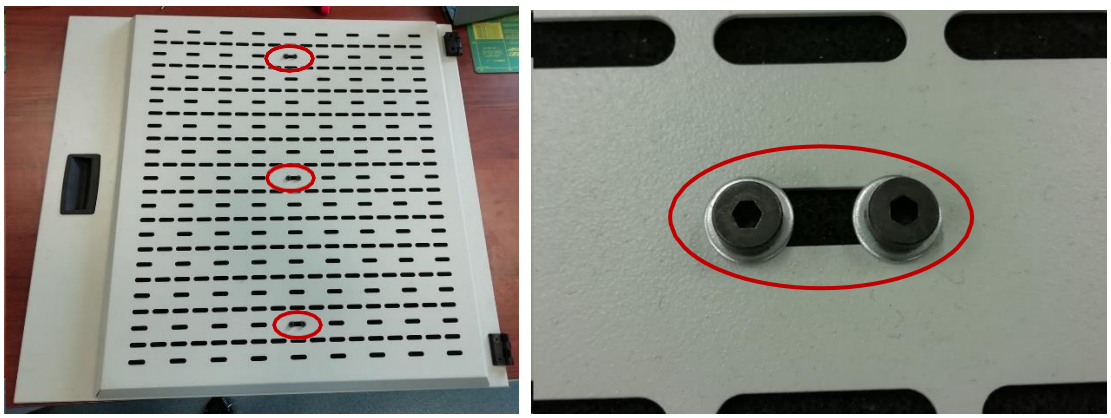

Fig. 20 Tightening the DIN7984-M4x6 screws

14. Tighten the 4 DIN7991-M5x12 screws fixing the top cover to the printer, use threadlocker (Fig. 21).

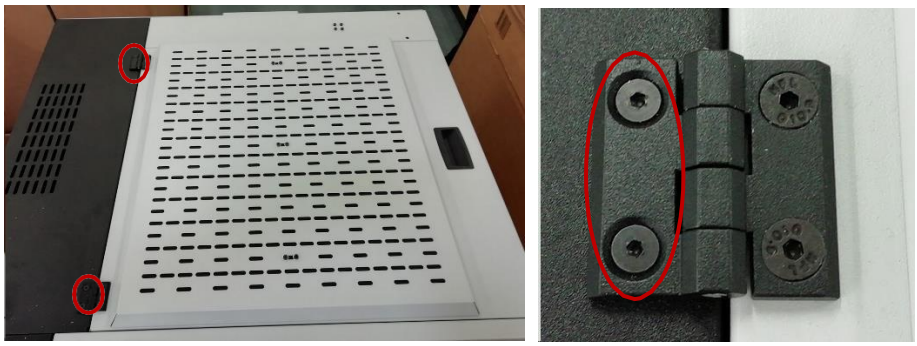

Fig. 21 Tightening the DIN7991-M5x12 screws fixing the top cover to the printer

11. LUBRICATION OF GUIDES AND BALL SCREWS

Recommended frequency: every year or 4,000 hours of printer service.

Before you start to lubricate, please obtain:
- HIWIN GREASE G01 or SKF LGEP 2,
- a manual lubricator (Fig. 22).

Fig. 22 Manual lubricator

1. Identify which manufacturer's ball screws and guides are installed in the printer.

➢ HIWIN (Fig. 23):
- HIWIN ball screws are fitted with grease nipples in the nut,
- Linear carriages are black-green-red colour.

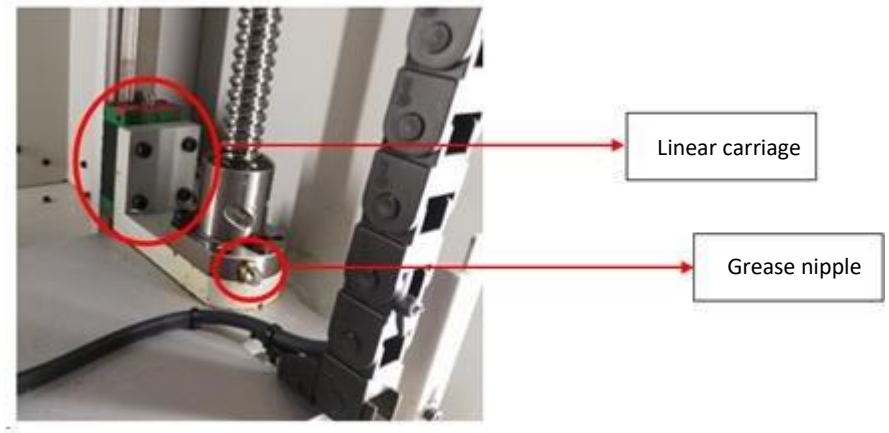

Fig. 23 Ball screws and guide rails manufactured by HIWIN

➢ SKF (Fig. 24):
- SKF ball screws have no grease nipples,
- Linear carriages are black.

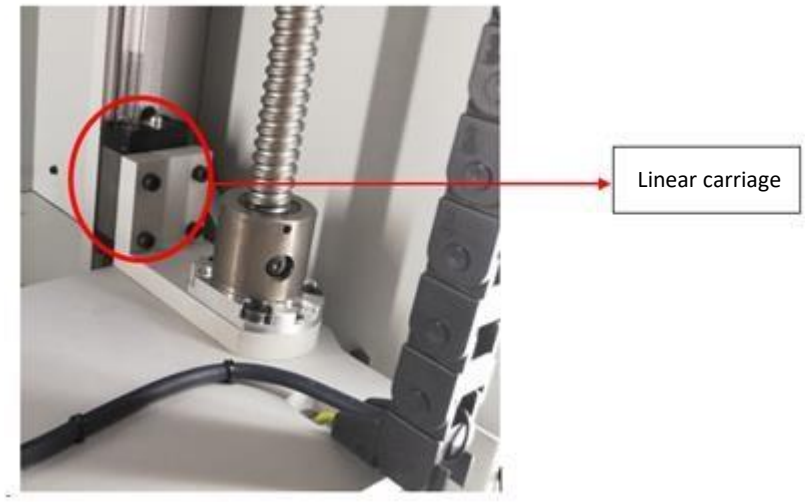

Fig. 24 Ball screws and guide rails manufactured by SKF

2. Select the right grease:

➢ for HIWIN ball screws and guide rails - HIWIN GREASE G01 (fig.25) or SKF LGEP 2 grease (Fig. 26).

Fig. 25 SKF LGEP 2 grease

Fig. 26 SKF LGEP 2 grease

➢ for SKF ball screws and guide rails - SKF LGEP 2 grease (Fig. 26) .

3. Fill the lubricator with the appropriate grease according to the manufacturer's instructions.
4. Lubricating the Z axis:
   - Set the heatbed to the lower position (*Manual Controls → Down*).
   - Lubricating linear guides:
     - Push grease into the grease nipple of the left linear carriage (Fig. 27). It is located at the top of the liner carriage. Push grease out by pressing the lubricator nozzle firmly against the grease nipple and pressing smoothly the lubricator lever once.

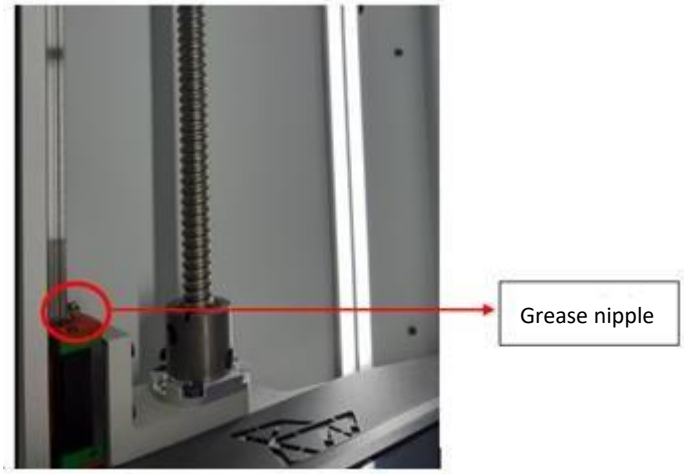

Fig. 27 Lubricating the linear guides on the left side

- Repeat the operation for the right-hand carriage of the Z axis (Fig. 28).

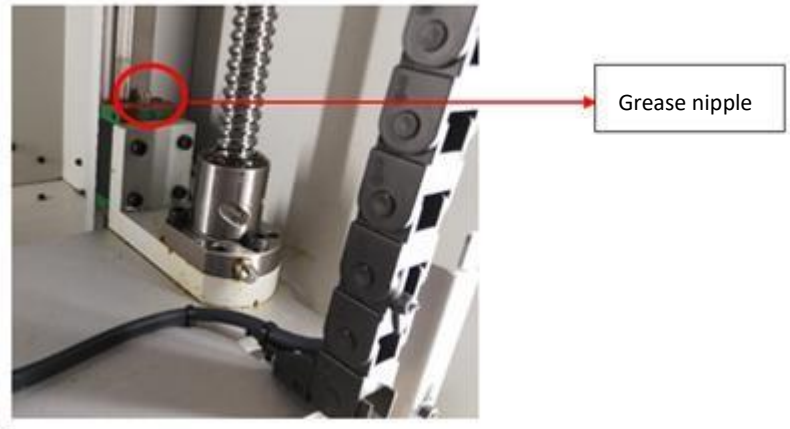

Fig. 28 Lubricating the linear guides on the left side

- Lubricating ball screws:
  - For SKF screws (Fig. 29): apply grease to the raceway of the ball screws using a wooden stick (or other blunt tool). Apply the grease every 5 cm.

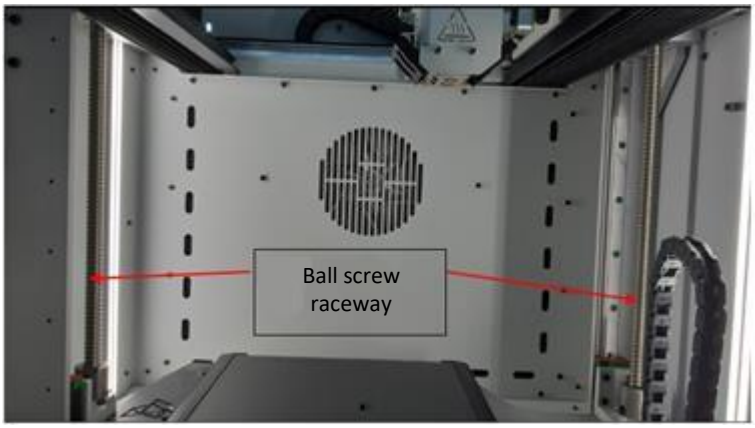

Fig. 29 Lubricating SKF ball screws

- For HIWIN screws (Fig. 30): push the grease into the grease nipple of the ball screw nut. Push grease out by pressing the lubricator nozzle firmly against the grease nipple and pressing smoothly the lubricator lever once.

Fig. 30 Lubricating HIWIN ball screws

- Move the heatbed up and down twice using the option: *Manual Controls → Up/Down*.
- Collect excess grease from linear carriages and ball screw nuts using a paper towel.

5. Lubricating the X axis:
   - Move the module to the left until it stops to access the grease nipples on both X axis carriages.
   - Push grease into the grease nipple of the front linear carriage of the X axis (Fig. 31) by pressing the lubricator nozzle firmly against the grease nipple and pressing smoothly the lubricator lever once.

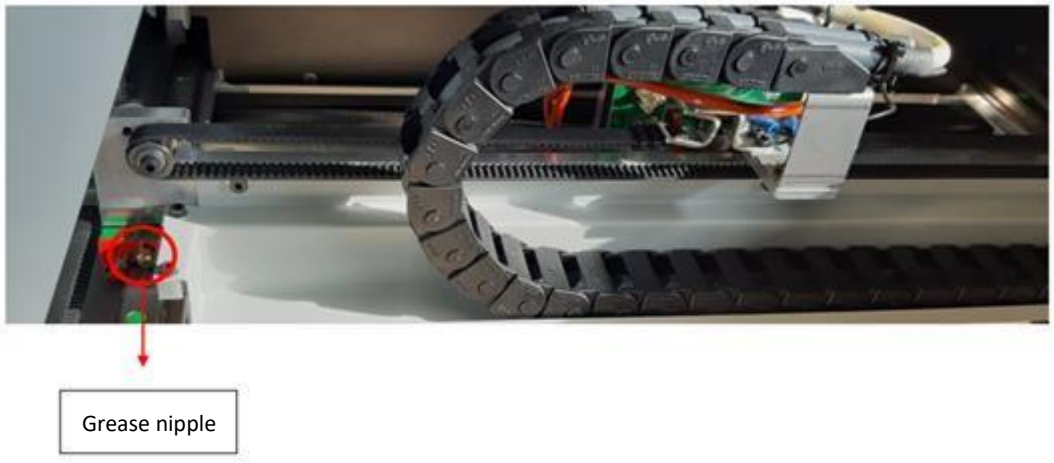

Fig. 31 Lubricating the front linear carriage of the X axis

- Repeat the operation for the rear carriage of the X axis (Fig. 32).

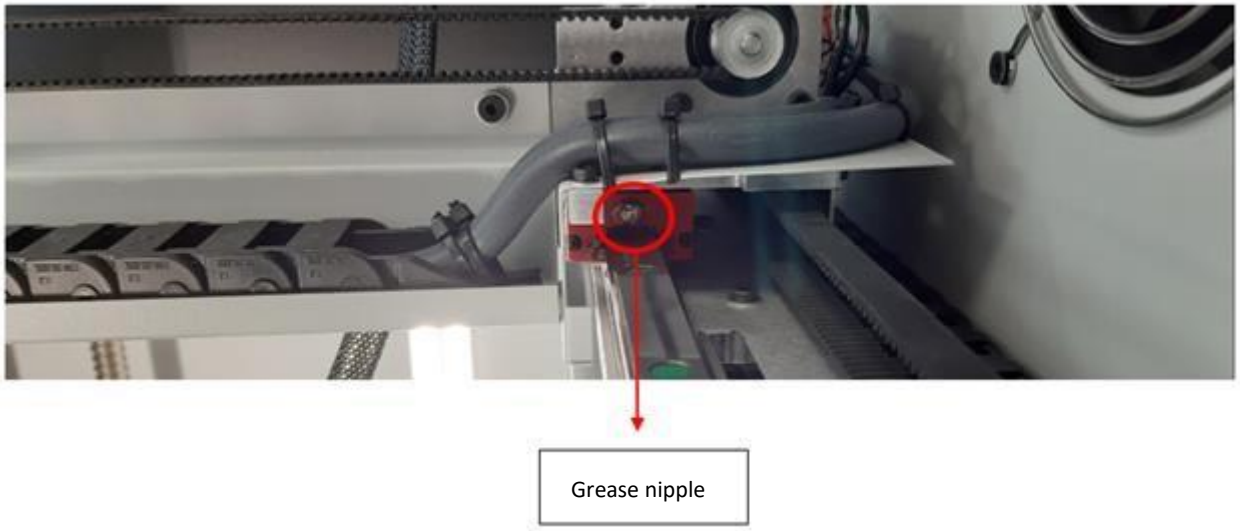

Fig. 32 Lubricating the rear linear carriage of the X axis

- Move the module to the right and left twice.
- Remove excess grease from the linear carriages using a paper towel.

6. Lubricating the Y axis:
   - Move the module forward to the front of the printer until it stops to access the Y axis linear carriage grease nipple (Fig. 33).

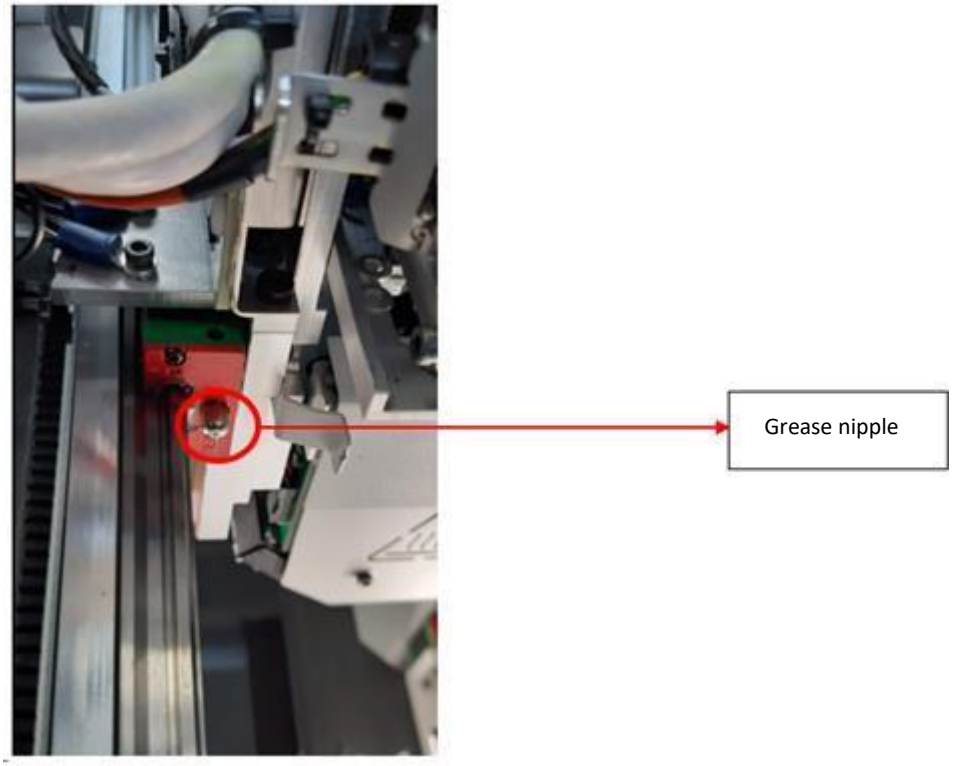

Fig. 33 Lubricating the Y axis

- Push grease out by pressing the lubricator nozzle firmly against the grease nipple of the Y axis carriage and pressing smoothly the lubricator lever once.
- Move the module back and forth twice.
- Remove excess grease from the linear carriages using a paper towel.

12. CHECKING THE TENSION OF THE TIMING BELTS

Recommended frequency: every six months or 2,000 hours of printer service.

Before proceeding to check the tension of the toothed belts, you should obtain:
- Belt Tension Tester BTT Hz (Fig. 34).

Fig. 34 Belt Tension Tester BTT Hz

Procedure of the measurement of the tension timing belts.

1. Run the belt tension tester (Fig.35).

Fig.35

2. Position the carriage as shown in the picture (Fig. 36), viewing from the front of the printer:
   - Position the carriage on the X axis as shown in Fig. 37. The marked sheet metal edge should be positioned in the middle of the fifth mounting hole of the linear guide, counting from the right side (Fig. 37).
   - The carriage on the Y axis shall be positioned as shown in Fig. 38. The marked sheet metal edge should be positioned in the middle of the black mounting hole of the linear guide, counting from the fan on the rear side of the printer (Fig. 38).

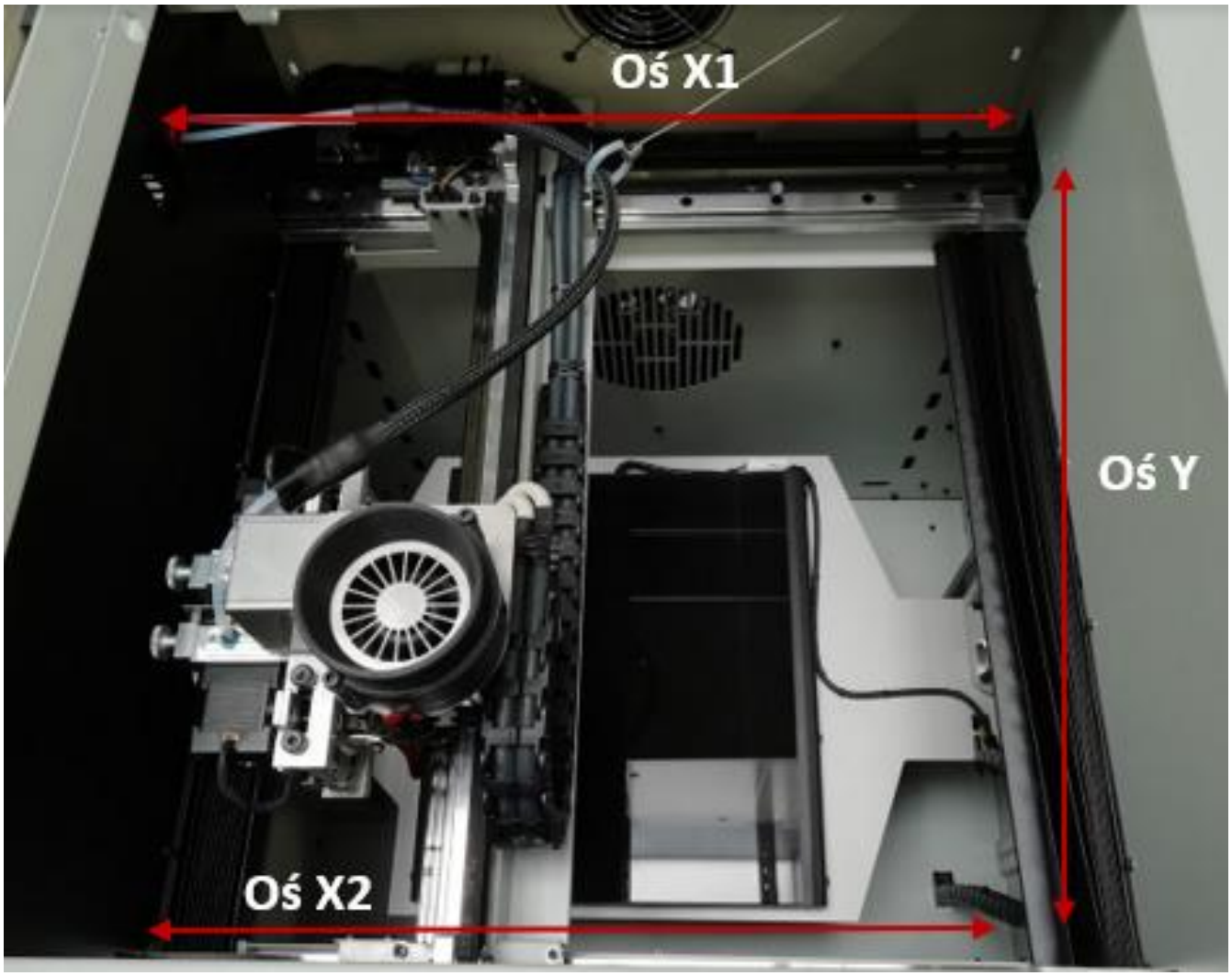

Fig. 36 Positioning of the carriage

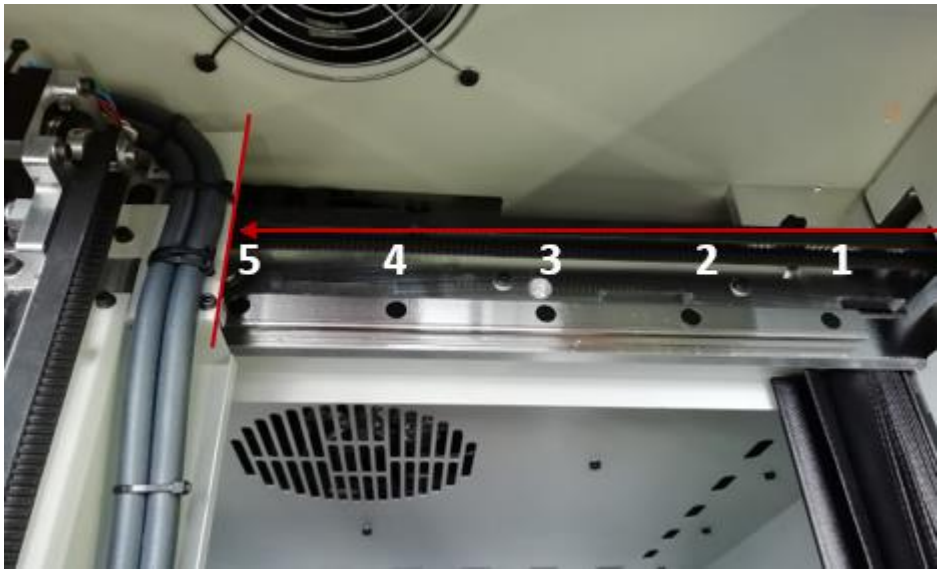

Fig. 37 Setting the carriage on the X axis

Sheet metal edge set in the middle of the fifth black mounting hole of the linear guide

Sheet metal edge set in the middle of the fifth black mounting hole of the linear guide

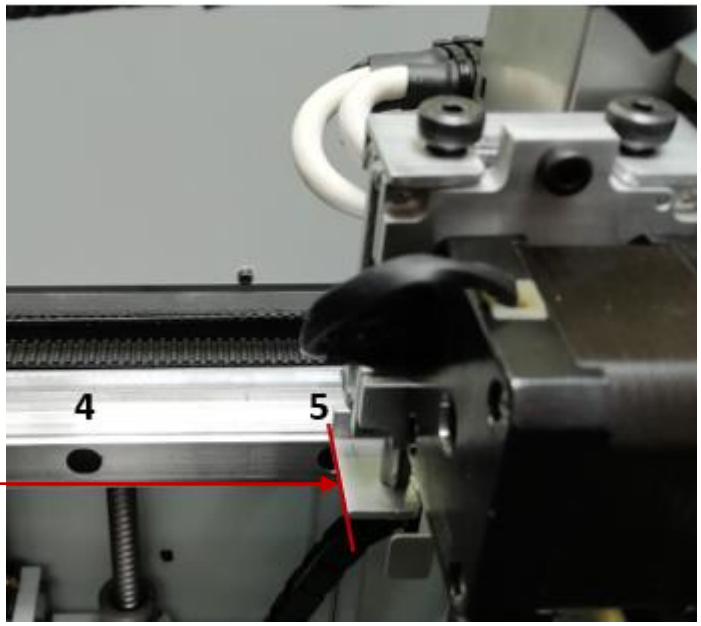

Fig. 38 Positioning the carriage on the Y axis

3. Measuring the timing belt tension on the X1 axis (Fig. 39):
    - Place the microphone facing the toothed belt side at the third black mounting hole of the linear guide counting from the right side of the printer (Fig. 39).

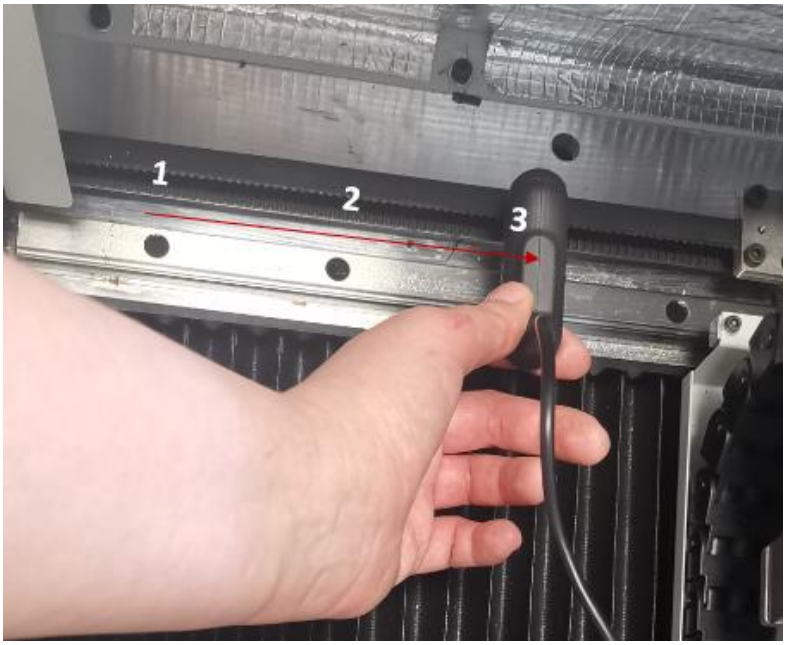

Fig. 39 Measurement location of the timing belt tension on the X1 axis

- Start the tester.
- Make the timing belt vibrate by vigorously jerking it like a guitar string.
- Check the voltage value on the tester and read the frequency value.

For a correctly tensioned Timing Belt on the X1 axis, the measured value should be between 90 and 97 Hz.

4. Measuring the timing belt tension on the X2 axis (Fig. 44):
    - Place the microphone facing the toothed belt side at the third black mounting hole of the linear guide counting from the right side of the printer.

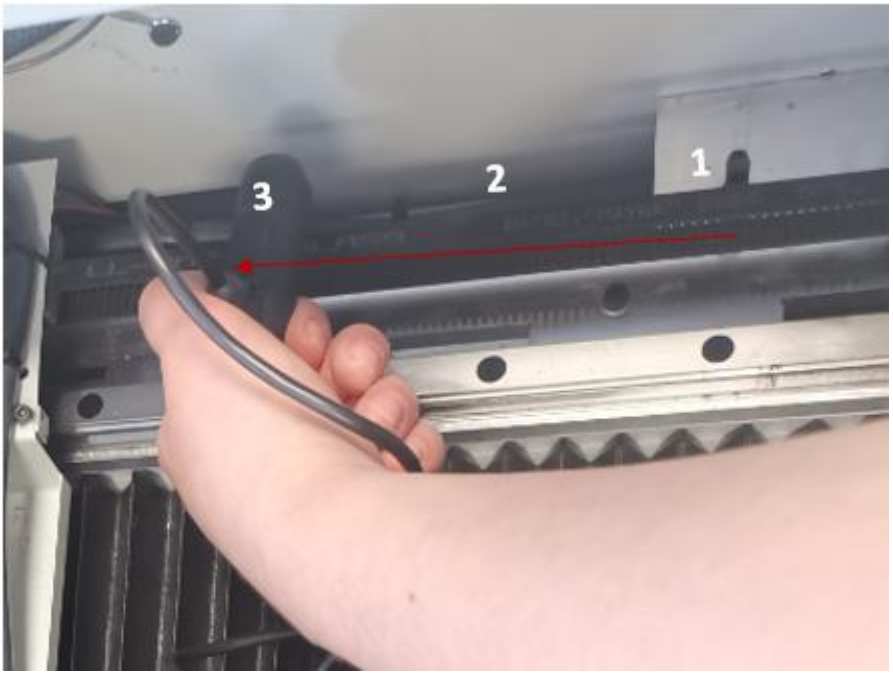

Fig.44 Measurement location of the timing belt tension on the X2 axis

- Start the tester.
- Make the timing belt vibrate by vigorously jerking it like a guitar string.
- Check the voltage value on the tester and read the frequency value.

For a correctly tensioned Timing Belt on the X2 axis, the measured value should be between 93 and 100 Hz.

5. Measuring the timing belt tension on the Y axis (Fig. 45):
   - Place the phone with the microphone facing the toothed belt side at the third black mounting hole of the linear guide counting from the fan side of the on the rear of the printer (Fig. 45).

Fig. 45 Measurement location of the timing belt tension on the Y axis

- Start the tester.
- Make the timing belt vibrate by vigorously jerking it like a guitar string until the measuring fields in the app light up green.
- Check the tension value.

For a correctly tensioned Timing Belt on the Y axis, the measured value should be between 50 and 55 Hz.

If the measured tension values of the X1, X2 or Y axes are not within the specified ranges, please contact the 3DGence Technical Support for assistance.

13. BOWDEN REPLACEMENT

Recommended frequency: in the case of damage.

In the case of damage, please contact the 3DGence Technical Support for assistance.

14. HEATBED REPLACEMENT

Recommended frequency: in the case of damage.

In case of damage, please contact 3DGence Technical Support to purchase a new heatbed and obtain assistance.

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