

Maintenance Instructions

B500

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Preface

General notes

The maintenance activities described in this document essentially pertain only to the machine. Maintenance activities of auxiliary units (e.g., bar loading magazines, exhaust systems) are described in the documentation of the specific manufacturer.

The maintenance and servicing activities must absolutely be observed. Failure to conduct maintenance and servicing in accordance with these instructions (especially not at the respective intervals) rules out any claims for damages. This does not apply if it is proved that the non-compliance with the maintenance and servicing activities is unrelated to the defect. Normal wear and tear, especially of components such as bearings and seals, is not a defect. These components are therefore excluded from the warranty. It is recommended to keep a written log of all maintenance activities carried out.



The maintenance intervals are given based on the operating hours counter / "Hydraulic system On" operating condition.



Do not clean the machine with compressed air.

Raised dirt particles may cause breathing difficulties or injuries (especially of the sensory organs).

Furthermore, raised dirt particles or chips may reach spots where they cause technical problems.



Do not use cotton waste for cleaning.

When cleaning with cotton waste, fibers or thread can get loose causing safety problems.



Do not use highly volatile solvents such as benzene, trichloroethylene or similar cleaning agents.

These cleaners may damage the seals, which can lead to safety problems.



Do not clean the machine with a pressure washer.

Cleaning with a pressure washer results in strong corrosion.

Furthermore, bearings may be degreased and seals may become leaking, which can lead to safety problems.



A suitable cleaning tool must be used to clean the hole in the tool mounting.



Always specify the machine type and machine number when ordering spare parts. This and other information about the machine are located on the nameplate under the main switch of the control cabinet.



When carrying out maintenance work on fluid systems (hydraulic, lubrication, and pneumatic systems), make sure **before** starting the work that the respective system **has been depressurized** (accumulator drain valve / manual slide valve / emergency stop).

Safety Instructions

Maintenance is to be performed only by authorized and trained personnel. This applies particularly to work on motors (spindle motors) or other electrical assemblies. The instructions in the respective manufacturer documentation must be followed for such work.

We recommend the use of original spare parts and accessories. For damages caused by the use of parts from third-party providers, liability and warranty are excluded. The use of such products may change the structural characteristics of the machine and negatively affect the active or passive safety.

In general, maintenance is to be carried out with the machine turned off. The main switch must be locked out. Even when the main switch is switched off, parts of the machine (e.g., the control cabinet light) may still carry electricity. These parts are labeled. In a few cases, maintenance work needs to be performed with the machine turned on (e.g., replacement of backup batteries). These maintenance activities must be carried out with special care.

Prior to working on the machine, it must be allowed to cool down, as hot parts may be located under the covers.

All maintenance work on the machine must be carried out with utmost care. Fasteners must be loosened carefully and parts must be secured against falling down. When elastic items (springs) are removed/replaced, appropriate devices must be used. Any (non-horizontal) axes that pose a risk of falling down must be moved to their end positions or secured against falling down. Pedal switches must be put aside to avoid inadvertent actuation.

For removing machine parts, suitable lifting gears must be used. Removed machine parts must be placed in a safe position and secured against falling over.

When the control cabinet is open or the machine covers are open or removed, no cellular or wireless phones may be used within a 2 m radius.

Flexible hydraulic hoses made of elastomer-based plastics are subject to a natural aging process and should be replaced regularly. The machine operator is responsible for compliance with the laws and regulations of the country of use with regard to the use of hydraulic hoses. In Germany, the relevant institutions recommend a renewal cycle of 6 years for the hydraulic hoses.

Damaged power supply and fluid lines must be replaced immediately.

It may be necessary to remove or disable protective equipment to carry out repairs. Any removed protective equipment must be reinstalled immediately after finishing the repair.



Suitable climbing aids (ladders or steps) may be required to perform maintenance or service work.

The currently valid safety regulations, as well as the specific manufacturer's information for the intended use must be observed.

After all maintenance work and work on electrical assemblies, a test run or functional test must be performed.



Additionally, the general safety precautions in the operating manual “**Safety instructions for CNC turning machines**” must be observed. The safety precautions, as a separate document, are part of the **INDEX-TRAUB** user documentation.



When carrying out maintenance work on fluid systems, (hydraulic, lubrication, and pneumatic systems), make sure **before** starting the work that the respective system **has been depressurized**.
(accumulator drain valve/manual slide valve/emergency stop)

Service Interval - Care activities

Maintenance Summary - Care activities



It is recommended to document the maintenance activities carried out by using the appropriate maintenance log. The maintenance log has the document number DIE220EN - 05.06.2019.



The maintenance interval is highly dependent on the production and environmental conditions of the machine. The determination of the appropriate interval must be made by the operator.

The maintenance interval should be between once per shift and once a week!

- A010** - Check work area door and viewing glass
- A023** - Check hydraulic system (visual inspection)
- A043** - Check pneumatic system (visual inspection)
- A048** - Check the lubrication system (visual inspection)
- A070** - Check filter on air conditioner cooling fan
- A080** - Clean and lubricate clamping device
- A090** - Check electrical lines (visual inspection)
- A095** - Visual inspection of all fluid lines and electrical cables
- A097** - Clean cooling lubricant outlet on clamping cylinder
- A120** - Check cooling lubricant (visual inspection)
- A130** - Check work area light (visual inspection)
- A210** - Check hydraulic shock absorbers and rubber pads on the telescopic plates
- A267** - Cleaning the chip conveyor

A010 - Check work area door and viewing glass

Orientation

Inspection and maintenance of the work area door includes several steps:

- Inspection of the viewing glass for damage.
- Checking the safety label on the viewing glass (replacement interval 8 years).
- Checking/adjusting or replacing, if necessary, the wipers.
- Checking the work area door for smooth opening/closing.
- Automatic work area door (optional). Hydraulic valves and motor, control panel, rack and spur gear. (for hydraulic door drive)
- Automatic work area door (optional - electric door drive - **follow the manufacturer's documentation**).

The viewing glass consists of three panes. the inner pane of tempered glass, the central pane of polycarbonate, and the outer pane also made of polycarbonate. The inner pane is relatively resistant. It can be cleaned with any commercially available cleaning agents. Only the center pane is essential for the impact resistance of the viewing glass.

The polycarbonate panes are subject to **natural** aging and therefore must be subjected to regular visual inspection. Through contact with cooling lubricant, the aging process is accelerated even further



If the viewing glass is damaged, it must be replaced. This is necessary regardless of the extent of damage. Even with minimal damage, the impact resistance of the glass can no longer be guaranteed.

Heavily soiled or damaged wipers may cause damage to the inner pane. Moreover, it may be possible that the work area door can be moved only with considerable effort due to heavy soiling or chip deposits in the wipers.

Check the guide rails of the work area door. The guide bars must be checked and cleaned regularly so that the work area door can be moved without much effort.

Procedure

1. Check viewing glass for damage.

2.



Clean the outer pane with a soft cloth or sponge and glass cleaner or soap and water. Do not use abrasive or alkaline cleaners (e.g., benzene, acetone or carbon tetrachloride) and no sharp tools or sharp objects (such as razor blades or screwdrivers).

Clean outer pane.

3. Clean inner pane.

4. Check wipers. Remove and clean the wipers. If the wipers are severely deformed or damaged, they must be replaced. To be able to clean the door panels evenly, be sure to reinstall the wipers after their removal aligned in parallel and ensure that they snugly contact the work area door.

5. Check the work area door for ease of movement. To do so, open and close the work area door. If the work area door can be moved only with effort, determine the cause. Possible causes include – depending on the work area door – defective or improperly adjusted wipers. Chips on the guide bar or between the door and wiper, or in the guide rollers of the work area door.

A023 - Check hydraulic system (visual inspection)

Orientation

To ensure trouble-free operation, periodic checks of the oil level are necessary. The fill level must be between the upper and lower marks on the oil sight glass.

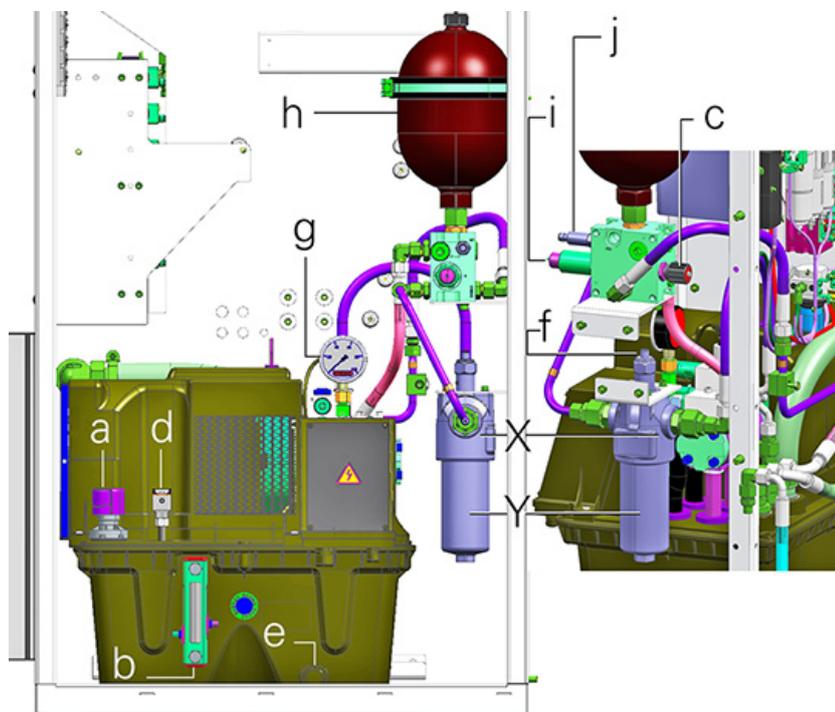


Only use hydraulic fluid grade 15/13/10 in accordance with ISO 4406.

Viscosity other than 32 according to DIN ISO 3448 is not admissible.



For all work in connection with operating materials, the information in the data sheets of the respective manufacturers and the information in the document **Notes on Operating Materials** must be observed.



Example: Hydraulic unit B400 B500 B500

- a Filler neck (hydraulic fluid)
- b Fill level indicator
- c Accumulator drain valve
- d Monitoring (level and temperature)
- e Oil drain plug
- f Electrical monitoring (contamination indicator)
- g Pressure gauge (system pressure)
- h Pressure accumulator
- i Safety valve
- j Electrical monitoring (system pressure)
- X Hydraulic fluid filter (line filter)
- Y Filter bell



Screws on the hydraulic system, the connected components, and the supply lines must be tightened to the manufacturer's specified torques.

Procedure

1.  The hydraulic fluid level should always be near the top mark when the machine is switched off. During production, the oil level may drop after several consumers have been connected.

Check oil level at the oil sight glass.

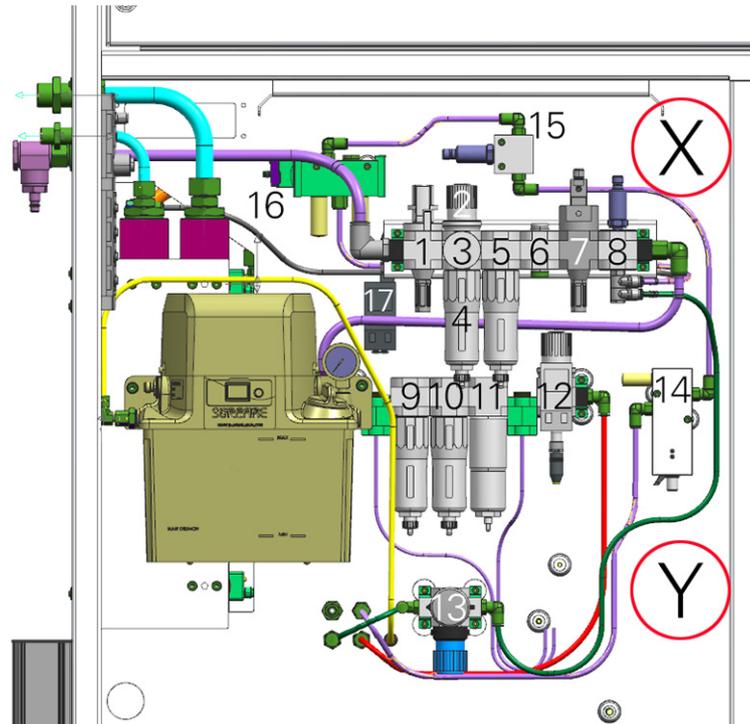
2. Visual inspection of the hydraulic fluid. The hydraulic fluid may not exhibit any foaming or cloudiness at the oil sight glass. In case of problems of this kind, immediately determine the cause and correct the error. If in doubt, take a sample for analysis and contact the manufacturer of the hydraulic fluid.
3. Check pressure setting on pressure gauge and adjust if necessary. The value to be checked here is specified (see hydraulic diagram) and should be between 70-80 bar.
4. Check supply and fluid lines (damage and leakage). Supply and fluid lines must be checked for damage. Pre-damage such as kinks or abrasions should be logged and replacement should be initiated.

A043 - Check pneumatic system (visual inspection)

Orientation

To ensure trouble-free operation, periodic checks (visual inspection) of the pneumatic system are necessary.

- Check system pressure and sealing air settings.
- Check supply and fluid lines.
- Check silencers.
- Drain condensate (not applicable to auto-drain).
- Check pressure setting on the pressure differential monitoring pressure gauge.



Example: Pneumatic maintenance unit B400 B500 B500 (by FESTO)



Due to different requirements and/or specifications of the respective manufacturers, be sure to review the respective manufacturer's documentation!

The following components are used on the system maintenance unit (X) and the extension for sealing air on the glass scales (Y):

- **X System maintenance unit**
- 1. Switch-on valve (manual)
- 2. Pressure regulating valve system pressure 6 bar
- 3. Pressure gauge for system pressure
- 4. Filter insert with retained particle size 40 µm with automatic condensate drain
- 5. Filter insert with retained particle size 5 µm with automatic condensate drain
- 6. Branch module
- 7. Electrically actuated switch-on valve
- 8. Pressure sensor for system pressure
- **Y Expansion of "glass scales" lock-out air**

- 9. Microfilter insert with retained particle size 1 µm with automatic condensate drain
- 10. Filter insert with retained particle size 0.01 µm with automatic condensate drain
- 11. Activated carbon filter **no automatic condensate drain**
- 12. Pressure regulating valve with pressure sensor for glass scales sealing air 1.0 bar
- 13. Pressure regulating valve for steady rest
- 14. Proportional valve for gripping force adjustment (WPRU)
- 15. Safety pressure sensor
- 16. 3/2-way valve
- 17. Differential pressure sensor



If the differential pressure sensor (17) outputs an error message, **all 5 filter elements on the pneumatic system must be replaced.**



Filters are hazardous waste and must be disposed of in a controlled manner.

Requirement



Service and maintenance are to be carried out according to the manufacturer's specifications.

Procedure

1. Check pressure setting on pressure gauge and adjust if necessary. An operating pressure of 6 bar has been set at the factory.
2. Check supply and fluid lines (damage and leakage). Supply and fluid lines must be checked for damage. Pre-damage such as kinks or abrasions should be logged and replacement should be initiated.

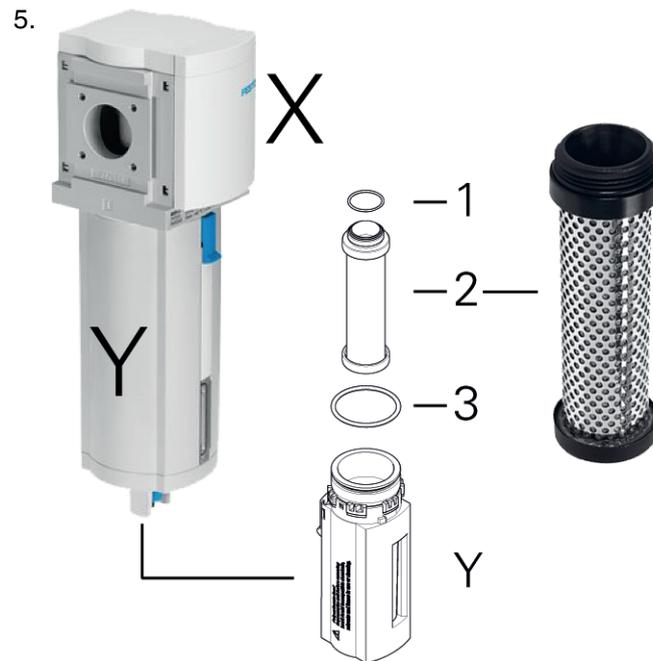
3.



Example: Various silencer versions from FESTO

Check silencer, replace if necessary

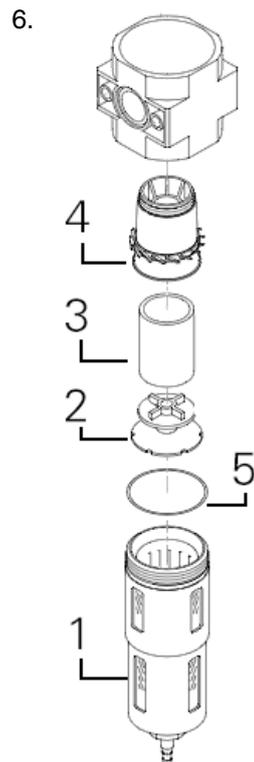
4. Drain condensate (not applicable to auto-drain).



Replace activated carbon filter (by FESTO)

- X Filter base housing
- Y Filter bowl
- 1 Sealing ring
- 2 Activated carbon filter cartridge
- 3 O-ring

Check activated carbon filter, replace if necessary. **When disassembling the filter bowl, make sure that sealing rings and O-rings (1 + 3) are also installed.** Unscrew filter bowl Y from filter base X and remove activated carbon filter cartridge 2. Check sealing rings and O-rings (1 + 3), replace if necessary. Reinstall all parts in reverse order.



Example: Exploded view of fine filter replacement (by FESTO)

- 1 Filter bowl
- 2 Separating disk
- 3 Filter cartridge (check retained particle size)
- 4 Filter receptacle
- 5 O-ring

Check fine filter or microfilter, replace if necessary. **When removing the filter bowl, make sure to include the O-ring (5), separating disk (2) and filter holder (4).** Unscrew filter bowl (1) from filter base body and remove filter cartridge (3), check, and replace if necessary. Check O-ring (5), replace if necessary. Reinstall all parts in reverse order.

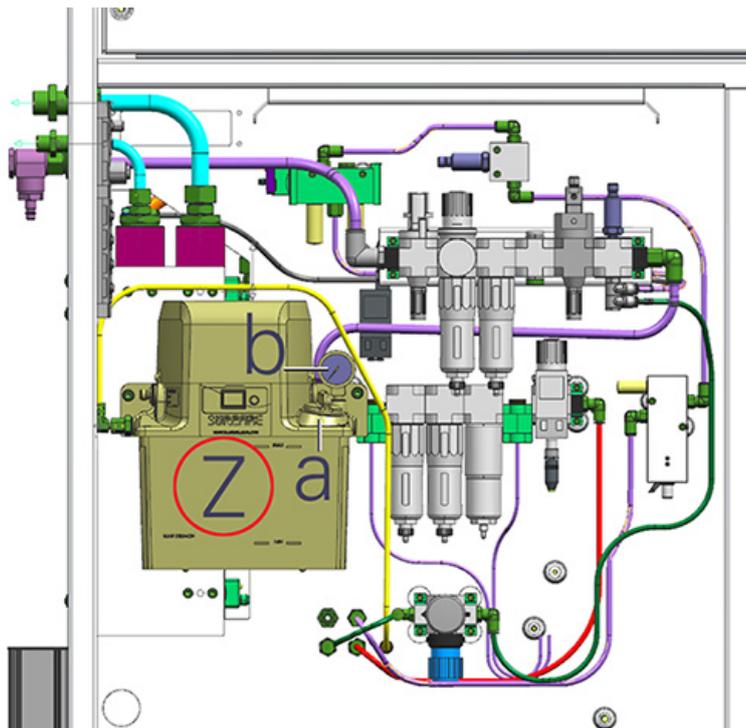
A048 - Check the lubrication system (visual inspection)

Orientation

Various components must be checked regularly on the lubrication system.



Due to different requirements and/or specifications of the respective manufacturers, be sure to review the respective manufacturer's documentation!



Example: Lubrication system B400 B500 (by BIJUR DELIMON Sure Fire II)

The following components must be checked on the lubrication system (Z):

- a) Filler neck
- b) Pressure gauge for system pressure (>20 bar)

Procedure

1. Check oil level.
2. Check pressure setting on pressure gauge (>20 bar)

A070 - Check filter on air conditioner cooling fan

Orientation

The filters must be replaced regularly depending on the environmental conditions.



Whether air flow exists can quickly and easily be made visible by attaching a thread at the opening of the air outlet.



Use only the original filters according to the spare or wear parts list! Otherwise the machine is at risk of sustaining serious damage due to overheating.

Requirement

A sufficient number of filters must be available.

Procedure

1. Remove cover frame.
2. Check the filters, replace if necessary.
3. Reinstall all covers.

A080 - Clean and lubricate clamping device

Orientation

To ensure reliability and accuracy of the machine, clamping devices must be subjected to periodic maintenance.

The interval of this maintenance is strongly influenced by the type of material and daily production time. Especially for short chipping materials (e.g., brass or cast iron), these maintenance activities must be performed much more frequently.



Due to different requirements and/or specifications of the respective manufacturers, be sure to review the respective manufacturer's documentation!



Depending on the materials to be machined (e.g.: brass, cast iron) and the number of shifts per day, more frequent cleaning of the chuck is necessary.

For this, the clamping device must be removed and completely cleaned. Here, also the labyrinth ring (spindle cover) and the space behind the ring must be cleaned.

Requirement



Example: Three-jaw chuck from different manufacturers.



Do not use cotton waste for cleaning.

When cleaning with cotton waste, fibers or thread can get loose causing safety problems.

Procedure

1.



Caution

Sharp contours on the clamping device

Cuts

Use personal protective equipment (e.g., protective gloves)

Clean clamping devices

Alternatively, the following procedure can be used!

If necessary, unmount clamping devices for cleaning (follow manufacturer's instructions).

2. Lubricate clamping devices according to manufacturer's instructions.
3. Clean labyrinth ring and space behind the labyrinth ring.

A090 - Check electrical lines (visual inspection)

Orientation



Leave the immediate area around the machine and the additional units free; do not use it as storage or warehouse space. This significantly reduces the risk of damage to electrical lines.

Electrical lines routed outside the machine (e.g., lines for cooling lubricant systems, chip conveyor, and pedal switch) must be regularly checked for damage (e.g., pinching or cuts).

Procedure

1.



Damaged electrical lines.

Electric shock.

Switch off machine and accessory units and arrange for immediate replacement of damaged lines by an electrically trained technician.

Check electrical lines to chip conveyor.

2. Check electrical lines to cooling lubricant system.
3. Check electrical lines to workpiece feeder.
4. Check electrical lines to workpiece discharge unit.
5. Electrical leads for the pedal switches.
6. Check electrical lines of the working area light.
7. Check electrical line to sub-panel / hand-held control unit (option).
8. Check electrical lines to other optional attachments.

A095 - Visual inspection of all fluid lines and electrical cables

Orientation

Depending on the duration of use, usage profile of the machine and different environmental conditions, it is absolutely necessary to subject all fluid lines and electrical cables to regular visual inspections. This allows that any faults or problems can be detected and eliminated early on.



Damaged fluid lines may cause leakage of fluids under high pressure. Be sure to use personal protective equipment during visual inspection.

Requirement

Should defective points be found on fluid lines or electrical cables during the visual inspection, the machine must be switched off and the damaged lines or cables must be promptly replaced.



Replaced fluid lines must be tightened to the torque specified by the manufacturer.

Procedure

1. Visual inspection of all supply and fluid lines.
2. Visual inspection of all electrical cables.

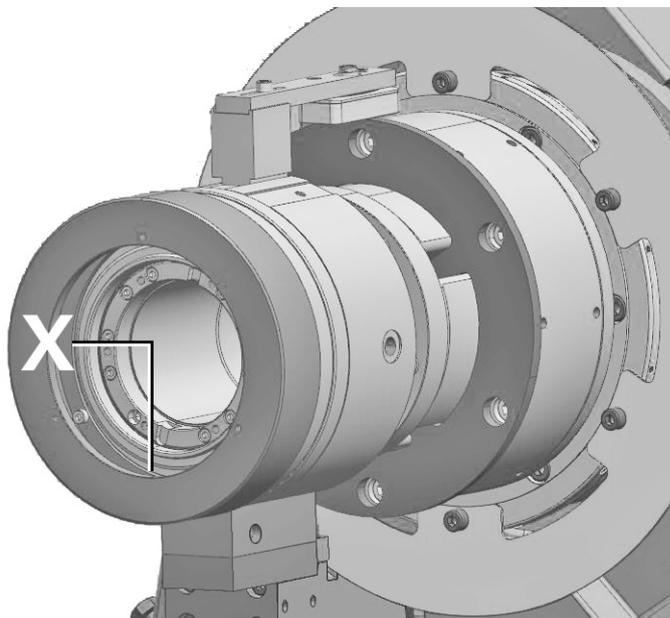
A097 - Clean cooling lubricant outlet on clamping cylinder

Orientation

During machining, the cooling flow flushes small chips through the spindle in the direction of the clamping cylinder. Therefore, the cooling lubricant outlet on the clamping cylinder must be cleaned at regular intervals.

Procedure

1. Disassemble the machine enclosure in the area of the spindles.
2. If necessary, remove the acrylic glass cover on the cooling lubricant collection bin.
- 3.



Example: Cooling lubricant outlet B400 B500

Clean cooling lubricant collection bin. Check that the cooling lubricant outlet **X** is free of chips or other debris.

4. Reinstall the acrylic glass cover, if applicable.

A120 - Check cooling lubricant (visual inspection)

Orientation



Follow the user documentation **Notes on Operating Materials** and the documentation of the cooling lubricant manufacturer.



For all work in connection with operating materials, the information in the data sheets of the respective manufacturers and the information in the document **Notes on Operating Materials** must be observed.

The cooling lubricant is subject to wear depending on the material and the generated temperature. Regular inspection is therefore essential.

In case of strong formation of odor, fungus or mold, the cooling lubricant emulsion must be changed at once. The principle of open lubrication may cause a slight commixture between cooling lubricant and hydraulic fluid. If the surface of the cooling lubricant tank is covered with a layer of oil, the cooling lubricant must be replaced. Furthermore, determine the cause of the oil ingress.



Synthetic cooling lubricants or cooling lubricant based on esters are not admissible.

If the type of cooling lubricant or the manufacturer is changed, make sure that the cooling lubricant meets the required specifications.

See the manufacturer's documentation for the fill quantities.



Regularly checking the cooling lubricant is necessary in particular if cooling lubricant emulsions containing mineral oil are used, so that the required properties are ensured.

Requirement

A refractometer is required to determine the concentration.

Procedure

1.



Caution

**Biological and chemical changes in the cooling lubricant.
Skin irritation or respiratory and circulatory problems.**

Wear personal protective equipment (e.g., safety gloves and safety goggles).

Remove machine enclosure in the area of the cooling lubricant tank.

2. Visual and olfactory inspection of the cooling lubricant.

3. Check cooling lubricant emulsion. See document **Notes on Operating Materials**.

4. Check supply and fluid lines. Supply and fluid lines must be checked for damage. Pre-damage such as kinks or abrasions should be logged and replacement should be initiated.

A130 - Check work area light (visual inspection)

Orientation

To ensure even illumination of the working areas in the machine, work area lights are installed in the work area.

They enable safe working and should therefore be checked regularly. **Damaged lighting fixtures must be replaced immediately.**



Be sure to follow the manufacturer's documentation.



According to the manufacturer, this lighting fixture is maintenance-free.

Procedure

1.



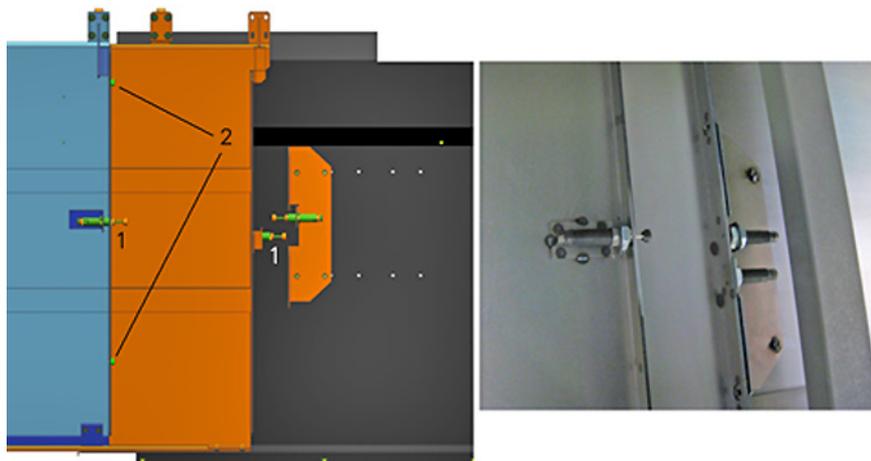
Example: Work area light R200, R300 (photo: Herbert Waldmann GmbH & Co. KG)

Check all lamps (visual inspection). Check lamp protective glass for damage. If cooling lubricant has already penetrated into the work area light, the lamp must be repaired.

A210 - Check hydraulic shock absorbers and rubber pads on the telescopic plates

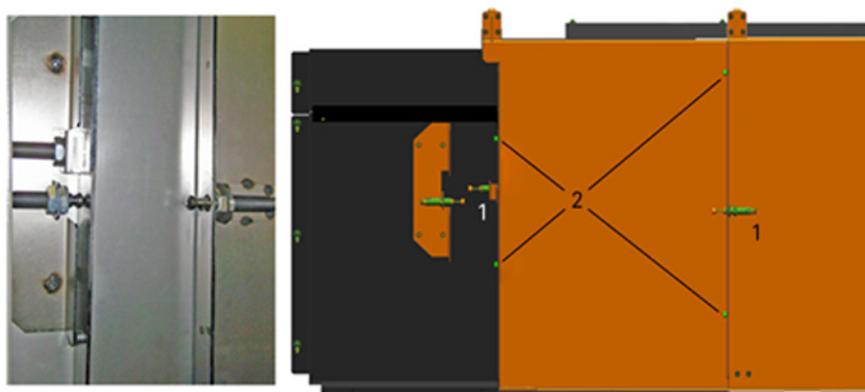
Orientation

On the telescopic plates, hydraulic shock absorbers and rubber pads are mounted that serve as impact protectors. Heavy contamination or damage to the telescopic plates may cause malfunction of the telescopic plates. The shock absorbers and pads prevent jamming or hard impact of the telescopic plates. The machine must **not** be operated with defective or missing rubber pads or hydraulic shock absorbers.



Example: View of the telescope on the main spindle side (viewing from the drive area)

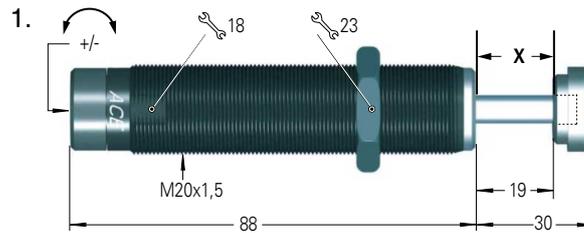
- 1 Hydraulic shock absorber
- 2 Rubber pad



Example: View of the telescope on the counter spindle side (viewing from the drive area)

The hydraulic shock absorbers and rubber pads can be ordered directly from **INDEX** or from a representative.

Procedure



Example: ACE shock absorber

Check hydraulic shock absorber on the telescopic plates. Check the tightness of the cylinder (visual inspection for leakage) and whether the cylinder or the piston rod is damaged. If the cylinders are damaged, they must be replaced immediately. After the installation, the shock absorbers must be adjusted. Use the nut (size 23) to adjust the working area of the absorber and use left worm screw (+/-) to adjust the damping of the cylinder. Be sure to follow the manufacturer's documentation for this!



Example: Pads

Check rubber pads on the telescopic plates (visual inspection). If the rubber pads are worn, they must be replaced immediately.

A267 - Cleaning the chip conveyor

Orientation



Due to different requirements and/or specifications of the respective manufacturers, be sure to review the respective manufacturer's documentation!

To ensure a smooth production process, the chip conveyor should be cleaned and serviced regularly.

With regular cleaning, any defects can be detected and corrected early. Thus, prolonged downtime due to repair work can be reduced to a minimum.

The chip conveyor is used for removal of swarf from the work area and is also a reservoir for the cooling lubricant. The cooling lubricant is filtered in the chip conveyor. For this purpose, various filters and filter plates are built into the chip conveyor. These filters must be cleaned regularly. In particular, make sure that the area around the cooling lubricant pump(s) is always free of chips or dirt.



For all work in connection with operating materials, the information in the data sheets of the respective manufacturers and the information in the document **Notes on Operating Materials** must be observed.

Requirement



Be sure to interrupt the motion of the conveyor belt by opening the work area door or switching off the chip conveyor before commencing cleaning work around the discharge chute!



The conveyor belt can only move when the chip conveyor is switched on and the work area door is closed.

Procedure

1.



Service and maintenance are to be carried out according to the manufacturer's specifications.

Clean the chip conveyor.

2. Clean the discharge chute. **Pay particular attention to chip build-up and remove them around the discharge chute.** Chip build-up can accumulate in the area of the drive roller so that it can become compacted, causing damage to the conveyor belt including the drive shaft.
3. Check the wipers at the discharge chute and the inlet port.
4. Visual inspection of brush-off device (option).

5.



Example: G200.2 with chip conveyor and conveyor belt

Clean filter basket and magnetic filter plates (option).

6. Remove and clean pre-filters (option) on the cooling lubricant pump.

7.



If the supply of cooling lubricant is insufficient, the filter basket on the cooling lubricant pump must be cleaned.

Remove cooling lubricant pump. Remove and clean filter basket on the cooling lubricant pump.

Alternatively, the following procedure can be used!

Extract cooling lubricant, remove screen directly from the cooling lubricant pump and clean it.

Service Interval - 2.000 Operating hours

Maintenance Summary - 2.000 Operating hours



It is recommended to document the maintenance activities carried out by using the appropriate maintenance log. The maintenance log has the document number DIE220EN - 05.06.2019.

- C010** - Check maintenance logs of servicing activities
- C020** - Clean and check wipers and guide rails of the work area door
- C035** - Check work area door (optionally with electr. drive) and viewing glass
- C080** - Check all electrical connections and drive belts of the drive motors
- C140** - Check cooling unit for cooling lubricant
- C160** - Checking the guidance and support elements as well as the slidable lattice grate of the telescopic cover
- C510** - Check backup data carrier
- C525** - Check control cabinet
- C540** - Check cable and hose clamps for tight seating

C010 - Check maintenance logs of servicing activities

Orientation

The maintenance logs on the performed maintenance activities allow you to review the maintenance activities carried out between two maintenance intervals. The logs may contain important indications as to work that may be necessary beyond the maintenance activities. Similarly, the logs can be used for determining the cause of malfunctions due to incorrect or inadequate maintenance activities carried out.

Procedure

1. Check maintenance or inspection logs.

C020 - Clean and check wipers and guide rails of the work area door

Orientation



Regular inspection of the wipers prevents damage to the wipers themselves and to the work area door.

If the work area door can be opened and/or closed only with increased effort, it can be expected that the wipers are already destroyed by accumulation of chips and swarf compaction.

Requirement



Example: Chip hook and chip brush

Use appropriate tools to remove coarse chips, chip nests and other debris.

Procedure



Example: 1 Removing chip nest using appropriate tools (e.g., chip hooks)

Remove large chips on the inside of the work area door from top to bottom. Use a chip hook for this purpose.



Example: 2 Sweep small chips and other debris from top to bottom using chip brooms or brushes.

Remove small chips and chip accumulations on the inside of the work area door from top to bottom. Use a chip brush for this purpose.



Example: 3 upper wipers, G300

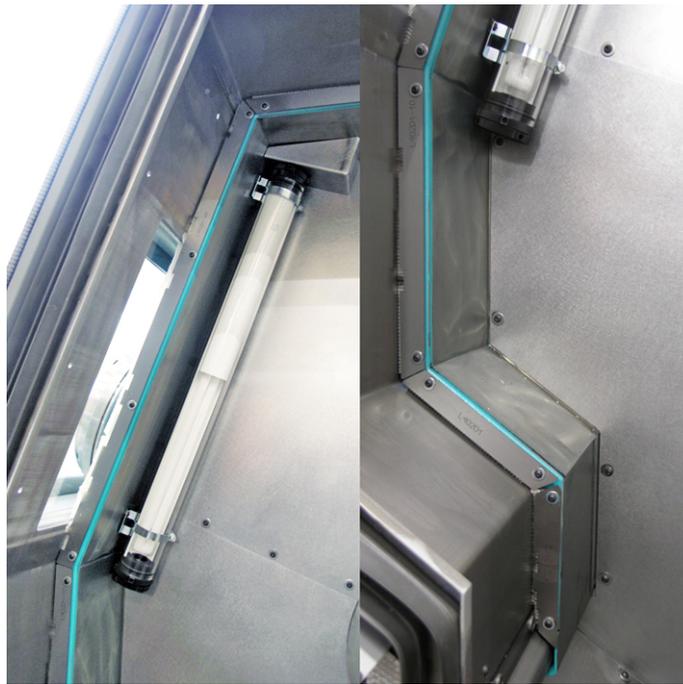
Clean wipers.

Alternatively, the following procedure can be used!

In case of heavy soiling or adhesion of chips to the wipers, the wipers and associated cover plates should at any rate be completely removed and cleaned. **In this case, also clean the area behind the wipers.**

- 4.
- 

Make sure that the wipers evenly contact the work area door, before tightening the screws.



Example: 4 wipers on the sides and bottom, G300

Check the wipers for proper seating. After the work area door has been cleaned, it should open and close again without much effort as usual

5.



If cleaning or replacement of the wipers has not resulted in tangible improvement, the soiled rollers and the guide rail of the work area door must also be cleaned.

Clean rollers and guide rail of the work area door.

C035 - Check work area door (optionally with electr. drive) and viewing glass

Orientation

Inspection and maintenance of the work area door includes several steps:

- Inspection of the viewing glass for damage.
- Checking the safety label on the viewing glass (replacement interval 8 years).
- Checking/adjusting or replacing, if necessary, the wipers.
- Checking the work area door for smooth opening/closing.
- Check functions of the automatic work area door (optional - electric door drive - **Follow manufacturer's documentation from Langer & Laumann**).

The viewing glass consists of three panes. the inner pane of tempered glass, the central pane of polycarbonate, and the outer pane also made of polycarbonate. The inner pane is relatively resistant. It can be cleaned with any commercially available cleaning agents. Only the center pane is essential for the impact resistance of the viewing glass.

The polycarbonate panes are subject to **natural** aging and therefore must be subjected to regular visual inspection. Through contact with cooling lubricant, the aging process is accelerated even further.



If the viewing glass is damaged, it must be replaced. This is necessary regardless of the extent of damage. Even with minimal damage, the impact resistance of the glass can no longer be guaranteed.

Heavily soiled or damaged wipers may cause damage to the inner pane. Moreover, it may be possible that the work area door can be moved only with considerable effort due to heavy soiling or chip deposits in the wipers.

Regularly check and clean the guide rails of the work area door.

Check function of the automatic work area door with electric drive (option like open/close) with different speeds with or without obstacle detection check.

Requirement



The automatic work area door can be tested only when the machine is switched on and fully functional.

Be sure that the wipers have been checked before testing the automatic work area door. Be sure to remove any chip nests and make sure that the wipers have been cleaned and attached to the plates.

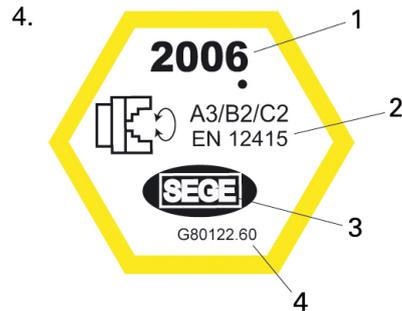
Procedure

1. Check viewing glass for damage.

2.  Clean the outer pane with a soft cloth or sponge and glass cleaner or soap and water. Do not use abrasive or alkaline cleaners (e.g., benzene, acetone or carbon tetrachloride) and no sharp tools or sharp objects (such as razor blades or screwdrivers).

Clean outer pane.

3. Clean inner pane.



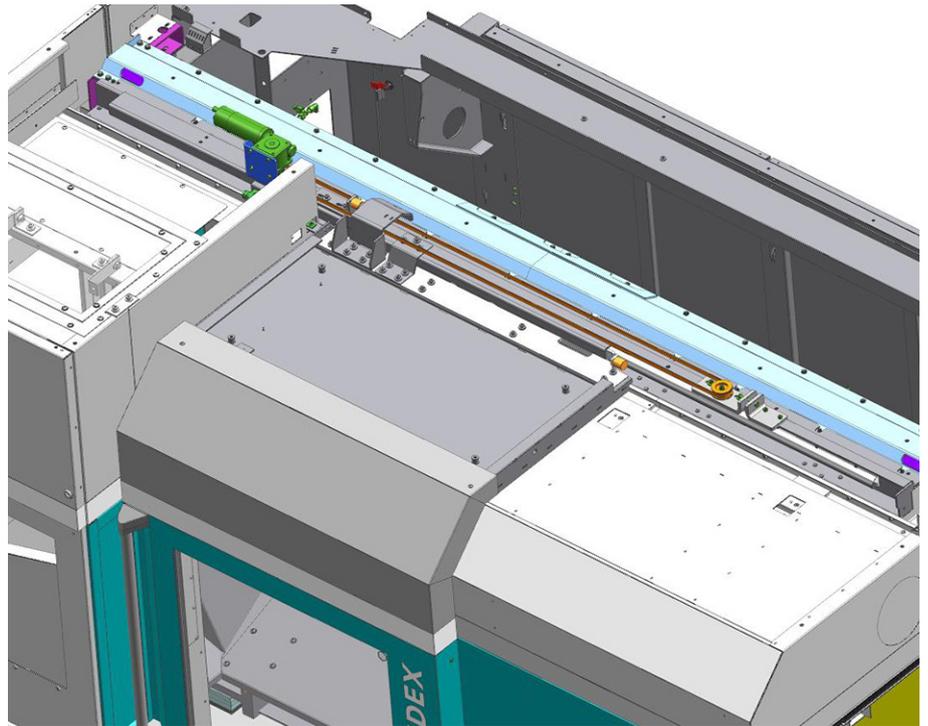
Example: Safety label - viewing glass 2006

- 1 Year of manufacture
- 2 Protection class and EN standard
- 3 Manufacturer
- 4 INDEX part number

Check safety label (replacement interval every 8 years).

5. Check wipers. Remove and clean the wipers. If the wipers are severely deformed or damaged, they must be replaced. To be able to clean the door panels evenly, be sure to reinstall the wipers after their removal aligned in parallel and ensure that they snugly contact the work area door.

6.



Example: View of the automatic work area door with drive

Check the work area door for ease of movement. To do this, press the emergency stop button and manually open and close the work area door. If the work area door can be moved only with effort, determine the cause. Possible causes are defective or improperly adjusted wipers, or chips on the guide bar or in the guide rollers of the work area door.

7.



Danger

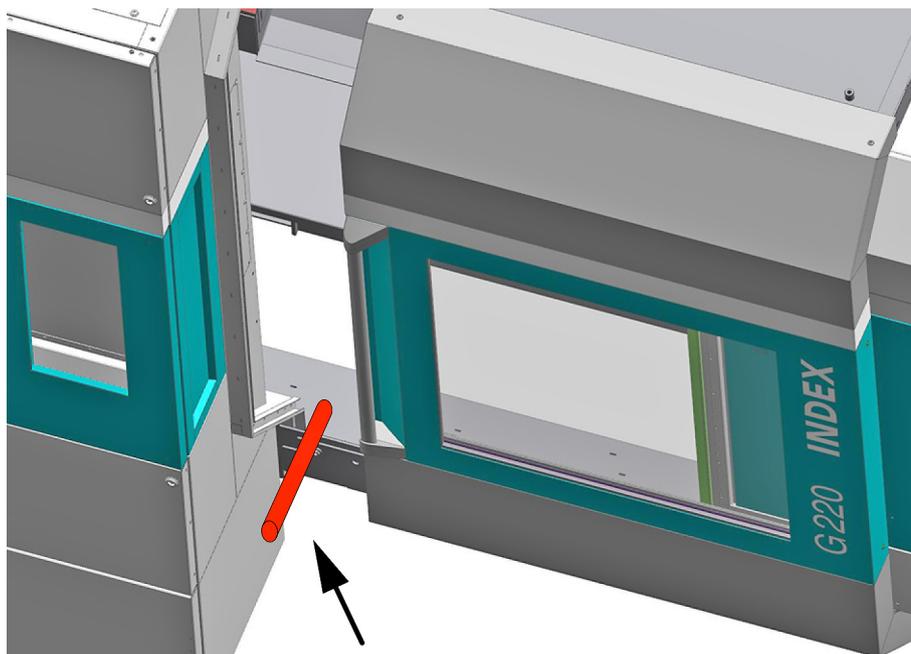
Pinching of limbs due to faulty obstacle detection on the work area door

Check obstacle detection.



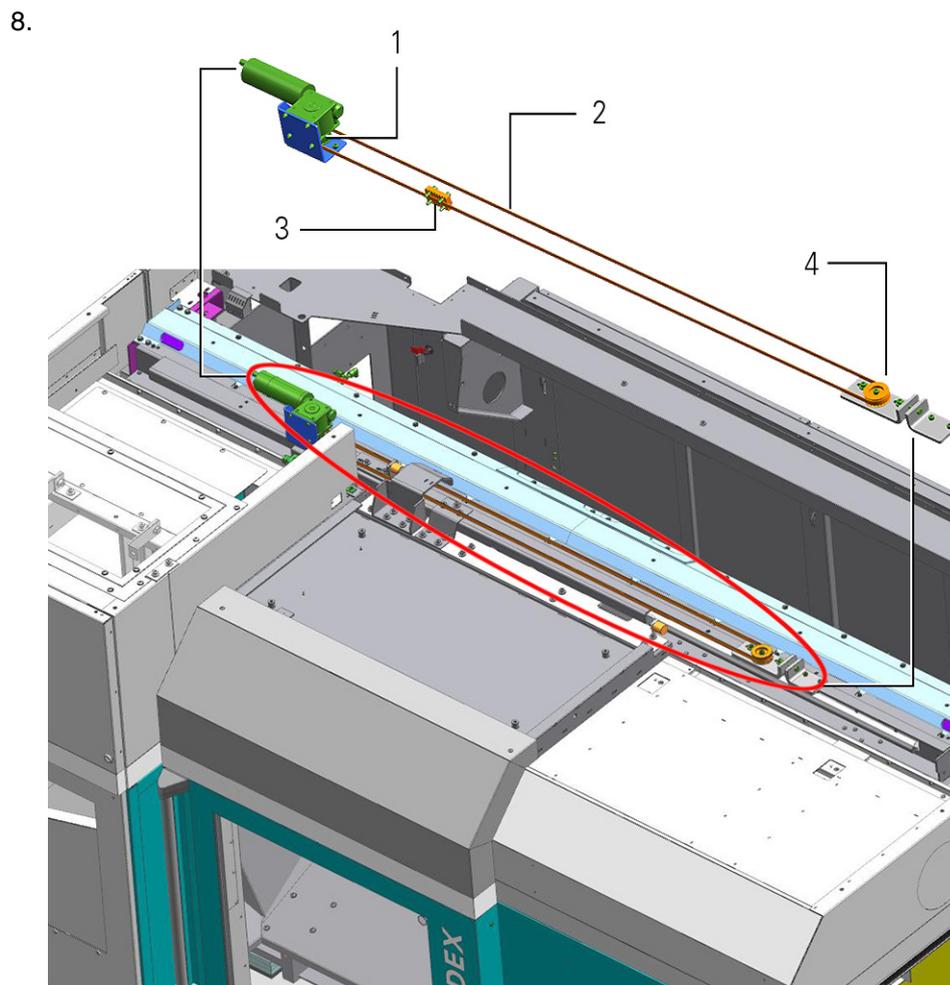
Use only appropriate tools such as a broom handle, wooden beams or similar for checking.

The machine must be switched on and fully functional for this test.



Example: Checking the obstacle detection

Check obstacle detection of the automatic work area door. To check the obstacle detection, an object, e.g., a broomstick (see example), is held into the travel path of the work area door while it is closing. When the work area door contacts the broom stick in the closing area, the obstacle detection is triggered and the door should stop its forward movement.



Example: View of the automatic work area door G220 with drive

- 1 Drive/deflection pulley
- 2 Belt
- 3 Driver
- 4 Deflection pulley

Visual inspection of the drive of the automatic work area door. This is in particular an assessment of the toothed belt (2) - condition, tension. Also the condition of the two deflection pulleys (1+4) and the actuator (3).

C080 - Check all electrical connections and drive belts of the drive motors



Carrying out the maintenance activities described below requires special knowledge. For this reason, these maintenance activities must only be carried out by staff that has received adequate training by the machine manufacturer!

Orientation

This activity is merely a test to check the power and encoder connections for proper seating and tightness. Simultaneously, all drive belts are subjected to a visual inspection.

Requirement

Move the tool carriers to a suitable position.

It may also be necessary to remove various covers or plates for carrying out a visual inspection. Furthermore, a special pair of pliers is needed for tightening the power and encoder connections.



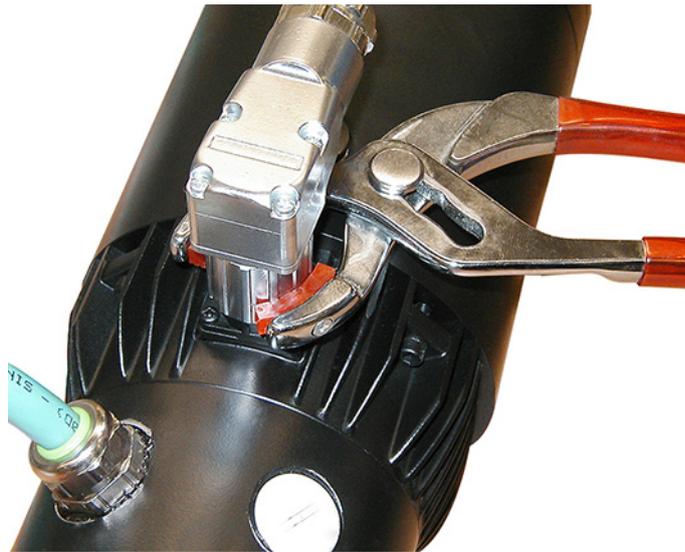
Example: Special pliers for tightening power and encoder connections on the motors

Procedure

1. Loosen connector and check for corrosion and leaks.
- 2.



If traces of corrosion or moisture are visible, they must be eliminated and their causes must be determined. If the connectors cannot be cleaned, they must be replaced.



Example: Tighten motor connector

When done checking, reconnect plugs and tighten with special pliers (see the example).

3. Check belt on drive motors for any damage or deterioration.

C140 - Check cooling unit for cooling lubricant



Carrying out the maintenance activities described below requires special knowledge. For this reason, these maintenance activities must only be carried out by staff that has received adequate training by the machine manufacturer!

Orientation

Water-cooling equipment maintain the temperature in the cooling lubricant circuit on a previously set value. The heat generated by the machining process is dissipated away from the workpiece by the cooling lubricant and the cooling lubricant is cooled down again to the preset temperate by the water cooling unit(s).

To achieve a constant temperature level in this circuit, it is necessary to include it in the inspection and maintenance operations.

Be sure to observe the third-party manufacturer documentation and the technical data of the respective equipment. If in doubt, contact the manufacturer of the equipment or the cooling lubricant vendor.

Requirement

Prerequisite for effective operation within the cooling circuit is the condition of the cooling lubricant. To check the condition of the cooling lubricant, a refractometer is required. With the help of this instrument, it is possible to determine the concentration of cooling lubricant in water. In addition, the monitoring features available on the cooling unit must be checked or adjusted.

Procedure

1. General visual inspection for tightness.
2. Check condition of coolant.
3. Check fill level control(s) (option).
4. Check flow rate sensor and record current values.
5. If necessary, readjust flow rate sensor and record new values.
6. Check temperature sensors/thermostats and record current settings.
7. If necessary, readjust temperature sensors/thermostats and record new values.

C160 - Checking the guidance and support elements as well as the slidable lattice grate of the telescopic cover

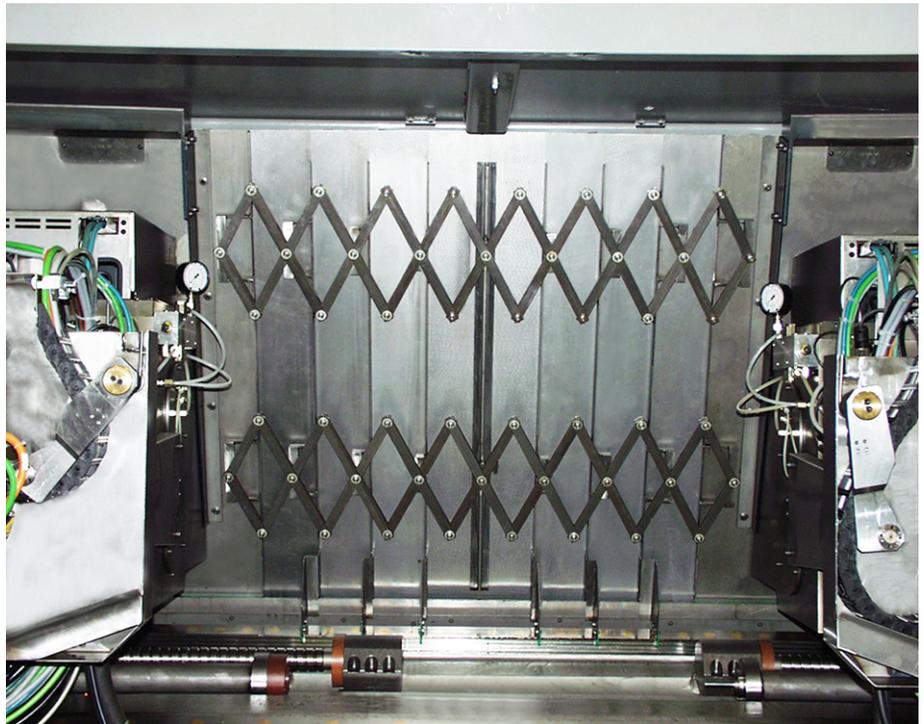
Orientation

Check the guidance and support elements of the telescopic cover for wear symptoms (e.g., traces of abrasion) or damage. Worn or defective guidance or support elements must be replaced immediately.

Procedure

1. Clean and oil telescopic cover.

2.



Example: Telescopic cover with slidable lattice grate (in the drive area)

Check guidance and support elements of the telescopic cover.

3. Check the slidable lattice grate for wear.

Alternatively, the following procedure can be used!

To do so, position the respective tool carrier in the center between the two end positions and determine the sag of the slidable lattice grate. If the sag is more than 5 mm, the slidable lattice grate must be repaired immediately.

C510 - Check backup data carrier

Orientation

If data from the control is lost, the backup CD/DVD always provides the ability to quickly restore the operation of the machine.

Therefore, regularly checking this data carrier is essential.

Procedure

1. Check the existing backup data carrier for readability. Insert the data carrier into the appropriate drive of a standard PC.

2.



If the data carrier is not recognized, it is damaged. To create a new backup data carrier, contact the machine manufacturer.

If the data carrier is recognized, make a copy to the hard disk. Create a folder named "Backup Copy" at a suitable location in the directory tree.

3. Copy the entire contents of the backup data carrier to this folder. If the copying process finished without displaying an error message, the data carrier is fine.
4. Delete the folder on your hard disk.

C525 - Check control cabinet

Orientation

To avoid problems and prevent any resulting system failures, simplified control cabinet checks must be carried out at regular intervals on the cabinet and associated components. Additional built-in air conditioning units ensure a constant temperature in the control cabinet. These air conditioners cannot work efficiently if filters are dirty or doors are not tight.

Procedure

1.  **Electric shock**
Power off the machine and wait approx. 30 minutes. Check with a meter if there is still voltage applied to the intermediate circuit.

Check settings of the fuses. For this purpose, review the information in the wiring diagram.
2. Check Sinamics S120 connections, control modules , connectors, bus, device bus and intermediate circuit bus for tight seating.
3. Clean suction port(s).
4. Check door seals.

C540 - Check cable and hose clamps for tight seating



Carrying out the maintenance activities described below requires special knowledge. For this reason, these maintenance activities must only be carried out by staff that has received adequate training by the machine manufacturer!

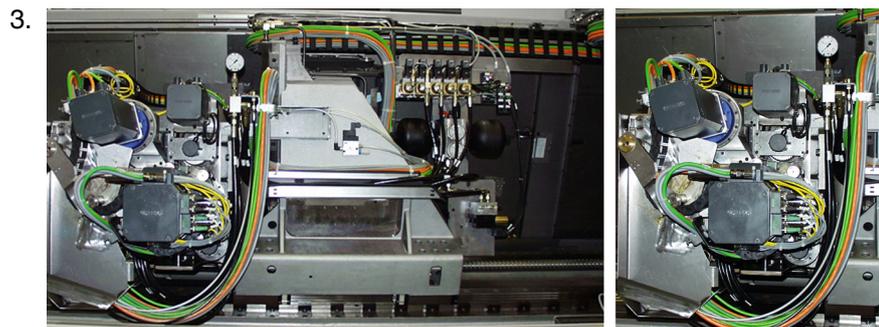
Orientation

Cable and hose clamps are used to bundle and/or hold the cables and hoses in a certain position.

Loose or faulty clamps can be abrasive to cables or hoses and damage them. Under unfavorable circumstances, defective clamps may lead to “entangling” of the cables/hoses, which may result in tearing off entire bundles.

Procedure

1. Check cables for chafing and kinks.
2. Check cable and hose clamps for tight seating. In case of moving drags or bundles, check for any movement within the function.



Example: Power cabling, G400

Check strain relief. Check the correct position of the boots and adjust the strain reliefs.

4. Record any damages and initiate repair.

Service Interval - 4.000 Operating hours

Maintenance Summary - 4.000 Operating hours



It is recommended to document the maintenance activities carried out by using the appropriate maintenance log. The maintenance log has the document number DIE220EN - 05.06.2019.

- D010** - Cleaning of the machine
- D017** - Clean spring steel wiper in the area of the work area door
- D020** - Check the pressure accumulator
- D047** - Check the lubrication system
- D063** - Check the pneumatic system
- D085** - Check main and counter spindles
- D170** - Check the system for reconditioning the cooling lubricant
- D180** - Check fire extinguishing system (visual inspection)
- D347** - Replace belts and check belt tension
- D457** - Replacing hydraulic fluid
- D500** - Perform data backup
- D520** - Check control cabinet and cable assemblies (visual inspection)
- D540** - Check motor protection switch setting and load tap
- D550** - Check air conditioners in the control cabinet

D010 - Cleaning of the machine

Orientation

To ensure consistent quality, high availability and value retention, the machine must be regularly cleaned, depending on the operating conditions.

Of course, this is influenced by various factors. The use of emulsion as a cooling lubricant requires a more frequent and intensive cleaning.

Compared to machining producing long chips, machining producing short chips requires a considerably higher maintenance effort. Short chips, such as in the machining of brass or cast iron, form chip accumulations or become deposited in small cracks and corners. These positions must be cleaned regularly to avoid damage to the respective components.

Areas such as telescopic covers, rubber seals, sealing lips or wipers are particularly affected points. Frequent cleaning of these areas is particularly important.

Requirement



Only the agents described in the documentation may be used for the cleaning and after-treatment of the machine.

Always use the proper tool to remove chips.

The following tools are required for cleaning:

- chip hooks,
- chip brushes,
- spray bottles of cleaners or cooling lubricant,
- a sufficient quantity of rags,
- oil to apply to the telescopic plates and all other bare parts by spraying or by brushes.

Procedure

1.



Chips and projecting tools in the work area.

Cuts.

Use of personal protective equipment such as safety goggles and gloves, and appropriate tools.

Remove chips from the work area.

2. Remove accumulated chips particularly from the area of the tool carriers and the work area door.
3. Flush work area with cooling lubricant.
4. Wipe clean with rags.
5. Apply an oil film to bare metal plates and telescopic covers.
6. Check plates for damage, repair or replace if necessary.

7.  When cleaning the drive area, make sure that the dirt does not penetrate directly into the path measuring systems and the ballscrews. The cleaning process must not aggravate the contamination of the components.

Clean drive area. Spray cooling lubricant onto the area around the supports of the guide bars and then sweep off the rough dirt down into the drag of the machine with a hand brush. Afterwards rub with rags.

8.  When cleaning the spindle carriers, make sure that the dirt does not penetrate directly into the spindle encoders. The cleaning process must not aggravate the contamination of the components. Follow the manufacturer's documentation.

Cleaning of the spindle carriers of the main and counter spindles. Remove machine covers in the area of the spindles. Then remove and clean the spindle covers.

9. Clean the machine drag. Remove accumulations of chips, especially in the area of the counter spindle. For this purpose, move the counter spindle towards the main spindle and flush the area with cooling lubricant in the direction of the chip conveyor. Sweep the dirt arising from the cleaning of the drive area also in the direction of the chip conveyor and then flush with cooling lubricant. Afterwards rub with rags.
10. Clean and reinstall machine covers.
11. Clean the drip pan under the workpiece handling unit.

D017 - Clean spring steel wiper in the area of the work area door

Orientation

For ensure trouble-free operation of the work are door (**applies also to automatic work area door/option**), the spring steel wipers in the work area, described below, must be cleaned. Accumulation of chips (chip nests), depending on the machined material, may cause a compression of chips at this point. This can lead to malfunction and damage to the work area door.

Procedure

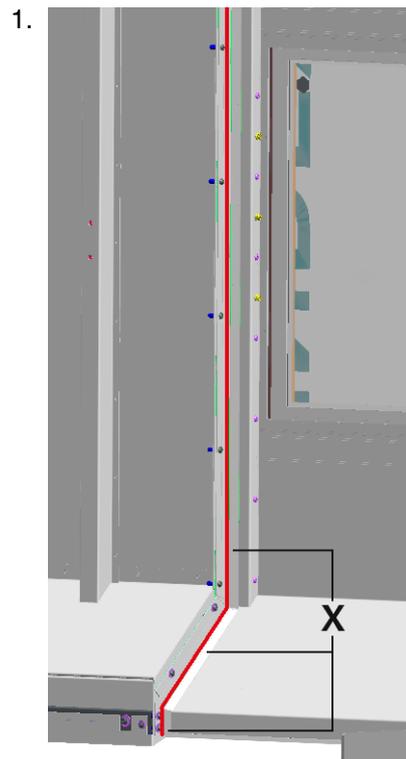


Fig.: G200.2_spring steel wiper

After opening the work area door and turning off the hydraulic system, loosen and remove the screws of the marked cover panels (X).



Fig.: Tool for removing chips

After removing the cover panels, remove the spring steel wipers and clean the space behind this cover /these wipers. Avoid pushing the chips into the spaces

behind the cover by using a suitable tool such as a chip hook and brushes to remove the chips.

3. Reattach the spring steel wipers and cover panels, making sure that they rest evenly against the work area door so they can cleanly wipe off any chips.

D020 - Check the pressure accumulator

Orientation

A pressure accumulator consists of two chambers, a liquid and a gas section with a membrane as a separator. The liquid section is connected to the hydraulic circuit, so that the bubble reservoir is filled when the pressure rises, thereby compressing the gas. When the pressure drops, the compressed gas expands and displaces the stored pressurized liquid into the circulation. This ensures that the pressure level is maintained during load changes or temporary higher loads.



Screws on the hydraulic system, the connected components, and the supply lines must be tightened to the manufacturer's specified torques.

Procedure

1. Check the pressure accumulator. With the machine powered on (not during the program or continuous run), slowly open the accumulator drain valve on the hydraulic fluid tank and watch the needle on the system pressure gauge.

The pressure gauge needle slowly falls to a point where it quickly drops to zero. This point is the approximate accumulator bias tension. This value is 50 +/-2 bar. **If this value is below 40 bar, the pressure accumulator must be replaced.**

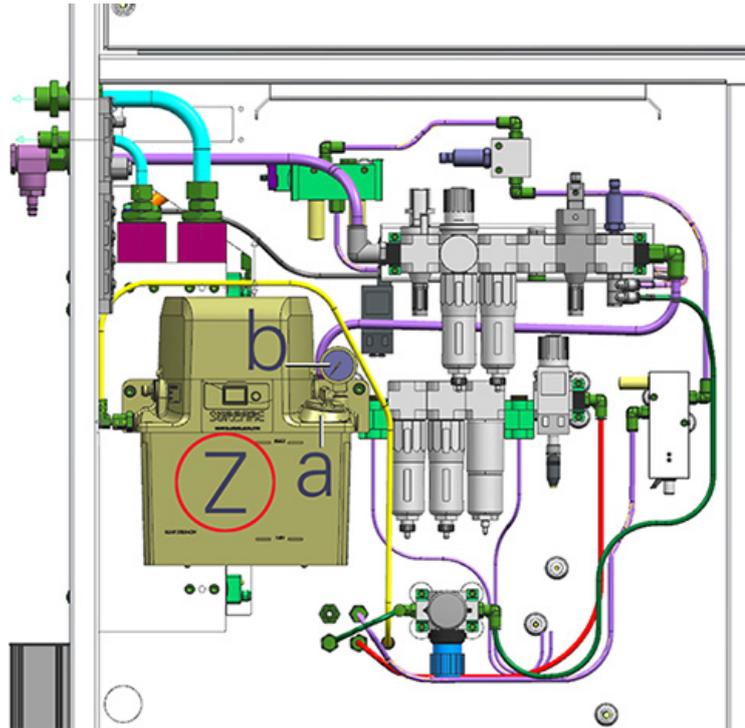
D047 - Check the lubrication system

Orientation



Due to different requirements and/or specifications of the respective manufacturers, be sure to review the respective manufacturer's documentation!

The principle of open lubrication requires refilling of lubricating oil.



Example: Lubrication system B400 B500 (by BIJUR DELIMON Sure Fire II)

During maintenance of the lubrication system, first perform a visual inspection of all components involved in lubrication for leaks and their visual condition. The following components must be examined during maintenance of the lubricating oil system:

- Lubricating oil tank (Z)
- Oil level in lubricating oil tank
- Lubricating oil pump
- Supply and fluid lines
- Pressure gauge (b)
- Metering valves
- Pressure sensors



For all work in connection with operating materials, the information in the data sheets of the respective manufacturers and the information in the document **Notes on Operating Materials** must be observed.



Screws on the lubrication system, the connected components, and the supply lines must be tightened to the manufacturer's specified torques.

Requirement

The maintenance of the lubricating oil supply requires the following auxiliary or working equipment:

- Use an ample supply of cleaning rags.
- A sufficient amount of lubricating oil for refilling/changing.
- Replacement filters for lubricating oil tank.



Oil type, specification and quantity as specified in the technical data.



Use only the original filters according to the spare or wear parts list!



Service and maintenance are to be carried out according to the manufacturer's specifications.

Procedure

1.



Danger

Pressurized fluids exiting from damaged or incorrectly installed fluid lines.

General cuts or eye injuries.

Power off the machine and depressurize the hydraulic system before any maintenance activities. Secure the machine against being switched on. Wear personal protective equipment.

Check supply and fluid lines (damage and leakage). Supply and fluid lines must be checked for damage. Pre-damage such as kinks or abrasions should be logged and replacement should be initiated.

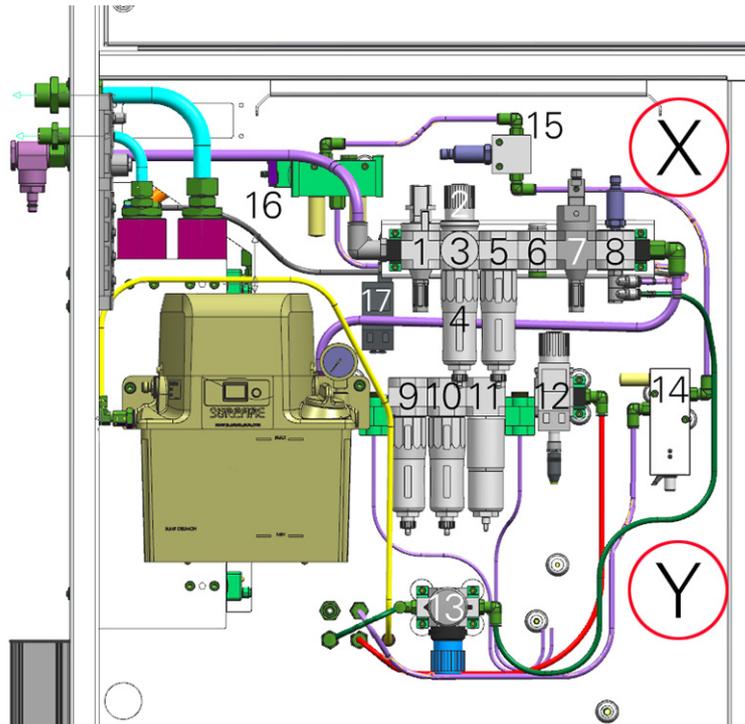
2. Check lubrication pressure (**pressure gauge >20 bar**) and related sensors.
3. Activate lubrication pulse in the control ten times.
4. Monitor the area around the lubricating oil distributor for leakage.
5. Check oil level in lubricating oil tank, replenish if necessary.

D063 - Check the pneumatic system

Orientation

To ensure trouble-free operation, periodic checks (visual inspection) of the pneumatic system are necessary.

- Check system pressure and sealing air settings.
- Check supply and fluid lines.
- Check silencers.
- Drain condensate (not applicable to auto-drain).
- Check pressure setting on the pressure differential monitoring pressure gauge.



Example: Pneumatic maintenance unit B400 B500 (by FESTO)



Due to different requirements and/or specifications of the respective manufacturers, be sure to review the respective manufacturer's documentation!

The following components are used on the system maintenance unit (X) and the extension for sealing air on the glass scales (Y):

- **X System maintenance unit**
- 1. Switch-on valve (manual)
- 2. Pressure regulating valve system pressure 6 bar
- 3. Pressure gauge for system pressure
- 4. Filter insert with retained particle size 40 µm with automatic condensate drain
- 5. Filter insert with retained particle size 5 µm with automatic condensate drain
- 6. Branch module
- 7. Electrically actuated switch-on valve
- 8. Pressure sensor for system pressure
- **Y Expansion of "glass scales" lock-out air**

- 9. Microfilter insert with retained particle size 1 µm with automatic condensate drain
- 10. Filter insert with retained particle size 0.01 µm with automatic condensate drain
- 11. Activated carbon filter **no automatic condensate drain**
- 12. Pressure regulating valve with pressure sensor for glass scales sealing air 1.0 bar
- 13. Pressure regulating valve for steady rest
- 14. Proportional valve for gripping force adjustment (WPRU)
- 15. Safety pressure sensor
- 16. 3/2-way valve
- 17. Differential pressure sensor



If the differential pressure sensor (17) outputs an error message, **all 5 filter elements on the pneumatic system must be replaced.**



Filters are hazardous waste and must be disposed of in a controlled manner.

Requirement



Service and maintenance are to be carried out according to the manufacturer's specifications.

Procedure

1. Check pressure setting on pressure gauge and adjust if necessary. An operating pressure of 6 bar has been set at the factory.
2. Check supply and fluid lines (damage and leakage). Supply and fluid lines must be checked for damage. Pre-damage such as kinks or abrasions should be logged and replacement should be initiated.

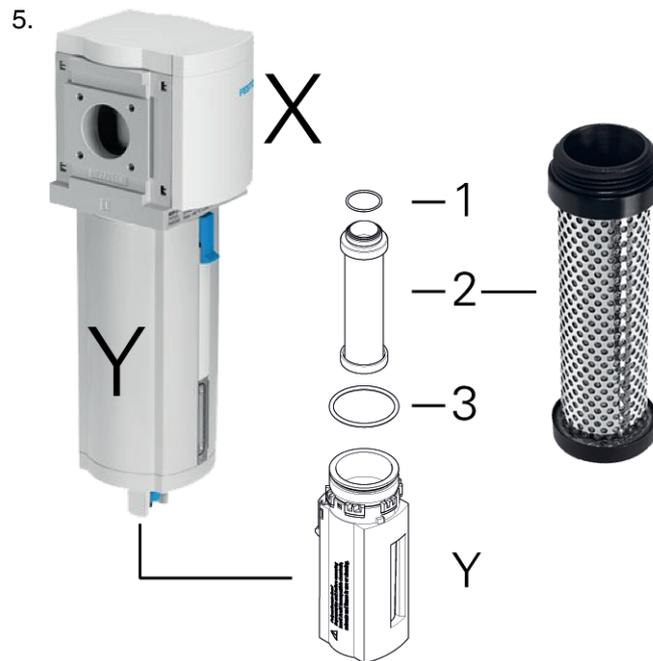
3.



Example: Various silencer versions from FESTO

Check silencer, replace if necessary

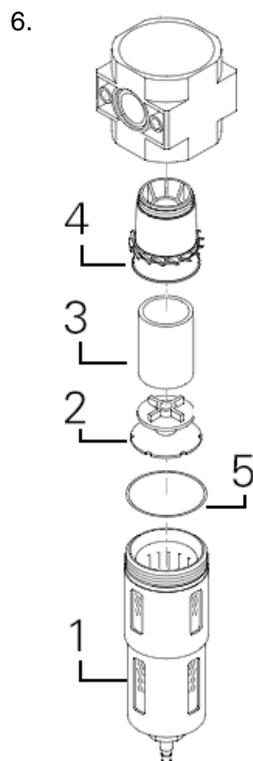
4. Drain condensate (not applicable to auto-drain).



Replace activated carbon filter (by FESTO)

- X Filter base housing
- Y Filter bowl
- 1 Sealing ring
- 2 Activated carbon filter cartridge
- 3 O-ring

Replace the activated carbon filter. **When disassembling the filter bowl, make sure that sealing rings and O-rings (1 + 3) are also installed.** Unscrew filter bowl Y from filter base X and remove activated carbon filter cartridge 2. Check sealing rings and O-rings (1 + 3), replace if necessary. Reinstall all parts in reverse order.



Example: Exploded view of fine filter replacement (by FESTO)

- 1 Filter bowl
- 2 Separating disk
- 3 Filter cartridge (check retained particle size)
- 4 Filter receptacle
- 5 O-ring

Replace fine filter or microfilter. **When removing the filter bowl, make sure to include the O-ring (5), separating disk (2) and filter holder (4).** Unscrew filter bowl (1) from filter base body and remove filter cartridge (3), and replace. Check O-ring (5), replace if necessary. Reinstall all parts in reverse order.

D085 - Check main and counter spindles



Carrying out the maintenance activities described below requires special knowledge. For this reason, these maintenance activities must only be carried out by staff that has received adequate training by the machine manufacturer!

Orientation

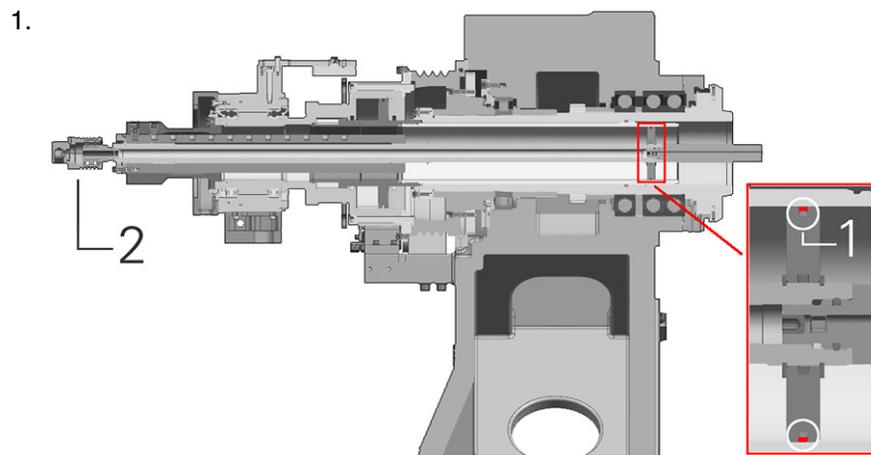
During this maintenance activity, various components in the area of the spindles are checked for leaks on the one hand and for the general condition of the power and encoder connections on the other.

Requirement

The following tools and spare parts are required to carry out this maintenance:

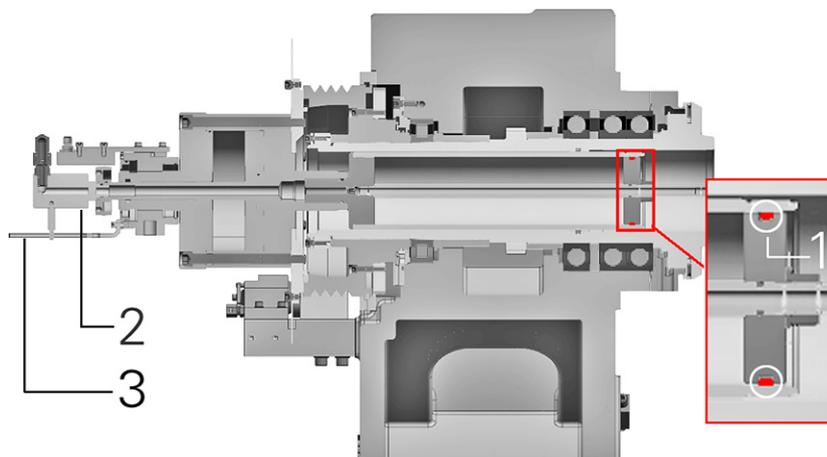
1. Sealing rings or O-rings
2. Supply or fluid lines as necessary

Procedure



Example: Version for depth stop/flushing unit

- 1 O-ring
- 2 Rotary feed device



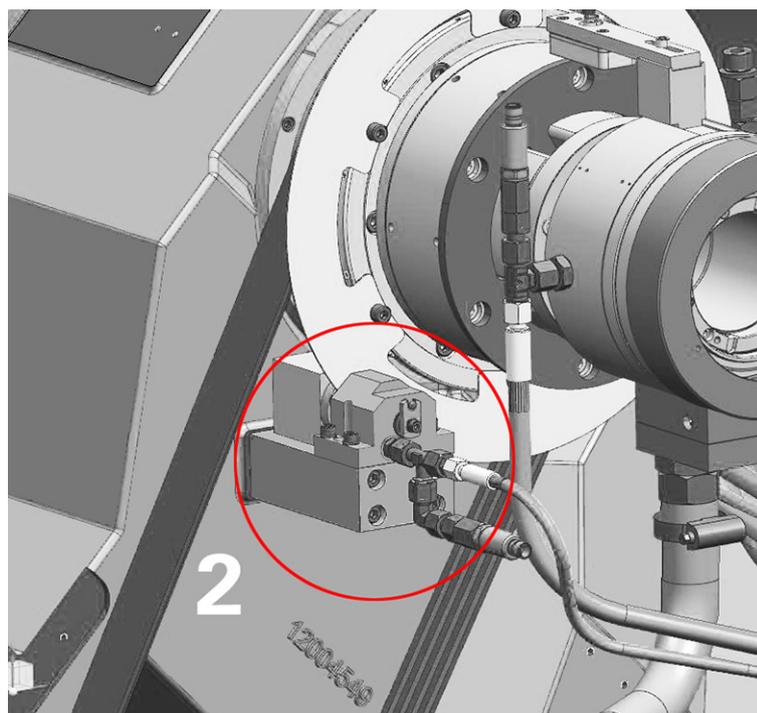
Example: Version for depth stop/flushing unit

- 1 O-ring
- 2 Rotary feed device
- 3 Anti-twist stop

Check the tightness of the depth stop/flushing unit and the correct seating of the rotary feed device.

2. Tightness of the solid or hollow clamping cylinder.

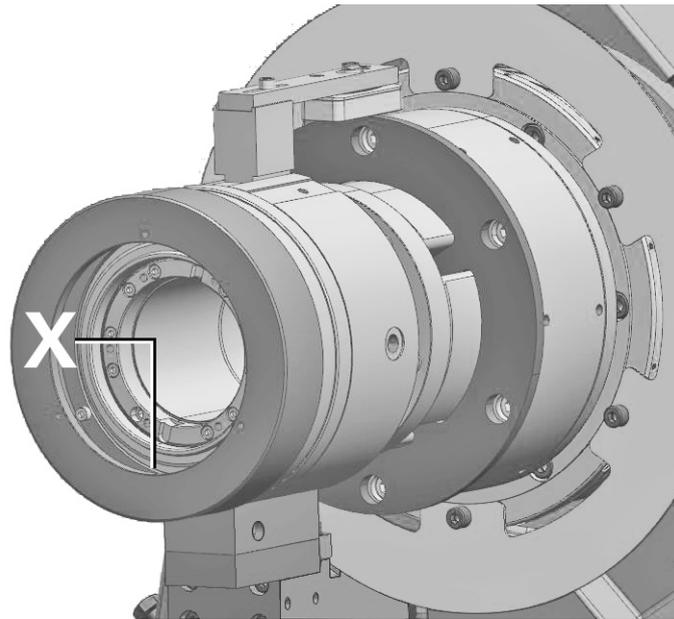
3.



Example: Holding brake (X) B400 B500

Check the tightness of the holding brake (2).

4.



Example: Coolant drain on the clamping cylinder

Check the cooling lubricant drain (X) on the clamping cylinder. Check that the drain is free and contains no chips. Loosen screws and remove cooling lubricant drain of the clamping cylinder. Remove chips or other impurities and ensure that the cooling lubricant can drain off. Then reassemble and tighten the screws.

5.



Due to different requirements and/or specifications of the respective manufacturers, be sure to review the respective manufacturer's documentation!

Check and potentially replace O-rings or other seals on the clamping devices. O-rings and other seals on the clamping devices prevent that chips or cooling lubricant penetrate into the hydraulic circuit or even into the mechanical components of the respective assemblies where they can cause significant damage. In any case, make sure that the seals recommended by the manufacturer are used or installed during maintenance or repair work.

6. Check the condition/tightness of the power and encoder connections as well as the fluid lines of the respective components.

D170 - Check the system for reconditioning the cooling lubricant

Orientation

Cooling and cleaning equipment for cooling lubricants is used where reconditioning of the cooling lubricant is necessary. Here, in order to achieve high availability of the cooling lubricant, the cooling lubricant is filtered (e.g., using edge gap filters or vacuum rotation filters) and also cooled (using coolers) to a certain preset temperature.

Here, the filters, pressure and temperature sensors, valve functions and fluid lines of the devices must be checked.

Similarly, the supply lines to the machine and the fluid lines in the machine must be checked for damage such as abrasions or kinks or leakage.



For all work in connection with operating materials, the information in the data sheets of the respective manufacturers and the information in the document **Notes on Operating Materials** must be observed.



Due to different requirements and/or specifications of the respective manufacturers, be sure to review the respective manufacturer's documentation!

Requirement

To determine the concentration of cooling lubricant in the cooling lubricant, a measuring device (refractometer) is necessary.

Procedure

1. Evaluate the overall impression of the system.
2. Visual inspection for leaks.
- 3.



Filters are hazardous waste and must be disposed of in a controlled manner.

Replace filter.

4. Check and potentially adjust float switch settings.
5. Check and potentially adjust temperature sensor settings.
6. Check and potentially adjust pressure sensor settings.

D347 - Replace belts and check belt tension



Carrying out the maintenance activities described below requires special knowledge. For this reason, these maintenance activities must be carried out only by authorized personnel of the manufacturer!

Orientation



Use only the original belts according to the spare or wear parts list.

Requirement



After replacing a drive belt, be sure to observe the values (Hz) specified in the table below for the belt tension of the respective axis. **A frequency meter is required for testing.**

Also the reference point may need to be checked or adjusted.

B400			X1	Z1	Y1	A8	A11		
	30mm	Hz			63				
	52mm	Hz				92			
	77mm	Hz					100		

Setting values in Hertz (Hz) for belt tension

A8 Main spindle drive
A11 Main spindle drive

Procedure

1.



**Uncontrolled movements of axes or machine components.
Severe cut and crush injuries.**

Secure all axes or components against uncontrolled movements during maintenance or repair work.

Move the tool slides to a suitable position.

2. Replace Y1 belt.
3. Measure belt tension (frequency meter) and adjust belt.
4. Replace A8 belt.
5. Measure belt tension (frequency meter) and adjust belt.
6. Replace A11 belt.

7. Measure belt tension (frequency meter) and adjust belt.

D457 - Replacing hydraulic fluid

Orientation



Power off the machine and secure it against power on.



Use only approved hydraulic fluid. Details can be found in the documentation and on the label of the hydraulic fluid tank.

When changing the type of hydraulic fluid, the unit must be flushed with new fluid.



For all work in connection with operating materials, the information in the data sheets of the respective manufacturers and the information in the document **Notes on Operating Materials** must be observed.

Requirement



Specification and quantity of hydraulic fluid as specified in the technical data.

Before replacing the hydraulic fluid, make sure that the required spare parts such as seals and filters are available.



Use only the original filters according to the spare or wear parts list.

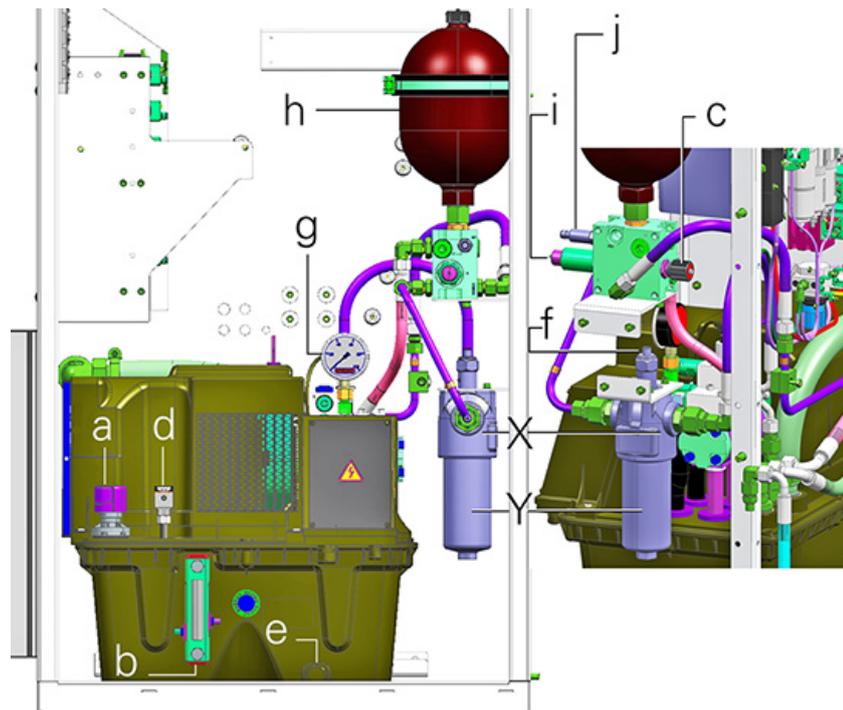
Procedure

1. Suction off old fluid through the filler neck (a) or drain the fluid from the drain plug (e). Use a suitable collection bin for this purpose.

2.



Use only lint-free cleaning cloths or a sponge!



Example: Hydraulic unit B400 B500

- a Filler neck (hydraulic fluid)
- b Fill level indicator
- c Accumulator drain valve
- d Monitoring (level and temperature)
- e Oil drain plug
- f Electrical monitoring (contamination indicator)
- g Pressure gauge (system pressure)
- h Pressure accumulator
- i Safety valve
- j Electrical monitoring (system pressure)
- X Hydraulic fluid filter (line filter)
- Y Filter bell

Replace filter.

3. Unscrew the filter bell (Y).

4.  Dispose of the fluid in the filter bell (Y); do **not** refill into the hydraulic tank.

Replace the filters (Z) of the hydraulic fluid filters (X). A different number of hydraulic filters (X) may be installed, depending on the version. Unscrew filter bell (Y), remove contaminated hydraulic fluid (oil sump) and used filter (Z) from the filter bell (Y) and dispose of them according to environmental regulations.

5.  Only filters with retained particle sizes described in the fluid plans must be used.



Z

Example: Filter (Z)

Clean filter bell (Y) and insert a new filter (Z). Reinstall the filter bell (Y) and tighten **by hand until it stops**. Then back off the filter bell (Y) 1/8 turn.

6. To fill in new hydraulic fluid, use a pump with a min. 10 µm micro filter that is exclusively used for hydraulic fluid.
7. Fill in the prescribed amount of new hydraulic fluid.
8. Switch on the machine and hydraulic system.
9. Check and, if necessary, replenish hydraulic fluid level.
10. Vent hydraulic system. To bleed the hydraulic system, open the accumulator drain valve (c) for about 10 seconds and then close it again.

D500 - Perform data backup



Carrying out the maintenance activities described below requires special knowledge. For this reason, these maintenance activities must only be carried out by staff that has received adequate training by the machine manufacturer!

Orientation

If data from the control is lost, the backup CD/DVD always provides the ability to quickly restore the operation of the machine. If machine data have been modified as part of maintenance or repair work, a data backup **must** be performed. In this case, a backup of the PLC and NC archives is sufficient. The data can be saved to a floppy disk or USB stick, depending on the machine control equipment. In a system recovery, the backup CD/DVD created when the machine was delivered is restored on the machine. Afterwards, the PLC and NC archive files are loaded from the floppy disk or USB stick.

Procedure

1. Perform data backup.

D520 - Check control cabinet and cable assemblies (visual inspection)

Carrying out the maintenance activities described below requires special knowledge. For this reason, these maintenance activities must only be carried out by staff that has received adequate training by the machine manufacturer!

Orientation

To avoid problems and prevent any resulting system failures, simplified control cabinet checks must be carried out at regular intervals on the cabinet and associated components. This include a visual inspection of the wire harnesses of the individual modules and the grounding cable. Additional built-in air conditioning units (option) ensure a constant temperature in the control cabinet. These air conditioners cannot work efficiently if filters are dirty or doors are not tight.



Use only the original filters according to the spare or wear parts list!
Filters are hazardous waste and must be disposed of in accordance with environmental guidelines and regulations of the country of operation.

When working in or on the control cabinet, switch off the machine and secure it against power on.

Requirement

Even with the machine powered off, some devices or components in the control cabinet are still energized.



Observe the specific electrical diagrams for this machine.

Procedure

1. Switch off the machine.
2. Have the electrical diagrams for the corresponding machine ready.
3. Replace all filters on the control cabinet and cabinet components.
4. Check that the cabinet doors can be properly closed. If the cabinet doors can not be closed properly, determine the cause and eliminate it. Possible causes could be faulty seals, hinges, or even a damaged cabinet door.
5. Check all cabinet seals. They should be free of oil and condensation.
6. Clean the control cabinet. Use a suitable vacuum cleaner for this purpose.
7. Check the cabinet lighting (optional).

8. Check grounding cable. Grounding cables are located, e.g., between the control cabinet and cabinet doors and between the drag and the machine bed.
9. Check cable assemblies for damage, replace if necessary.

D540 - Check motor protection switch setting and load tap



Carrying out the maintenance activities described below requires special knowledge. For this reason, these maintenance activities must only be carried out by staff that has received adequate training by the machine manufacturer!

Orientation

This check must be carried out on all motors that have a motor protection.

Obtain the motor rated current from the nameplate or from the circuit diagrams.

Requirement



Observe the specific electrical diagrams for this machine.

Procedure

1. Check the motor protection switch setting.
2. Check consumer tap

D550 - Check air conditioners in the control cabinet

Orientation

Because of different brands and manufacturers, be sure to observe the appropriate manufacturer's documentation.

Procedure

1. Check air conditioners in the control cabinet.
2. Check condensate drain.
3. Check air inlets and outlets.

4.



Use only the original filters according to the spare or wear parts list.

Replace filter.

Service Interval - 5 Years

Maintenance Summary - 5 Years



It is recommended to document the maintenance activities carried out by using the appropriate maintenance log. The maintenance log has the document number DIE220EN - 05.06.2019.

I020 - Replace the pressure accumulator

I020 - Replace the pressure accumulator

Orientation



According to the pressure equipment directive 97/23/EC, the pressure accumulators built into the machine are of category I/ module A. They are provided with a CE mark by the manufacturer, and a declaration of conformity has been issued. Due to this categorization, the pressure accumulators must be subjected to an external and internal inspection and a strength test by a qualified person after a period of time recommended by the pressure accumulator's manufacturer. For pressure units with gas cushions, an internal inspection is recommended after 10 years at the latest. We recommend to replace the pressure accumulator after 5 years to avoid an internal inspection that is laborious and expensive for this size of pressure accumulator.



Due to different requirements and/or specifications of the respective manufacturers, be sure to review the respective manufacturer's documentation!



The machine operator is obliged to check the pressure accumulator according to applicable rules and directives. Defective pressure accumulators must be disposed of according to applicable rules after they have been depressurized by a qualified technician. The directives and regulations applicable in the country of use must be followed.



Screws on the hydraulic system, the connected components, and the supply lines must be tightened to the manufacturer's specified torques.

Procedure

1. Replace the pressure accumulator.

2.



Example: Pressure accumulator

Connect and secure the pressure accumulator. Observe the tightening torque.

Service Interval - 8 Years

Maintenance Summary - 8 Years



It is recommended to document the maintenance activities carried out by using the appropriate maintenance log. The maintenance log has the document number DIE220EN - 05.06.2019.

J150 - Replacing the viewing glass

J150 - Replacing the viewing glass

Orientation



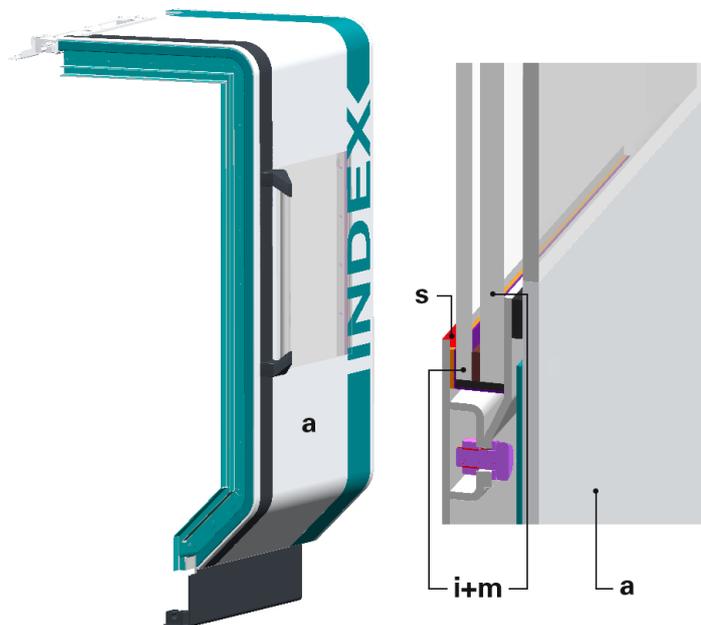
If the viewing glass is damaged, it must be replaced. This is necessary regardless of the extent of damage. Even with minimal damage, the impact resistance of the glass can no longer be guaranteed.



For safety reasons, it is recommended to obtain the viewing glass directly from the machine manufacturer.

The viewing glass consists of three panes: the inner pane (**i**) made of tempered glass, the central pane (**m**) made of polycarbonate, and an outer pane (**a**) made of PMMA (polymethyl methacrylate). The inner pane (**i**) is relatively resistant. It can be cleaned with any commercially available cleaning agents. Only the center pane (**m**) is essential for the impact resistance of the viewing glass. The polycarbonate pane is subject to natural aging and must therefore be replaced at regular intervals.

After replacing the inner viewing glass and after the installation activities are complete, the glass must be sealed on the inside of the work area door (**S**). It is necessary to provide a suitable sealant. **The sealant Terostat 930 is used at the factory for this purpose.**



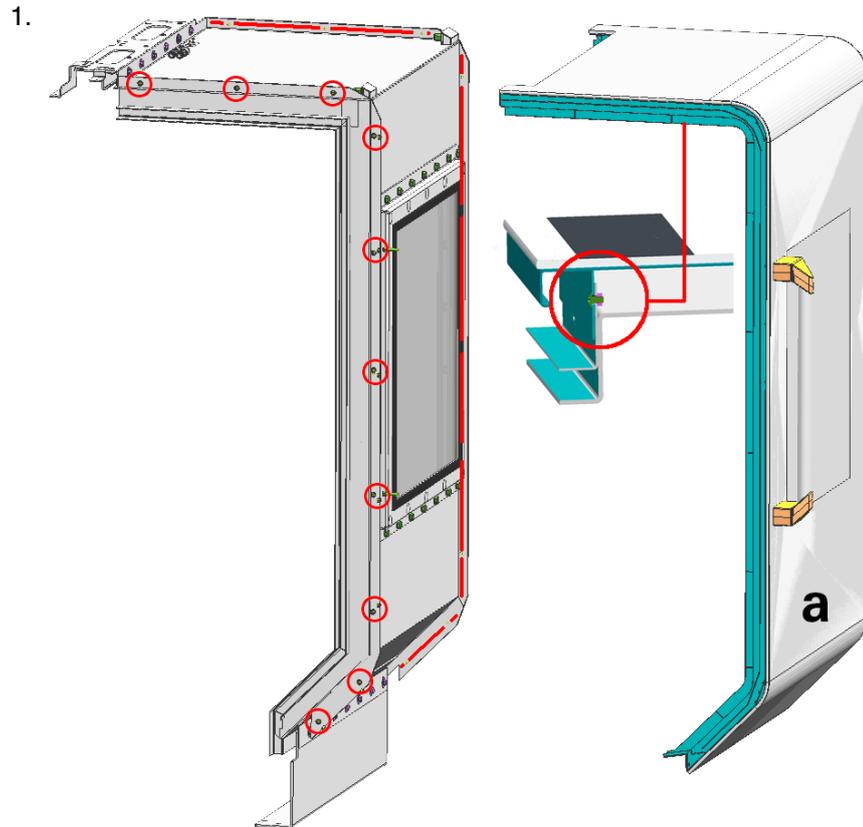
Example: G200.2_Arbeitsraumuere_01_1

- a** Outer pane (design pane made of PMMA - polymethyl methacrylate)
- m** Center pane (polycarbonate)
- i** Inner pane (glass)
- S** Silicone gasket



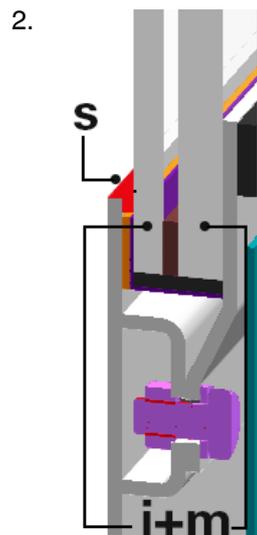
If sealing compounds from other manufacturers are used, their equivalence must be guaranteed by the supplier or manufacturer in writing.

Procedure



Example: G200.2_Arbeitsraumuere_03_1

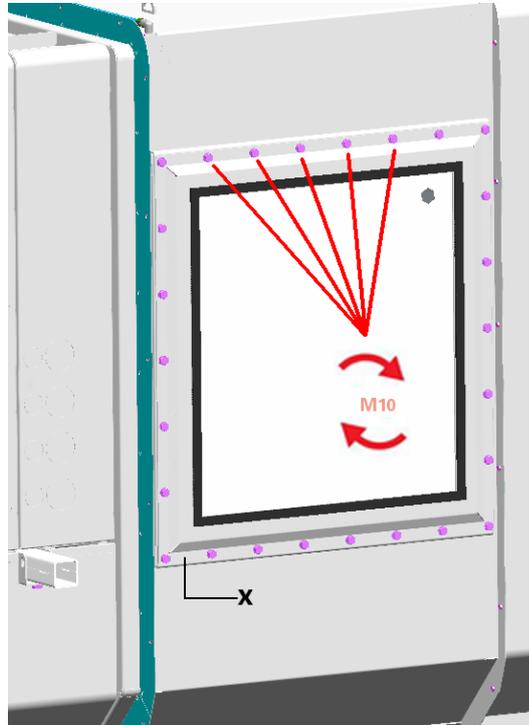
The front cover is also the front pane/design pane (**a**). It is screwed to the work area door. Loosen the screws (M6) along the contour on both sides and remove (Fig. 03_1). Remove front cover/pane, carefully place aside and secure against tipping over.



Example: G200.2_Arbeitsraumuere_06

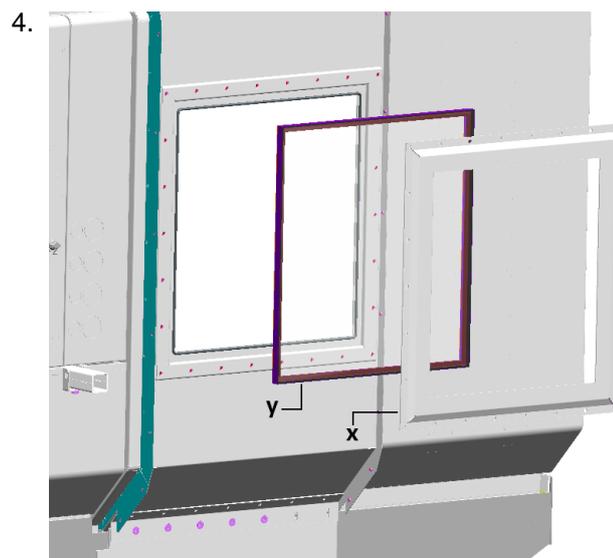
Cut the silicone sealing (**S**) on the inside of the viewing glass (see Fig. _06) with suitable knife.

3.  Assistance of a second person to hold the glass is recommended for the activity below. This generally also applies to the installation of the new pane, in particular when sealing and fastening the clamp frame with screws.



Example: G200.2_Arbeitsraumuere_07

Remove the clamping frame (x) of the glass package. Loosen and remove all screws from the clamping frame (see Fig_07).

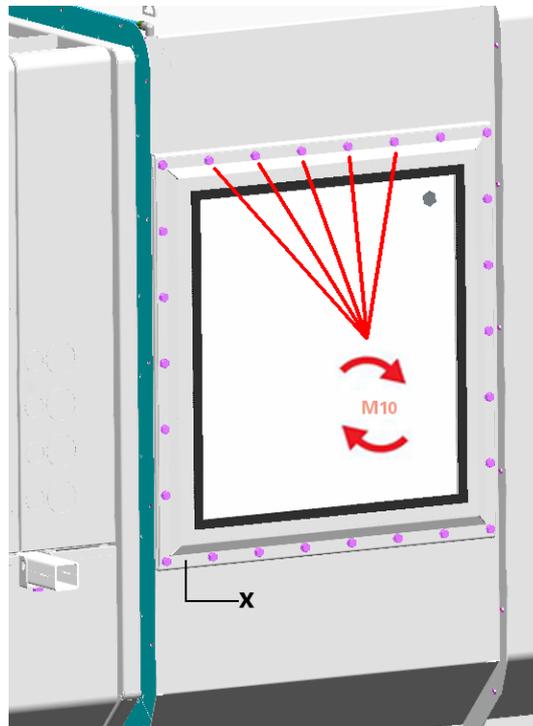


Example: G200.2_Arbeitsraumuere_04

Remove the clamping frame (x) and glass package (y). (See Fig._04)

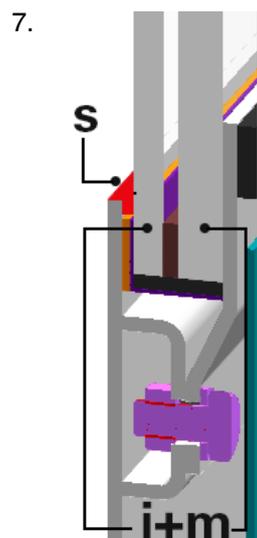
5. For assembly, follow the steps in reverse order. Ensure proper cleanliness during the installation.

6.  Make sure of cleanliness and stress-free installation when mounting the clamping frame into the work area door.



Example: G200.2_Arbeitsraumtuere_07

Reinstall the glass package and clamping frame. After installation, tighten all screws (Fig.:_07) to the prescribed torque.



Example: G200.2_Arbeitsraumtuere_06

Seal the inner pane in the work area with sealant **(S)** again. After the assembly of the panes and frame parts, the inner pane must be sealed using a sealant (Terostat 930 gray is used at the factory). See Fig.:_06



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