

Maintenance Instructions

TNA400.2

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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, extraction 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.

**Maintenance intervals**

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

**Maintenance intervals displayed on the controller (XPanel)**

Depending on the respective machine type and the different controller types, a corresponding message is issued on the controller when a maintenance interval is reached. The maintenance instructions stored on the respective controller provide information (maintenance log) explaining the service and maintenance activities to be performed.

**Cleaning of the machine****Do not clean the machine with compressed air**

- Raised dirt particles may cause breathing difficulty or injury (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.

Solvents

- Do not use highly volatile solvents such as petroleum spirit, trichloroethylene or similar cleaning agents. These cleaners may damage the seals, which can lead to safety problems.

Pressure washers

- 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.



Cleaning of tool mountings

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



Ordering spare parts

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.



Operating material

For all work in connection with operating media, observe the information in the data sheets from the respective manufacturers and the information in the document Notes on Operating Materials.



Pressure accumulators ≤ 1 L

Pressure accumulators with a volume of ≤ 1 L are **not** subject to testing and labeling according to the current issue of the pressure equipment directive. The guidelines and regulations applicable in the country of use must be followed.

Safety Instructions



Safety Instructions and Technical Details

The user documentation and, in particular, the document “**Safety Instructions and Technical Details**” must be observed.



Carrying out maintenance work

Authorized and trained personnel

- 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.

Allow the machine to cool down

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

Maintenance work on machine being switched off

- In general, maintenance is to be carried out with the machine switched 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.

Required tools

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

Performing maintenance, repair or service work

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

Use of climbing aids (ladders or steps)

- In addition, appropriate climbing aids may be required to carry out these activities. When working on climbing aids at great heights, e.g. on the control cabinet, these must always be secured or fastened (depending on the machine, eyelets are also provided for this purpose).



Procurement/use of spare parts

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.



Cellular and cordless phones

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



Handling hydraulic and hose lines

Damaged hydraulic hose lines must be replaced immediately. Typical types of damage include chafing, kinks, cracks, deformations, or visible leaks.

Flexible, pressurized hydraulic hose lines of **INDEX** equipment are generally designed as thermoplastics or metallic hydraulic hose lines.

The machine operator/owner is responsible for compliance with the laws and regulations of the country of use with regard to the use of hydraulic hoses.

We recommend inspection and documentation of the hydraulic hose lines installed inside the machine and not directly visible every 12 months. For hydraulic hose lines visible in the work area or mounted outside the machine and connecting components to the machine, we recommend inspection and documentation every 6 months.

For the flexible, pressurized hydraulic hose lines used by **INDEX**, empirical values are available for very different periods of use, some of which exceed 10 years.



Maintenance work on fluid systems (hydraulic, lubrication, and pneumatic systems)

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).



Test run or functional test

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

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 DTE065EN - 26.10.2022.



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!

- AL015** - Check the work area door and window pane
- AL023** - Check hydraulic system (visual inspection)
- AL027** - Replace the breathing filter at the filler neck of the hydraulic fluid tank.
- AL043** - Check pneumatic system (visual inspection)
- AL055** - Check the lubrication system (visual inspection)
- AL070** - Check filter on air conditioner cooling fan
- AL080** - Clean and lubricate clamping device
- AL090** - Check electrical lines (visual inspection)
- AL095** - Visual inspection of all fluid lines and electrical cables
- AL100** - Clean cooling lubricant outlet on clamping cylinder
- AL120** - Check cooling lubricant (visual inspection)
- AL130** - Check work area light (visual inspection)
- AL210** - Check hydraulic shock absorbers and rubber pads on the telescopic plates
- AL265** - Clean the chip conveyor

AL015 - Check the work area door and window pane

Orientation

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

- Inspection of the window pane for damage.
- Checking the safety label on the window pane (replacement interval 8 years).
- Check/adjust or replace, if necessary, the wipers.
- Check 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 window pane consists of three panes. The inner pane made of tempered glass, the central pane made 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 window pane.

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 window pane is damaged, it must be replaced. This is necessary regardless of the extent of damage. Even with minimal damage, the impact resistance of the pane 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 window pane 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 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 are defective or improperly adjusted wipers, chips on the guide bar or the guide rollers of the work area door.

AL023 - 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.

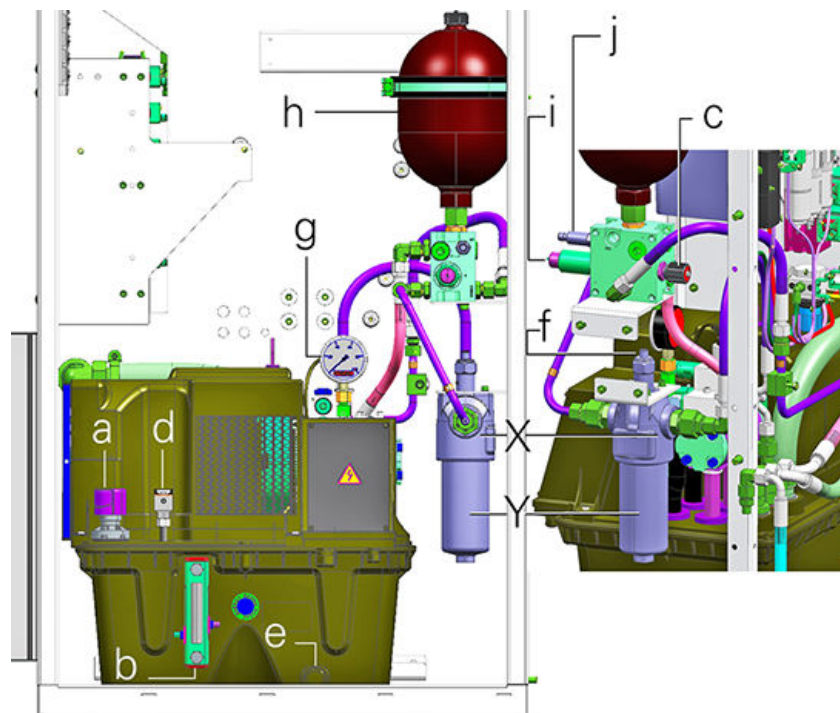


Only use hydraulic fluid grade 15/13/10 in accordance with ISO 4406.

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 TNA400.2 TNA500.2

- 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.

AL027 - Replace the breathing filter at the filler neck of the hydraulic fluid tank.

Orientation



The breathing filter on the oil filler neck of the oil tank must be regularly replaced depending on the environmental conditions.



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



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

Requirement

It is essential to keep the filter described here in stock. **It is not permitted to own the machine without this filling and breathing filter.**



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



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

Procedure

1.



Example: Filling and breathing filters of hydraulic and lubrication systems (by ARGO-HYTOS GmbH)

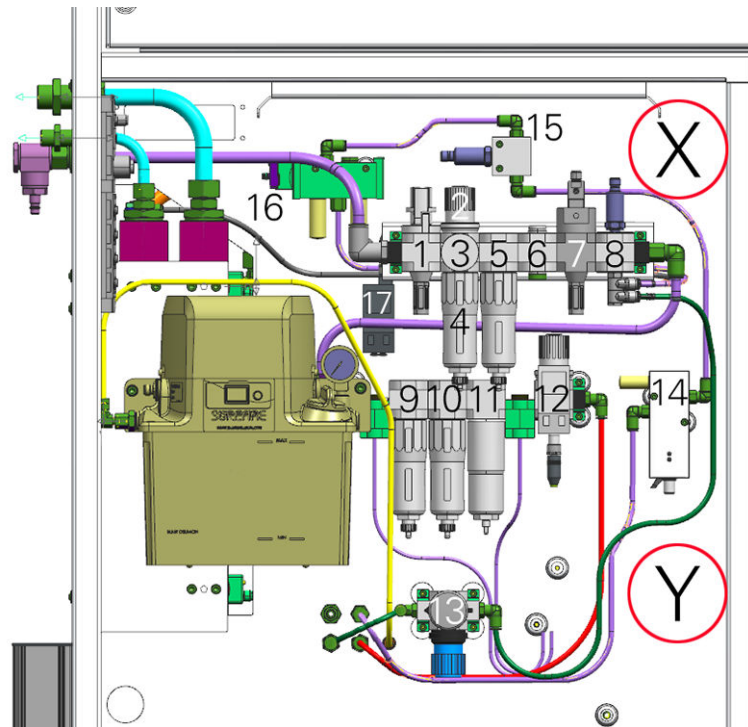
Replace breathing filter.

AL043 - 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.
- Drain condensate (not applicable to auto-drain).



Example: Pneumatic maintenance unit TNA400.2 TNA500.2 (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 filter fineness 40 µm with automatic condensate drain
- 5. Filter insert with filter fineness 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" sealing air**
- 9. Microfilter insert with filter fineness 1 µm with automatic condensate drain
- 10. Filter insert with filter fineness 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.

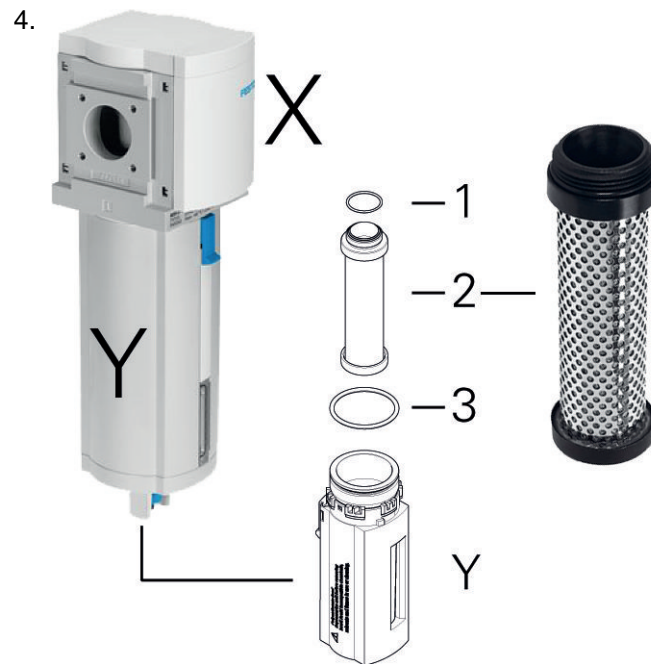
Requirement



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

Procedure

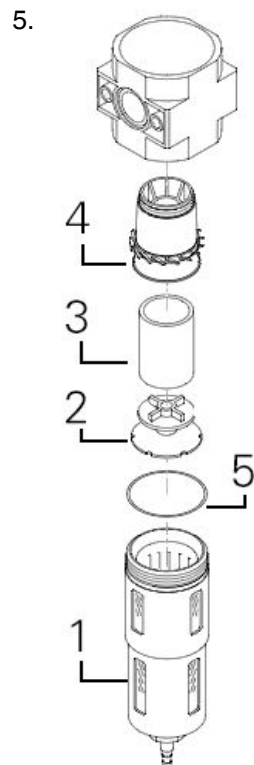
1. Check pressure setting on pressure gauge and adjust if necessary. An operating pressure of 6 bar has been set at the factory.
2. Check supply and fluid lines (damage and leakage). Supply and fluid lines must be checked for damage. Pre-damage such as kinks or abrasions should be logged and replacement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

Check fine filter or microfilter, replace if necessary. **When removing the filter bowl, be sure to include the O-ring (5), separating disk (2), and filter receptacle (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.

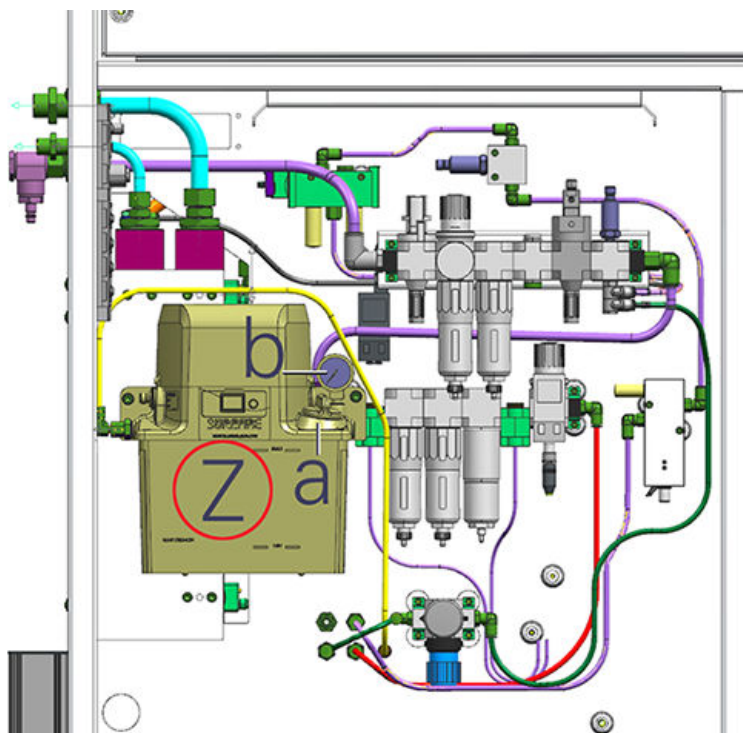
AL055 - Check the lubrication system (visual inspection)

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 TNA400.2 TNA500.2 (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)

AL070 - Check filter on air conditioner cooling fan

Orientation

The filters must be replaced regularly depending on the ambient 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 filter.
3. Reinstall all covers.

AL080 - 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.

AL090 - 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 removal unit.
5. Electrical leads for the pedal switches.
6. Check electrical lines of the working area light.
7. Check electrical line to sub-panel / handheld control unit (option).
8. Check electrical lines to other optional attachments.

AL095 - Visual inspection of all fluid lines and electrical cables

Orientation

Depending on the duration of use, usage profile of the machine and different ambient 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 fluid lines.
2. Visual inspection of all electrical cables.

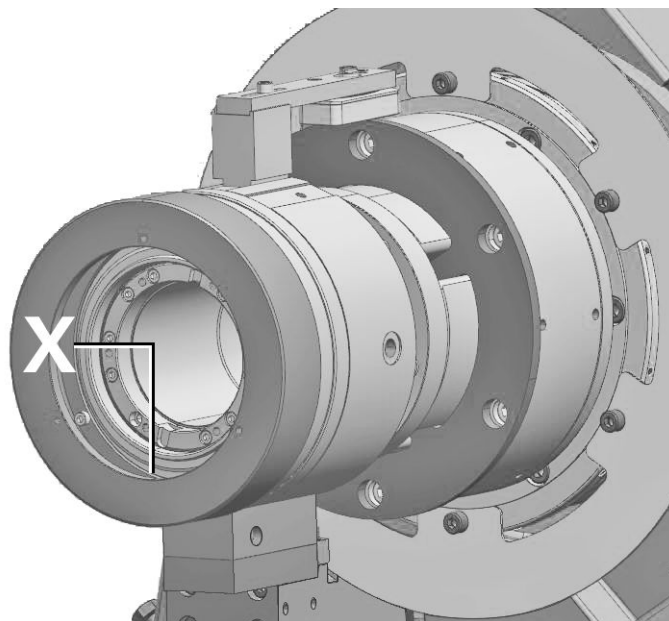
AL100 - Clean cooling lubricant outlet on clamping cylinder

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 TNA400.2 TNA500.2

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.

AL120 - 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 a cover (e.g. at the filter basket) on the chip pan or the chip conveyor.

2. Visual and olfactory inspection of the cooling lubricant.

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

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

AL130 - 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.



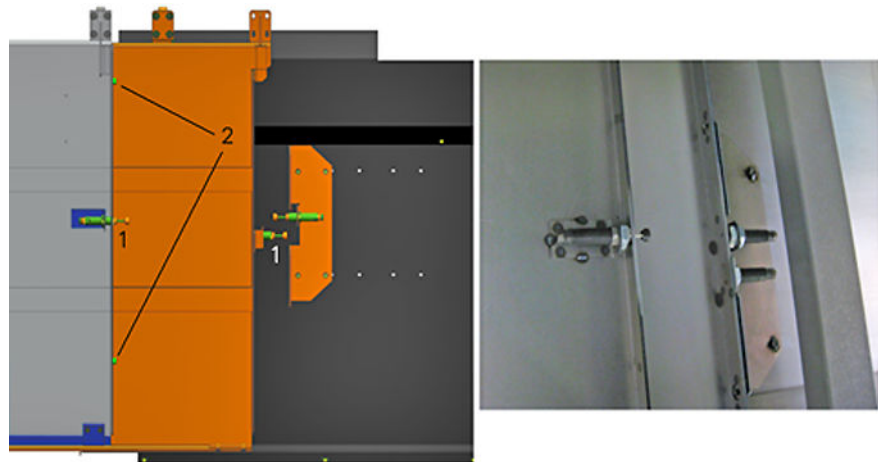
Example: Work area light (photo: Herbert Waldmann GmbH & Co. KG)

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.

AL210 - Check hydraulic shock absorbers and rubber pads on the telescopic plates

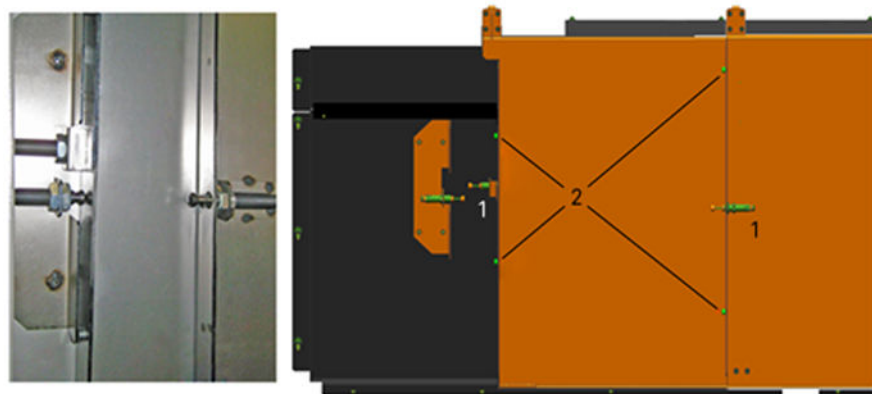
Orientation

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)

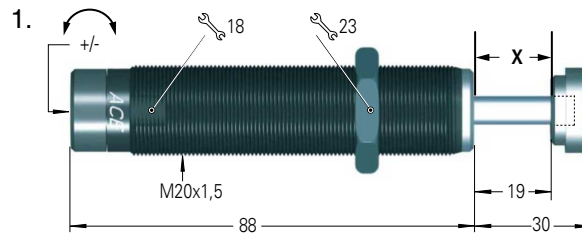
- 1 Hydraulic shock absorber
- 2 Rubber pad



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 (AF23) 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.

AL265 - Clean 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: TNA400.2 TNA500.2 with chip conveyor

Clean strainer 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 strainer basket on the cooling lubricant pump must be cleaned.

Remove cooling lubricant pump. Remove and clean strainer 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 DTE065EN - 26.10.2022.

- CL010** - Check maintenance logs of servicing activities
- CL020** - Clean and check wipers and guide rails of the work area door
- CL035** - Check work area door (optionally with electr. drive) and window pane
- CL080** - Check all electrical connections and drive belts of the drive motors
- CL140** - Check cooling unit for cooling lubricant
- CL160** - Checking the guidance and support elements as well as the slidable lattice grate of the telescopic cover
- CL500** - Perform data backup
- CL520** - Check control cabinet
- CL540** - Check cable and hose clamps for tight seating

CL010 - 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.

CL020 - 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.




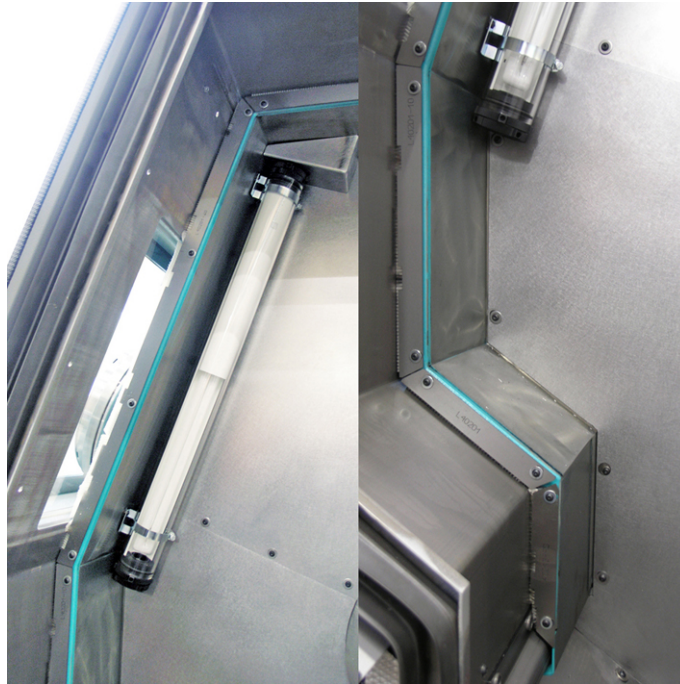
Example: 3 upper wipers, G300

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 panels 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.

CL035 - Check work area door (optionally with electr. drive) and window pane

Orientation

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

- Inspection of the window pane for damage.
- Check the safety label on the window pane (replacement interval 8 years).
- Check/adjust or replace, if necessary, the wipers.
- Check 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 window pane consists of three panes. The inner pane made of tempered glass, the central pane made 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 window pane.

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 window pane is damaged, it must be replaced. This is necessary regardless of the extent of damage. Even with minimal damage, the impact resistance of the pane 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 window pane for damage.

2.

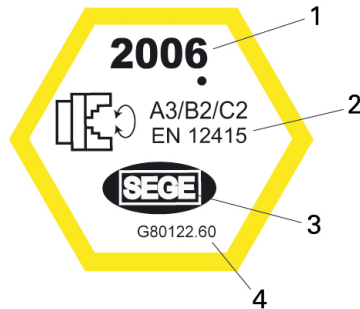


Clean the outer pane with a soft cloth or sponge and glass cleaner or soap and water. Do not use abrasive or alkaline cleaners (e.g., benzene, acetone or carbon tetrachloride) and no sharp tools or sharp objects (such as razor blades or screwdrivers).

Clean outer pane.

3. Clean inner pane.

4.



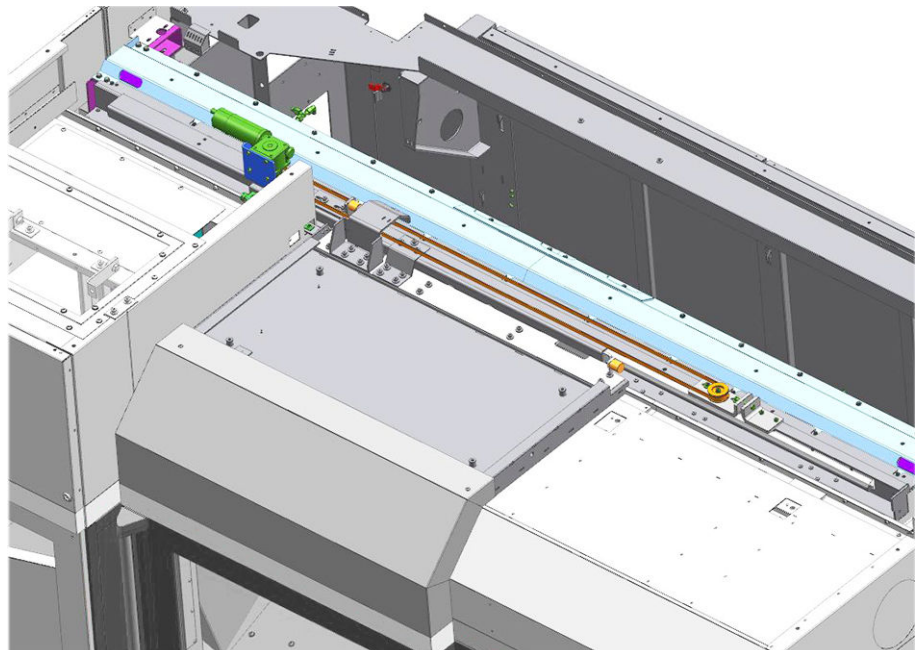
Example: Safety label – window pane 2006

- 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 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: 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.  **Pinching of limbs due to faulty obstacle detection on the work area door**
 Danger Check obstacle detection.
-  INDEX recommends an annual check of the obstacle detection function of the automatic work area door.
- The check should only be carried out using a suitable aid, e.g., a rectangular strip or a softwood squared timber.
- INDEX recommends documenting the results of the inspection and keeping them at the workplace.
- 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. During the obstacle detection test, a rectangular strip or softwood squared lumber, for example, is held in the travel path of the work area door during the closing process. If the rectangular strip or squared timber comes into contact with the work area door in the closing area, the obstacle detection is triggered and the closing movement must be reversed.

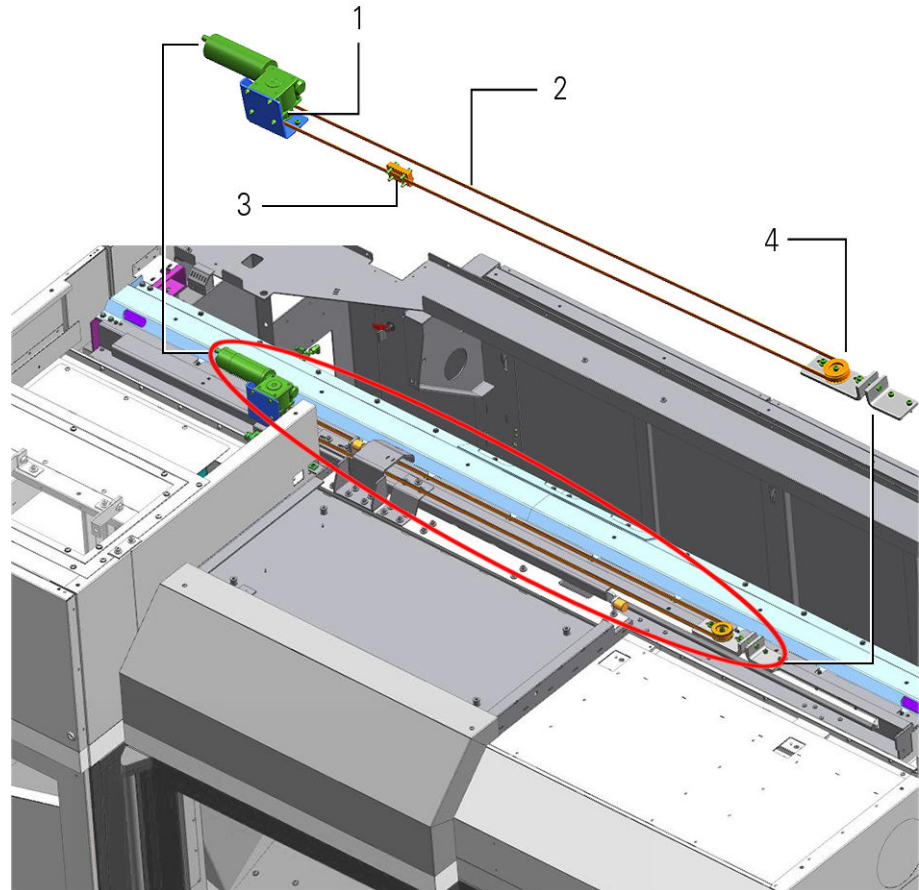
If the obstacle detection does not immediately lead to reversal of the moving direction, the complete work area door must be checked immediately. **The machine must not be operated any further.**

8.



Be sure to contact the **INDEX** service department or an **INDEX** representative.

9.



Example: Automatic work area door 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).

CL080 - 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.



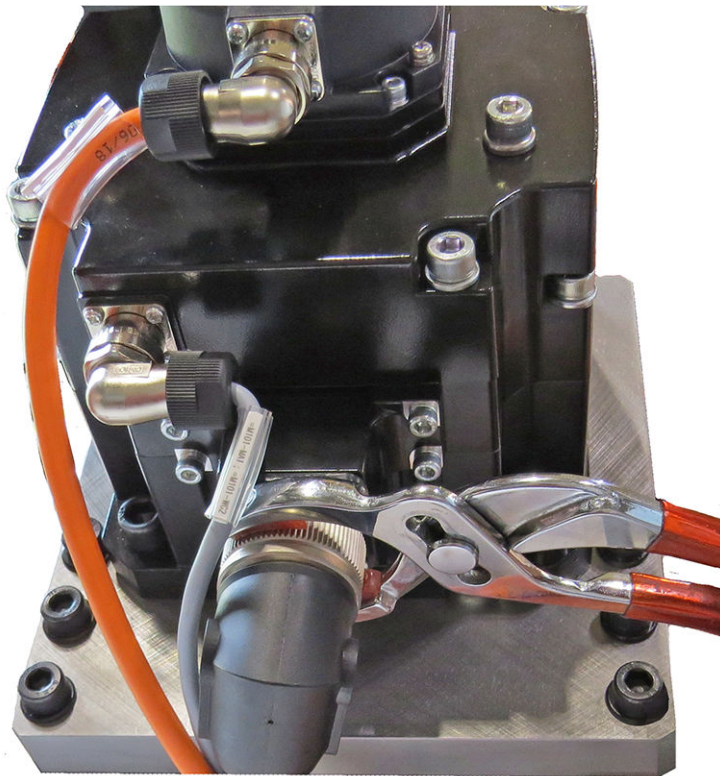
Example: Special pliers for tightening power and encoder connections on the motors

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 wear.

CL140 - 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 glass(es) (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.

CL160 - Checking the guidance and support elements as well as the slidable lattice grate of the telescopic cover

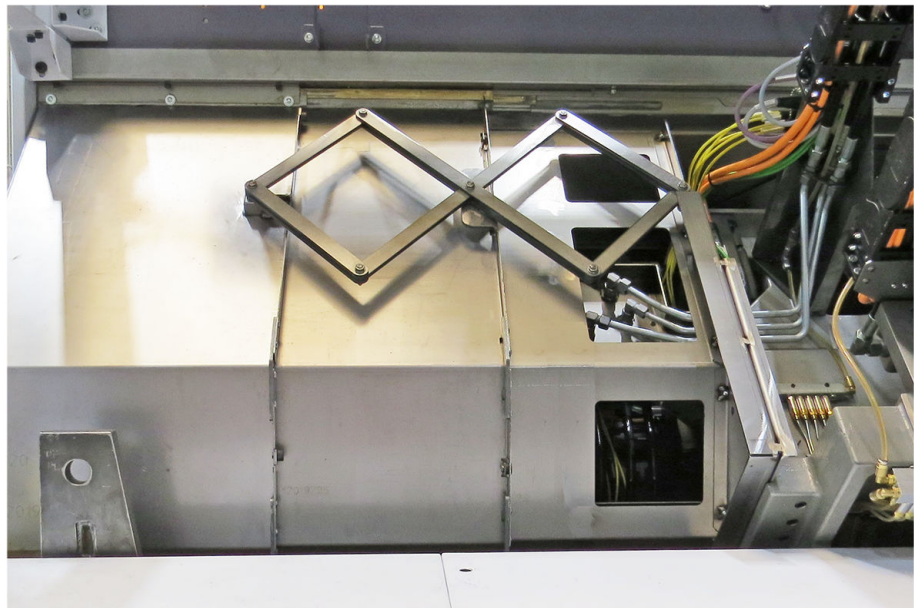
Orientation

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.

CL500 - Perform data backup

Orientation

Using a current data backup, the machine can be restored to the original state before the failure after a defect of the internal storage device/NC control.

The file name of the data backup includes the machine type, machine number, and date/time of the backup.



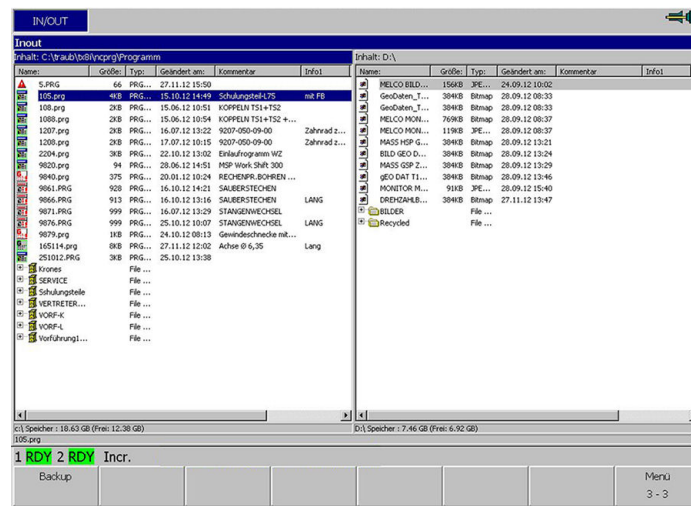
Network settings and the customer's NC programs are not included in the backup.

Backup additionally to an external data carrier for access in case of a defect of the internal storage medium.

Procedure

1. Connect USB device to USB port

- 2.



Example shown

IN/OUT screen and use **TAB** to activate the right part of the screen

3. **Softkey** Press **Select** (F3) (select appropriate target, e.g., USB)
4. **Softkey** Press **Menu** (F8) twice. Softkey text "Menu 3-3" appears
- 5.



Note that the backup includes no customer NC programs! Include them in a separate backup, if necessary

Softkey **Backup** (F1) and press **Softkey** **OK** (F1) to acknowledge the informational message

All relevant parameters and data for the backup are compiled

6. Press **Softkey** **OK** (F1) to confirm the transfer of the data to the desired storage location

CL520 - 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 (option) 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 the screws of drives, terminals, control modules, connectors, bus, device bus and intermediate circuit bus for tightness.

3.



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

If necessary, check settings on the air conditioning unit(s).

4. Clean suction port(s).

5. Check condensate drain.

6. Check door seals.

CL540 - 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!

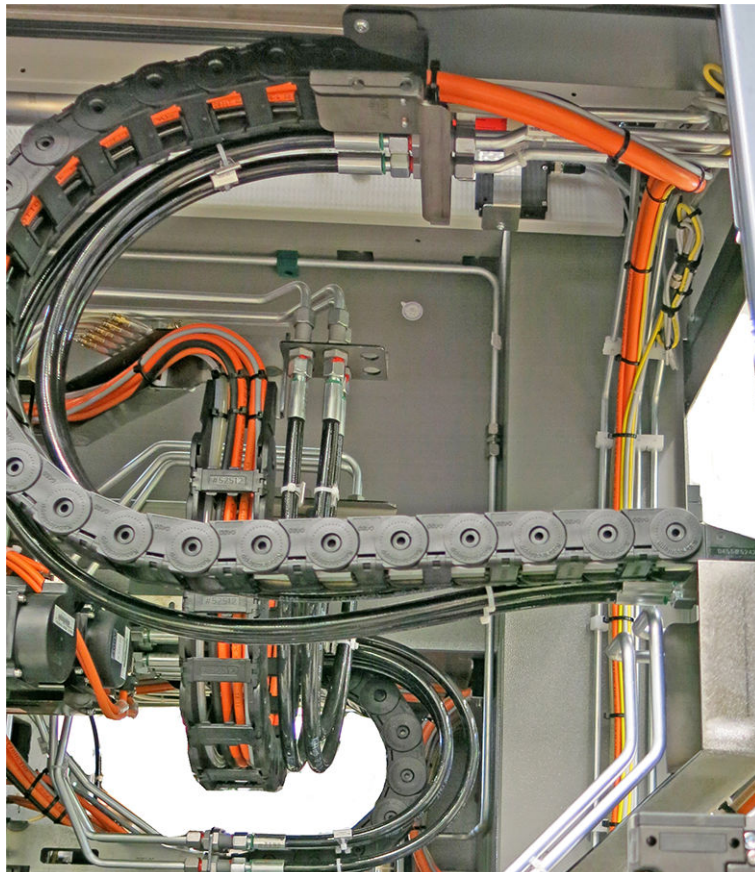
Orientation

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.
- 3.



Example: Energy guide TNL32

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 DTE065EN - 26.10.2022.

- DL010** - Cleaning of the machine
- DL017** - Clean spring steel wiper in the area of the work area door
- DL020** - Check the pressure accumulator
- DL047** - Check the lubrication system
- DL063** - Check the pneumatic system
- DL085** - Check main and counter spindles
- DL175** - Check the system for reconditioning the cooling lubricant
- DL180** - Check fire protection system (visual inspection)
- DL226** - Replace belts and check belt tension
- DL400** - Replacing hydraulic fluid
- DL510** - Perform data backup
- DL520** - Check control cabinet and cable assemblies (visual inspection)
- DL550** - Check air conditioners in the control cabinet
- DL590** - Check inspection/replacement date of the backup batteries in the control cabinet (NC)
- DL636** - Check the replacement interval of the servo backup batteries at the axis servos.

DL010 - 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. Chip accumulation particularly in 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 drive 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 base. 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.

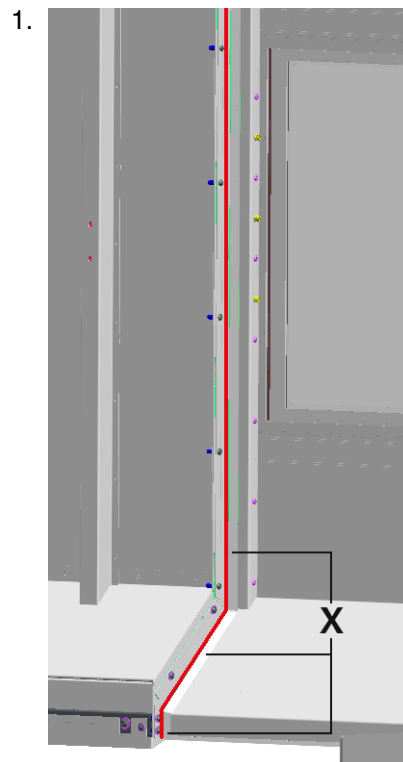
11. Clean the collecting tray under the workpiece handling unit.

DL017 - Clean spring steel wiper in the area of the work area door

Orientation

For ensure trouble-free operation of the work area 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



Example: Spring steel wipers

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



Example: 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. For assembly, follow the steps in reverse order. Ensure proper cleanliness during the installation.
4. 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.

DL020 - 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.**

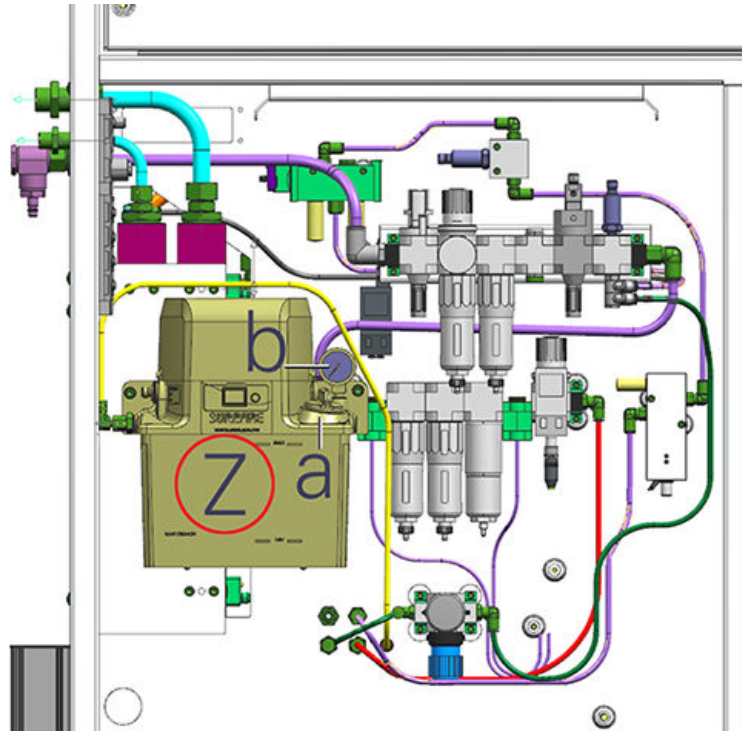
DL047 - Check the lubrication system

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 TNA400.2 TNA500.2

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.

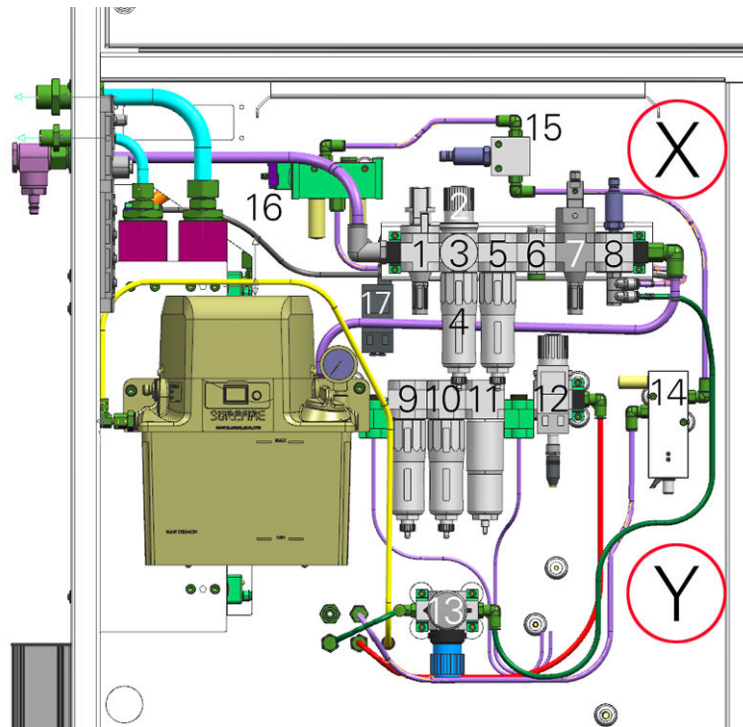
2. Check lubrication pressure (**pressure gauge >20 bar**) and related sensors.
3. Activate lubrication pulse in the control ten times.
4. Monitor the area around the lubricating oil distributor for leakage.
5. Check oil level in lubricating oil tank, replenish if necessary.

DL063 - 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.
- Drain condensate (not applicable to auto-drain).



Example: Pneumatic maintenance unit TNA400.2 TNA500.2 (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 filter fineness 40 µm with automatic condensate drain
- 5. Filter insert with filter fineness 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" sealing air**
- 9. Microfilter insert with filter fineness 1 µm with automatic condensate drain
- 10. Filter insert with filter fineness 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.

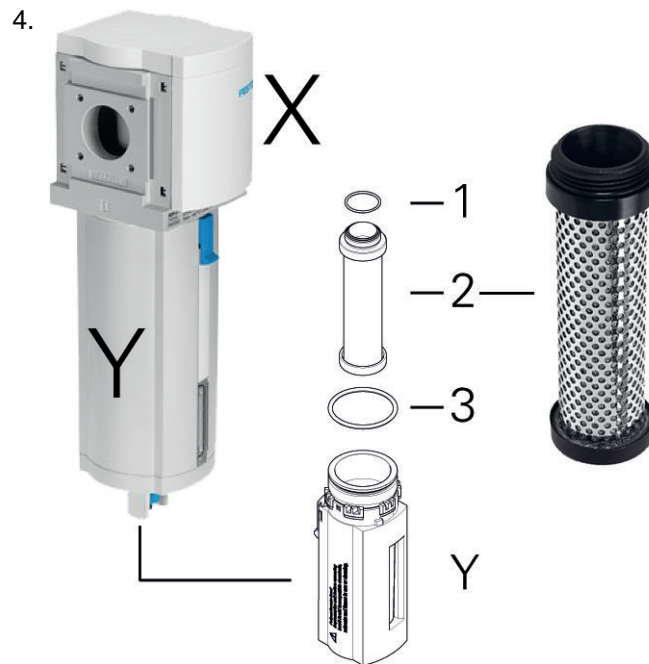
Requirement



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

Procedure

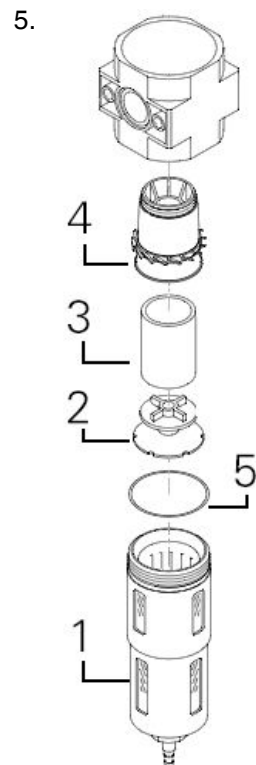
1. Check pressure setting on pressure gauge and adjust if necessary. An operating pressure of 6 bar has been set at the factory.
2. Check supply and fluid lines (damage and leakage). Supply and fluid lines must be checked for damage. Pre-damage such as kinks or abrasions should be logged and replacement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

Replace fine filter or microfilter. **When removing the filter bowl, be sure to include the O-ring (5), separating disk (2), and filter receptacle (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.

DL085 - 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

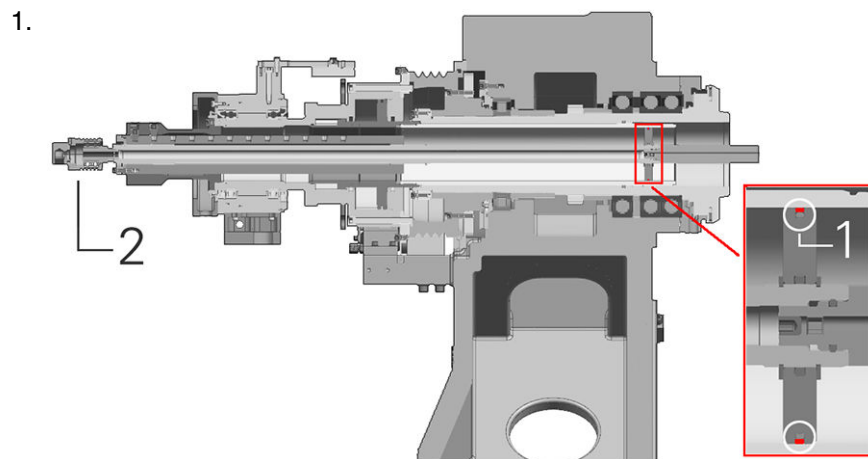
During this maintenance activity, various components in the area of the spindles are checked for leaks on the one hand and for the general condition of the power and encoder connections on the other.

Requirement

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

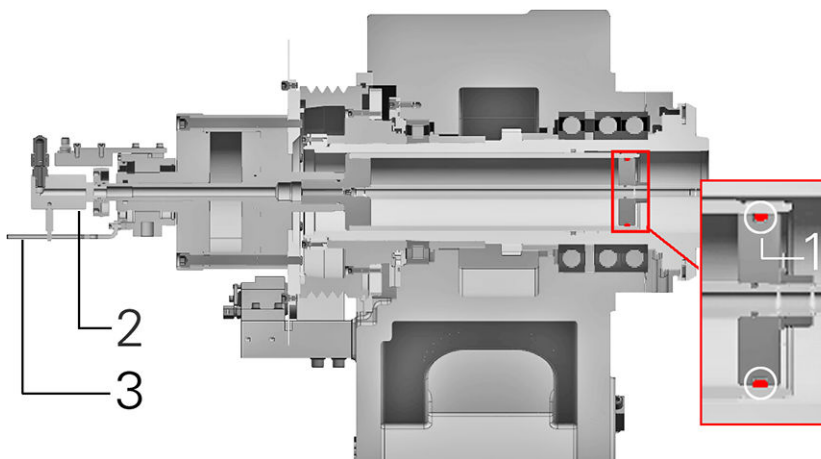
1. Sealing rings or O-rings
2. Supply or fluid lines as necessary

Procedure



Example: Variant for depth stop/flushing unit

- 1 O-ring
- 2 Rotary feeder



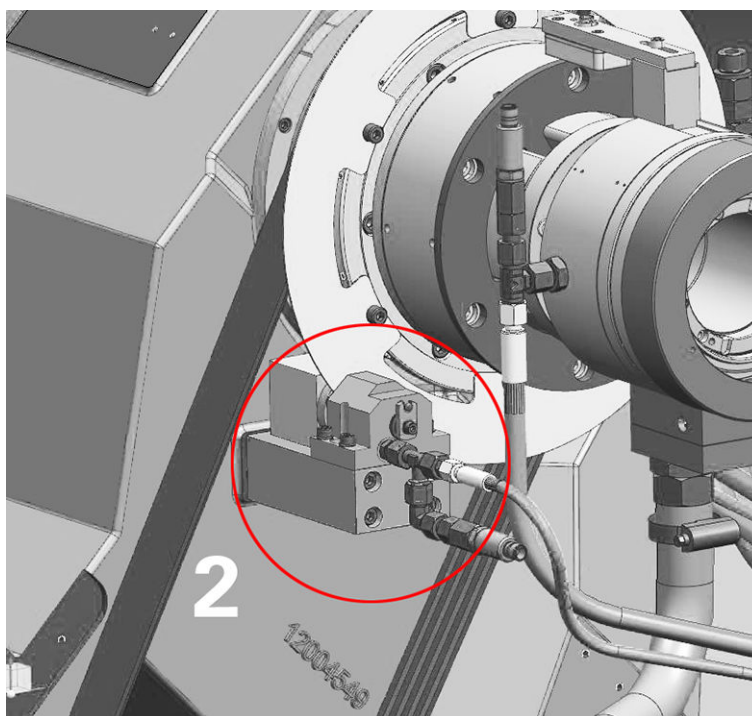
Example: Variant for depth stop/flushing unit

- 1 O-ring
- 2 Rotary feeder
- 3 Anti-twist lock

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

2. Tightness of the solid or hollow clamping cylinder.

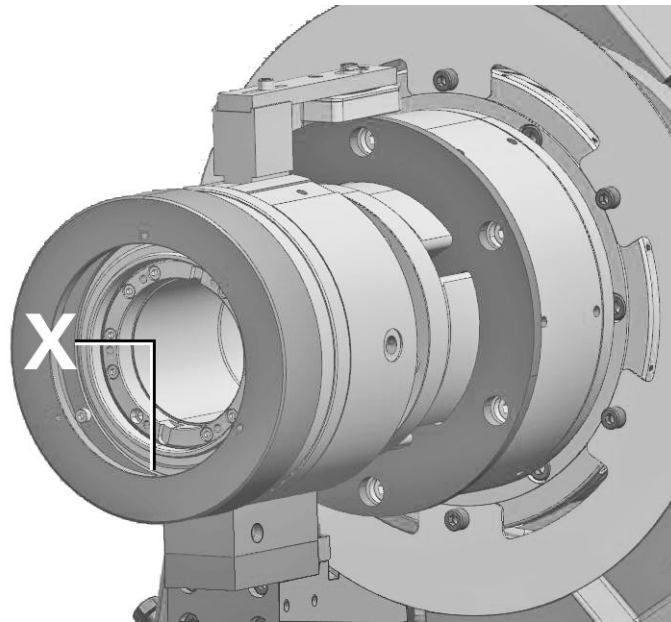
3.



Example: Holding brake (X) TNA400.2 TNA500.2

Check the tightness of the holding brake (2).

4.



Example: Cooling lubricant outlet 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.

DL175 - 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.

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.

DL180 - Check fire protection system (visual inspection)

Orientation



An examination of a fire protection system may only be conducted directly by the manufacturer or a person with written authorization by the manufacturer.

Be sure to read the operating instructions of the manufacturer!

Procedure

1.



Example: Kraft and Bauer stickers

- Check sticker for manufacturing date.
2. Check sticker for inspection date.
3. Check sticker for battery replacement.

DL226 - 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.

TNA400.2			X1	Z1	Y1	A8	A11	
	30 mm	Hz			63			
	52 mm	Hz				76		
	77 mm	Hz					86	

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.

DL400 - 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.

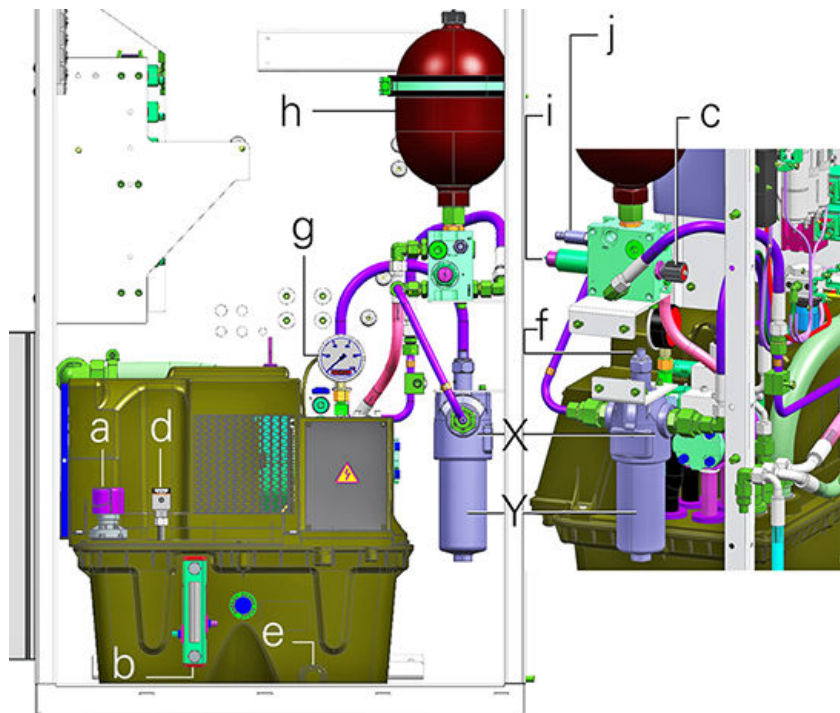
Procedure

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 TNA400.2 TNA500.2


- 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 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.

DL510 - Perform data backup

Orientation

Using a current data backup, the machine can be restored to the original state before the failure after a defect of the internal storage device/NC control.

The file name of the data backup includes the machine type, machine number, and date/time of the backup.



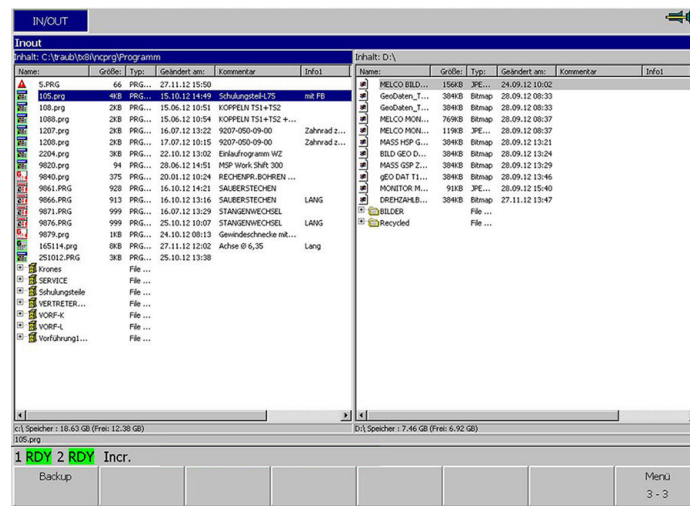
Network settings and the customer's NC programs are not included in the backup.

Backup additionally to an external data carrier for access in case of a defect of the internal storage medium.

Procedure

1. Connect USB device to USB port

- 2.



Example shown

IN/OUT screen and use **TAB** to activate the right part of the screen

3. **Softkey** Press **Select** (F3) (select appropriate target, e.g., USB)
4. **Softkey** Press **Menu** (F8) twice. Softkey text "Menu 3-3" appears
- 5.



Note that the backup includes no customer NC programs! Include them in a separate backup, if necessary

Softkey **Backup** (F1) and press **Softkey** **OK** (F1) to acknowledge the informational message

All relevant parameters and data for the backup are compiled

6. Press **Softkey** **OK** (F1) to confirm the transfer of the data to the desired storage location

DL520 - 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 base and the machine bed.
9. Check all connections in the control cabinet, tighten loose connections

10.

**Danger from electricity**

The charge lamp should be off (must not illuminate).
Measure the voltage at the power rails to ensure they are de-energized.

Remove the covers from the power rails of the amplifiers and retighten all connections. Then reinstall the covers.

11. Check cable assemblies for damage, replace if necessary.

DL550 - 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.

DL590 - Check inspection/replacement date of the backup batteries in the control cabinet (NC)

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 ensure that no important machine data is lost in the event of a power failure, backup batteries or rechargeable batteries are installed at various points of the machine, which must be regularly tested and/or replaced. The backup batteries described here have a lifespan of 4 years after which they must be replaced promptly.



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

Requirement

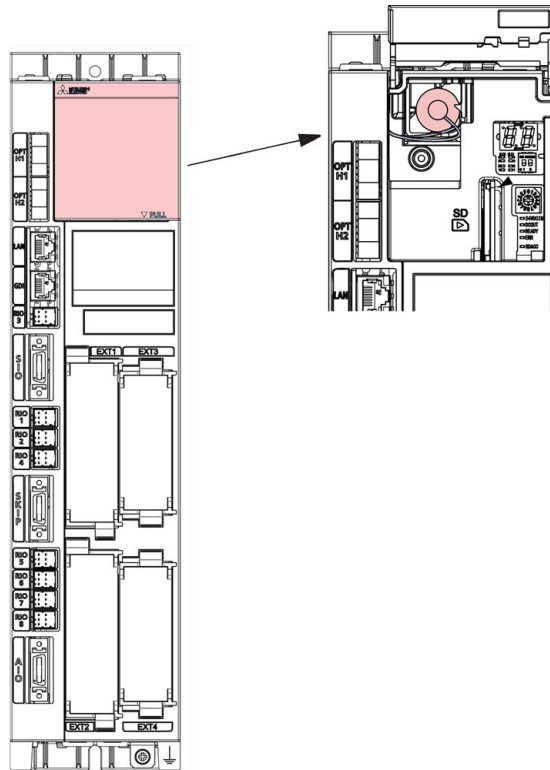
Prior to this maintenance activity, make sure that you have a sufficient number of batteries or rechargeable batteries available.

The required number of backup batteries varies depending on the extensions of the machine. The number of required backup batteries can be found in the electrical diagrams of the machine or obtained from the customer service of the machine manufacturer.

Procedure

1. Switch off drives.
2. Press the emergency stop button.

3.



NC backup battery in the control cabinet

Open the battery compartment cover.

4. Remove the battery including connectors.
5. Insert a new battery and plug in the connectors.

6.



Example of the data to be logged in a maintenance schedule.

- approved/replaced on:
- Name:
- Signature:

Record testing or replacement date in a maintenance schedule.

7. Record testing or replacement date of NC backup battery in the control cabinet.
8. Close covers.

DL636 - Check the replacement interval of the servo backup batteries at the axis servos.

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 ensure that no important machine data is lost in the event of a power failure, backup batteries or rechargeable batteries are installed at various points of the machine, which must be regularly tested and/or replaced. The axis servo backup batteries described here have a lifespan of 4 years after which they must be replaced promptly.



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

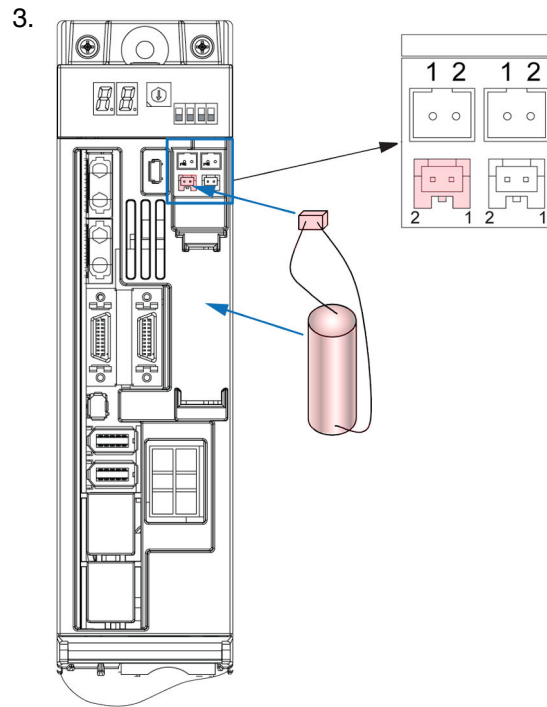
Requirement

Prior to this maintenance activity, make sure that you have a sufficient number of batteries or rechargeable batteries available.

The number of axis servos and thus the required number of backup batteries vary depending on the extensions of the machine. The number of required backup batteries can be found in the electrical diagrams of the machine or obtained from the customer service of the machine manufacturer.

Procedure

1. Switch on the NC.
2. Press the emergency stop button.



Servo backup battery in the control cabinet

Disconnect and remove the servo backup battery.

4. Connect a new servo backup battery and insert it into the axis servo.

- 5.
- i** Example of the data to be logged in a maintenance schedule.

 - Axis servo:
 - approved/replaced on:
 - Name:
 - Signature:

Record testing or replacement date in a maintenance schedule.

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 DTE065EN - 26.10.2022.

- IL010** - Replacing the pneumatically pilot- controlled cooling lubricant valves
- IL020** - Replace the pressure accumulator

IL010 - Replacing the pneumatically pilot- controlled cooling lubricant valves

Orientation

In the course of the machine's operating time, internal wear of the pneumatically pilot-controlled cooling lubricant valves may occur, with the result that cooling lubricant may penetrate the pneumatic control lines. To avoid consequential damage, **INDEX** recommends replacing these valves after 5 years.

Requirement



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



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

Procedure

1. Renew valves.

IL020 - 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 guidelines 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 DTE065EN - 26.10.2022.

JL005 - Note on replacing the window pane or removing the design pane

JL020 - Replace the window pane

JL005 - Note on replacing the window pane or removing the design pane



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



The instructions described in this point only serve as information for the subsequent maintenance activity “**replace window pane**” of the respective machines.

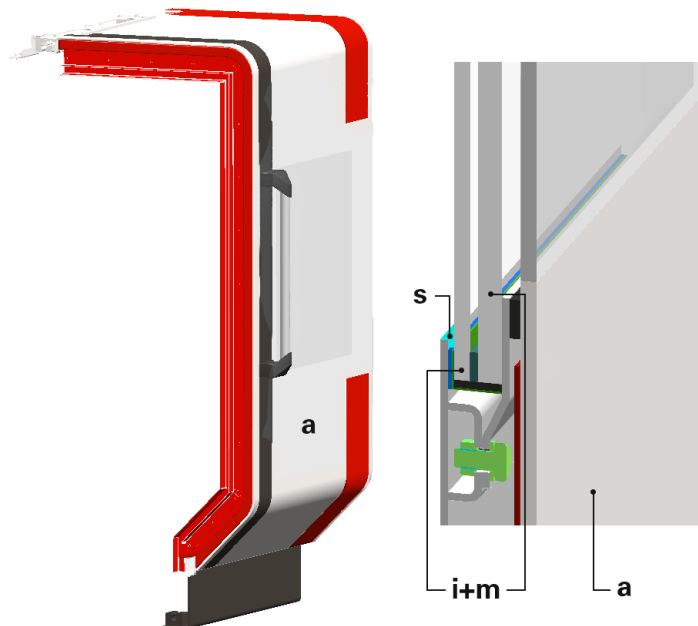


If the window pane is damaged, it must be replaced. This is necessary regardless of the extent of damage. Even with minimal damage, the impact resistance of the pane can no longer be guaranteed.



For safety reasons, it is recommended to obtain the window pane directly from the machine manufacturer or its country representative.

The window pane 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 window pane. The polycarbonate panes are subject to natural aging and must be replaced at regular intervals.



Example: TNA400.2 Work area door


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

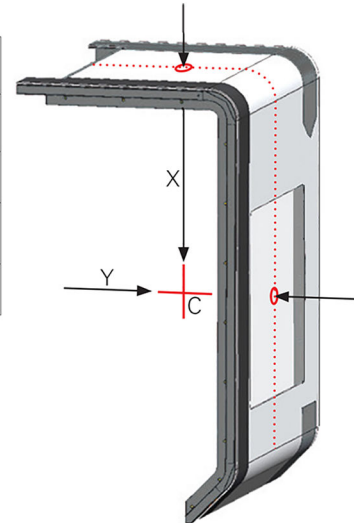
Depending on the machine type, it may be necessary to remove a handle attached here before dismantling the design disks.

Requirement



General information. **The values indicated in the table must be strictly observed.**

A		B	C	
			X	Y
TNL20	-	46	617	110,5
TNA400.2 TNA500.2	+	67	603	48
TNX220.3	+	91,5	707	166



Example: Design pane specifications for the respective machines

- A** Machine designation
- B** Weight (kg)
- C** Values for centers of gravity
- Y** Y-value (mm)
- X** X-value (mm)



From a weight of approx. 80kg, the use of lifting equipment (cranes, forklifts or similar) is recommended. The machines marked with + in the table (**example: design pane specifications...**) have threaded bushings at the top of the design pane and are therefore crane-compatible.

If the design pane is not removed using a crane or other lifting equipment but by hand using suction lifters, it is imperative that the current **Load Handling Ordinance (LasthandhabV)** be taken into account. When using suction lifters (see example), be sure to select the appropriate size or type according to the table (**example: design pane specifications...**).



The locally valid guide lines and regulations must be taken into consideration.



60kg



100kg

Example: Bohle suction lifter 60 kg-100 kg

Procedure

1. If you have questions, be sure to contact the **INDEX** service department or an **INDEX** representative.

JL020 - Replace the window pane

Orientation



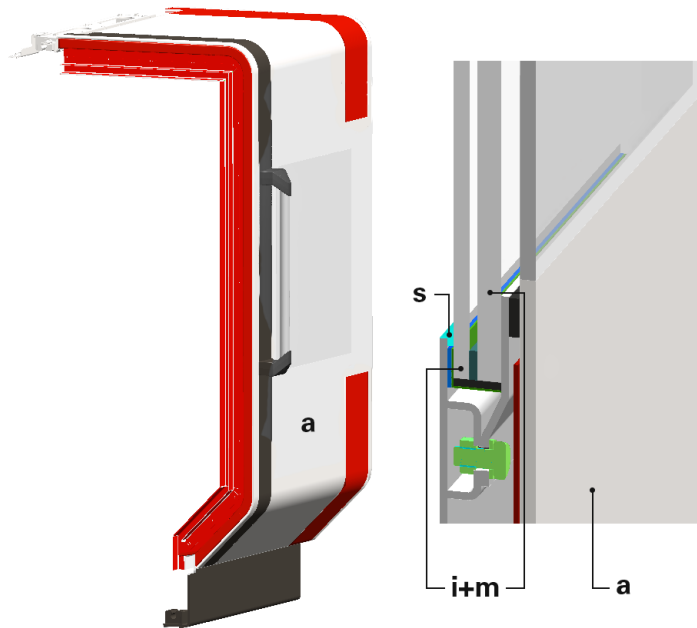
If the window pane is damaged, it must be replaced. This is necessary regardless of the extent of damage. Even with minimal damage, the impact resistance of the glass can no longer be guaranteed.



For safety reasons, it is recommended to obtain the window pane directly from the machine manufacturer.

The window pane 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 window pane. The polycarbonate pane is subject to natural aging and must therefore be replaced at regular intervals.

After replacing the inner window pane and after the installation work is complete, it 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.**



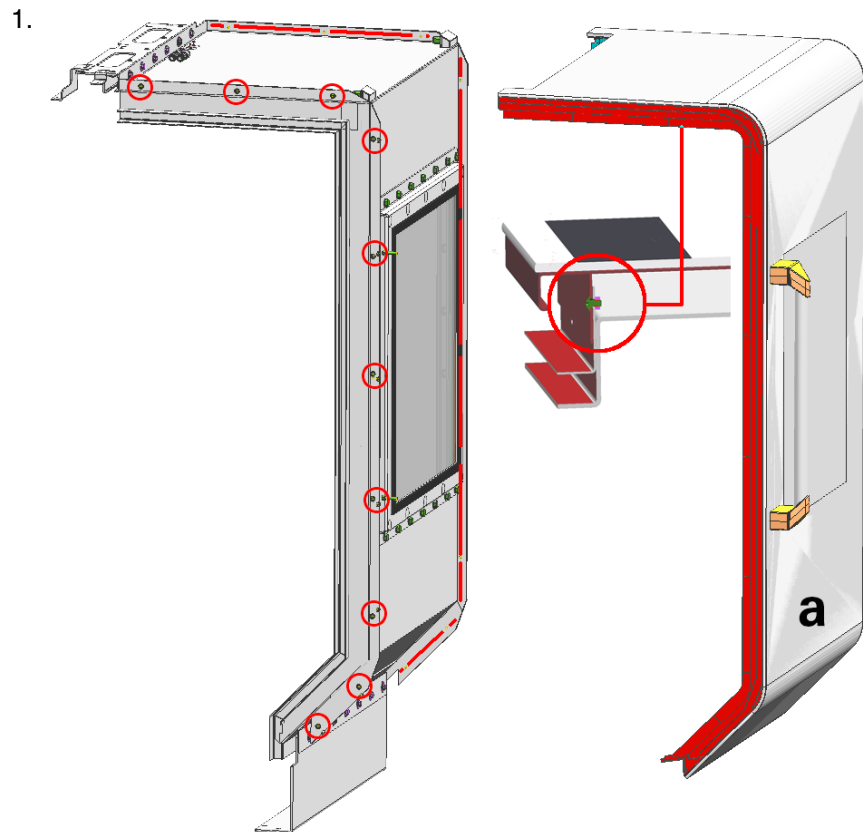
Example: TNA400.2 TNA500.2 work area door 01

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



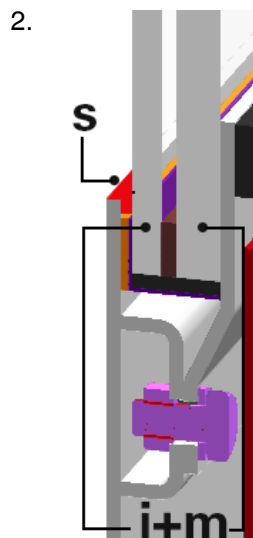
If sealing compounds from other manufacturers are used, their equivalence must be guaranteed by the supplier or manufacturer in writing.

Procedure



Example: TNA400.2 TNA500.2 work area door 03

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.



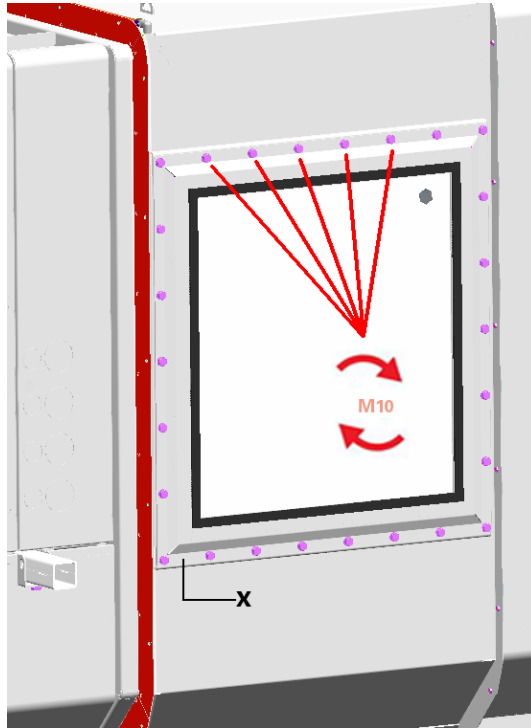
Example: TNA400.2 TNA500.2 work area door 06

Cut the silicone sealing (**S**) on the inside of the window pane (see Fig. 06) using a suitable knife.

3.



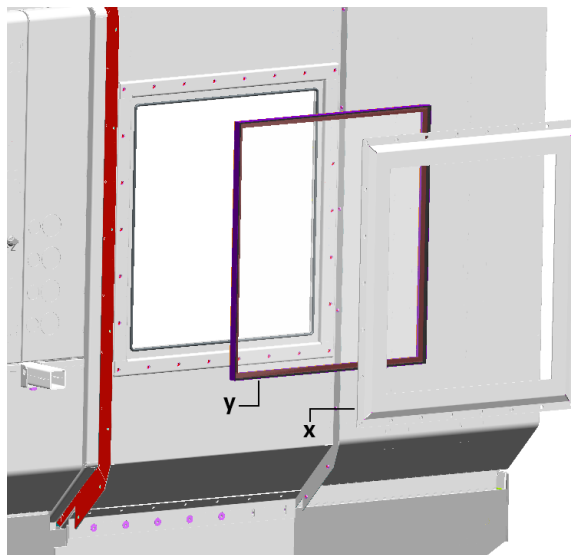
Assistance of a second person to hold the glass is recommended for the activity below. This generally also applies to the installation of the new pane, in particular when sealing and fastening the clamping frame with screws.



Example: TNA400.2 TNA500.2 work area door 07

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

4.



Example: TNA400.2 TNA500.2 work area door 04

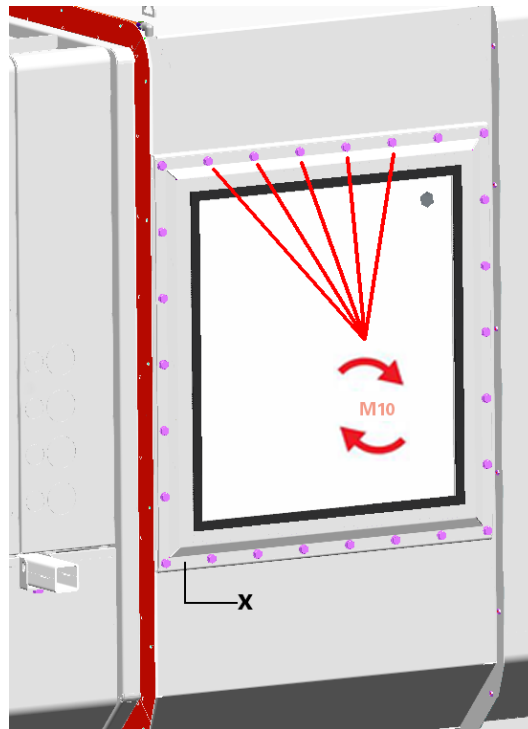
Remove the clamping frame (x) and glass package (y). (See Fig._04)

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

6.



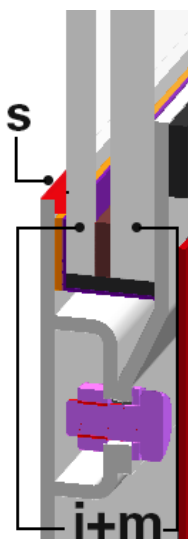
Make sure of cleanliness and stress-free installation when mounting the clamping frame into the work area door.



Example: TNA400.2 TNA500.2 work area door 07

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

7.



Example: TNA400.2 TNA500.2 work area door 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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