

Maintenance Instructions

G220

Control C200-sl

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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 degraded 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 DIE018EN - 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
- A025** - Check hydraulic system (visual inspection)
- A037** - Check pneumatic system (visual inspection)
- A075** - Checking fill levels of the fluid tanks
- 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
- A110** - Clean filter screens on chip conveyor
- A120** - Check cooling lubricant (visual inspection)
- A124** - Check the cooling unit and the coolant
- A130** - Check work area light (visual inspection)
- A180** - Clean the work area
- A265** - Cleaning the chip conveyor
- A280** - Clean labyrinth ring of spindles
- A320** - Wassermann tool change system

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.

A025 - 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.

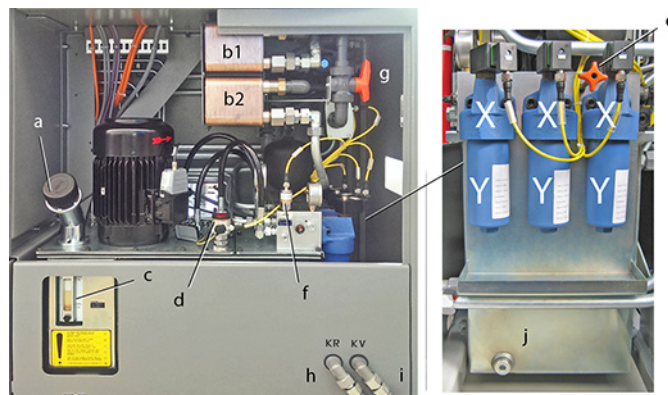


Only use hydraulic fluid grade 15/13/10 in accordance with ISO 4406.

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 G220 G420

- a Filler neck
- b1 Heat exchanger (hydraulic unit HLP32)
- b2 Heat exchanger (spindle unit HLP5 (VG5))
- c Fill level indicator
- d Monitoring (level and temperature)
- e Accumulator drain valve
- f Monitoring (system pressure)
- g Shut-off valve (cooling - water side)
- h Return flow (cooling - water side)
- i Inlet flow (cooling - water side)
- j Oil drain plug
- X Hydraulic fluid filter hydraulic fluid HLPD32 (VG32)
- Y Filter bowl



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.

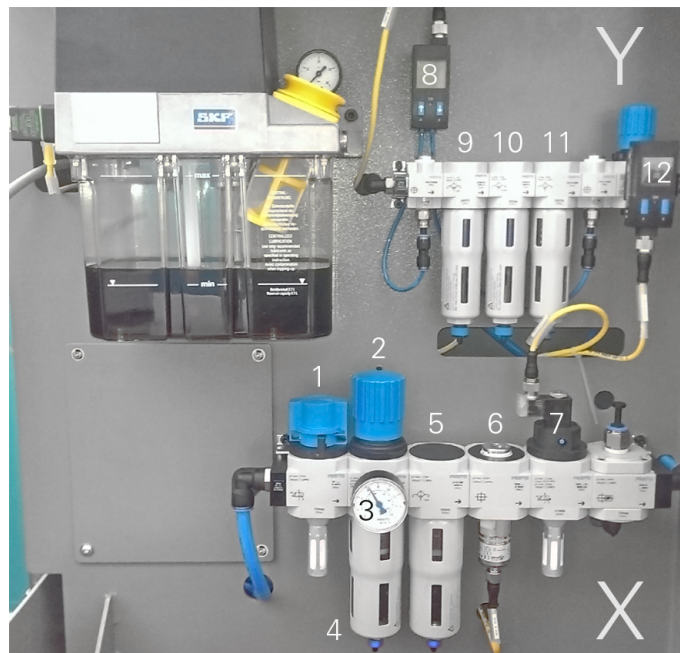
2. Visual inspection of the hydraulic fluid. The hydraulic fluid may not exhibit any foaming or cloudiness at the oil sight glass. In case of problems of this kind, immediately determine the cause and correct the error. If in doubt, take a sample for analysis and contact the manufacturer of the hydraulic fluid.
3. Check pressure setting on pressure gauge and adjust if necessary. The operating pressure is different depending on the machine type. See the fluid charts for the correct pressure setting.
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.

A037 - Check pneumatic system (visual inspection)

Orientation

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

- Check oil level at oiler (optional).
- 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 (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):

1. Switch-on valve (manual)
2. Pressure regulating valve for system pressure 6–8 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. System pressure monitoring
7. Electrically actuated switch-on valve
8. Pressure sensor for pressure differential monitoring
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 0.6-1.0 bar

Procedure

1. Check oil level at oiler (optional).
2. Check pressure setting on pressure gauge and adjust if necessary. An operating pressure of 6 bar has been set at the factory.
3. 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.

4.



Example: Various silencer versions from FESTO

Check silencers.

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

A075 - Checking fill levels of the fluid tanks

Orientation

To ensure the operational safety of the machine, the fill levels of all fluid tanks must be regularly checked, and topped off if necessary.

Operating fluids such as hydraulic fluids, cooling lubricants, lubricating greases/oils are also subject to degradation or aging like the components involved in this process, and must therefore be serviced, refilled or changed at regular intervals. Do not use cotton waste and highly volatile solvents such as benzene, trichloroethylene or similar cleaning agents. The machine must not be cleaned with compressed air. To ensure trouble-free operation, periodic checks of the oil level are necessary.

The hydraulic fluid and lubricating oil levels 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.

The interval for this maintenance activity is strongly dependent on the operating profile of the machine. If the machine is used in three-shift operation, this maintenance activity must be carried out much more frequently.

Requirement

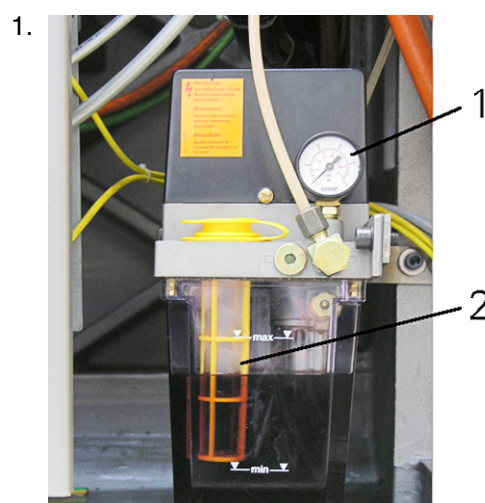


For all work in connection with operating materials, the information in the data sheets of the respective manufacturers and the information in the document **Notes on Operating Materials** must be observed.



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

Procedure

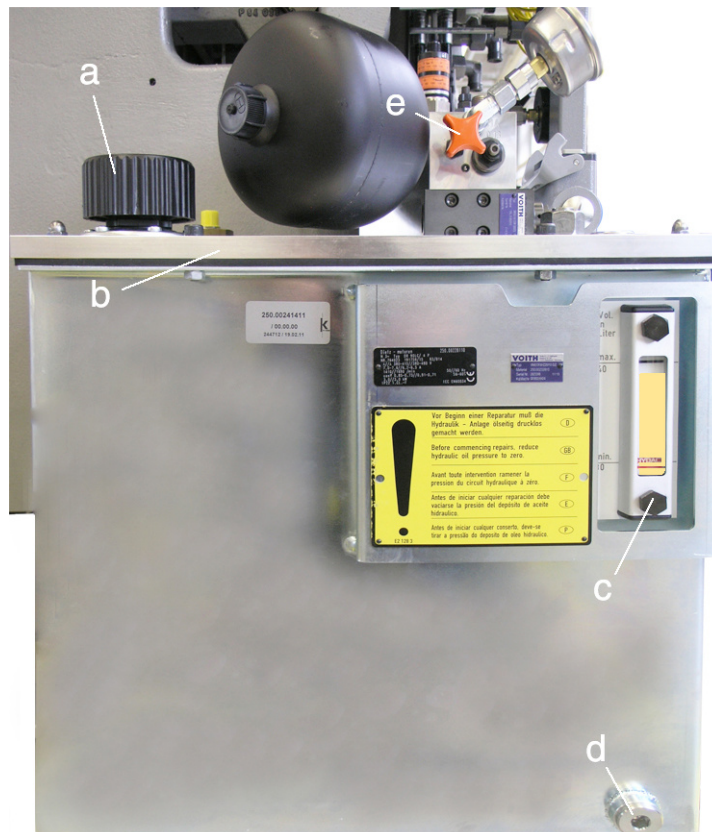


Example: Lubricating oil tank

- 1 Pressure gauge (pressure lubrication)
- 2 Filter insert and min./max. indicators

Check fill level at lubricating oil tank.

2.



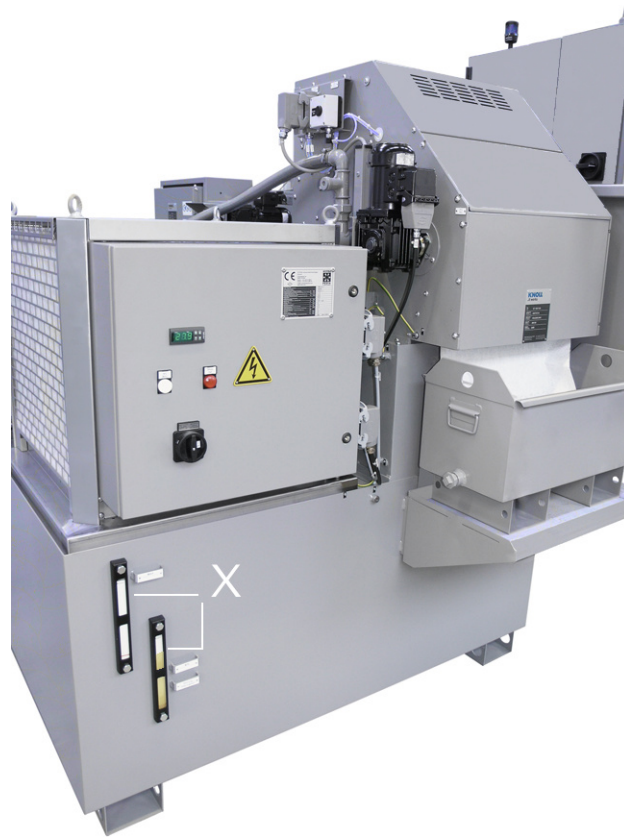
Example: Hydraulic unit C100, C200

- a** Filler neck
- b** Base plate of hydraulic unit
- c** Level control
- d** Drain plug
- e** Accumulator drain valve

Check fill level at hydraulic fluid tank.

3. Check fill level at cooling lubricant tank.

4.



Fill level indicator at a cooling lubricant recycling system (Knoll)

X Fill level indicator

Check the fill level at the cooling lubricant reconditioning system (option).

5. Check fill level at coolant tank (option).

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.

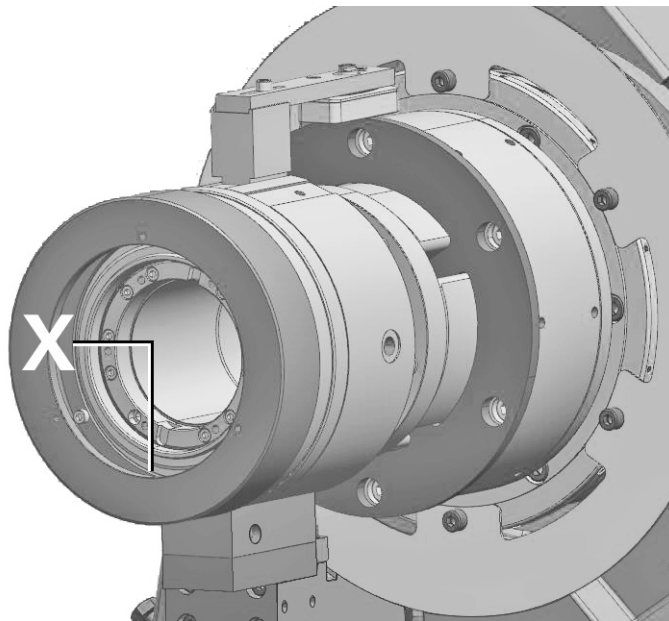
A097 - Clean cooling lubricant outlet on clamping cylinder

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

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.

A110 - Clean filter screens on chip conveyor

Orientation

The chip conveyor is used for removal of swarf from the work area and is also a reservoir for the cooling lubricant.

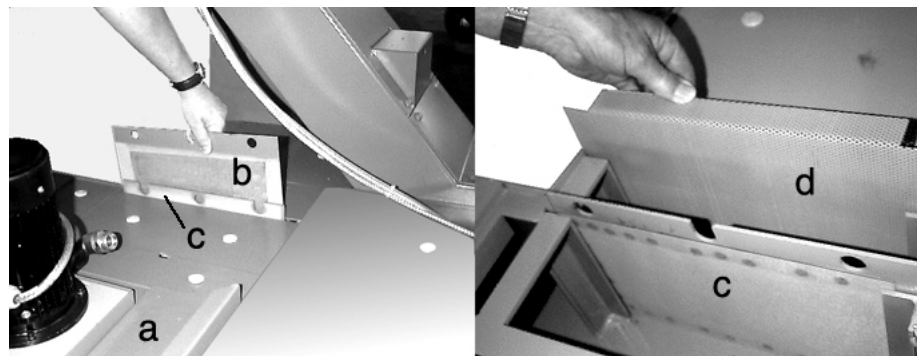
The cooling lubricant is filtered in the chip conveyor. For this purpose, various filters and filter plates are built into the chip conveyor. These filters must be cleaned regularly. In particular, make sure that the area around the cooling lubricant pump(s) is always free of chips or dirt.



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.



The chip conveyor must not be operated without the filters and filter plates provided by the manufacturer. Follow the manufacturer's documentation!



Example: Plug-in strainers ABC

Procedure

1.



Caution

**Cooling lubricant splashing out of the chip conveyor.
Skin irritation and damage to the eyes.**

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

Remove cover plates in the area of the cooling lubricant pump.

2. Remove and clean filter and plug-in plates.

3. Remove and clean magnetic filter plates (option).

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

5.



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.

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 ingression.



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.

A124 - Check the cooling unit and the coolant

Orientation

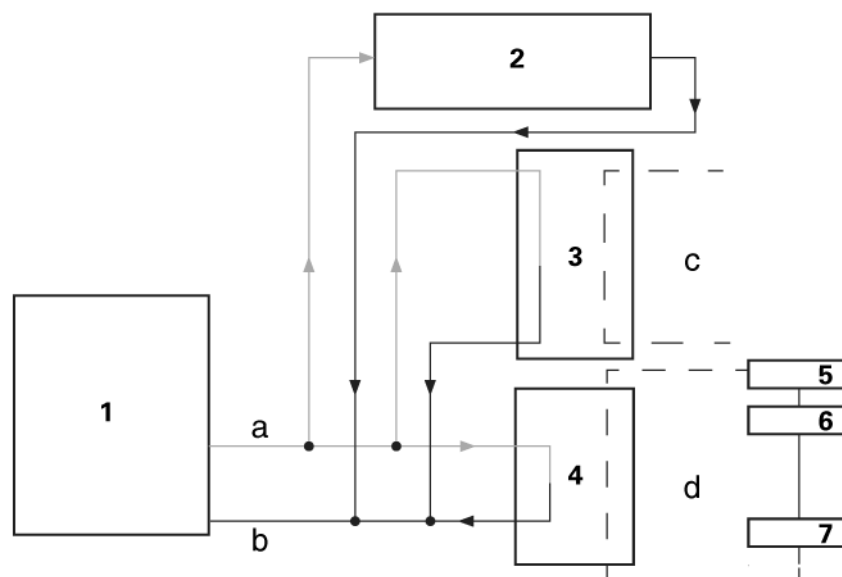
For add-on equipment that cannot be cooled conventionally with cooling lubricants or hydraulic fluid due to high temperature development, separate cooling is provided in an independent cooling circuit. The coolant used here must be checked continuously for its condition like other coolants. Also perform a visual inspection of the cooling unit and the supply and fluid lines as part of the servicing and maintenance activities. Check for leaks on the system in general as well as at screw connections, and supply and fluid lines.



This visual inspection or monitoring requires no specific knowledge of refrigeration according to the manufacturer's documentation. These activities can be carried out by instructed individuals with appropriate expertise.



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



Schematic of cooling system G220 G420

- 1 External cooling unit, or customer-side cooling
- 2 Heat exchanger (hydraulic unit)
- 3 Hydraulic unit
- 4 Heat exchanger (spindles)
- 5 Main spindle
- 6 Counter spindle
- 7 Tool carrier 1
- a Inlet flow (water)
- b Return flow (water)
- c Hydraulic fluid HLPD32 (VG32)
- d Cooling oil HLP5 (VG5)



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



Replenish only coolant of the same manufacturer having the same specification. Mixing different coolants may lead to corrosion of the cooling system and degradation of the coolant. The glycol content must be min. 25%.



When switching the coolant to another product or changing the manufacturer, the cooling system must be completely flushed and cleaned with this coolant. When preparing the coolant from concentrate and water, be sure to use demineralized water only. Only then the machine may be put back into operation.

External Machine Cooling Water Supply

A	B	C	D	E	F
G220	20°C±2°K	38	4,5	15	8
G420	10 - 20°C	50	2,5	15	8

Technical Data of the Cooling Water Supply G220 G420

- A Machine
- B Water temperature [°C]
- C Cooling water, Q_{min} / Q_{max} [l/min]
- D Differential pressure P_{inlet} and P_{return} [bar]
- E Required cooling capacity [kW]
- F Pressure in the cooling system [bar]

The information given in the Technical Data of the cooling water apply at an ambient temperature of max. 40 °C.



The values specified in the table must absolutely be observed! Deviating from these values will not ensure sufficient cooling of the machine.

The maximum operating pressure must not exceed 8 bar!



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



Be sure to replenish with a ready-mix. Mixing different glycol alkalis may trigger chemical reactions causing agglutination or clumping of the coolant.

Procedure

1. Check coolant. Test criteria for this visual inspection are the clarity and transparency of the coolant.
2. Check filling level on the level indicator.

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



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.

A180 - Clean the work area

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.



Caution

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. Examine any visible damage, and repair or replace, if necessary.

A265 - Cleaning the chip conveyor

Orientation



Be sure to follow 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. Clean the chip conveyor. Sweep accumulated chips from the tool carriers and chip deflectors onto the chip conveyor belt. Provide a collection bin at the chip discharge chute switch on the chip conveyor. Continue to open the work area door frequently and clean the slats of the conveyor belt with a broom. If a hand shower (option) is available, it can be used to rinse the interior and the conveyor belt.
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.  Only one insert screen may be present in the chip conveyor during operation.



Example: G220 G420 with chip conveyor and conveyor belt

Clean screens and magnetic filter plates (option). To avoid clogging of the cooling lubricant channels, the insert screen, coarse screen and the magnetic filter plate (option) should be cleaned weekly or as appropriate depending on the degree of contamination of the chip conveyor. Insert a second, non-built-in insert screen at the motor side. This prevents sludge deposits and chips from entering the suction area of the pump. Then remove and clean the dirty screen, and have it ready for the next maintenance interval.

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.

A280 - Clean labyrinth ring of spindles

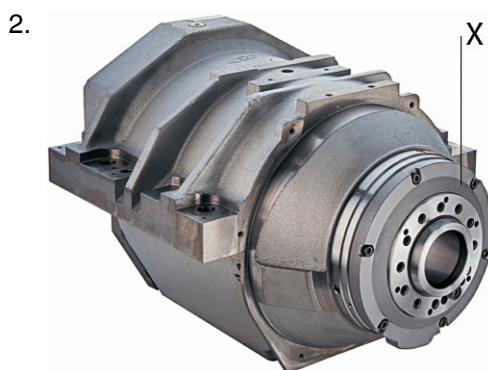
Orientation



When machining short-chipping materials such as brass, cast iron, or in case of residues from the grinding, the work area must be cleaned more frequently due to the special nature of the contamination. Depending on the duration of use, usage profile of the machine and different environmental conditions, it is necessary in particular to remove and clean the labyrinth rings.

Procedure

1. Loosen and remove the screws on the labyrinth ring (X) of the spindle. The number of screws that are necessary to fasten the labyrinth ring may differ depending on the type of machine.



Example: (X) Labyrinth ring on the main spindle G200

Remove the labyrinth ring.

3. Clean the labyrinth ring. Clean the free space behind the labyrinth ring by hand with a cloth.
4. Reinstall the labyrinth ring and tighten the screws to the proper torque.

A320 - Wassermann tool change system

Orientation



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

The visual inspections described in the manufacturer's documentation must be carried out as part of maintenance activities.

Procedure

1. Perform visual inspections according to manufacturer's instructions.

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 DIE018EN - 05.06.2019.

- C010** - Check maintenance logs of servicing activities
- C035** - Check work area door (optionally with electr. drive) and viewing glass
- C047** - Check tool clamping sets of the milling spindles (from Berg)
- C050** - Checking and potentially replacing the cooling lubricant adapter (HSK tool mountings)
- C065** - Check telescopic covers and wipers
- C070** - Check outer wipers of linear guides
- C080** - Check all electrical connections and drive belts of the drive motors
- C130** - Replace filter on air conditioner cooling fan
- C140** - Check cooling unit for cooling lubricant
- C155** - Check coolant
- C190** - Clean labyrinth rings of spindles
- C510** - Check backup data carrier
- C525** - Check control cabinet
- C555** - Replace hydraulic fluid filters
- C570** - Wassermann tool change system

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.

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.

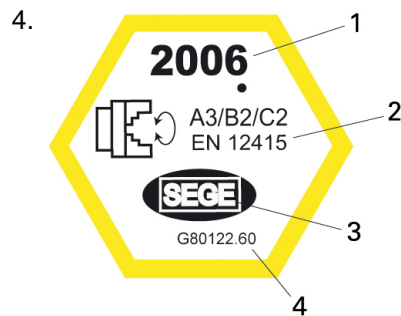
Procedure

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.



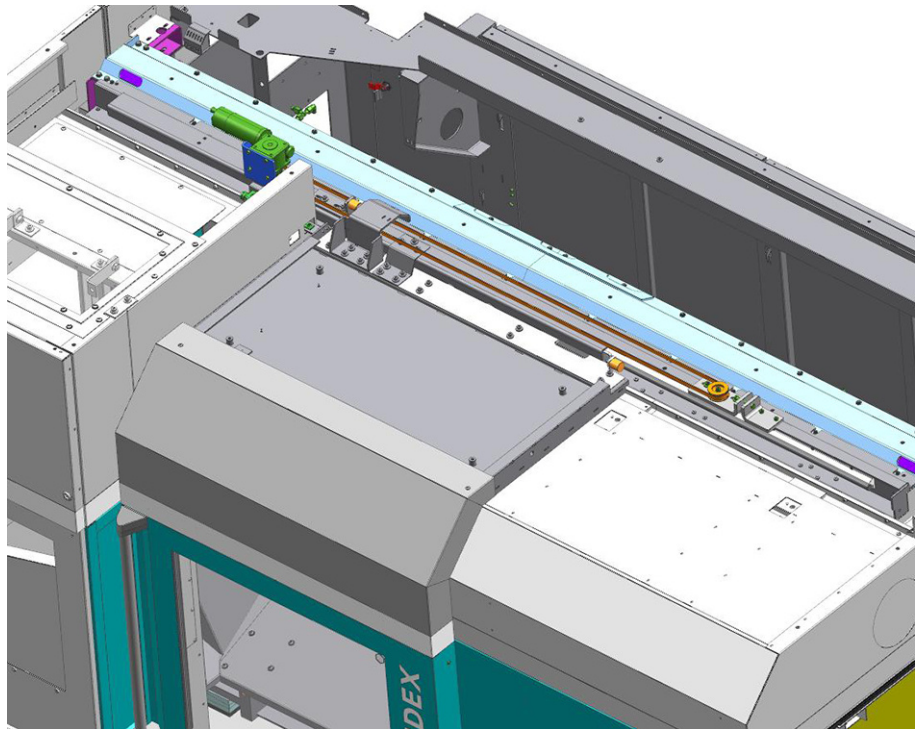
Example: Safety label - viewing glass 2006

- 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

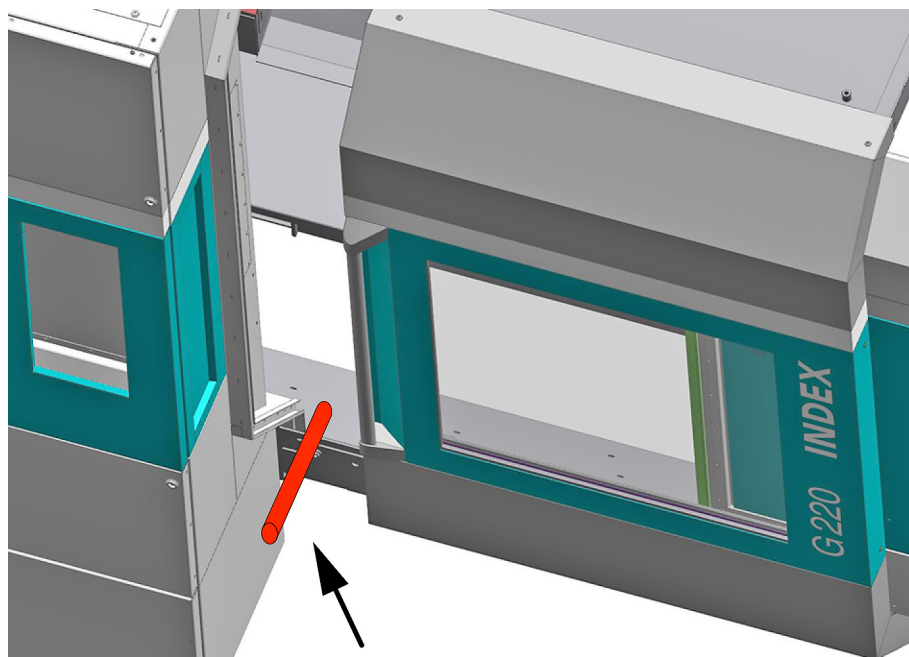
Pinching of limbs due to faulty obstacle detection on the work area door

Check obstacle detection.



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

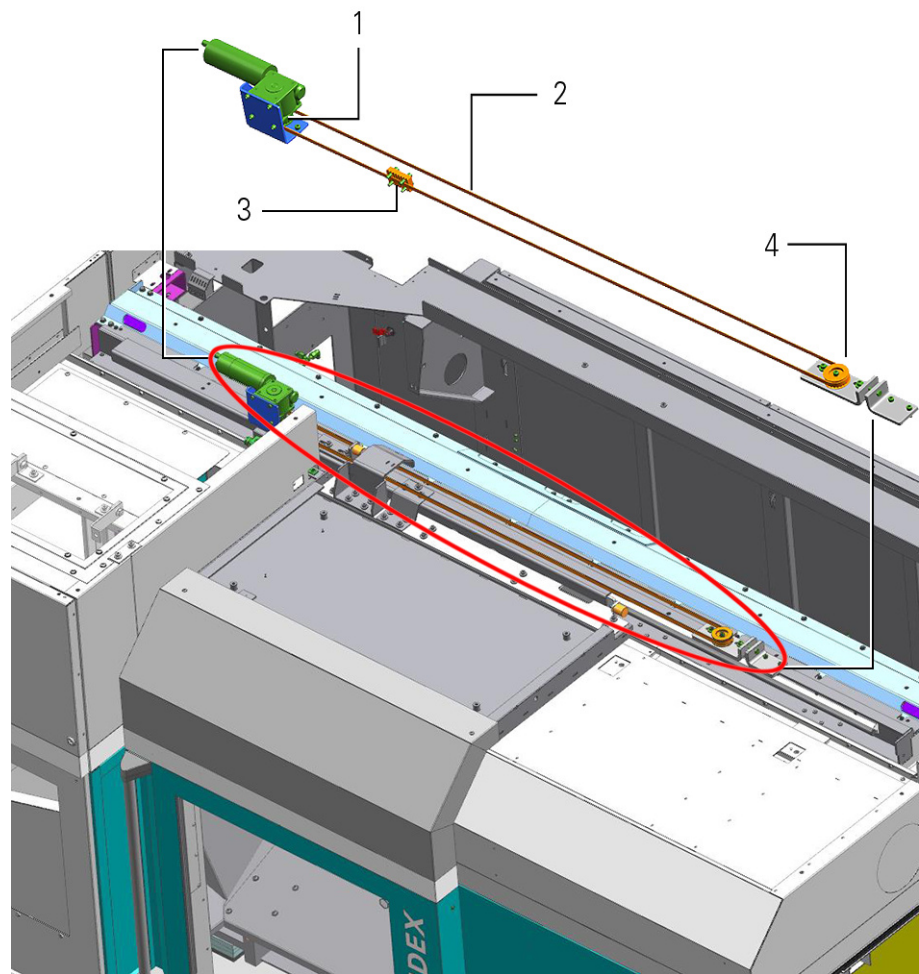
The machine must be switched on and fully functional for this test.



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.

8.



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).

C047 - Check tool clamping sets of the milling spindles (from Berg)



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



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

The machine described here uses only clamping sets from Berg-Spanntechnik. These clamping sets (HSK and Capto) installed in the tool or milling spindles should be checked regularly. Regular checks ensure continuous and trouble-free operation. Based on manufacturer's instructions, we recommend replacement of the clamping sets when the clamping force falls below the following values (see Table F_{min}).

		F_1 (kN)	F_{min} (kN)
R200	HSK-T40	10	7
R300	HSK-T63	24	17
	PSC 63	30	21
G220	HSK-T40	10	7
	HSK-T63	24	17
G200.2	HSK-A40	11	8
G420	HSK-T63	24	17
	PSC 63	30	21

Table for testing the clamping force of clamping systems (Berg-Spanntechnik)

F_1 = nominal clamping force in kN (manufacturer data)

F_{min} = manufacturer recommendation in kN

The values for F_1 listed in the table are based on **DIN 69063-1** for HSK and **ISO 26623-2** for PSC - CAPTO



Example: HSK clamping sets from Berg



New or manufacturer-reconditioned clamping sets must **not** be relubricated. Improper lubrication of the clamping sets may cause damage to the clamping set or failure of the entire clamping system.

Requirement

A measuring device required to measure the clamping force can be sourced through **INDEX -Werke**, a representative or the tool manufacturer.



Example: Clamping force measuring system from Berg

The Berg clamping force measuring system for tool mountings is designed for force measurement with a stationary spindle. Clamping force measurements can be performed on HSK, SK and Capto tool mountings.

Procedure

1. Check clamping sets of the tool spindles. This procedure depends on the measuring device. **Therefore be sure to follow the manufacturer's documentation of the measuring device.**

C050 - Checking and potentially replacing the cooling lubricant adapter (HSK tool mountings)



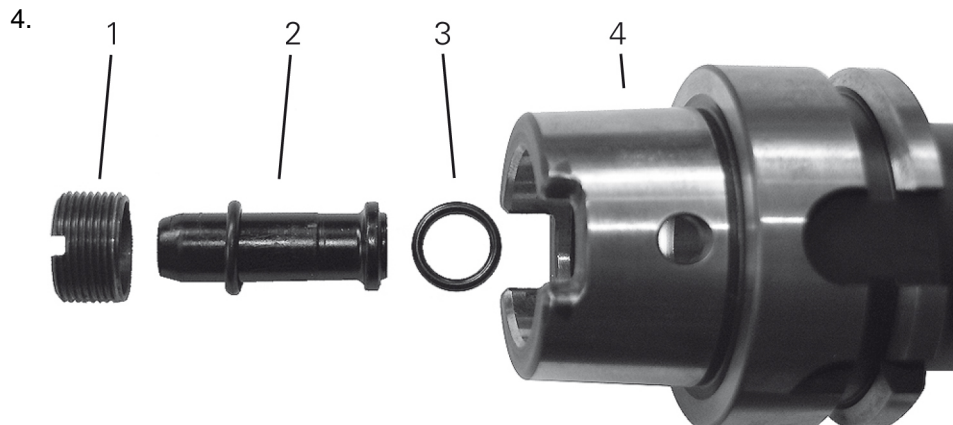
Carrying out the maintenance activities described below requires special knowledge. For this reason, these maintenance activities must only be carried out by staff that has received adequate training by the machine manufacturer!

Orientation

HSK tool mountings feature a so-called internal cooling lubricant supply, in which the cooling lubricant is fed through the tool to the tool's cutting edge. To ensure a tight connection between the tool spindle and the HSK shank when a tool is changed (automatically or manually), there is a cooling lubricant adapter inside the HSK shank. This adapter is spring-mounted using O-rings so it can move to some extent, which provides for a safe tool change. As this O-ring is subjected to natural wear, it must be checked and replaced if necessary at regular intervals.

Procedure

1. Check and potentially replace the cooling lubricant adapter (also for tools inside the tool magazine). Check the correct seating of the cooling lubricant adapter, and replace the sealing ring at the cooling lubricant adapter.
2. Remove the tool including the HSK tool mounting.
3. Check the centric position of the cooling lubricant pipe. It should be possible to shift the pipe approximately 1 mm from the center, after which it centers again automatically (resilient). Otherwise the cooling lubricant pipe has to be removed and the O-ring has to be replaced. The following steps must be performed.



Example: Sealing at the cooling lubricant adapter

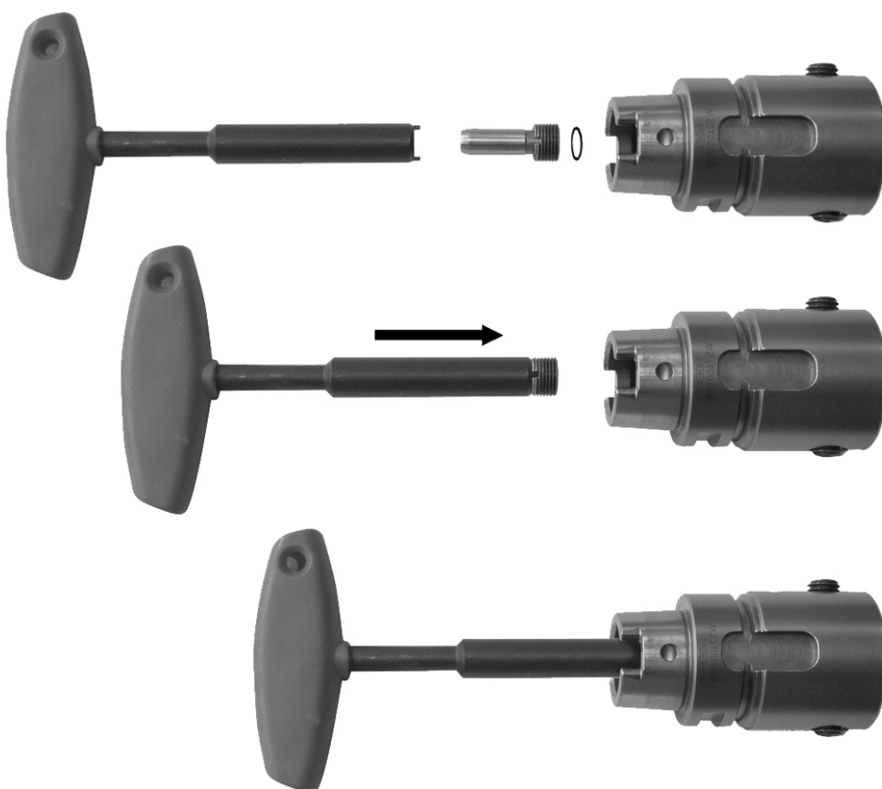
- 1 Groove nut
- 2 Cooling lubricant tube
- 3 O-ring
- 4 HSK tool mounting

Clean the tool including the HSK tool mounting before the removal.

5. Loosen and remove groove nuts (1) inside the HSK tool mounting (4) using the supplied special tool.
6. Remove cooling lubricant pipe (2) and replace O-ring (3).

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

8.



After assembly, check again the central position of the pipe. See item 3.

C065 - Check telescopic covers and wipers

Orientation

Depending on the material used and the machining process, the telescopic covers and wipers must be cleaned and checked regularly. In particular, before any prolonged shutdown of the machine (e.g., during weekends).

Dirty telescopic covers and wipers affect the accuracy of the machine and its service life.

Contamination of the telescopic covers and wipers results in increased friction (stiffness) of the plates. This may damage the telescopic covers and wipers so that contaminants can get into the area behind the telescopic cover. This in turn may cause damage to other machine parts, requiring expensive repair. In the event of damage, determine the cause of the damage and immediately notify the machine manufacturer or its representative company.



After cleaning, the telescopic covers and wipers must be coated with low-viscosity oil.

The oil must not resinify and sediments must not form when exposed to other fluids or machining residues (e.g., metallic dust). Otherwise, the service life of the wipers would be considerably impaired.

Requirement

Before starting the cleaning, move the tool slides to positions that are more convenient for the cleaning process.



Power off the machine and secure it against power on.

Procedure

1. Clean telescopic plates. Remove chips with a suitable chip hook or hand-held broom. Afterwards rub with a cloth.
2. Check telescopic and guide plates for damage. Look for deep scoring or abrasion.
3. Oil the telescopic covers.
4. Switch the machine on and move the tool slides until an even film of oil is visible over the whole travel range of the telescopic cover. If relubrication is required, first stop the traversing motion and set feed rate override to “zero” position.

C070 - Check outer wipers of linear guides



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

Regularly checking wipers of the roller guides prevents accelerated wear of the linear guides. This test is a visual inspection. But if the wiper is destroyed and no longer snugly contacts the contour of the guide, it must be replaced. **It is essential to ensure absolute cleanliness when removing and installing the wiper.**

Requirement

Move the tool carriers to a suitable position. For checking the outer wipers, parts of the machine enclosure must be removed from the machine. In most cases, access to the wipers is best in the end positions of the respective axes. To move to the positions in which the wipers can be checked, it may be necessary to switch the machine on/off several times.

Procedure

1. Move the tool carrier to the position required for checking.

- 2.



Caution

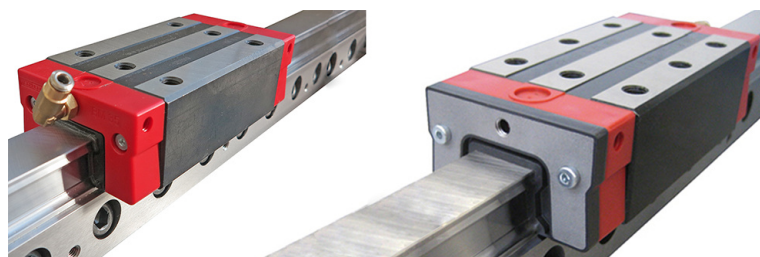
Moving tool carriers, spindles, or belt drives.

Risk of bruising and lacerations.

Switch off the machine via the main switch or shut down with the emergency stop.

Remove relevant machine enclosure.

- 3.



Example: Wiper on the trolley of the linear guide (view from the preassembly).

Check wipers.

4. Replace wipers. Loosen and remove the mounting screws of the wiper on the trolley. Push the wiper from the guide bar. Clean the guide bar and push a new wiper onto the guide bar. Finally lightly oil the guideway.

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.



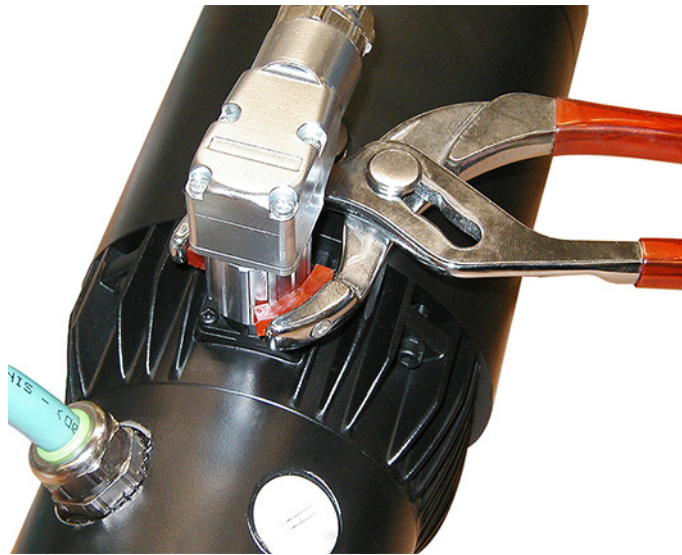
Example: Special pliers for tightening power and encoder connections on the motors

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.

C130 - Replace 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



Example: Filter

Remove machine covers and/or filter housing cover.

2. Replace filter.
3. Reinstall all covers.

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.

C155 - Check coolant

Orientation

For add-on equipment that cannot be cooled conventionally with cooling lubricants or hydraulic fluid due to high temperature development, separate cooling is provided in an independent cooling circuit. The coolant used here must be checked continuously for its condition like other coolants.



Apart from this interval, the coolant should generally be replaced once a year.

The system comprises a cooling circuit on the machine side and either

1. a water re cooler located next to the machine or
2. an external cooling circuit provided by the machine operator.



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



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



Replenish only coolant of the same manufacturer having the same specification. Mixing different coolants may lead to corrosion of the cooling system and degradation of the coolant. Required glycol concentration min. 25%.

When switching the coolant to another product or changing the manufacturer, the cooling system must be completely flushed and cleaned with this coolant. When preparing the coolant from concentrate and water, be sure to use demineralized water only. Only then the machine may be put back into operation.

The machine is filled with Nalco VARIDOS FSK25 at the factory. This water-glycol mixture can be ordered in 25 kg pack sizes from **INDEX**.



When using a water re cooler, be sure to follow the manufacturer's instructions.



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

Procedure

1. Check coolant.
2. Check supply and fluid lines for damage such as buckling and abrasions, and for liquid leaks. Replace supply and fluid lines if necessary. Record the age or date of replacement of supply and fluid lines in the service, testing and maintenance schedules or reports.

C190 - Clean labyrinth rings of spindles

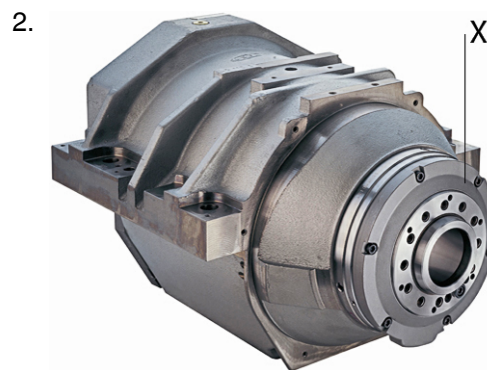
Orientation



When machining short-chipping materials such as brass, cast iron, or in case of residues from the grinding, the work area must be cleaned more frequently due to the special nature of the contamination. Depending on the duration of use, usage profile of the machine and different environmental conditions, it is necessary in particular to remove and clean the labyrinth rings.

Procedure

1. Loosen and remove the screws on the labyrinth ring (X) of the work spindle. The number of screws that are necessary to fasten the labyrinth ring may differ depending on the type of machine.



Example: (X) Labyrinth ring on the main spindle G200

Remove the labyrinth ring.

3. Clean the labyrinth ring. Clean the free space behind the labyrinth ring by hand with a cloth.
4. Reinstall the labyrinth ring and tighten the screws to the proper torque.

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.

C555 - Replace hydraulic fluid filters



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

One or more hydraulic fluid filters are installed on the machine depending on the product and its equipment. The filters are provided with a sensor that signals malfunction or contamination to the control. If a fault is displayed on the control, the filter unit should be removed or replaced.



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



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



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

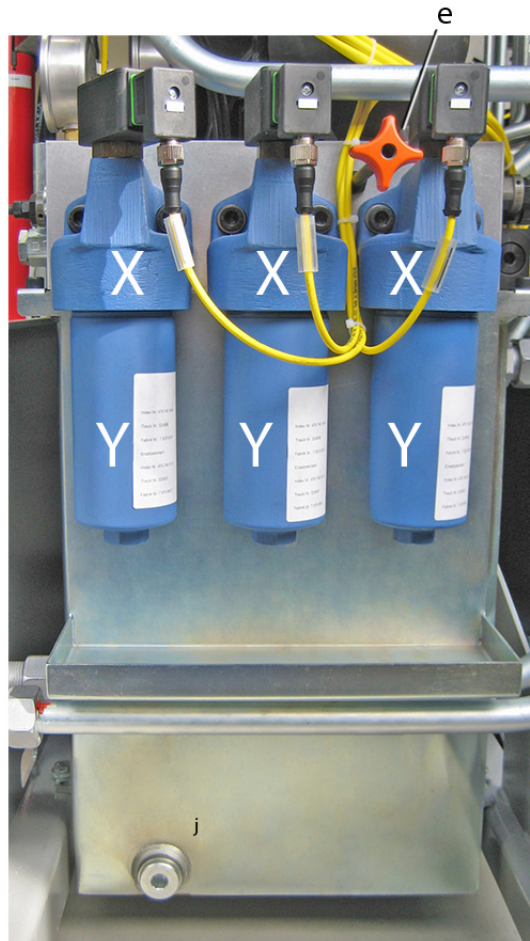
A suitable container should be ready for the disposal of the filter and the residual oil in the filter bowl.

Procedure

1.



Power off the machine, depressurize the hydraulic system by opening the accumulator relief valve(s), and protect against accidental power on.



Example: Hydraulic fluid filter G220 G420

- e Accumulator drain valve
- X Hydraulic filter
- Y Filter bowl

Using a wrench, loosen the filter bowl (Y) and remove it from the filter unit (X).

2.



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



Example: Filter insert (Z)

Empty filter bowl (Y) into prepared container. **Do not fill fluid from the filter bowl (Y) back into the tank!** Remove filter (Z).

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

C570 - Wassermann tool change system

Orientation



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

Procedure

1. Perform 2000 h maintenance according to the manufacturer's documentation.

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 DIE018EN - 05.06.2019.

- D015** - Clean cover in the area of the work area door
- D050** - Check the lubrication system
- D055** - Check the pneumatic system
- D105** - Wassermann tool change system
- D170** - Check the system for reconditioning the cooling lubricant
- D335** - Replace belts and check belt tension
- D450** - Replacing hydraulic fluid

D015 - Clean cover in the area of the work area door

Orientation

To ensure trouble-free operation of the automatic work area door, the cover 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

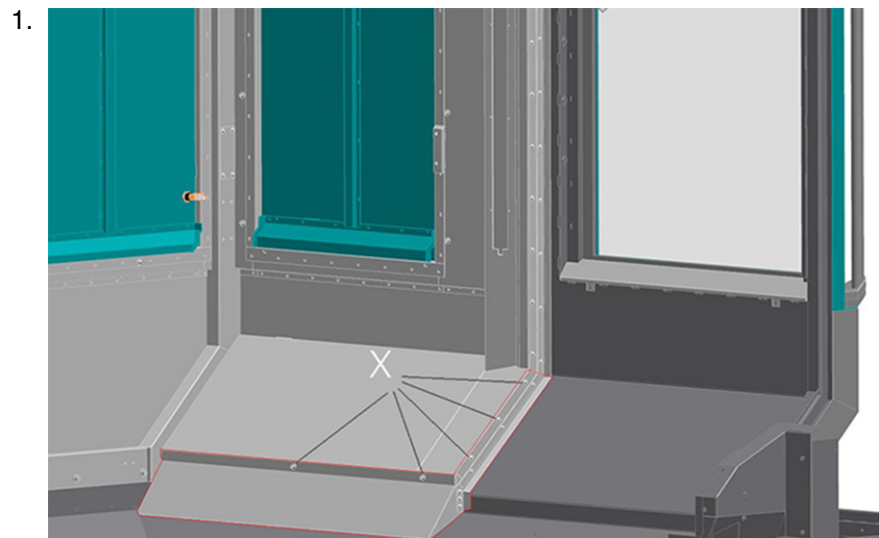


Fig.: G220 G420 chips a

After opening the work area door and turn off the hydraulic system, loosen and remove the screws (X) marked in Figure (a). It may be necessary to loosen and remove the screws of the wipers as well.

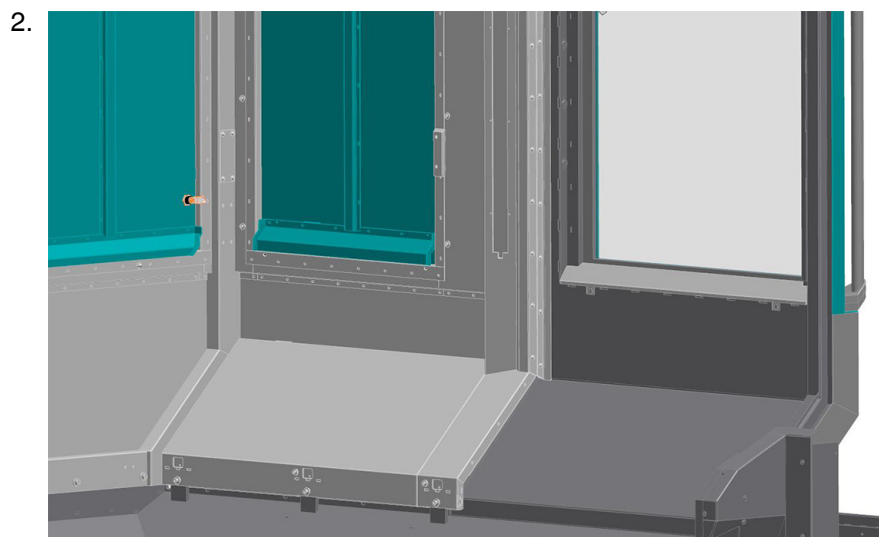


Fig.: G220 G420 chips c



Fig.: Tool for removing chips

Clean the space behind this cover after removing the cover (c). 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.



Deflagration or flames.

Be sure to screw on the cover again.



Operation of the machine without this cover is not allowed.

The cover is part of the machine enclosure and serves also as protection in case of a fire, in particular in case of deflagration or to minimize exit of flames.

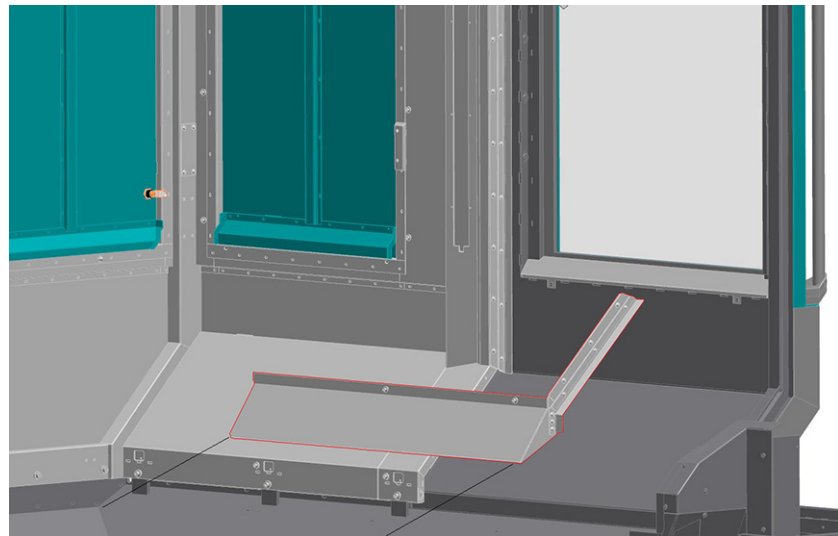


Fig.: G220 G420 chips b

Then replace the cover (b) and reinstall and adjust the wipers that may have been removed.

D050 - 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.

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
- Oil level in lubricating oil tank
- Lubricating oil pump
- Supply and fluid lines
- Pressure gauge
- 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 and related sensors.
3. Activate lubrication pulse in the control ten times.
4. Monitor the area around the lubricating oil distributor for leakage.

D055 - Check the pneumatic system

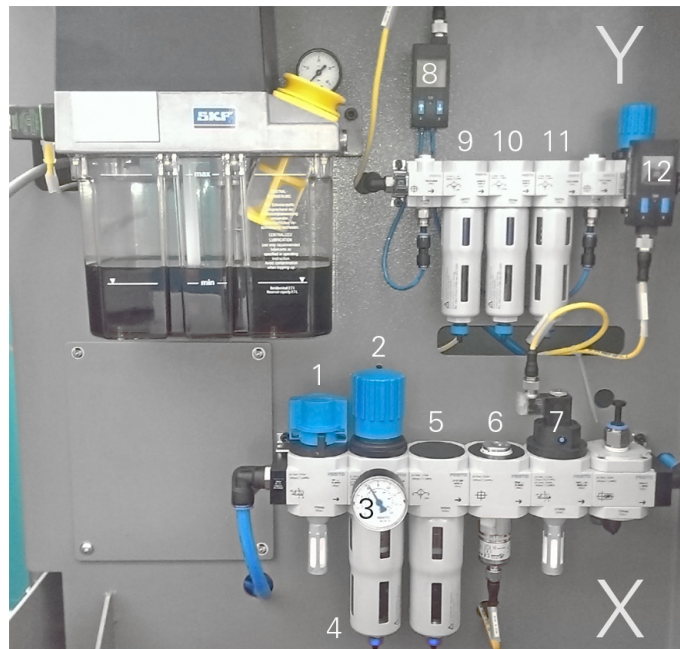
Orientation

The pneumatic system is composed of two components. The system section (X) and the sealing air section (Y). To ensure trouble-free operation, periodic checks of the pneumatic system are necessary.

- Check oil level at oiler (optional).
- Check supply and fluid lines.
- Check silencers.
- Replace filter.
- Drain condensate (not applicable to auto-drain).
- Check the pressure settings on the pressure gauges (system and sealing air).



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




Example: G220 Pneumatic maintenance unit by Festo

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

1. Switch-on valve (manual)
2. Pressure regulating valve for system pressure 6–8 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. System pressure monitoring
7. Electrically actuated switch-on valve
8. Pressure sensor for pressure differential monitoring
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 0.6-1.0 bar

Procedure

1.  Power off the machine to depressurize the pneumatic system and secure against accidental switching on.


Check oil level at oiler (optional).

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.




Example: Various silencer versions from FESTO

Check silencer, replace if necessary.

4.  Dirty filter cartridges must never be cleaned but always replaced. Filter cartridges are hazardous waste and must be disposed of according to local regulations.


Only filters with a filter fineness described in the fluid plans must be used.

Replace filter.

5.  Condensate is extremely harmful to the environment due to its high pollution impact. Condensate must be collected in a container specifically marked for this purpose and properly disposed of.

Drain condensate (not applicable to auto-drain).

6. Switch on the machine.
7. Check the pressure setting on the system pressure gauge and adjust if necessary. A pressure of 6 bar has been set at the factory.

8.  Dirty measuring systems or lack of sealing air can cause damage to the machine.

Check sealing air supply. To protect measuring systems or other components from the ingress of liquids or dirt, they are pressurized (0.6 bar). In this case, a low hiss is noticeable. To ensure trouble-free operation, periodic checks of the sealing air supply are necessary.

9. Check all fluid lines of the sealing air supply for damage.
10. Check the pressure setting on the sealing air pressure gauge and adjust if necessary. A pressure of 0.6 bar has been set at the factory.
11. Check sealing air supply on the components. A reliable method is the use of a suitable pressure gauge. The pressure gauge is attached to the line that is screwed off to monitor the existing pressure. The pressure should be in the range of the preset pressure of the sealing air supply. If this is not the case, the cause must be determined and the fault must be fixed.

Alternatively, the following procedure can be used!

Disconnect the fluid line in the area of the components and cover the opening of the fluid line with your finger. A slight counter pressure should be felt. Then connect the fluid line again.

D105 - Wassermann tool change system

Orientation



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

For efficiency reasons, we recommend carrying out the 5000 h maintenance interval described in the manufacturer's documentation in the 4000 h maintenance interval.

Procedure

1. Perform 5000 h maintenance according to the manufacturer's documentation.

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.

D335 - 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.

G220			Z1	Z2	Z5	X2	Z8
	20mm	Hz	124	124	124	141	100 400mm
	30mm	Hz	94	94	94		

Setting values in Hertz (Hz) for belt tension



Up to machine number 10310028, drive belts with a width of 20 mm are used for the Z1, Z2, and Z5 axes. Starting with machine 10310029, they are replaced by drive belts with a width of 30 mm. These drive belts are pretensioned with a value of 94 Hz (see table above).

Procedure

1.



Caution

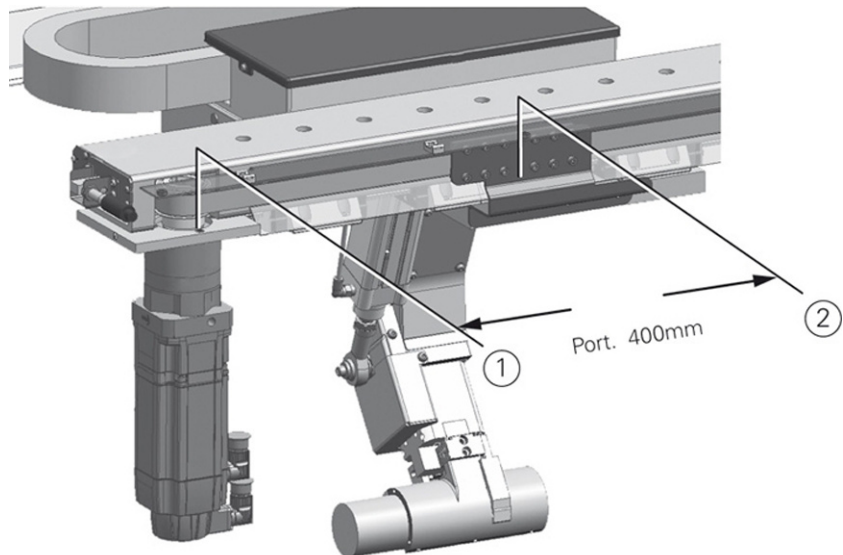
**Uncontrolled movements of axes or machine components.
Severe cut and crush injuries.**

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

Move the tool slides to a suitable position.

2. Replace Z1 belt.
3. Measure belt tension (frequency meter) and adjust belt.
4. Replace Z2 belt.

5. Measure belt tension (frequency meter) and adjust belt.
6. Replace Z5 belt.
7. Measure belt tension (frequency meter) and adjust belt.
8. Replace X2 belt.
9. Measure belt tension (frequency meter) and adjust belt.
- 10.



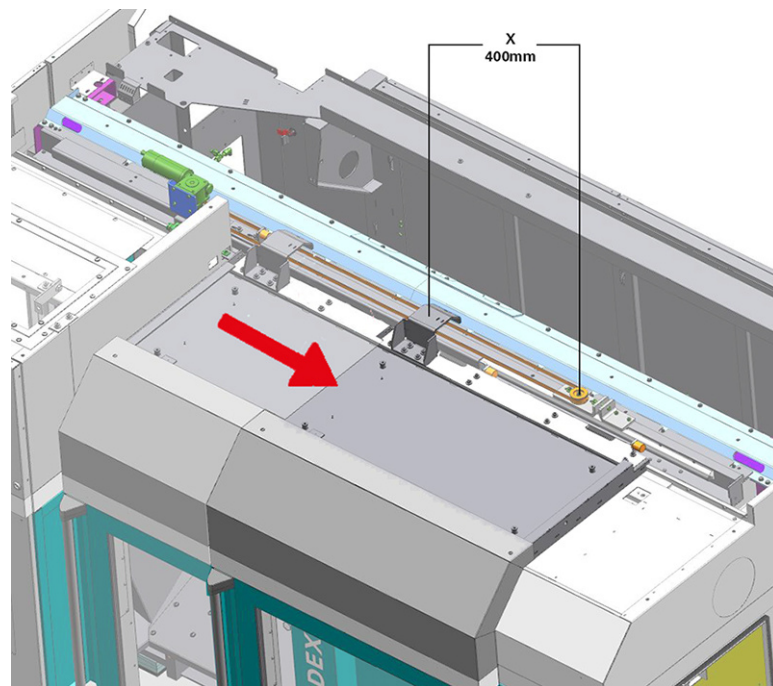
Example: Distance between guide pulley and belt clamping

- 1 Guide pulley at drive
- 2 Belt clamping

Replace Z8 gantry type receiver belt. The value of 400mm listed in the table refers to the distance between the center of the guide pulley on drive 1 and the center of the belt clamping of this unit 2 (see example: distance between guide pulley and belt clamping). This value or distance is necessary to accurately adjust the belt tension.

11. Measure belt tension (frequency meter) and adjust belt.
12. Replace the belt of the work area door drive.

13.

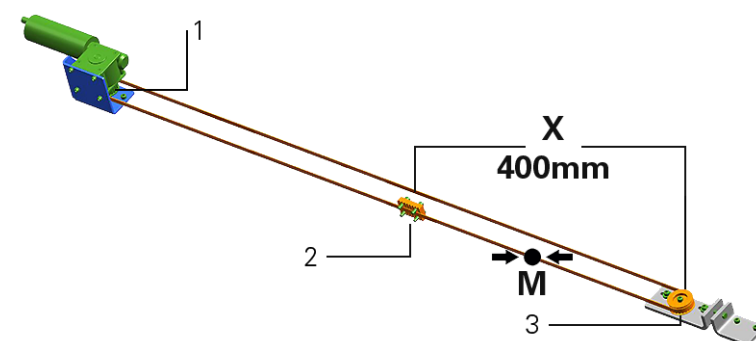


Auto_Arbeitsraumtuer_G220_6

X 400 mm measuring range

Conditions to measure the belt tension. Open the work area door until there is a 400 mm clearance between the actuator (2) on the belt and the deflection pulley/belt tensioner (3). (see examples of Auto_Arbeitsraumtuer_G220_6 + 5)

14.



Auto_Arbeitsraumtuer_G220_5

- 1 Drive
- 2 Driver
- 3 Belt tensioner
- M Measuring point for frequency meter

Adjust belt tension. Using a frequency meter and the belt tensioner (3), the belt tension can now be set to **100 Hz** at the marked poin t **M**.

D450 - 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.



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.

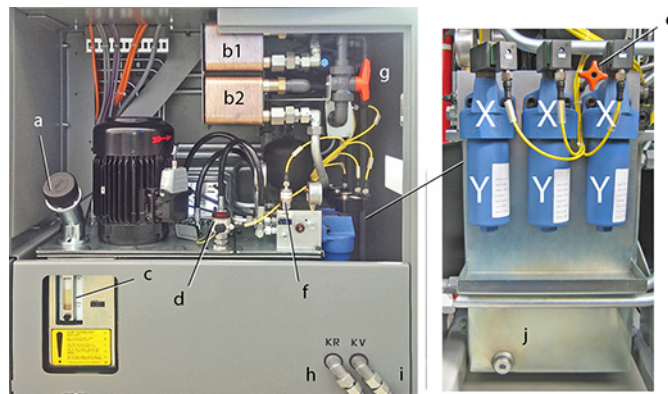
Procedure

1. Suction off old fluid through the filler neck (a) or drain the fluid from the drain plug (d) below the fill-level glass (c). Use a suitable collection bin for this purpose.

2.



Use only lint-free cleaning cloths or a sponge!



Example: Hydraulic unit G220 G420

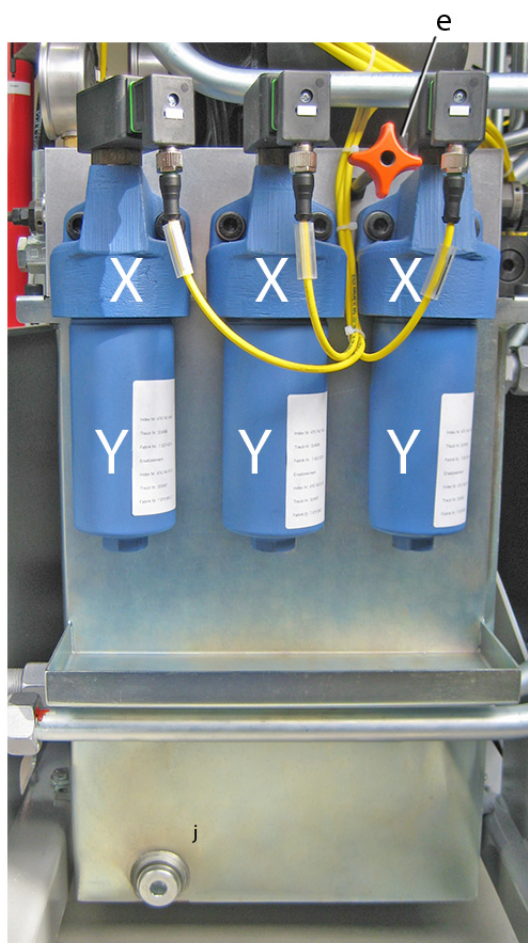
- a** Filler neck
- b1** Heat exchanger (hydraulic unit HLP32)
- b2** Heat exchanger (spindle unit HLP5 (VG5))
- c** Fill level indicator
- d** Monitoring (level and temperature)
- e** Accumulator drain valve
- f** Monitoring (system pressure)
- g** Shut-off valve (cooling - water side)
- h** Return flow (cooling - water side)
- i** Inlet flow (cooling - water side)
- j** Oil drain plug
- X** Hydraulic fluid filter hydraulic fluid HLPD32 (VG32)
- Y** Filter bowl

Ensure absolute cleanliness during the activities described here.

3.



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



Hydraulic fluid filter G220 G420

- e Accumulator drain valve
- X Hydraulic fluid filter
- Y Filter bowl

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

4.



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



Z

Example: Filter insert (Z)

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

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

Service Interval - 8.000 Operating hours

Maintenance Summary - 8.000 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 DIE018EN - 05.06.2019.

E010 - Wassermann tool change system

E010 - Wassermann tool change system



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



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

For efficiency reasons, we recommend carrying out the 2-year maintenance interval described in the manufacturer's documentation in the 8000 h maintenance interval.

Procedure

1. Perform 2-year maintenance according to the manufacturer's documentation.

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 DIE018EN - 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 DIE018EN - 05.06.2019.

J140 - Replacing the viewing glass

J140 - Replacing the viewing glass

Orientation



With the introduction of the new 2018 design, the viewing glass on the machine must only be replaced by trained specialist personnel or by **INDEX Service**.



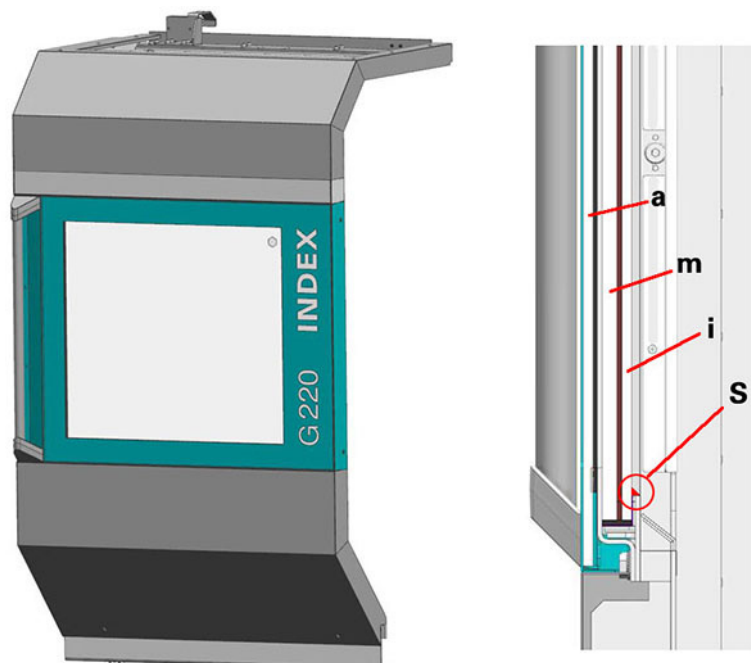
If the viewing glass is damaged, it must be replaced. This is necessary regardless of the extent of damage. Even with minimal damage, the impact resistance of the glass can no longer be guaranteed.



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 the outer pane (**a**) also made of polycarbonate. 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 panes are subject to natural aging and must be replaced at regular intervals.

After replacing the inner viewing glass, it must be sealed on the inside of the work area door. It is necessary to provide a suitable sealant. The sealant Terostat 930 is used at the factory for this purpose.

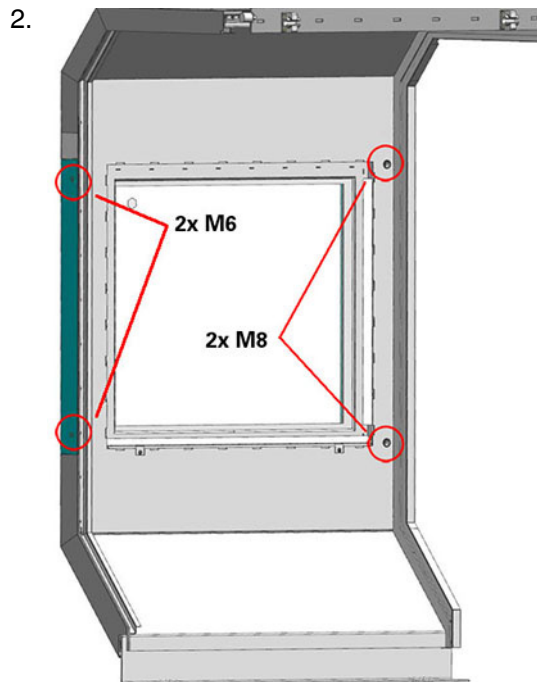


G220 Overall view of viewing glass 1

- a** Outer pane (polycarbonate)
- m** Center pane (polycarbonate)
- i** Inner pane (glass)
- s** Silicone gasket

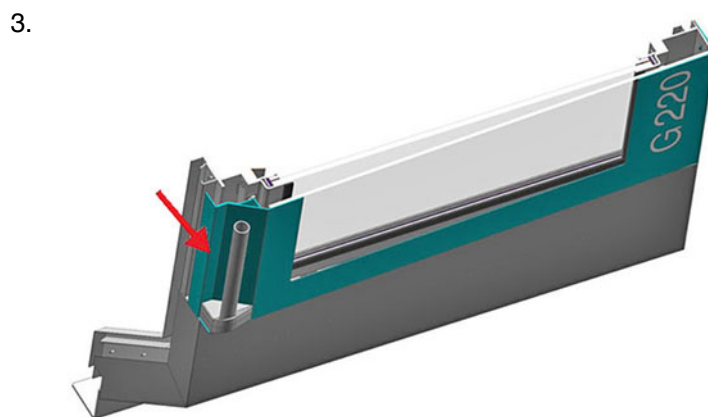
Procedure

1. Unscrew the front cover. The front cover is additionally bolted to the work area door through the handle.



G220 Replacement 5 2 viewing glass

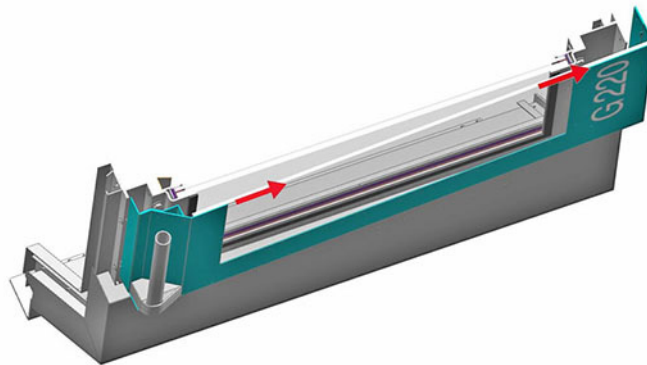
Loosen and remove screws (2x M8) on the handle (screwed from the inside) and two screws (2x M6).



G220 Replacement 1 viewing glass

Slightly pull the left side of the front cover to the front.

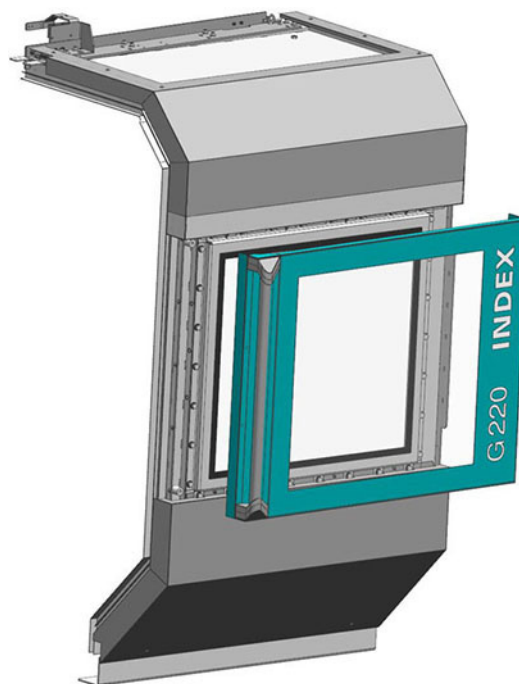
4.



G220 Replacement 2 viewing glass

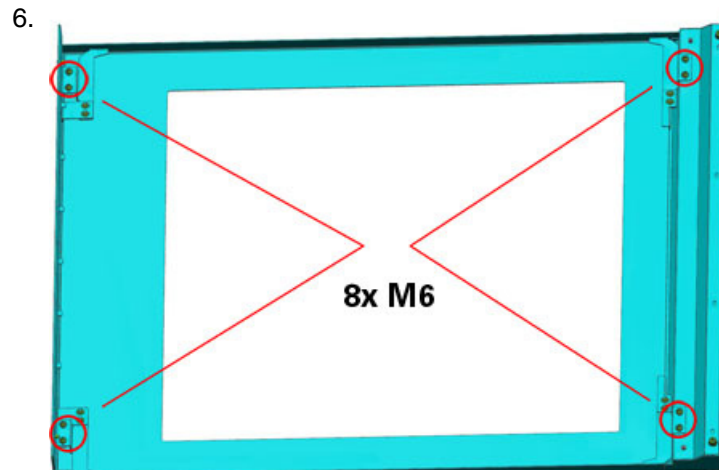
The front cover can now be pushed to the right and detached on the right side.

5.



G220 Replacement 3 viewing glass

The front cover can now be removed.



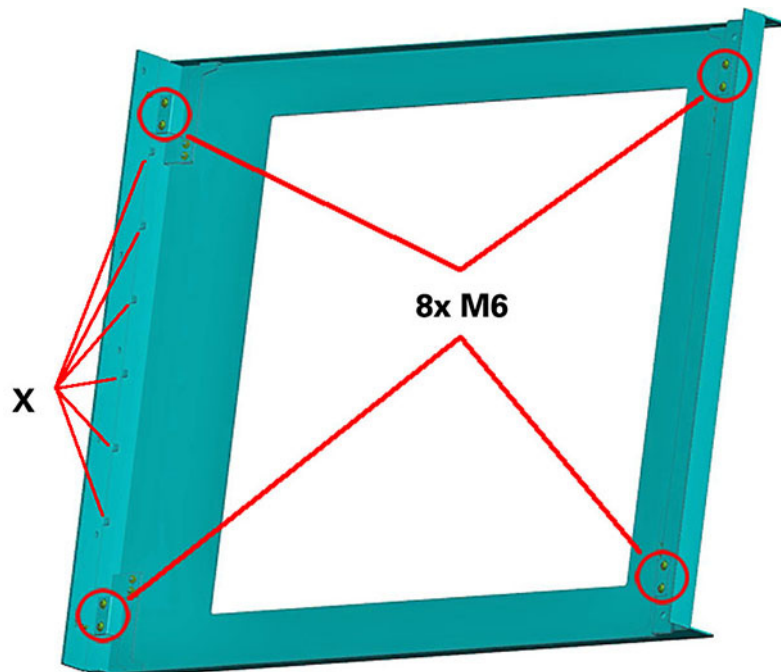
G220 Replacement 5 1 viewing glass

Remove the outer viewing pane from the front cover. The viewing pane is fastened in the front cover with 4 angle brackets that are located in the corners on the side of the front cover rear. Place the front cover on a flat surface (preferably on a large table). Loosen and remove the screws (8x M6) of the 4 angle brackets on the sides. This allows you to remove the outer pane from the front cover.

7.



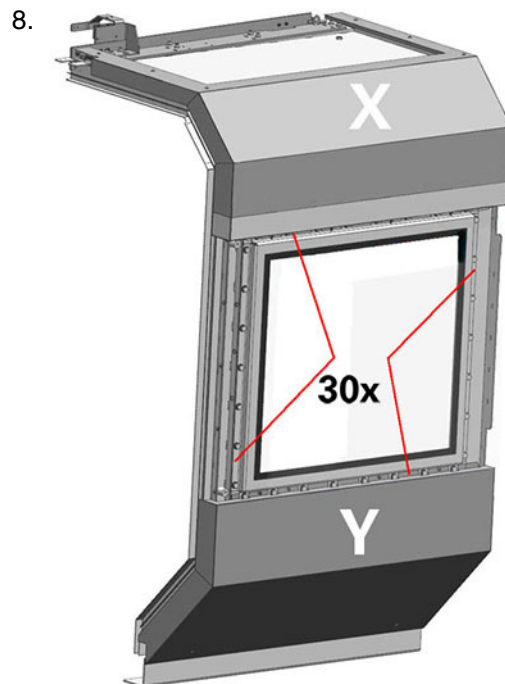
Make sure that the side tabs (X) have not been bent by the removal. If so, straighten them again so that the tabs can be inserted again into the holes provided for this purpose.



G220 Replacement 5 2 3 viewing glass

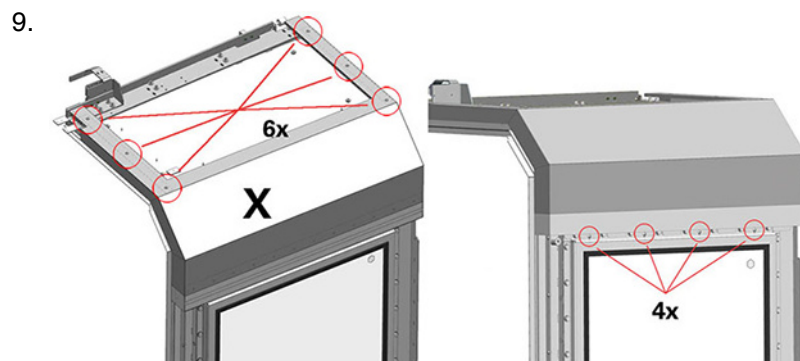
For assembly, follow the steps in reverse order. Ensure proper cleanliness during the installation. The remaining screws (8x) of the angle brackets may

need to be loosened as well when installing the pane. This makes it easier to align the pane within its frame.



G220 Replacement 3 1 viewing glass

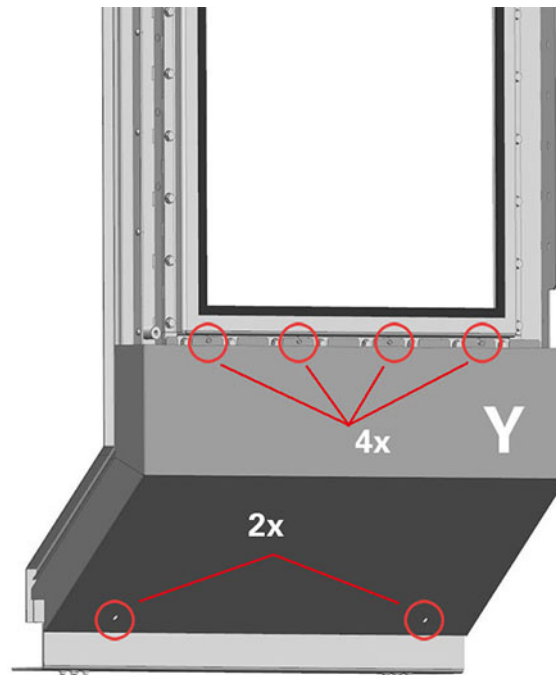
Replace the inner pane. After removing the front cover, the inner pane can be replaced. For this purpose, the covers (X+Y) and the screws (30x) of the clamping frame must be removed. Also the seal of the pane on the inside of the work area door must be cut.



G220 Replacement 6&4 1 viewing glass

Remove the upper part of the front cover (X) at the work area door. Loosen and remove the screws (6x and 4x) as shown in the figures. Then you can remove the top cover.

10.



G220 Replacement 7 viewing glass

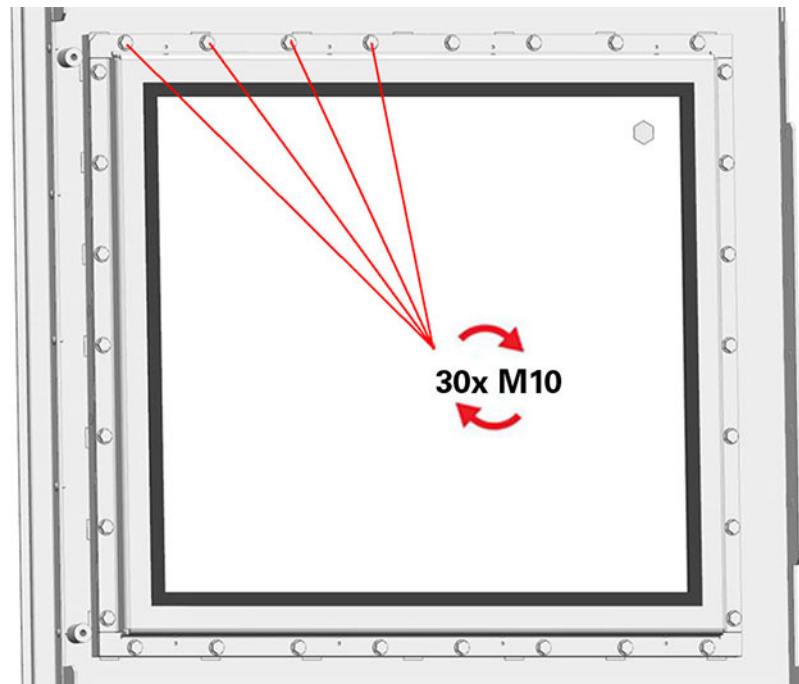
Remove the lower part of the front cover (Y) at the work area door. Loosen and remove the screws (2x and 4x) as shown in the figure. Then you can tilt the cover forward and detach it.

11.

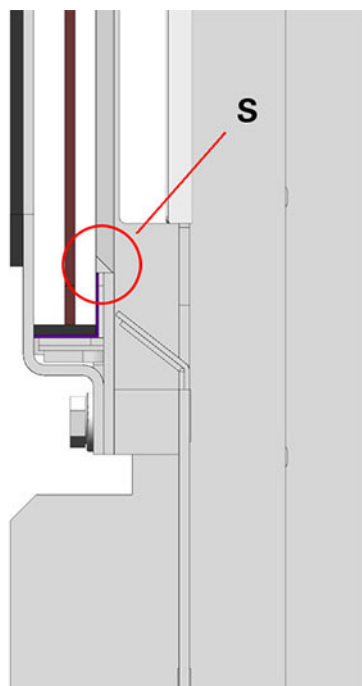


Assistance of a second person to hold the pane is recommended. This generally also applies to the installation of the new pane, in particular when sealing and fastening the clamp frame with screws.

Make sure the pane is mounted free of tension.



G220 Replacement 9 viewing glass

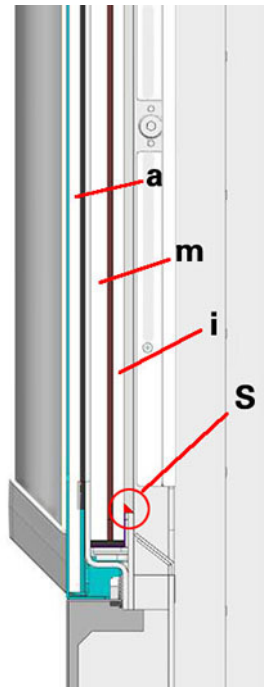


G220 Replacement 8 viewing glass

Loosen the screws of the clamping frame (30x M10) (see Fig.) and remove with the clamping frame. Before the cutting the seal (S) using a suitable knife, make sure that the pane cannot fall down.

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

13.



G220 Replacement 8 2 viewing glass

Seal the inner pane in the work area with sealant. 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) (S). See Fig.: G220 G420 Replacement 8 2 viewing glass



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